Activities

The following activities will help your students understand concepts and issues relating to forests, as well as increase your students' awareness about their roles in local and global forest conservation issues. The layout for each activity is organized in the following manner:

Title of the Activity

Objectives

Background information relevant to the major concepts of the activity. Some activities link back to one or more corresponding background information sections.

Materials needed for the activity
Preparation to be done before the lesson
Detailed, step-by-step instructions of the activity

If a certain part of an activity addresses a specific component or components under one of the Essential Learnings, the component(s) will be listed in the accompanying text box. For example, if one section of an activity targets the third component under Essential Learning 2 in the core subject of mathematics, Math 2.3 would be listed after that section of the activity. Refer to your copy of the Washington State Essential Academic Learning Requirements for listings of the Essential Learnings and components. The EALRs can be accessed at http://www.k12.wa.us/curriculuminstruct/ealrs.asp. Each activity is also aligned with the Environmental Education Guidelines for Washington Schools (http://www.k12.wa.us/CurriculumInstruct/EnvironmentSustainability/pubdocs/EEGuidelines2000.pdf) and the North American Association for Environmental Education Guidelines for Learning http://www.naaee.org/npeee/learner_guidelines.php.

Synopsis of activity

Grade Level Expectations (GLEs) for second grade in the following core subjects:

A = arts, crafts, drama, dance, music
C = communication
E = social studies - economics
G = social studies - geography
H = social studies - history
M = math
R = reading
S = science
V = social studies (civics)
W = writing

Environmental Education Guidelines (EEGs) for Washington schools

North American Association for Environmental Education (NAAEE) Guidelines for Learning

Assessment

We have included two activities, "Forest Story Circle" (page 71) and "Drawing Forests" (page 71), that can be used as pre- and post-assessment activities. These assessments will assist you in measuring student learning resulting from the information and activities from this packet that you have shared with your students. If you wish to share with us the results of the pre- and post-assessment activities, we welcome the feedback. Send examples of student work to: Education Programs Coordinator, Woodland Park Zoo, 601 N. 59th St., Seattle, WA 98103.

The activities and/or background information in this packet are designed to correspond with the following district science kits or science units, in addition to units on forests.

- **Birds**
- **Cycles**
- **Habitats**
- **Insects**
- **Life Cycle of Butterflies**
- **Migration**
- **Organisms**
- **Pebbles, Sand, Silt**
- **Plant Growth and Development**
- **Plants**
- **Soils**
- **Weather**

Before You Begin Exploring Forests

Forest Explorers Notebook

One effective way to assess the impact of the Forest Explorers program is to have each student keep a notebook that can hold all of their assignments and that can act as a journal in which to record observations in nature and/or on their field trip to Woodland Park Zoo. Students can either bring in a notebook or journal from home or you can have them make one out of scrap paper.

What is Soil?

Forest Explorers is designed to complement several science kits, including the NSRC/STC Soils science kit curriculum adopted by the Seattle School District as part of the NSF science program. The activities on pages 56 through 60 can be done as a supplement to that science kit or, if your school doesn't use the Soils science kit, as a basic introduction to soil.

What is a Tree?

Before starting a unit on forests, it might be helpful for your students to have a lesson on trees. The activities on pages 61 through 70 introduce students to tree types, life cycles, characteristics, structure and photosynthesis.

Key Concepts for Your Forest Explorers Field Trip

In order to provide students with a broad range of learning opportunities and to satisfy a variety of Essential Academic Learning Requirements (EALRs), we strongly recommend that you choose two to three activities from each section. Before your Forest Explorers field trip, we recommend the following activities to give students a good knowledge base on which the Forest Explorers field trip will build.

- Pre-assessment Activities—page 71
- Mapping Temperate and Tropical Forests—page 72
- Forest Layers—page 74
- Graphing Forest Temperature and Rainfall—page 79
- Needs vs. Wants—page 91
- Create a Habitat—page 92 or Habitat for Rent—page 93
- Beneficial Forests—page 111
- Forest Products—page 112
- Hands-on Conservation Projects—page 120

What is Soil?

Soil Investigation

In this activity, students will understand the basic components of soil.

Soil is made up of clay, silt and sand particles mixed with organic matter. Organic matter, or humus (hyoo·mus), is created when plant and animal remains break down or decompose. During this process, nutrients are released into the soil for living plants to use.

Materials:

- shovel
- four plastic grocery bags
- newspaper
- large, clear bowl or tub

Preparation: Somewhere on school grounds or in your backyard, find an area under vegetation with a good layer of leaf litter. Fill a plastic grocery bag with undecomposed leaves. Next, scrape off the dark, moist, humus layer (decomposed organic matter) into another plastic bag. Then, dig down below the humus to the broken up parent material (the sand, silt and clay) and fill another plastic bag. Finally, if possible, dig down below the sand, silt and clay to the bedrock and dig up a good sized rock. If this is not possible, find a large rock from your schoolyard or backyard. Note: You may want to check with your school maintenance staff before digging a hole on school grounds.

1. Ask your students if they know what soil is. Most will say dirt. Tell them that when most people think of dirt, they think of what you get on your clothes. Soil, however, is alive and is crucial for people, animals and plants to survive. Tell your students that they're going to make soil.

2. Place the newspaper on a table in the front of the room and place the big, clear bowl on top of it. Call four volunteers up to the front of the class. Hand one of them the bedrock, one of them the bag of broken up parent material, one of them the bag of humus and one of them the bag of leaf litter. Then, have the rest of the class gather around the table to watch.

Synopsis: Students create soil layers from the bottom layer up

GLEs: S 1.1.1, S 1.3.4

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 1: F; Strand 2.1: A, B; Strand 2.2: C, D

3. Tell your students that soil starts with rock, which gets broken down into smaller pieces. Have the student with the rock attempt to break it into smaller pieces. Reassure the student that it takes millions of years for rocks to break down and have them put the rock in the bottom of the clear bowl. Allow the other students to touch the rock if they like.

4. Tell your students that when the rock breaks down, it forms different size particles. The smallest particles are clay; the next largest particles are silt; the largest particles are sand. Have the student with the bag of the broken up parent material add the sand, silt and clay to the clear bowl. Allow the other students to touch the broken up parent material.

5. Ask your students what would happen if they left an apple core under their bed for a month. Most will say it will rot. Tell them that the same thing happens when plants die in the forest. Only instead of saying rot, we say the plant decomposes. The decomposed plant material is called humus (not hummus, a Mediterranean spread made of chickpeas!) and it has lots of nutrients in it that plants need. If your students don't know what nutrients are, tell them they're like vitamins for plants. Have the student add the humus to the clear bowl and allow the other students to feel it.

6. Finally, have the student with the leaves add the leaf litter to the bowl. Tell your students that eventually these leaves will look like the humus. If possible, find a place in or near your classroom to place the clear bowl so that you and your students can watch the decomposition process. If desired, add more leaves as the existing ones decompose. When finished with the Soil Investigation, contents of the clear bowl can be added to a compost bin or returned to area where the soil was dug up.

Pitfall Traps for Bugs

In this activity, students experience leaf litter "bugs" firsthand, classify the "bugs" they find, and learn about the importance of decomposers in soil.

Many "bugs" found in the leaf litter that has been shed by plants of both temperate and tropical rain forests are important decomposers of dead plant and animal matter. Leaf litter, dead animals, feces and skin sheds decay through the interactions of decomposers, which primarily consist of fungi and bacteria but also include worms, sowbugs, millipedes and other arthropods. Through this process, nutrients are released in a form plants can use.

Synopsis: Students trap and observe insects found in leaf litter

GLEs: S 1.1.5, S 1.1.6

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 1: c; Strand 2.2: A, C, D

Materials:

- 12-oz. plastic cup (per trap)
- Vaseline
- stones (four per trap; approximately 1-inch in diameter)
- plywood or other flat piece of wood (approximately 1 square foot; one per trap)
- small shovel
- copies of "What Kind of Bug Have I Found?" key
- camera equipment (optional)

Preparation: Depending on time and the ability of your students, you can set up the pitfall traps using the following instructions and then check them with your students, or you can have your students set up and check the traps. Be sure to set up the pitfall traps 12 to 24 hours before they will be checked. Alternatively, students could set up traps at home and report their findings back to the class. Note: You may want to check with your school maintenance staff before digging holes on school grounds for your traps.

1. Ask your students if they remember what happens to leaf litter. Confirm that it decomposes and ask your students if they remember how decomposing leaves help plants. Remind them that when plants decompose, nutrients (like vitamins) are released into the soil for living plants to use. Ask your students if they think any animals help with this process. Ask them to name animals they think help with decomposition and write their responses on the board. When they name bugs, confirm that bugs are some of the most important decomposers in the world and that they're going to try to find some of these important decomposers.

2. On your school grounds, select locations for pitfall traps, such as in the lawn, in leaf litter under trees, in leaf litter in open space, etc. For each type of location, you may want to place three or more pitfall traps so that you can have duplicate samples in each location. Draw a map of the area and the locations of the pitfall traps, so you can find the traps easily when you need to check them.

3. Using the small shovel, dig holes in which to sink each cup so that the lip of the cup is level with ground surface. Using a finger, coat the top 1⁄2 inch of the inside surface of each cup with Vaseline (this will prevent bugs that fall in from escaping).

4. Using the stones, rest the piece of wood over the top of the cup so that it sits 1⁄2 inch off of ground. This will prevent rain from getting into the cup and will keep larger animals, such as small mammals, from falling into the cup.

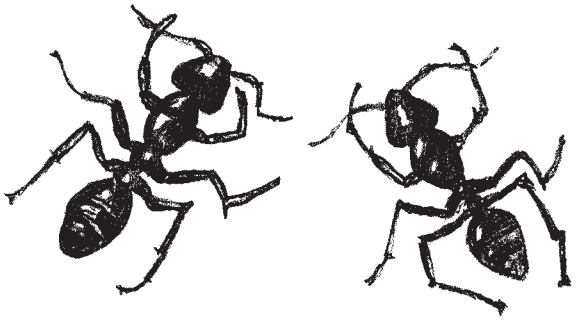
5. Check each cup at least every 24 hours—more often is better. Be sure to remove each cup when the study is completed so that you don't trap arthropods unnecessarily.

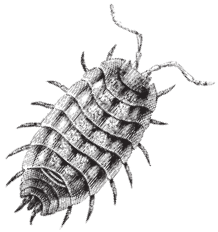
6. Have your students examine the bugs found in the cups each time the cups are checked. Students can draw the types of bugs found and then release them back into their habitats. If camera equipment is available, take photographs of each type of bug.

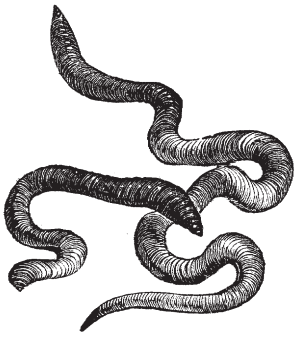
7. Back in the classroom, help your students identify the different bugs found using the "What Kind of Bug Have I Found?" key. Talk about how many of the bugs they found (sowbugs, mites, springtails, earthworms and millipedes, for example) are likely to be decomposers, which feed on the decaying remains of dead plants and animals. Brainstorm

with your class about why decomposers are important (decomposers help release nutrients into the soil for plants to use; decomposers speed up the decomposition process; by speeding up the decomposition process, decomposers are helping to minimize the amount of decaying plants and animals present).

8. Have your students draw any decomposers found in your pitfall traps. They can draw it in its natural environment, and label it with its name and its status as a decomposer. If you were able to keep the bowl of soil and leaf litter outside your classroom, you may want to release the bugs found in the pitfall traps into the bowl to help aid the decomposition process. Or, bugs can be returned to the area they were found.







What Kind of Bug Have I Found?

Worksheet

1a. Six legs.....Go to **#2**

1b. Eight legs.....Arachnidia (spiders, scorpions, mites, ticks)

1c. Two pairs of legs for each body segment.....Diplopoda (millipedes)

1d. One pair of legs for each body segment.....Chilopoda (centipedes)

1e. Five or more pairs of legs.....Crustacea (crayfish, crabs, barnacles, shrimp, sowbugs)

2a. Wings present.....Go to **#3**

2b. No wings.....Go to **#17**

3a. One pair of wings present.....Diptera (flies)

3b. Two pairs of wings present.....Go to **#4**

4a. Front and hind wings dissimilar in structure; front wings leathery or distinctly hard.....Go to **#5**

4b. Front and hind wings similar in structure and membranous, not leathery or hard; wings covered with hairs or colored powdery scales.....Go to **#10**

5a. Mouthparts almost always elongated into a slender beak.....Hemiptera (true bugs, leafhoppers, aphics, scales)

5b. Mouthparts not elongated into a beak, but are a chewing type.....Go to **#6**

6a. Pincher-like appendages at tip of abdomen.....Dermaptera (earwigs)

6b. No pincher at tip of abcomen.....Go to **#7**

7a. Front wings hard, without veins, and meet in a straight line down the middle of the back.....Coleoptera (beetles)

7b. Front wings leathery, veined and either overlap or are held roof-like over the body.....Go to **#8**

8a. Hind legs enlarged for jumping.....Orthoptera (grasshoppers, crickets, katydids, walkingsticks)

8b. Hind legs long and slender for running.....Go to **#9**

9a. Triangular head; short antennae; raptorial front legs.....Mantodea (mantids)

9b. Long antennae, head hidden by a part of the thorax.....Blattaria (cockroaches)

10a. Wings completly or partly covered in scales; mouthparts usually appeear as a coiled tube..... Lepidoptera (butterflies, moths)

10b. Not with the above combination of characteristics.....Go to **#11**

11a. The body and wings are covered with hairs.....Trichoptera (caddisflies)

11b. Does not have the above combination of charcteristics.....Go to **#12**

12a. Front and hind wings longs and similar in length and shape; wings at rest held out to side or above body; abdomen very long and slender.....Odonata (dragonflies, damselflies)

12b. Does not have the above combinations of characteristics.....Go to **#12**

13a. Both pairs of wings are the same length and have a complex network of veins.....Isoptera (termites)

13b. Front wings longer than hind wings.....Go to **#14**

14a. Hind wings very broad; body generally flattened; tip of abdomen usually with two short tails..... Plecoptera (stoneflies)

14b. Hind wings not unusually broad; body not flattened.....Go to **#15**

15a. Front wings longer and with more veins than hind wings; body stout or constricted juncture between thorax and abdomen; needle-like (sting) or saw-like appendage on tip of females abdomen..... Hymenoptera (ants, bees, wasps)

15b. Front and hind wings very similar in size and number of veins; body not stout, no constriction between thorax and abdomen; needle-like or saw-like appendage on tip of abdomen may be greatly enlarged and curved upward.....Go to **#16**

16a. Head extended downward to form a stout beak.....Mecoptera (scorpionflies)

16b. Head does not form a stout beak.....Neuroptera (lacewings, antlions)

17a. Body flattened from the side; or from top to bottom; external parasites.....Go to **#18**

17b. Body generally not flattened; 2 or 3 short to long tails are present at the tip of the abdomen.....Go to **#19**

18a. Body flattened from the side; jumping insects with large legs.....Siphonaptera (fleas)

18b. Body flattened from top to bottom.....Anoplura (sucking lice)

19a. Large eyes and three tails one of which is longer than the others.....Thysanura (silverfish)

19b. Not the above mentioned characteristics.....Collembola (springtails)

What is a Tree?

Tree Charades

In this activity, students will learn about types and characteristics of trees.

Technically speaking, a tree is a perennial, woody plant with a single erect trunk. Most trees have trunks at least 3 inches (7.6 centimeters) in diameter and are taller than 13 feet (4 meters). Trees are either deciduous (plants that drop all of their leaves at one time once a year) or evergreen (plants with green leaves present throughout the year). Two main tree types include broadleaf (a tree with broad, flat leaves) and coniferous (a cone-bearing, needleleaf tree).

Materials:

- Large piece of poster paper or a chalkboard/ whiteboard
- Northwest tree field guide (recommended: *Trees of Seattle* by Arthur Lee Jacobson; *Trees of the Pacific Northwest* by George A. Petrides, Olivia Petrides; *Plants of the Pacific Northwest Coast* by Jim Pojar and Andy MacKinnon. See resources for full bibliography)
- Leaves or drawings (included) of the following broadleaf and evergreen trees: red alder, pacific madrone, western larch, western red cedar, Douglas fir
- Calendar
- Digital or Polaroid camera (optional)

1. Introduce the concept of deciduous and evergreen trees. Ask students if the trees at their house change color in the fall and drop their leaves. Have they ever had to rake them up? Those trees are deciduous. One way to help them remember the term is by saying these trees decide to drop their leaves. Then ask your students if they've seen plants at their house that always have green leaves that don't drop off in the fall. These trees are easy to remember; they're evergreen or always green.

2. Show the leaves from the broadleaf and coniferous trees. Tell your students that broadleafs have big leaves to capture a lot of sun and that coniferous trees have smaller, more compact leaves in the shape of needles. These leaves hold in water during the summer and heat during the winter.

Synopsis: Students learn the difference between coniferous and broadleaf trees, and deciduous and evergreen trees. Students also adopt a tree to observe all year.

GLEs: S S 1.1.6

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 1: E; Strand 2.2: A

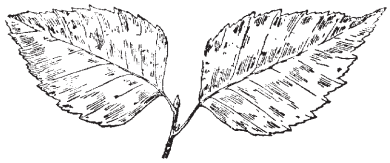
3. Draw on the board or the poster paper (make each blank box at least 1'x1'):

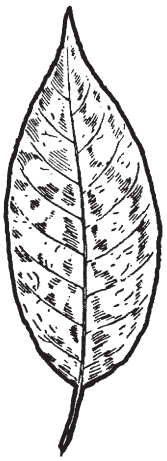
	Deciduous	Evergreen
Broadleaf	Red alder	Pacific madrone
Coniferous	Western larch	Western red cedar Douglas Fir

4. Call six students up to the front of the class for tree charades. Give each students one of the leaves or drawing of leaves. Give the sixth student a calendar open to spring. Have the students with broadleaf leaves (red alder and pacific madrone) stand on one side and the coniferous students (western larch, western red cedar and Douglas fir) stand on the other. Have your students point to the broadleaf trees. Then have them point to the coniferous trees. Now, have your students point to the deciduous trees. Most will point to the broadleaf trees. Tell them that most broadleaf trees are deciduous, such as red alder, but some, like pacific madrone, are evergreen. Now have them point to the evergreen trees. Most will point to the coniferous trees. Tell them that most conifers, like western red cedar and Douglas fir, are evergreen, but some, like western larch, are deciduous.

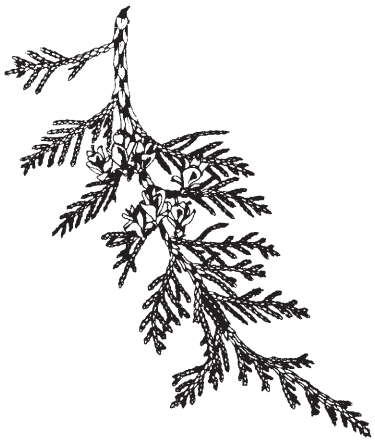
5. Tell them we're going to figure out which trees are which. Have the student with the calendar start turning pages. For each month, ask students about that month such as what the weather's like, what humans would be wearing, how long the days are, what animals they might be seeing, etc. When the calendar starts getting to fall, have the student

with the red alder leaf drop their leaves. Using the chart, have the students call out what tree is it. Tape a red alder leaf to the chart next to where you wrote red alder. Have the student with the western larch leaves start dropping their leaves and have the students identify it. Tape a western larch leaf to the chart next to where you wrote western larch. When the student with the calendar gets to winter, have all five students freeze. What broadleaf tree still has its leaves? Tape a pacific madrone leaf to the chart next to where you wrote pacific madrone. What conifer trees still have their leaves? Tape the western red cedar and Douglas fir leaves on the chart.





6. Go out to an area of your schoolyard that has several trees. Have the students identify which trees are broadleafs and which are coniferous. Have each student "adopt" a tree (it is okay if the same tree is adopted by more than one student). Tell them that that is their tree that they are going to watch all year. If possible, take a digital or Polaroid photo of each student's tree. In their Forest Explorers notebook, have them draw a picture of their tree, describe its texture and coloration and collect any leaves that are on the ground. They should also write the date on the picture. Let them name the tree, but also bring along a field guide to identify each student's tree. If there are leaves on the ground, have each student collect a leaf from their tree.



7. Back in the classroom, have each student figure out whether their tree is broadleaf or coniferous and evergreen or deciduous. Have them tape their leaf (or a drawing of their tree) in the appropriate box on the board or poster paper. When finished with the leaves, return them to where they were found or added to a compost bin, but make sure there's no tape still attached.

8. Visit the tree again in the winter and in the spring to take pictures and to have the students make more journal entries. Have students compare their tree in fall with their tree in the winter and the spring.

Tree Life Cycle

In this activity, students will learn about the parts of a cone and then observe the growth process of an avocado seed.

Like all plants, a tree begins from a seed. A seed must have food, water and light to grow. Once the seed germinates, it grows into a seedling, which grows into a sapling and eventually saplings grow into trees that produce their own seeds. The trunk of a tree, which is protected by a tough outer covering of bark, connects the roots to the branches and transports water and minerals from the soil to the rest of the tree. The trunk supports the tree and as it grows taller than the plants around it, it is able to reach more sunlight, which is essential for growth. ***Note:*** *your students may have Plant Growth and Development in 3rd grade, where they will learn about pollination and germination more in-depth.*

Materials:

- Several different types of cones, at least one per student. Note: this activity can also be done in an outdoor area where there are a lot of cones and students can choose their own cone.
- Avocado
- Jar
- Toothpicks

1. Hand out one cone to each student. Tell your students that conifers (like the western larch, western red cedar and Douglas fir they learned about) produce cones. Cones are where new conifer trees come from. Hand out a cone to each student. Have them draw their cone in their journal.

2. Hold up a cone and point out its scales. Have them find a scale on their cone and label it on their drawing. Tell them that the seeds form inside the cone. If possible, have them pull off a scale and draw it. Tell them that in many conifers, the seeds are attached to the scales, which act as a wing when the seed is ready to be dispersed or carried away from the parent plant. Have them continue to take apart their cone and draw the insides. When finished with the cones, they can be scattered where you found them or added to a compost bin.

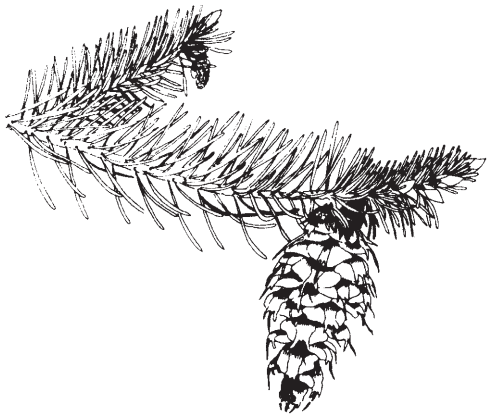
Synopsis: Students examine, draw and label cones. Students also observe an avocado growing in a jar of water.

GLEs: S 1.1.6, S 1.2.6, S 1.2.7,

EEGs: Goal 1, Objective A

3. Tell your students that the cones may or may not have seeds ready for planting, but that they're going to plant another type of seed. Tell them that seeds come in many shapes and sizes. Remove the pit from the avocado and show it to your students, explaining that avocado normally grows in tropical areas. (You may want to allow the students to taste the fruit). Poke three toothpicks into the avocado about 1/3 the way down from the pointed end. Suspend the pit in a jar of water submerging 1/3-1/2 of the pit with the pointed end up. Place the jar and pit in a sunny location. Make sure to keep the water level high enough to cover the bottom of the pit.

4. Your avocado tree should sprout in about three weeks. Students can observe the pit each day and record observations they make, such as when they notice roots, stem and leaves emerging. When the stem is several inches long the plant can be planted in potting soil indoors. Other planting ideas: Citrus seeds can be planted indoors directly into potting soil and, if kept warm and moist, should sprout in a few weeks.



Photosynthesis Play

In this activity, students will learn about how plants make their food through photosynthesis.

Leaves use energy from the sun to convert carbon dioxide in the air and water from the soil into sugars to feed the tree. This process is known as photosynthesis. Trees release oxygen into the air during photosynthesis. This is very important, as all animals—including people—need oxygen to survive.

Materials:

- Sun/Tree Food and Carbon Dioxide/Oxygen signs
- Markers
- Leaves (new or those from Tree Charades activity)
- Juice
- Clear glasses labeled WATER and NUTRIENTS
- Two straws

Preparation: Fill the NUTRIENTS glass with Juice and put a straw in the glass. Fill the glass marked WATER with water and put a straw in it.

Synopsis: Students learn about photosynthesis by acting it out in a play.

GLEs: S 1.1.5, S 1.1.6

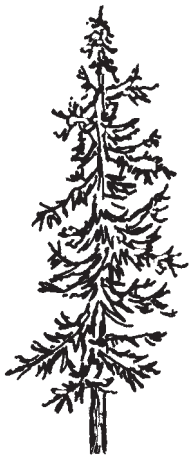
EEGs: Goal 1, Objective A

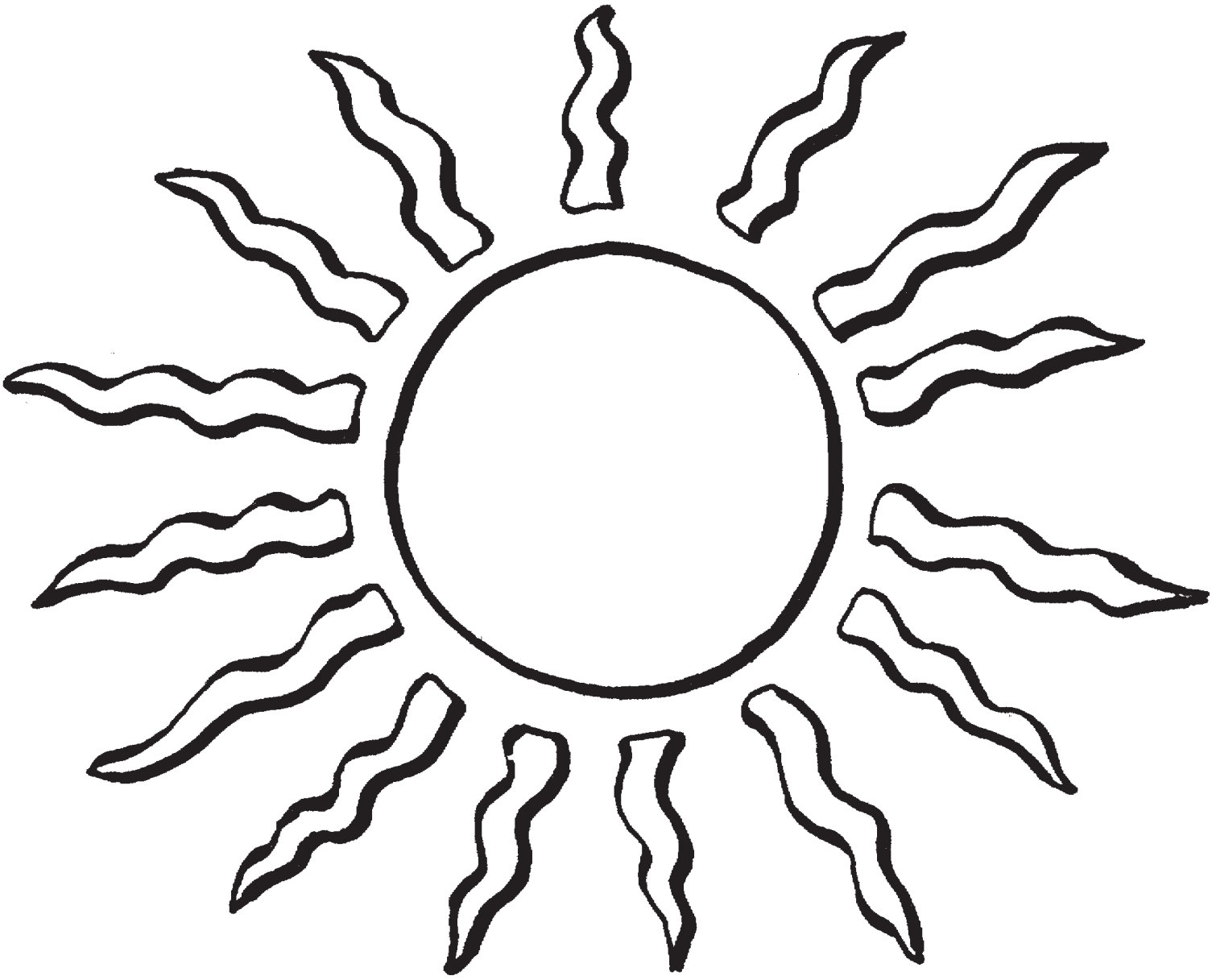
NAAEE Guidelines: Strand 2.2: C, D

1. Ask your students if they know how trees "eat." Tell them they make their own food by a process called photosynthesis. Ask for five volunteers to demonstrate the process. Have one volunteer be the tree, holding leaves. Have one student hold the Carbon Dioxide/Oxygen sign and one student hold the Sun/Tree Food sign. Tell the students with signs that you'll tell them when to hold up their signs.

2. Read the following paragraph aloud: "This is a tree (point to student). Like other plants, trees make their own food. Let's see how the tree does this. What are these? (point to the student's feet) That's right! Those are the tree's roots! Now, what do they do? That's right! They hold the tree up but roots also have another important job to do: sucking up the water and nutrients! The tree needs water (have one student hold up the water glass to the student playing the tree and allow her/him to drink) and nutrients (have another student hold up the nutrients glass to the student playing the tree and allow him/her to drink) to make food. The tree also needs carbon dioxide to make food (have the student with the carbon dioxide sign hold it up). Does anyone know what carbon dioxide is? Did you know that when you breathe out, you make carbon dioxide? Let's all breathe out right now so our tree can have some carbon dioxide to make food (everyone breathes out loudly). The tree takes the carbon dioxide into its leaves (have the student with the carbon dioxide hold it near the leaves) and, using water, nutrients and energy from the sun (have the student with the sun sign hold it by the leaves), it makes food (have the student with the sun sign turn it over so it reads Tree Food).

   Do you know what else happens? The plant also makes oxygen (have the student with the carbon dioxide sign turn it over so it reads oxygen). Do you know why oxygen's important? That's right! Living things, including people, need oxygen. Let's breathe in some of the oxygen this tree made (everyone breathes in loudly). So the tree not only makes its own food, but it also makes oxygen for us to breathe! Let's give the tree and our helpers a big round of applause!"





Tree Food

Carbon Dioxide

Oxygen

Becoming a Tree Trunk

In this activity, students will learn about the different parts of a trunk and how they help the tree grow wider

Each year a tree essentially grows a new "coat of wood" over the older wood. The outside layer of the tree is dead bark which provides protection from the environment. The inner bark layer is composed of live tissue that transports food downward. Between the bark and wood is the cambium layer which is responsible for increases in tree diameter by creating annual rings. The annual rings of wood are composed of large pores that carry water up to the leaves. Heartwood, or wood in the center of a large tree, is composed of dark-colored, dead cells used for storage.

Materials:

- Tape or chalk
- Tape measure

Preparation: in an open area, tape off or mark with chalk a distance of 19 feet (5.8 meters). This represents the diameter of an old growth western red cedar.

1. Ask your students if they know how trees get bigger. They might say trees grow taller, but also tell them that they get bigger around. Pick a student to be a tree seed. Have them stand in the middle of the line, crouching on the ground and covering their head with their hands. Pretend to sprinkle water on the seed and tell the student to start growing by standing up tall. Have them reach their arms out like branches and leaves. Tell them that they are now a sapling tree. Now tell your students that as the tree gets taller, it also needs to get bigger around. If a tree never got bigger around, it wouldn't be able to grow very tall because the wind would knock it down.

2. Pick three students to come up and be part of the tree. Have them hold hands, encircling and facing the sapling. Tell them that they are helping the tree get bigger around and they are also part of the tree's food and water transportation system. They're like highways, helping water get to the leaves and food get to the roots. On their backs is a thick layer of bark, which protects the tree from fire, insects and other animals. The student in the middle has now become heartwood, which are dead cells used for storage.

3. Pick five more students to encircle the tree. Tell them that they are now the food and water transportation system and that all of the students in the middle are dead heartwood. Ask students how big around trees get. After they've made some guesses, tell them that some of the trees in our backyards, such as western red cedar, can have trunks that are 60 feet (18 m) around in the forest! Keep adding students around the tree (you may have to take some students from the middle) until they have filled the 19-foot line. Congratulate them that they have now become a western red cedar!

Synopsis: Students learn how tree trunks become larger and how nutrients and water are transported by becoming parts of the trunk.

GLEs: 1.1.5, S 1.1.6

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A

Plant Experiments

Students will understand what happens to plants don't receive everything needed for the photosynthetic process. Students will also make predictions, learn how to make observations, and become skilled at recording data.

Materials:

- Five of the same small plants, all of comparable size in the same type of pot
- Materials for experiment, decided by each group
- Five pieces of graph paper
- Rulers

1. Brainstorm with the students what plants need to make their food: sun, water, nutrients, carbon dioxide. Ask your students what would happen if a plant didn't have one of these needs. Students will most likely say the plant will die. Remind them that there are lots of ways for plants to be unhealthy without dying. Tell your students they're going to do an experiment to test what happens when basic needs are limited.

2. Divide your students into four groups. Give each group a plant and a piece of graph paper and help them record their plant's height, number of leaves and color of leaves of their group's plant (see example).

3. Assign each group a different need to limit and have them record their limitation on their graph paper. Also have them brainstorm and record their prediction of what will happen to the plant. Have them be specific: lose leaves, leaves change color, grow more leaves, etc instead of just saying the plant will die.

Limitations:

   a. No light
   b. No water
   c. No soil/nutrients
   d. No air/carbon dioxide

4. Have each group decide how they will limit their group's particular need. Have each group write out their procedure for testing that limitation on their graph paper. Each group will also need to discuss what materials they'll need with you.

Synopsis: Student groups make predictions, monitor and record observations about four different plants that each have a different limiting need

GLEs: S 1.1.5, S 2.1.1, S 2.1.2, M 1.2.1

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 1: A, B, C, D, E, G; Strand 2.2: A, C, D

5. As a class, ask how the "no light" group will know that the effects of their limitation are different from the "no water" group? Would it help if there were one plant to compare them to that received all its basic needs? Introduce the concept of a control plant. Record the height, number of leaves and leaf color on the control plant's graph paper. Have the class come up with a prediction for what will happen to the control plant. Also have the class come up with a procedure for proving the control plant with all its basic needs (how much water should it get? Where should it be placed?). Have students also discuss where to put their group's plant and how much water to give it (if not limited).

6. Have students measure the heights, number and color of leaves of their plant weekly. Discuss what is happening to each plant that is missing a need. How does that plant compare to the control? What's the most accurate way to compare plant health? How accurate were the students' predictions?

Note: Plants that survive may be adopted by the class. Those that don't may be composted.

No Light Group Prediction Procedure			
week	height	# of leaves	leaf color

Exploring Forests

Exploring Forests Learning Objectives:

Students will be able to:

- Place temperate and tropical forests in a geographical context
- Draw and/or name three layers of the forest
- Explain how weather is one of the major differences between temperate and tropical forests
- Illustrate one similarity and one difference between temperate and tropical forests

Pre- and Post-Assessment Activities

The following activities will provide you with an understanding of your students' current knowledge of temperate and tropical rain forests. In order to encourage their creativity and expression, remind your students that these exercises are not tests, but a way of seeing what they already know and what they haven't learned yet. Make sure to collect and save all student work after it's been completed to use for comparison later.

1. Drawing Forests

Materials: paper, crayons or colored pencils

Instructions: give your students two blank pieces of paper. Ask them to draw a tropical rain forest on one and a temperate forest (such as the ones we have here in Washington) on another sheet. Have them label as many parts (animals, plants, etc) of the forest as they can. Have them write their names and the number "one" on each paper. There is no right or wrong way to do this activity and it may help your students to relax if you tell them to just draw what comes to mind when they think of a tropical rain forest or a temperate forest of Washington.

2. Forest Story Circle

Materials: tape recorder, stuffed animals, puppets or pictures of animals

Instructions: sit in a story circle with your students. Start the story with "Last year when I went hiking through the tropical rain forest..." or "Once upon a time we were in the temperate forest..." and have each student take a turn filling in a part of the story using the animals as props. Go around the circle one time for a tropical rain forest story and a second time for a temperate forest story. Use a tape to record their contributions so you can compare them later with their stories after they've finished the Exploring Forests unit.

Mapping Temperate and Tropical Forests

In this activity, students will place temperate and tropical forests in a geographical context

Background information: Temperate Forests of Washington section pages 2 to 3 and Tropical Rain Forests section pages 11 to 12.

Synopsis: Students map out the locations of temperate and tropical forests and draw the migratory route of the western tanager.

GLEs: S 1.1.5, S 2.1.1, S 2.1.2, M 1.2.1

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.1: A

Materials:

- Globe or world map
- One "Map of Temperate and Tropical Forests" per student
- Markers or crayons
- Picture of a western tanager (from guide book, internet, or sticker on the front cover)

1. Tell your students that they will be studying temperate and tropical forests over the next few days and you will start by familiarizing them with the areas in which these forests are found. Point out the temperate and tropical regions of the earth on a globe or map. Explain to the class that forests in Washington are called temperate forests. Point out that in other parts of the world the climate is different and so are the forests. In this lesson they will also be learning about the tropical rain forests in Costa Rica.

2. Using maps and globes as resources, have students complete the "Map of Temperate and Tropical Forests" worksheet. Ask your students to label the names of all the continents to help them put the different forests in a larger geographical context. Students can color in the keys of both forests; for example, they can use green for tropical and brown for temperate. Students can then draw a different color line across the equator. Bring in other mapping skills by having your students label oceans or add arrows pointing north, south, east and west.

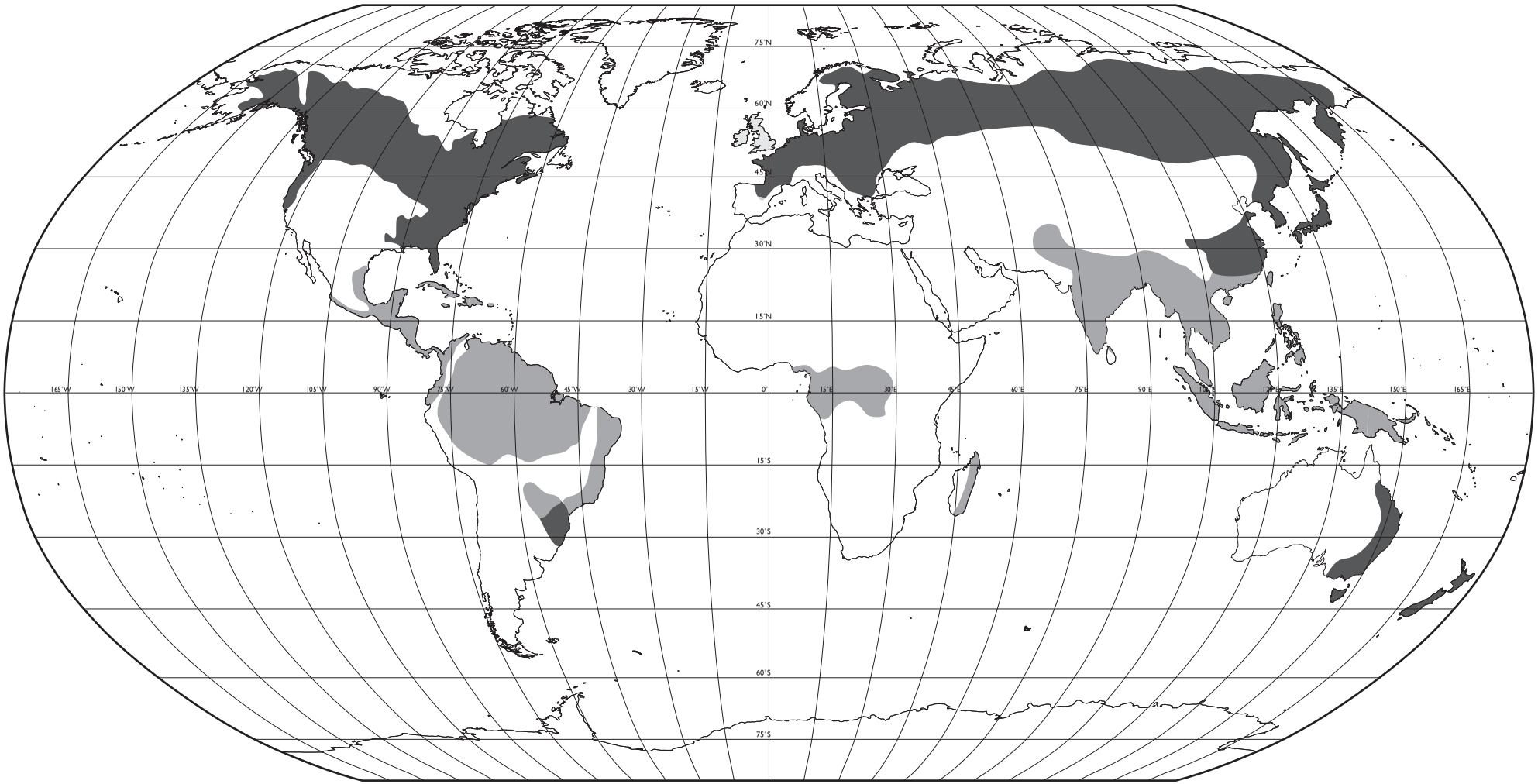
3. Ask your students the following questions using their worksheet as a guide:

   - What kinds of forests do we have in Washington?
   - What kinds of forests are in South and Central America?
   - Are there a larger area of temperate forests or tropical forests in the world?

4. Show your students a picture of the western tanager and tell them that this bird lives in Washington state during the summer and flies to Costa Rica for the winter. Find Washington and Costa Rica on a map or globe and then have students locate those places on their worksheets.

5. Using a ruler ask students to draw a line from Washington state to the country of Costa Rica on their worksheet to see how far the western tanager travels (approximately 3,375 miles each way). Using the mileage key at the bottom of the map ask your students to estimate the migration distance in air miles. It might be helpful to make a list of their estimates on the board in your classroom. Students will then measure the line they've drawn and calculate the exact number of miles the western tanager migrates one way. They can record both their estimate and the exact number of miles traveled next to the migration route on their map.

Map of Temperate and Tropical Forests



1 inch = 2,250 miles

Temperate Forest

Tropical Rain Forest

Forest Layers

In this activity, students will learn the three layers of the forest (four for tropical rain forest) and will learn about which animals live in the different layers of both forests.

Background information: Forest Structure section pages 1 to 2, Temperate Forest Layers section pages 4 to 10 and Tropical Rain Forest Layers 14 to 24.

Materials:

- One "Animals of the Temperate Forest" and "Animals of the Tropical Rain Forest" sheet for each student
- One "Layers of the Temperate Forest" and "Layers of the Tropical Rain Forest" sheet for each student
- Crayons or markers
- Scissors
- Tape

1. Using the teacher background information, introduce the forest layers to your students. Have students color and cut out the animals from "Animals of the Temperate Forest" worksheet. Talk about whether they've seen any of these animals in the temperate forest and which layer of the forest they'd expect to find them. Then, have them color the "Layers of the Temperate Forest" sheet and cut along the dotted lines to form a peek-a-boo door. They will then tape the animals onto the back of the "Layers of the Temperate Forest" sheet under the appropriate flaps so that the animals can be seen when the peek-a-boo door is raised. Do the same with the tropical rain forest pages.
2. After completing their projects students can use them to make up stories and reveal forest animals under the forest layer as they tell their story. You can also discuss what animals do in each layer and how many of the animals use more than one layer of the forest. Have the students guess which animals utilize more than one layer and discuss how those animals move about the forest.

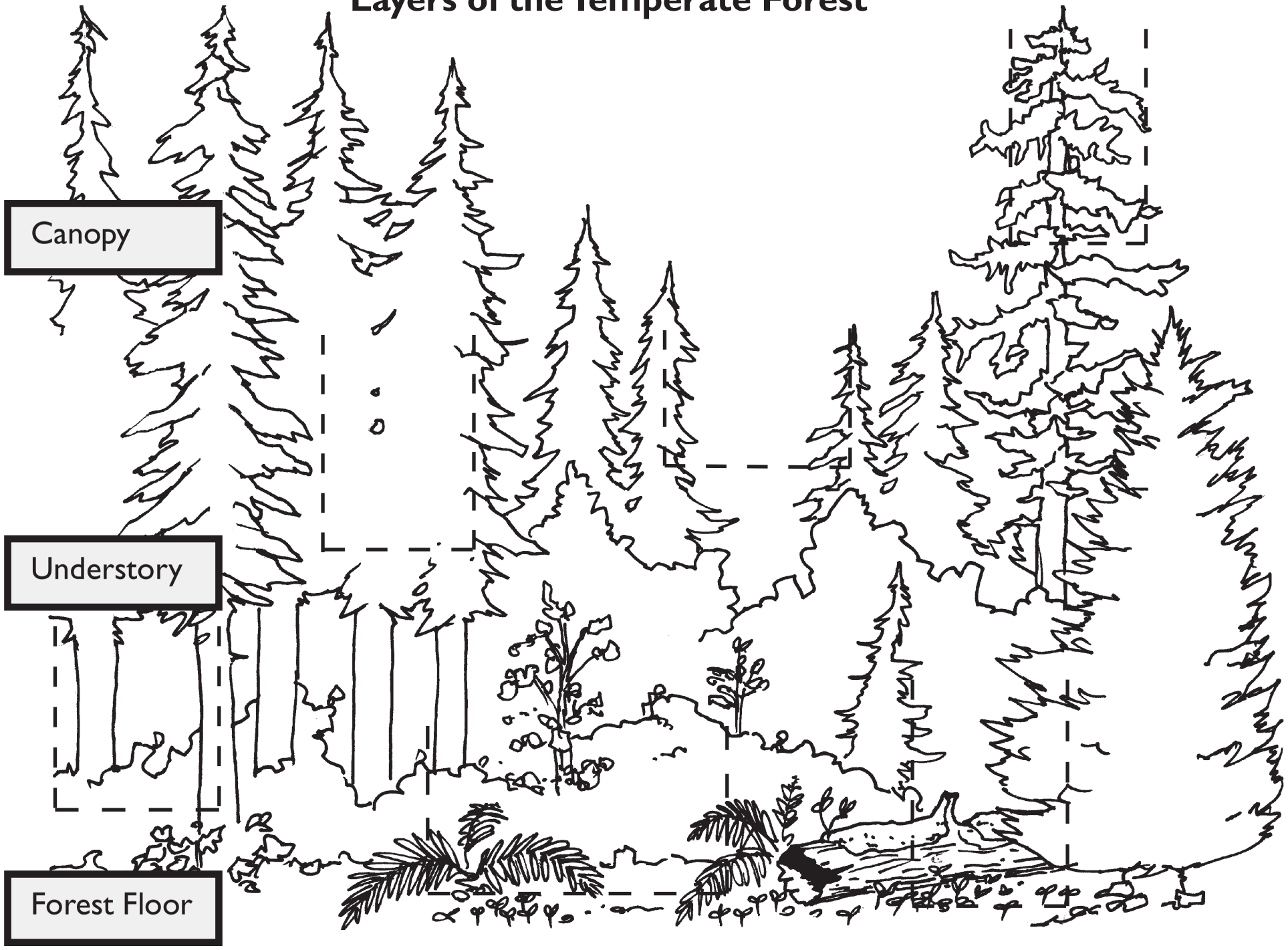
Synopsis: Students color in sheets depicting temperate and tropical rain forest layers. Students then add animals to their appropriate layer in the forest.

GLEs: S S 1.1.5, S 1.1.6

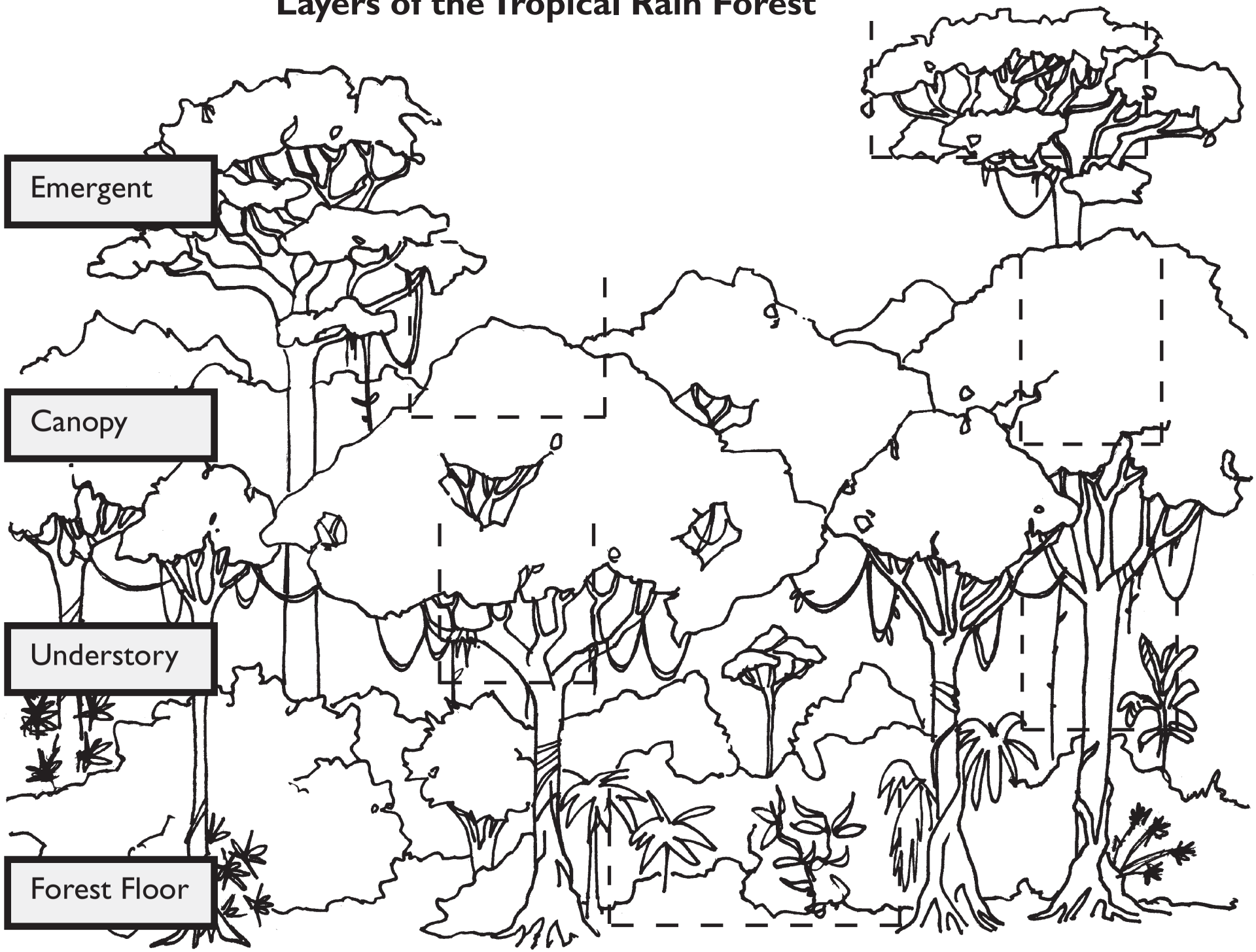
EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C

Layers of the Temperate Forest



Layers of the Tropical Rain Forest



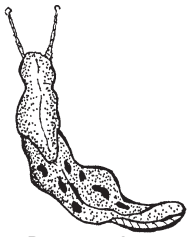
Animals of the Temperate Forest

Cut out the animals and put them in their forest layer

Black tailed deer
Forest Floor

Porcupine
Understory

Great horned owl
Canopy



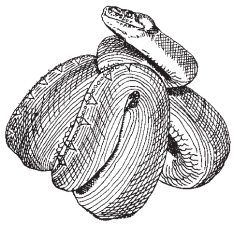
Banana slug
Forest floor

Flying squirrel
Understory

Skunk
Forest floor

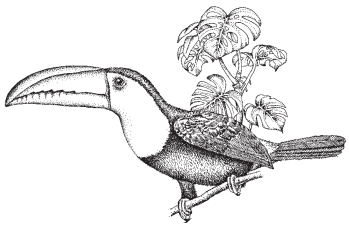
Animals of the Tropical Rain Forest

Cut out the animals and put them in their forest layer



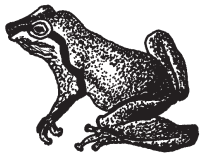
Emerald tree boa
Understory

South American bat
Canopy



Toucan
Emergent

Golden Lion Tamarin
Canopy



Poison Dart Frog
Understory

Ocelot
Forest floor

The Leaf Cutter Ants' Parade

Poems and songs can be used to inspire your students and help them to learn about the climatic characteristics of rain forests and rain forest plants and animals.

(Sing to the tune of "When Johnny Comes Marching Home")
The ants go marching back and forth
Hooray, hooray!
The ants go marching south and north
Hooray, hooray!
The ants go marching east and west
Looking for leaves to take back to their nest
And they all go marching—
The leaf cutters ant's parade

The ants go marching day and night
Hooray, hooray!
The ants go marching, what a sight
Hooray, hooray!
They munch and they crunch and they bite and they tear
Cutting up leaves that they find here and there
And they all go marching—
The leaf cutter ants' parade.

The gardens are growing underground
Hooray, hooray!
The gardens are growing underground
Hooray, hooray!
The gardens are growing underground
All over the leaves that the leaf cutters found
And they all go marching—
The leaf cutter ants' parade.

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Graphing Forest Temperature and Rainfall

In this activity, students learn about the seasonal variations of temperature and precipitation in temperate and tropical rain forests. Students also practice using bar graphs to represent data.

The main factor that determines what type of forest will grow in any one region is climate, primarily the patterns of precipitation and the annual temperature range. More background information: What is a Forest? section page 1

Materials:

- World map or globe
- One copy of "Temperature Graph" worksheet for each student
- Pencils

1. Explain that weather patterns, especially temperature, is one of the major differences between temperate and tropical forests. Point out the location of the earth's tropical rain forests on a world map or globe and explain that it is much warmer near the equator than it is farther to the north or south of it. Using the internet, look up the temperature in Washington and in Costa Rica on that day. Explain to the class that graphing is a good way to compare things like temperature.

Synopsis: Students graph the seasonal variations of temperature and precipitation in temperate and tropical rain forests.

GLEs: M 1.2.1, M 1.4.5, M 3.1.1, G 2.1.1

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 1: C, E, G; Strand 2.1: A; Strand 2.4: B

2. Give each student one copy of each of the "Temperature Graph" worksheets. Using the temperatures below, work together to fill in the bar graph of the average monthly temperature for both tropical and temperate forests. As you chart each month you can talk about what the weather is like during that month in Washington. You can refer to holidays, birthdays, or other memorable occasions to use as a reference for the temperature graph. If you have access to the internet, you can visit the Washington Climate Summaries web page www.wrcc.dri.edu/summary/climsmwa.html to gather data on your own.

3. You may want to assist with one graph and have the students complete the other on their own. After the students have filled in the graph, discuss the results as a class. How is the weather different in Washington than in Costa Rica? How might this affect what can grow there and what can live there?

Average temperature in Costa Rica (degrees Fahrenheit)

January	February	March	April	May	June	July	August	September	October	November	December
62	67	69	70..5	71	70.5	69.5	69.5	70	68.5	68.5	66.5

Average precipitation in Costa Rica (inches)

January	February	March	April	May	June	July	August	September	October	November	December
4.5	3.2	3.9	1.3	3.2	8.7	7.9	8.7	23.0	15.9	7.3	7.0

Average temperature in Washington state (degrees Fahrenheit)

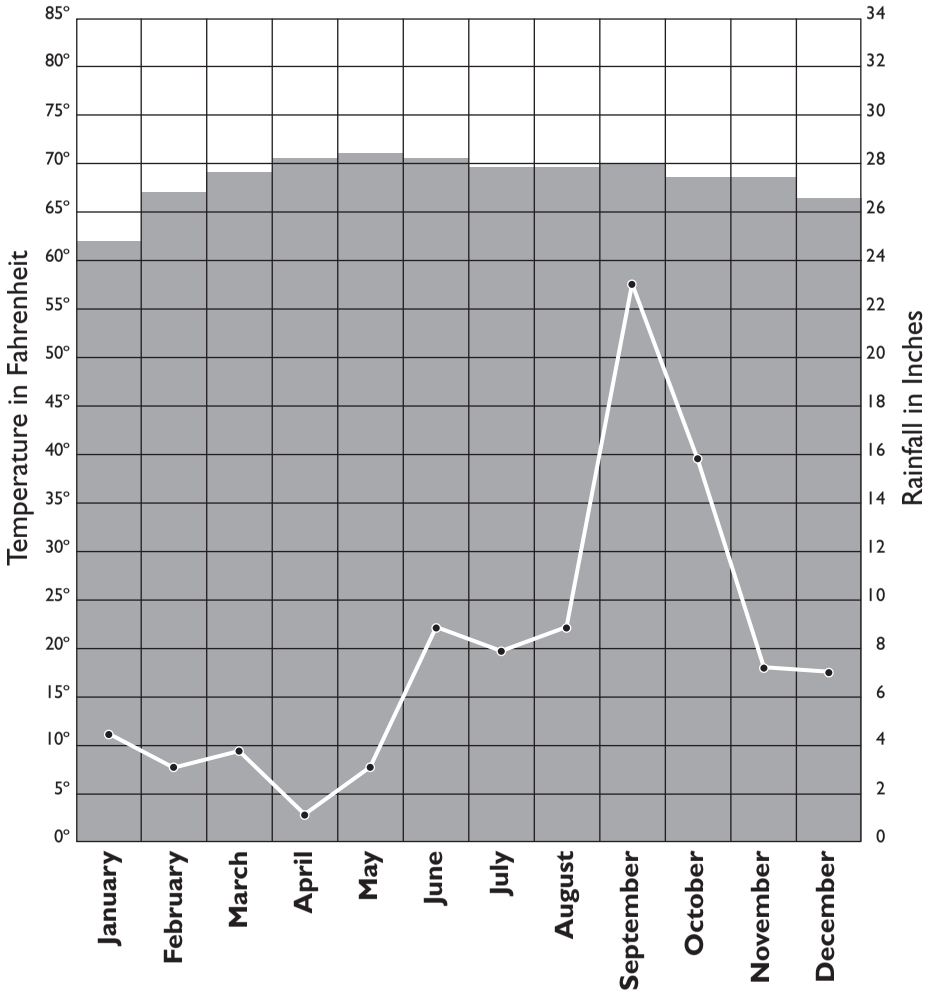
January	February	March	April	May	June	July	August	September	October	November	December
41.15	43.8	46.8	50.9	57.25	61.7	66.05	66.75	62.15	54.2	44.45	41.95

Average precipitation in Washington state (inches)

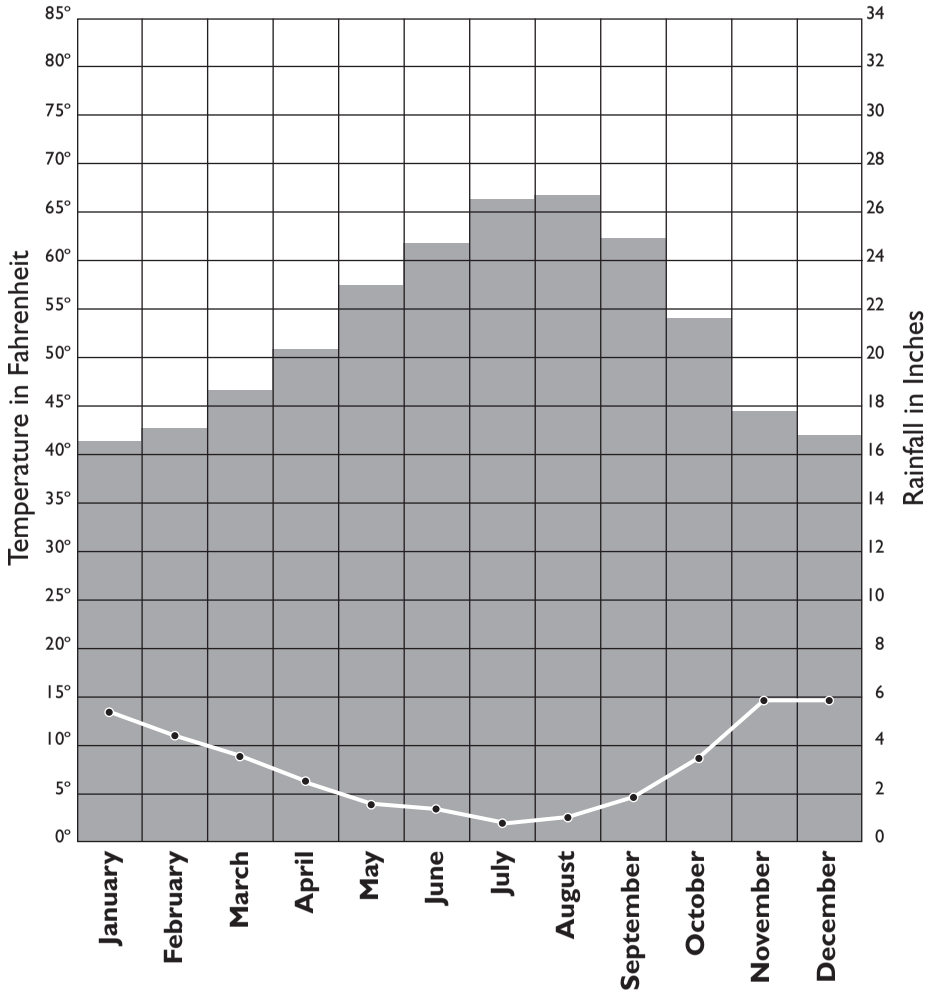
January	February	March	April	May	June	July	August	September	October	November	December
5.5	4.2	3.7	2.5	1.7	1.5	0.8	1.1	1.9	3.5	5.9	5.9

Teacher's Climate Worksheet Key

Average temperature and rainfall in Costa Rica

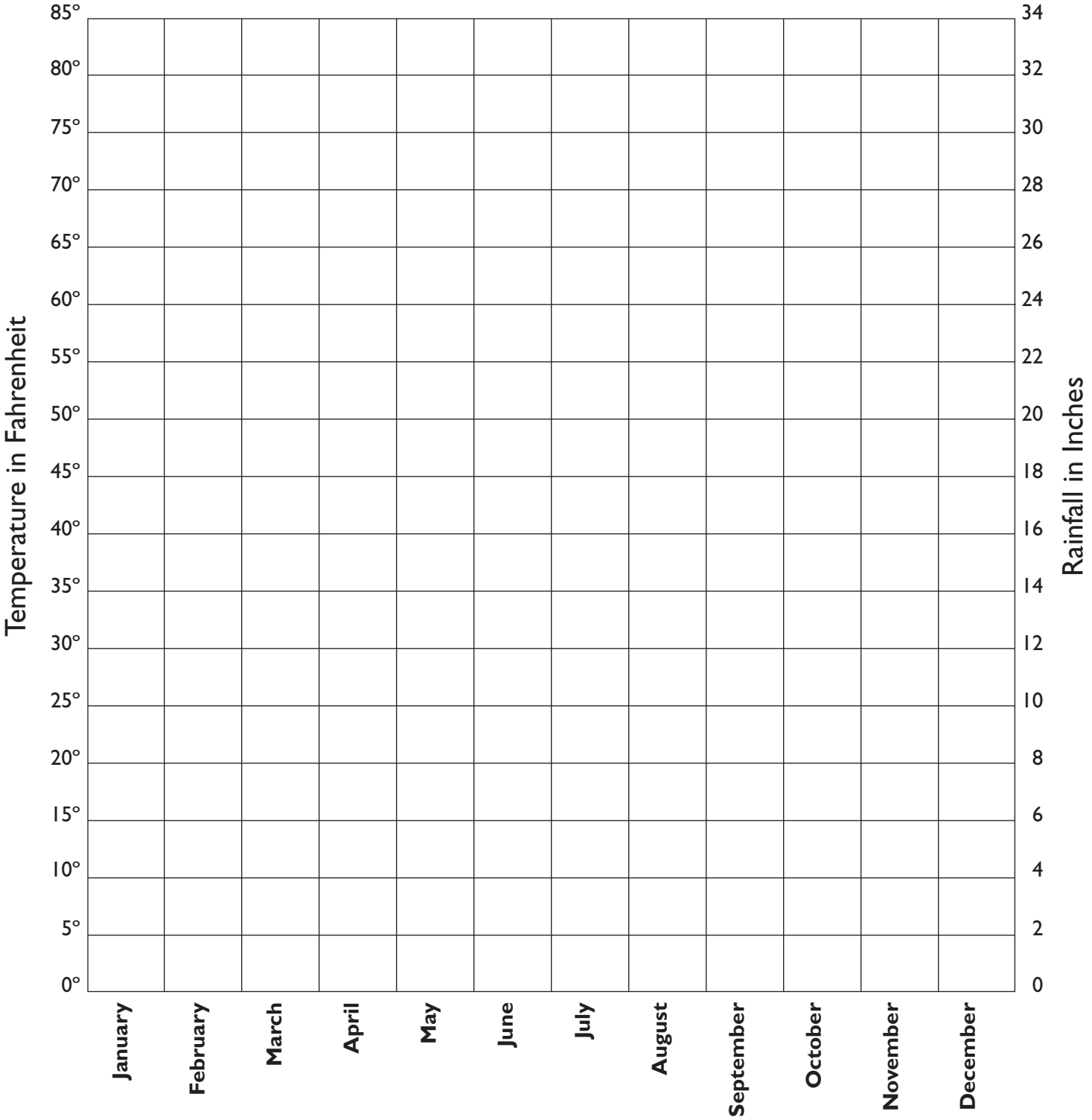


Average temperature and rainfall in Washington State



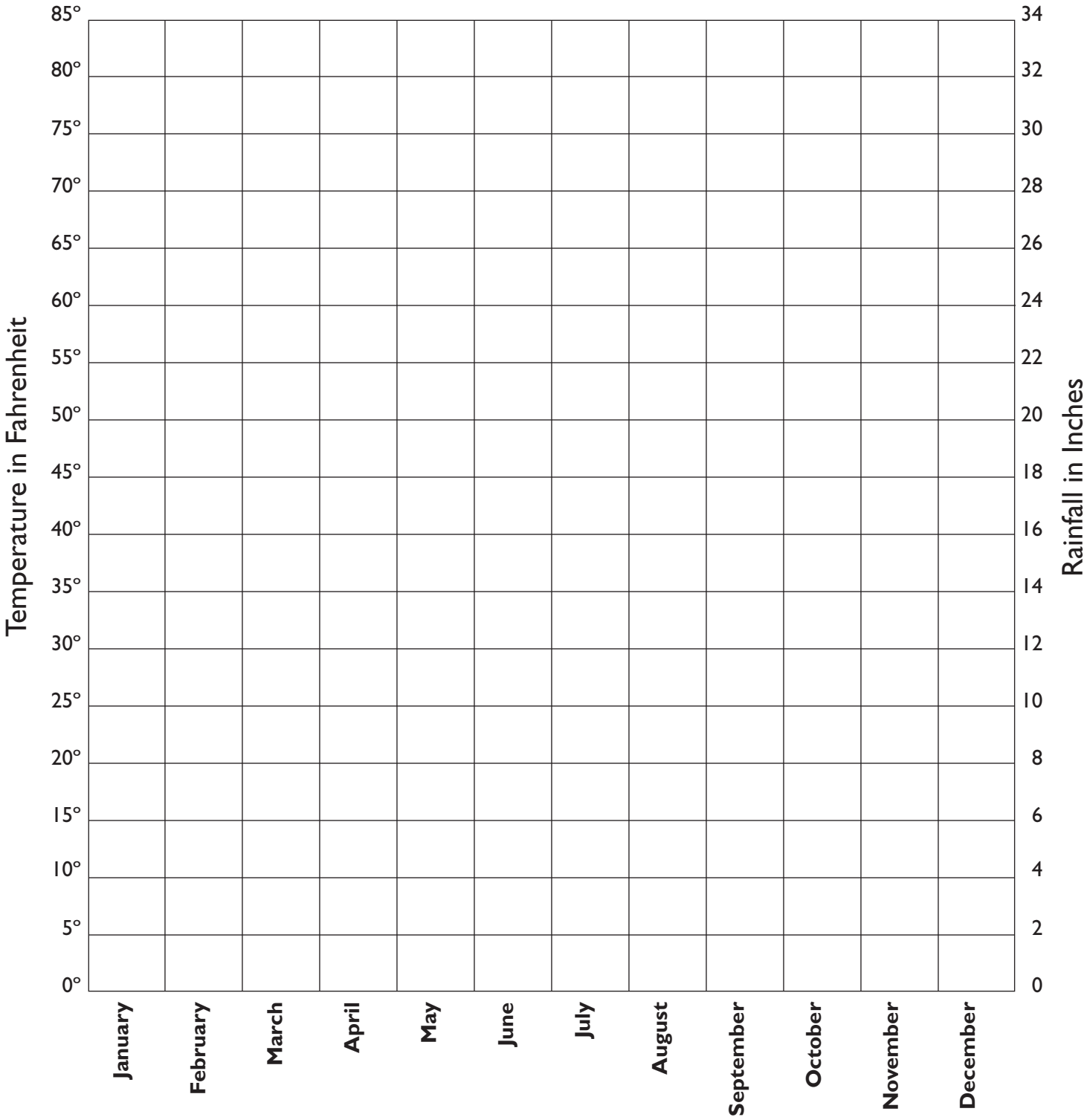
Forest Climate Worksheet

Average temperature and rainfall in Costa Rica



Forest Climate Worksheet

Average temperature and rainfall in Washington State



Jungle Rain

Poems and songs can be used to inspire your students and help them to learn about the climatic characteristics of rain forests and rain forest plants and animals.

Drip, drop, pour, and patter *(snap fingers in rhythm)*
Plip, plop, spit, and spatter
Drizzle, drazzle, drain
Jungle rain

Slip, slop, ripple, run *(rub hands together in rhythm getting faster)*
Trickle down, fall upon
Leaf and limb and flower
Jungle shower

Crash, smash, lightning flash
Raindrops splash, creatures dash *(pat knees in rhythm, getting even faster)*
Sticky, steamy, warm
Jungle storm

Rivers run, full and flowing *(rub hands together in rhythm getting slower)*
Plants are lush, green, and growing
Clouds begin to fizzle
Jungle drizzle

Sun comes out, shines and gleams *(all groups say—rhythms slow down and finally stop)*
Scattered drops and rising steam
Are all that now remain
Of jungle rain

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Biodiversity Beads

In this activity, students learn about the concept of biodiversity and compare the diversity of species in temperate and tropical rain forests.

Tropical rain forests host a higher number of different species than do temperate forests, or, in other words, tropical rain forests have higher biodiversity than do temperate forests. More background information: Why Are Tropical Rain Forests So Diverse? section page 12

Synopsis: Students compare biodiversity in temperate and tropical rain forests using different colored beads.

GLEs: S 1.1.6, M 1.1.1, M 3.1.1

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A

Materials:

- 20 pieces of scrap paper
- 10 sets of the following:
  - small plastic bag
  - 15 brown beads, 15 white beads, 15 black beads

  and 10 sets of the following:
  - small plastic bag
  - 5 beads each of 9 different colors

1. Divide your students into 10 groups of two to three students each.
2. Give each group one set of brown/white beads and one set of the multi-colored beads and two sheets of scrap paper. Instruct each group to spread one set of beads on one piece of paper and the other set on the other.
3. As a class, discuss the meaning of biodiversity (the diversity of species in an area).
4. Explain to your class that the two sets of beads represent the number of different species in forests—the brown/white beads represent a temperate forest and the multi-colored beads represent a tropical forest. Have each group count and record how many species (colors of beads) they have in each forest and how many individuals of each species they have in their forests.
5. If each color represents a different tree species, what observations can your students make about the relative biodiversity in temperate and tropical forests? What does it mean to say that in tropical forests "common species are rare and rare species are common"? (Most species have relatively few individuals and therefore cannot be considered common. However, there are so many different species of organisms, that it's common to find a rare species.) What does it mean to say that in temperate forests "common species are very common." (Temperate forests host a larger quantity of the species that they have.)

Forest Soil Comparison

In this activity, students will learn how the rate of decomposition is different in temperate forests than tropical rain forests. They'll also learn the how this difference affects the amount of leaf litter and humus in each forest.

Compared to the tropical rain forest, where warm, moist conditions encourage rapid decomposition of dead plants and animals, temperate forests have much slower rates of decomposition and thus much thicker layers of leaf litter and humus on the forest floor. More background information: Temperate Forest Soil section page 3 and Tropical Rain Forest Soil section page 13.

Synopsis: Students learn about the differences between temperate and tropical soil using cake, frosting and toppings.

GLEs: S 1.1.5, S 1.3.4, A 3.2

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 1: F; Strand 2.1: A; Strand 2.2: A, C, D

Materials:

- Two chocolate cakes
- Chocolate frosting
- Chocolate flakes, coconut and/or sprinkles
- Gummy worms
- Cake knife
- Plates or napkins
- Forks

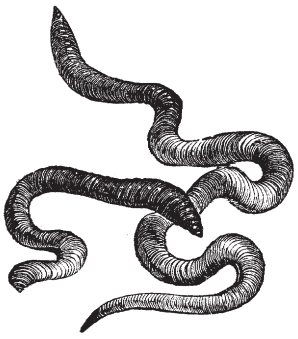
Preparation: Bake two chocolate cakes, one of which will represent temperate forest soil and one of which will represent tropical rain forest soil. Bring the chocolate frosting, chocolate flakes, coconut, or sprinkles and gummy worms to school along with the cakes.

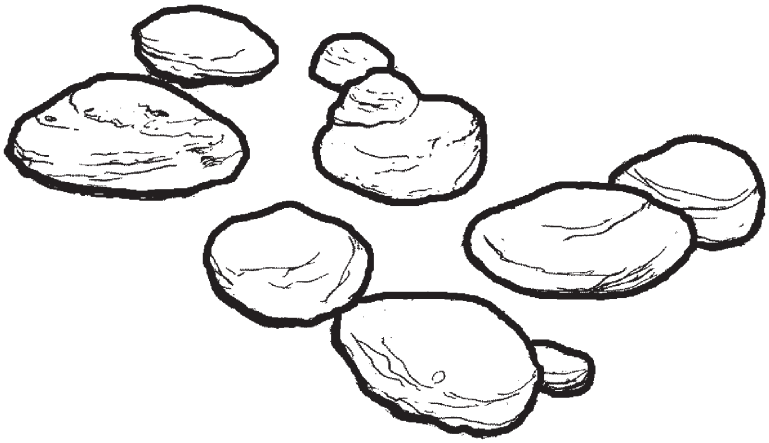
1. Ask your students if they remember what soil is made of (silt, clay and sand mixed with humus). Tell your students that soil is one more way that temperate and tropical rain forests are different. Show them two cakes. Tell them that each represent clay, silt and sand, one in a temperate forest and one in a tropical rain forest.

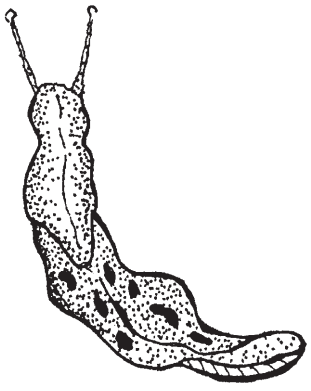
2. Start with the tropical rain forest cake. Ask students if they remember what the temperature was like in the tropical rain forest and how much rainfall that forest receives. Confirm that tropical rain forests are warm and wet year-round. Ask your students if they think dead plants will breakdown faster or slower in warm, wet places. Use the analogy of a piece of fruit on the kitchen counter versus a refrigerator; the fruit will rot faster in the warmer location than the cooler location. Therefore, there's not a lot of leaf litter (undecomposed leaves) or humus (decomposed leaves) on the tropical rain forest floor because they break down so quickly. Show students the frosting. Tell them that the frosting is going to be their layer of humus. Have a student come up and spread a very thin layer of frosting on the cake. Show students the chocolate flakes, coconut or sprinkles. Tell them that these are going to be the leaf litter on the forest floor. Have another student come up and sprinkle on a small amount of "leaf litter." Finally, remind students that a lot of organisms in soil are decomposers, helping to break down the leaf litter and turn it into soil. Introduce the gummy worms as decomposers and have a student come up and place worms on the top of the cake.

3. Now do the temperate forest cake. Ask students what the weather's like year-round in the temperate forest. They should answer that it's warm and dry in the summer and cool and wet in the winter. Ask your students when leaves might decompose fastest in the temperate forest. They should answer summer because it's warm, but remind them that it's also dry and that decomposition speeds up in wet conditions. Remind them that it's wet in the winter, but is it warm? No! Therefore, because the temperate forest never has ideal conditions, decomposition is a lot slower than in the tropical rain forest and there's a lot more humus and leaf litter on the ground. Have a student come up and spread a thick layer of frosting on the cake. Remind students that this is the humus layer, which will eventually be mixed with the sand, silt and clay particles.

Have another student shake a large amount of chocolate flakes, coconut or sprinkles on the cake to represent a large amount of leaf litter. Finally, have another student add the decomposers. Cut and enjoy!







Champion Trees

In this activity, students learn how large around and how high some trees can grow to.

Due to the ideal growing conditions for conifers in the Pacific northwest, this region has some very large and very old trees. Trees that reach outstanding ages, heights or girths are often referred to as "champion" trees. More background information: Temperate Forest Plants of the Canopy section page 9 and Tropical Rain Forest Plants of the Emergent Layer pages 21 to 22.

Synopsis: Using their bodies, students measure out the heights and circumferences of trees in temperate and tropical rain forests

GLEs: S 1.1.6, M 1.2.1

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A

Materials:

- Tape measure

1. Using the information in the table below, have students run a tape measure down a long hallway or out on schoolgrounds to equal the height of a champion tree. Then have the students lie down along the tape measure until the height of the tree is equaled. It may take more than one class of students to do this!
2. When measuring girth, again extend a measuring tape to the length of the circumference of a champion tree and have students stand along the tape outstretching their arms to meet one another. Then the number of students whose arm widths equal the circumference of the champion tree can join hands in a circle to illustrate the size of the tree's trunk.
3. To put the age of the tree in perspective, students can research historical events that occurred when the champion trees were just beginning to sprout.

Statistics on champion trees can be found in:

Franklin, Jerry F. and C. T. Dyrness. *Natural Vegetation of Oregon and Washington.* General Technical Report - PNW-8. Portland: USDA, Forest Service, Pacific Northwest Forest and Range Experiment Station, 1973.

Pojar, Jim and Andy MacKinnon, eds. *Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia, and Alaska*. Redmond, WA: Lone Pine Publishing, 1994.

Rainforest Alliance Learning Site. "Species profiles: Kapok tree." Rainforest Alliance. January 29, 2007. http://www.rainforest-alliance.org/programs/education/teachers/curriculum/resources/ documents/kapoktreeprofile.PDF

Washington State Big Tree Program. "Big Tree Champions." 2001. Mid-Columbia Community Forestry Council. January 29, 2007. http://www.treesforyou.org/bigtree/champs.htm

	Champion Circumferences:	Champion Heights:	Champion Ages: (Approximate)
Douglas fir	44 feet (13 m)	326 feet (99 m)	1300 years
Sitka spruce	60 feet (18 m)	305 feet (92 m)	1350 years
Western hemlock	25 feet (7.5 m)	230 feet (70 m)	1200 years
Western red cedar	60 feet (18 m)	178 feet (53 m)	1400 years
Kapok	40 feet (30 m)	213 feet (63 m)	200+ years

Becoming the Temperate and Tropical Rain Forest

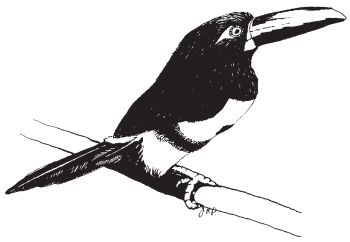
In this activity, students learn about different plants and animals in temperate and tropical rain forests.

Background information: Temperate Forest Layers section pages 4 to 10 and Tropical Rain Forest Layers section pages 14 to 24. Note: this can be a good activity for after your field trip to the zoo for those students who didn't get to be up on stage. All props are optional.

Materials:

- Scraps of paper with roles written on them
- Chairs and blankets
- CD or tape of rain forest sounds
- CD or tape player
- Empty plastic bottles
- Forest props: leaves, branches, fake plants, stuffed animals, masks, etc

1. In a large open space (outside if weather permits) create your own temperate or tropical forest. Assign different "roles" or have students select their roles by picking them out of a hat. The numbers of characters will depend on your class size. Here are some suggested roles:



Tropical Rain Forest

Emergent layer	Fruit bat
Ocelot	Forest floor
Sloth	Toucan
Canopy layer	Nurse log
Tapir	Green tree boa
Chorus of sounds	Leaf-cutting ant
Understory layer	Poison dart frog

Synopsis: Students act out different plants and animals in the temperate and tropical rain forests.

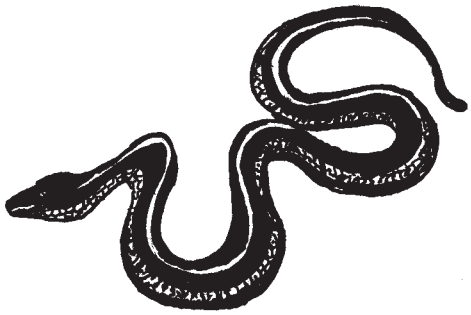
GLEs: S 1.1.6, S 1.2.7, A 3.2

EEGs: Goal 1, Objective A

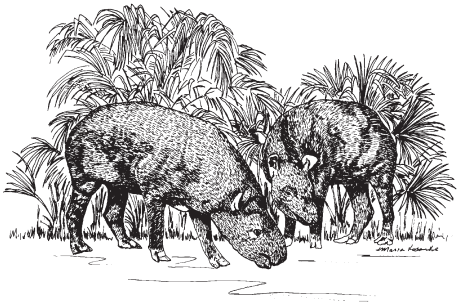
NAAEE Guidelines: Strand 2.2: A, C, D

Temperate Forest

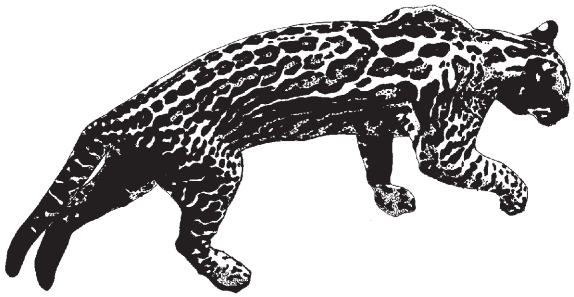
Canopy	Pileated woodpecker
Cougar	Chorus of sounds
Banana slug	Nurse log
Understory	Carpenter ant
Deer	Pacific tree frog
Hoary bat	Garter snake
Forest floor	



2. Students will create a drama, acting out as many different roles there are to play in both the temperate and tropical rain forest. Students who are emergent or canopy layers can stand on chairs or benches while understory students kneel on the ground as shrubs and small trees. Students playing the role of the forest floor will lie down and be a layer of soil and/or a nurse log. (You may want to lay blankets on the floor to make the forest floor "characters" more comfortable and add some color to the forest.)



3. Students who are in the roles of animals can act out predator/prey relationships. For example, in the tropical rain forest, the student who is the ocelot will creep up slowly and quietly to where a young tapir (another student) is nibbling on browse. To make a "kill" the ocelot will touch the tapir gently on the shoulder. Once the tapir has been touched, the tapir will become another forest layer or a chorus member, the ocelot will become the tapir and a tree layer will become the ocelot.



4. Keep rotating in this order so that everyone has a chance to play two roles. Take the opportunity to emphasize how important it is for predators to be quiet and sneaky and how important it is for prey animals to be observant and cautious, even when having an afternoon browse on forest plants.

5. Students or tapes/CDs can provide sounds of the rain forest (wind, rain and animal sounds). Students can make wind sounds by blowing air into empty plastic bottles (and if you pierce holes in the bottles you can change the pitch of the sounds). Have students experiment making rain, wind and animal sounds without props, using only their bodies.

6. Students can join hands to make vines that create pathways for animals to travel in the rain forest. Encourage students to move just like they think their character would (plant or animal) and have them change their movements and behavior when you introduce rain, wind, storms or if humans were to enter the forest.

Extension: Add other art activities by having students create new props (more leaves, bark, animal masks and coverings etc.).

Extension: Create a mural of a temperate forest and a mural of a tropical rain forest on opposite sides of the classroom. Have each student make different animals to add to the murals. Students can quiz each other on what forest and what layer their animal would be found in.

Forest Venn Diagram

In this activity, students compare and contrast the similarities and differences of temperate and tropical rain forests.

Background information: A Comparison of Forests section page 25.

Materials:

- Blackboard
- Chalk

1. Draw a Venn diagram on the board. Label one circle "Temperate Forest" and the other circle "Tropical Rain Forest." If Venn diagrams are new to your students, introduce your class to these diagrams as a way to compare how things are the same and how they are different. Explain to the students that the circle on the left represents the things found in the tropical rain forest and the circle on the right represents things found in the temperate forest. The area where the two circles overlap represents things that the forests have in common.

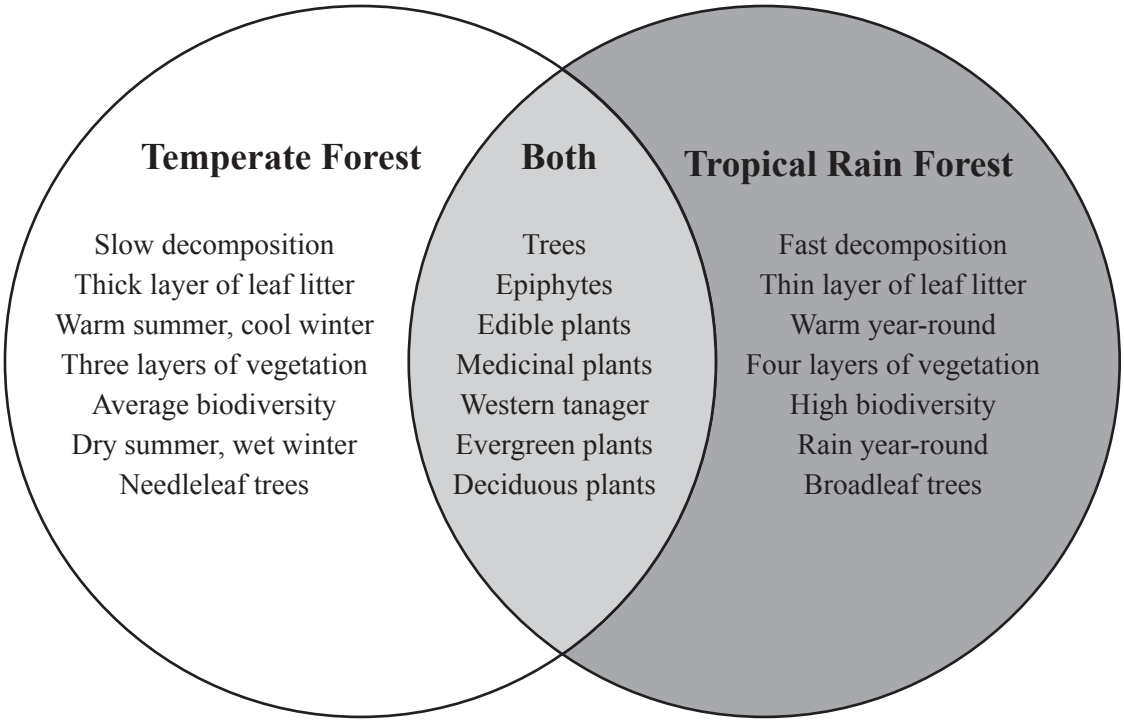
Synopsis: Students use a Venn diagram to compare and contrast temperate and tropical rain forests.

GLEs: S 1.1.5, S 1.1.6

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 1: F; Strand 2.1: A; Strand 2.2: C

2. Review with your students what they learned so far about forest locations, layers, animals and weather. As you brainstorm with the class the ways in which temperate and tropical forests are similar and different, fill in the Venn diagram.



Habitat

Habitat Learning Objectives:

Students will be able to:

- Describe an animal's (or plant's) five basic needs
- Define the word habitat and describe how a habitat provides for an animal's basic needs

Needs vs. Wants

In this activity, students will learn the five basic needs of all plants and animals. Students will also learn the difference between basic needs, secondary needs and wants.

Background information: Habitat section pages 28 to 29.

Materials:

- Common household objects
- Masking tape
- Signs that say "Wants", "Needs", "Don't Know", "Food", "Water", "Shelter", "Air", "Space", "Secondary" (can use scrap paper)

Preparation:

Bring common objects or pictures of objects that are basic needs, secondary needs or wants of second graders. Put them in a box. Mark off a table with masking tape: wants, needs, don't know.

1. Discuss with your students what people need to survive. Introduce the topic by asking the question, "If you were stranded on a deserted island, what would you need to live?" Give an example, such as space; a person needs enough room to move around. Ask for other examples.

2. Introduce the concepts of basic needs, secondary needs and wants. Basic needs are survival needs, including air, food, water, shelter and space. When talking about space and shelter, make sure all students have a clear idea of the meanings. Some students may assume "space" means "outer space," rather than the room needed to do essential things. Secondary needs allow animals, including humans, to thrive, stay healthy and reproduce or raise a family once their basic needs are met. These needs include things such as companionship, nesting materials, an education or a toothbrush. Wants are luxuries; things we desire, but may not require for survival, for staying healthy or for raising a family. Wants are things that make life more pleasant such as stereos, televisions, books, toys and fancy clothes.

3. Tell your students they're going to take a closer look at their own basic and secondary needs and wants using common household objects. Have each student come up and get an object from the box and put it in its appropriate spot on the table. When finished, find any that are incorrect in the needs and wants area and discuss why it should be put in the other area. Go through the "don't knows" and decide as a class where to put them. Then, mark off another table with sections for each basic need and a section for secondary needs. Go through the objects as a group and decide which need each object fulfills. This activity can be ongoing, with students bringing in objects from home. Write all the needs and wants on a chart.

Note: This activity is continued in the Conservation section.

Synopsis: Students learn about basic needs, secondary needs, and wants using common household objects.

GLEs: S 1.1.5, S 1.1.6

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A

Create a Habitat

In this activity, students will learn the word habitat and how a habitat provides for an animal's basic needs

Background information: Habitat section pages 28 to 29.

Synopsis: Students create a habitat diorama that meets all five of their chosen animal's basic needs

GLEs: S 1.1.5, S 1.1.6, A 3.2

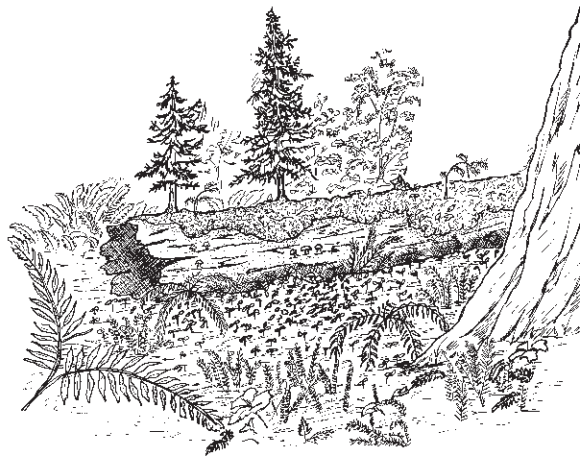
EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D

Materials:

- One box (shoebox, paper box, storage box, etc) for every student (have students bring from home)
- One "Habitat Plan" worksheet for every student
- Craft materials: construction paper, glue, tape, markers, tissue paper, pipe cleaners

1. Briefly review the concept of basic needs and then introduce the concept of habitat. Explain to the students that the place where an animal lives and finds all of the things it needs is called its habitat. Make sure that students are clear that a habitat is more than just the animal's home but also includes the surrounding area that provides all the animal's basic needs. Give an example of a type of habitat, such as a meadow. Describe how a meadow might provide everything a rabbit needs (i.e. grass to eat, air to breathe, dirt to dig a burrow in, a stream or pond to drink from, and lots of space to move around and find these things.).



2. Have each student choose an animal from the animal fact sheets provided and build a shoe box diorama habitat for that animal. If you're doing this activity after your Forest Explorers field trip to the zoo, have students pick an animal they saw at the zoo and make a habitat for it. Make sure animals are chosen from temperate and tropical forests. Students should research their animal using the fact sheets provided, magazines, books or other resource materials. Before beginning work on the diorama each student should fill out the "Habitat Plan" worksheet. This will help them plan their shoe box habitat to ensure the habitat they build will provide for all of their animal's basic needs.

3. After all the habitat dioramas are built, have each student present their diorama to the class. Dioramas can be displayed in your classroom or elsewhere in the school for other students to see.

Habitat Plan

Animal: _____

Basic needs	Describe how you will provide for each need in your habitat
Food	
Water	
Space	
Shelter	
Air	

Habitat for Rent

In this activity, students will apply their knowledge of how a habitat provides a plant or animal's basic needs.

Background information: Habitat section pages 28 to 29.

Synopsis: Students hear and write classified ads designed to find suitable habitat that meets all of the animal's basic needs.

GLEs: C 1.2.1, W (1.1, 1.2), S (1.1.5, 1.1.6)

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D

Materials:

- Classified ads from a newspaper
- Paper (or Forest Explorers notebook)
- Pens or pencils

1. Familiarize your students with the concept of habitat and basics needs. What is a habitat? (a plant or animal's home, where it meets its basic needs for survival) What are a plant or animal's basic needs? (air, food, water, shelter and space) Do humans have the same basic needs? (yes!) When a human needs to meet one of his or her basic needs, such as shelter, what might they do? (buy or rent a house or apartment) How do they find out about a house for sale or an apartment for rent? (the classified ads in a newspaper—show Classified Ads) Let's pretend that animals also use the classified ads when looking for a good habitat.
2. Have your students get out paper and a pen or pencil. Read each of the following "Habitat for Rent" ads to your class, instructing them to listen carefully to figure out what animals might want to "move into" each space. Have your students write down their guesses. They can also draw each animal in its habitat. Then, discuss their guesses as a class.
3. Have your students write one of their own ads with a particular animal of temperate or tropical forests in mind. They can then read their ads aloud and have the rest of the class guess what their animal is.

"Habitat for Rent" ads

- **Available Immediately:** A second-story nest in the canopy of the temperate forest. A perfect spot to raise your young out of sight of predators, like hawks and foxes. Good food sources nearby, especially large numbers of ants and other insects to feed on. (A bird)
- **Available Immediately:** A lovely damp nurse log on the forest floor of the temperate forest. You must be willing to share space with many other animals including insects, amphibians and small mammals. There is moss and shelf fungus that live on the outside and dark damp hallways on the inside. Natural wood walls and floors, of course. Excellent for hiding yourself and your young from predators. Lots of food sources around, from the fungus, leaf litter and bugs right outside your door to the wood walls of your own house. This place has it all! (An insect, slug or salamander)
- **Available Immediately:** A treetop penthouse in the emergent layer of the tropical rain forest. A perfect lookout for spotting your next meal or the closest predator. Lots of space and sunlight with easy access to all those "hard to reach" pieces of fruit in the forest. Must be ready to move at a moment's notice back to the canopy layer in case a predator tries to "move in." (A bird, bat or monkey)

Explore Urban Habitats

In this activity, students will apply what they have learned about habitats to actual places in the real world.

More background information: Habitat section pages 28 to 29.

Synopsis: Students explore urban habitats looking for signs of wildlife and ways wildlife meet their basic needs.

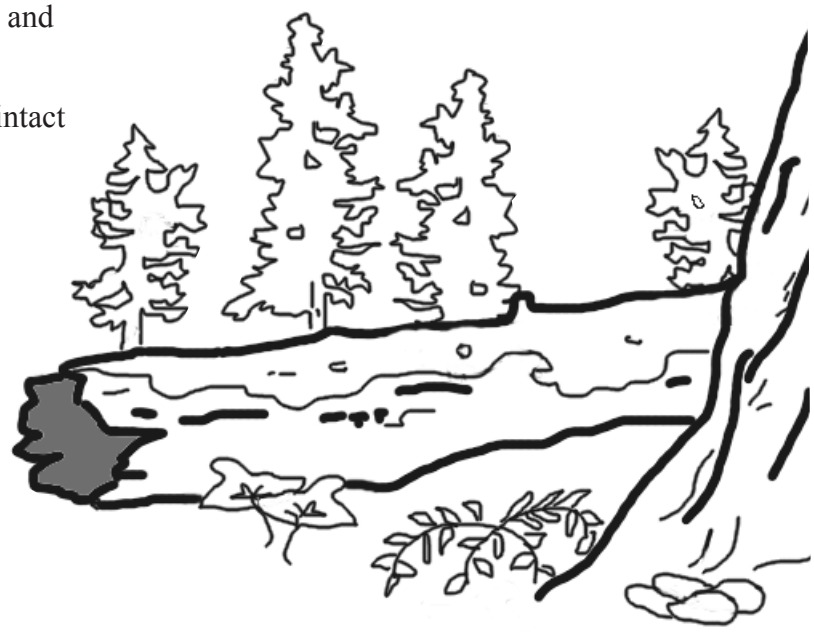
GLEs: S 1.1.5, S 1.1.6

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D; Strand 2.4: B

1. Visit a nearby park, playground or the schoolyard to look for wildlife or signs of wildlife. Prepare yourself for your trip by visiting your exploration site ahead of time. Look for signs of animal life: ant mounds, bird nests or insect activity in a tree. This will make it easier to help your students find these signs.
2. Divide students into teams and ask the teams to explore the area, looking for animals or traces of animals (tracks, eaten leaves, droppings). Remind students that if they look under logs or rocks to see what lives there, they should return anything they moved to its original position. Have students point out elements that would provide animals with their basic needs. Have them draw the habitat in their journals and label the ways that basic needs would be met.
3. Repeat this activity on an asphalt or concrete surfaced area such as a basketball court. Compare the two areas. Did they see plants or animals in either place? Which area had more plants or animals? Are both good habitats? Does the concrete area provide food, water, air, shelter and space?

Note: many King County parks have patches of intact temperate forest for your students to experience.



Habitat Game

Adapted from "Oh Deer" activity in Project Wild

In this activity, students reinforce what they learned about basic needs by becoming different animals and different needs.

Background information: Habitat section pages 28 to 29.

Synopsis: Students play a game in which they become different animals and different basic needs

GLEs: S 1.1.5, S 1.1.6, M 4.2.2

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D

Materials:

- Large open space, preferably outdoors
- Paper
- Pens or pencils

1. In the open space, have your student divide into two lines that face each other at a good running distance apart. Ask students to name an animal's five basic needs. As they name each need, demonstrate the hand symbol for that need and have your students do it back to you. If you're playing this game after your zoo visit, your students may remember these from the auditorium program.
   - Food—Hands placed over your stomachs
   - Water—Hands placed on your mouths
   - Air—Take an exaggerated breath in
   - Shelter—Hands pointed together over your heads to simulate a little house
   - Space—Hands spread wide apart from the sides of the body
2. Tell one line of students they are animals trying to meet their basic needs. (You can decide what animal they will be or allow students to choose. See "Becoming the Temperate and Tropical Rain Forests" for animal ideas.) The other line of students will be those basic needs or resources. Record the starting number of "animals" on the piece of paper.
3. The two lines of students will start with their backs to each other. They will individually decide what symbol they will represent when they turn around. At the count of three, the students will turn around and show their symbols. The "animals" will run forward and tag a student from the "basic needs" line who is showing their same symbol. When an animal successfully finds its basic need it is now strong enough to reproduce. The basic need they tagged then becomes that animal's offspring and they return with their "parent" over to the animal line. Any animal that does not find a matching basic need dies, and is recycled into a basic need and moves over to the basic needs line. This represents how nutrients travel through the food chain.
4. Run the game several times, recording the number of "animals" that survive each time.
5. Back in the classroom, ask students what happened when more than one animal ran for the same resource. Did they find themselves in a situation where there were more animals than available food, water, air, shelter and space? Explain that you recorded the numbers of animals that survived year after year. Write the number of surviving animals for each year on the board. Depending on your students' familiarity with graphing, either have your students graph the data themselves or graph it as a class. Discuss the fluctuations in the populations and the availability of resources. Explain to students that this happens in the wild too. Use this game to generate a discussion about the importance of habitat for animals.

Interdependence and Niches

Interdependence and Niches Learning Objectives:

Students will be able to:

- Construct a simple food chain and demonstrate how it shows links between plants and animals
- Give two examples of how living things are interdependent
- Describe or define a niche and be able to name an animal and its respective niche

Food Chains

In this activity, students construct a simple food chain and demonstrate how it shows links between plants and animals.

Background information: Interdependence and Niches section pages 30 to 32.

Synopsis: Students construct a food chain.

GLEs: S 1.1.6, S 1.2.7

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D

Materials:

- One "Food Chain" worksheet for every student (copied onto the back of scrap paper if possible)
- Crayons or markers
- Scissors
- Tape

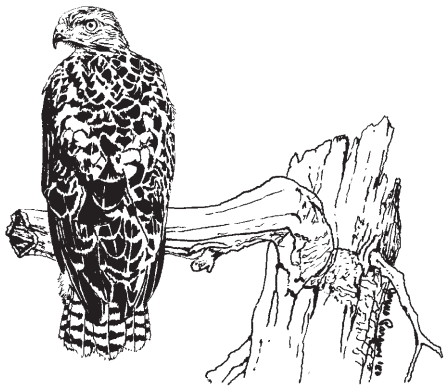
1. Discuss with your students the idea that food chains are one way to show interdependence, or how plants and animals are linked in nature. Using the chalkboard or overhead projector, have your class construct a simple food chain that might occur in the forests you're studying. For example:

   Sun → Huckleberry bush → Bird → Hawk

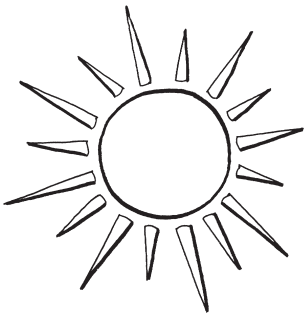
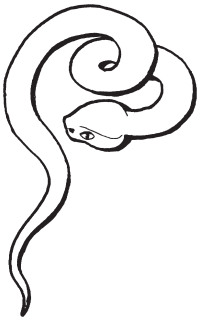
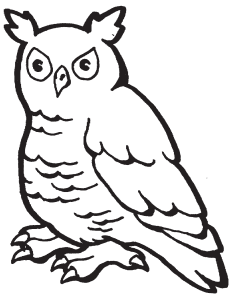
   A huckleberry bush gets energy from the sun, which it uses to grow and produce fruit. A bird eats some of the berries. Eventually, a hawk might eat the bird.

2. Hand out the "Food Chain" worksheets. Have your students color each of the links in their chain and cut them apart. Then have each student form a chain by taping the ends of the first link together to form a circle, then feeding the next link through the first and taping its ends together to form a circle. Repeat until all the links are hooked together to form a chain.

3. Ask your students if they think that the food chain stops with the top predator. How might the energy from a top predator be passed back into the system if that animal is never preyed upon by another animal? The food chain continues with that animal's death and decomposition, which fertilizes the soil and starts the cycle all over again. Explain that every plant and animal that avoids being eaten eventually dies and nourishes the soil for further growth. Nourishing the soil is one role that animals and plants play.



Food Chain Worksheet

A	Energy comes from the sun.		A
B	A plant uses the sun's energy to make food.		B
C	A mouse eats the plant.		C
D	A snake eats the mouse.		D
E	An owl eats the snake.		E

Food Web Game

In this activity, students will be able to give two examples of ways that living things are interdependent.

Background information: Interdependence and Niches section pages 30 to 32.

Materials:

- One 3”x5” card for each student
- One 1.5’ length of string per student (optional)
- Ball of yarn
- Crayons or markers

Preparation: Write the name of a component of a temperate or tropical rain forest community on each of the 3”x5” cards. Include sun, water, soil, air, and individual plant and animal species. Make sure to include producers, consumers and decomposers (use the food web illustration for ideas). There should be a different component for each student or the game can be played in shifts. If possible, attach string to the upper corners of the cards so they can be hung around the students’ necks.

1. Pass one card out to each student and have the students illustrate their cards. Have the students sit in a circle with the cards around their necks. Ask the students to imagine a forest community. Explain that the forest gets its energy from the sun. Hand the end of the ball of yarn to the student with the sun card. This student should hold onto the end of the yarn. Ask the members of the class to raise their hands if they think they represent community members that rely on the sun for energy (hint: plants). Walk over to a student that correctly raises his/her hand, and give her/him a section of the yarn to hold. Now, ask for an animal that depends on this plant (the student now holding the ball) for food or shelter. Continue to ask questions and pass the remainder of the ball of yarn around until all the students are holding at least one section of the yarn. A web should form as string is passed back and forth from student to student.
2. Now, stop and explain to the class that factors that affect one member of the community will be felt by other members as well. Have the students imagine that a tree is cut down. Instruct a student with a tree card tug on his/her yarn. Have any students who felt the tug raise their hand. Now these students can tug on their yarn. All students who felt the tug should raise their hand. Make up other scenarios (disease, introduced species) that would affect the forest and repeat. Explain how both natural and man-made disruptions to the forest create consequences throughout that community.

Synopsis: Students play a food web game in which they link plants and animals

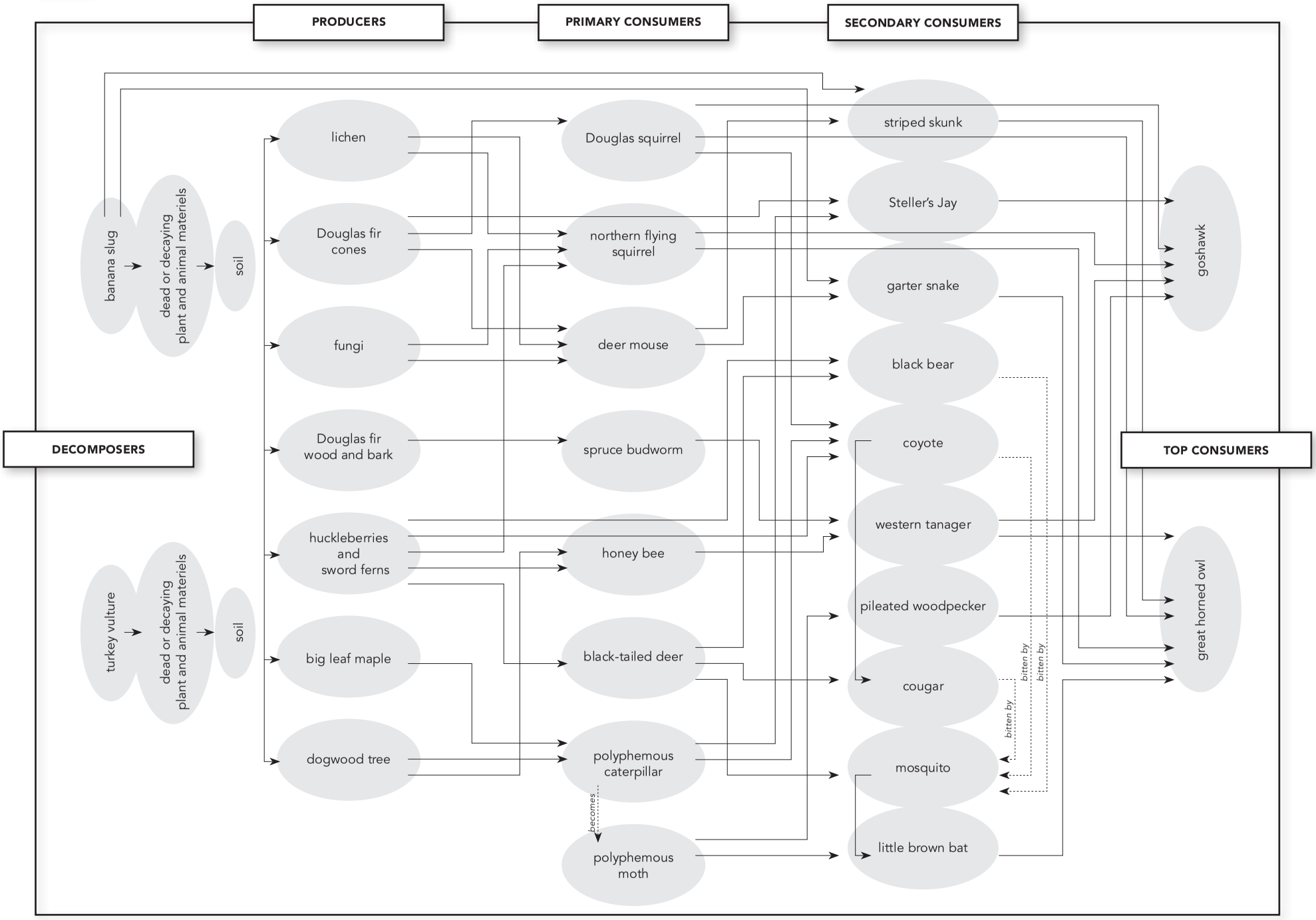
GLEs: S 1.1.6, S 1.2.7

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D; Strand 2.4: A, B

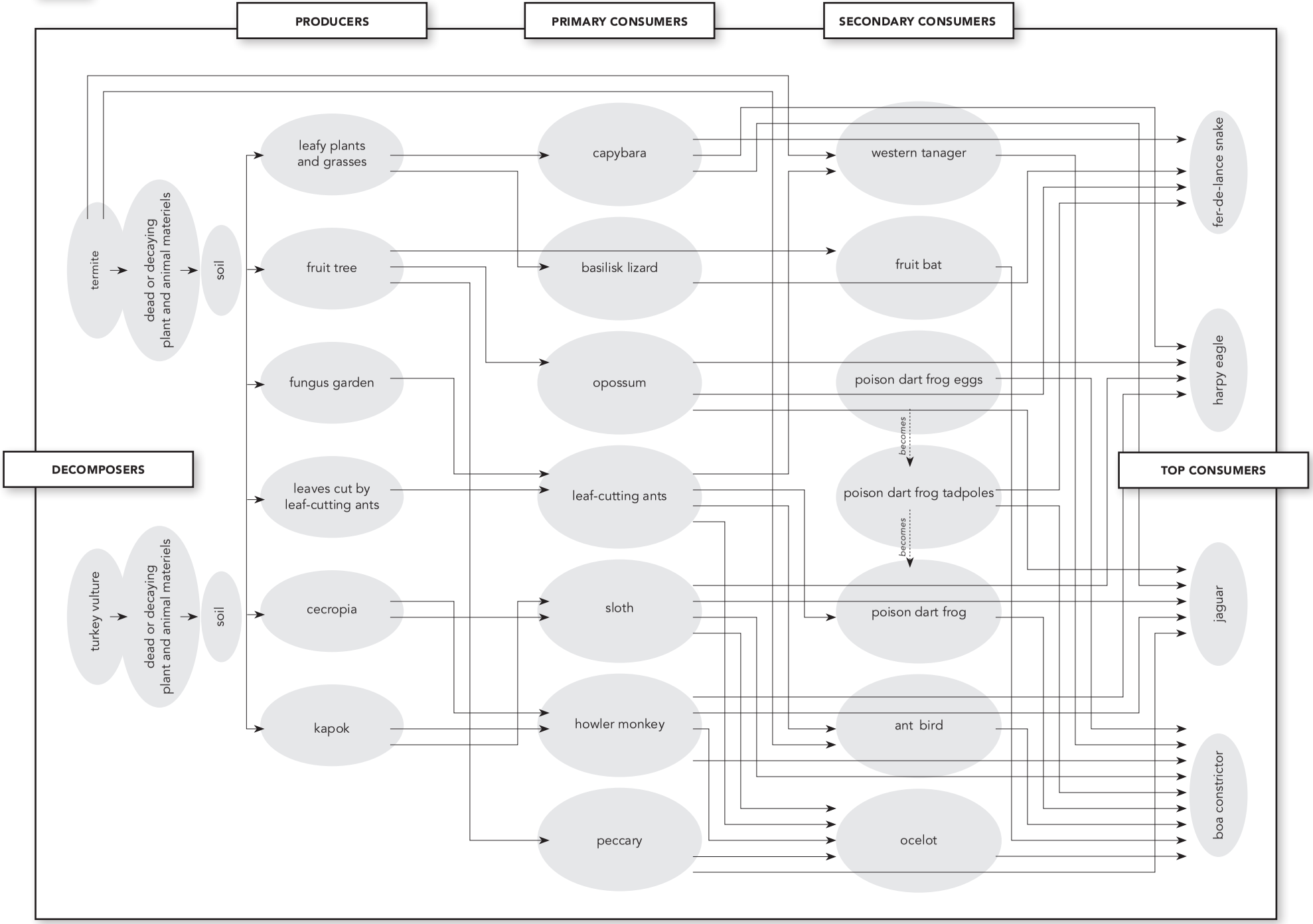
Temperate Forest Food Web

An example of a more complex food web for a temperate forest of western Washington:



Tropical Rain Forest Food Web

An example of a more complex food web for a ttropical rain forest of Costa Rica:



Interconnected Niches

In this activity, students will be able to define a niche and be able to name an animal and its respective niche.

Background information: Interdependence and Niches section pages 30 to 32.

Materials:

- One "About Me" worksheet for each student
- One "My Roles, Your Roles" worksheet for each student

1. As an introduction to the concept of niches, discuss with your students the roles people play in their community. Using yourself or another person as an example, make a list on the overhead projector or chalkboard of some of the roles you play in your community. This list could contain items such as teacher, mother/father, soccer coach, reader, basketball player, cook, hiker, grocery shopper, car washer, etc.

2. Explain to your students that people's roles in their communities are similar to the roles that species play in their ecological communities, also known as their "niche." Discuss how people's roles or activities play a part in defining who they are as people. Each person is unique and the combination of our activities, roles and habits makes us who we are. Additionally, discuss which other factors might help define you as a person. Are you a "morning person" or a "night person," a city dweller or a country dweller, a health food enthusiast or a junk food eater?

3. Point out to your students that many of the roles people have involve forests. You can ask students if they go camping, hiking or picnicking in forested areas or use the forest in other ways. Also, have them think of the products they use in their daily lives: paper? chocolate? wood? bananas? Keep a tally of their responses on the board to see how many of your students' niches extend into the forest.

4. In class or as homework, have the students fill out the "About Me" worksheet.

5. When completed, point out to the students that even though some things about us are the same, each of us has a different set of characteristics that define us. Break the students up into pairs. Each pair should fill out the Venn diagram on the "My Roles, Your Roles" worksheet using the information from the "About Me" worksheet to compare the niches they fill.

6. Then have each pair of students choose an animal from the temperate or tropical rain forest (if they created habitat dioramas, they can choose the animal they created a habitat for), and work together to describe the niche of the animal, including what it eats and how it obtains food, what preys on it, and how the animal avoids predators.

7. Wrap up the activity with a class discussion about niches. Have each pair of students share information about what they discovered while filling out the "My Roles, Your Roles" worksheet and information about their forest animal and its niche.

Synopsis: Students figure out their niche in the community as well as the niche of a forest animal

GLEs: S 1.1.6, S 3.2.4

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, B, C; Strand 2.3: A, B; Strand 2.4: A, C2.4: A, B

About Me...

Name_____

Things I do: *(chores, school, hobbies)*

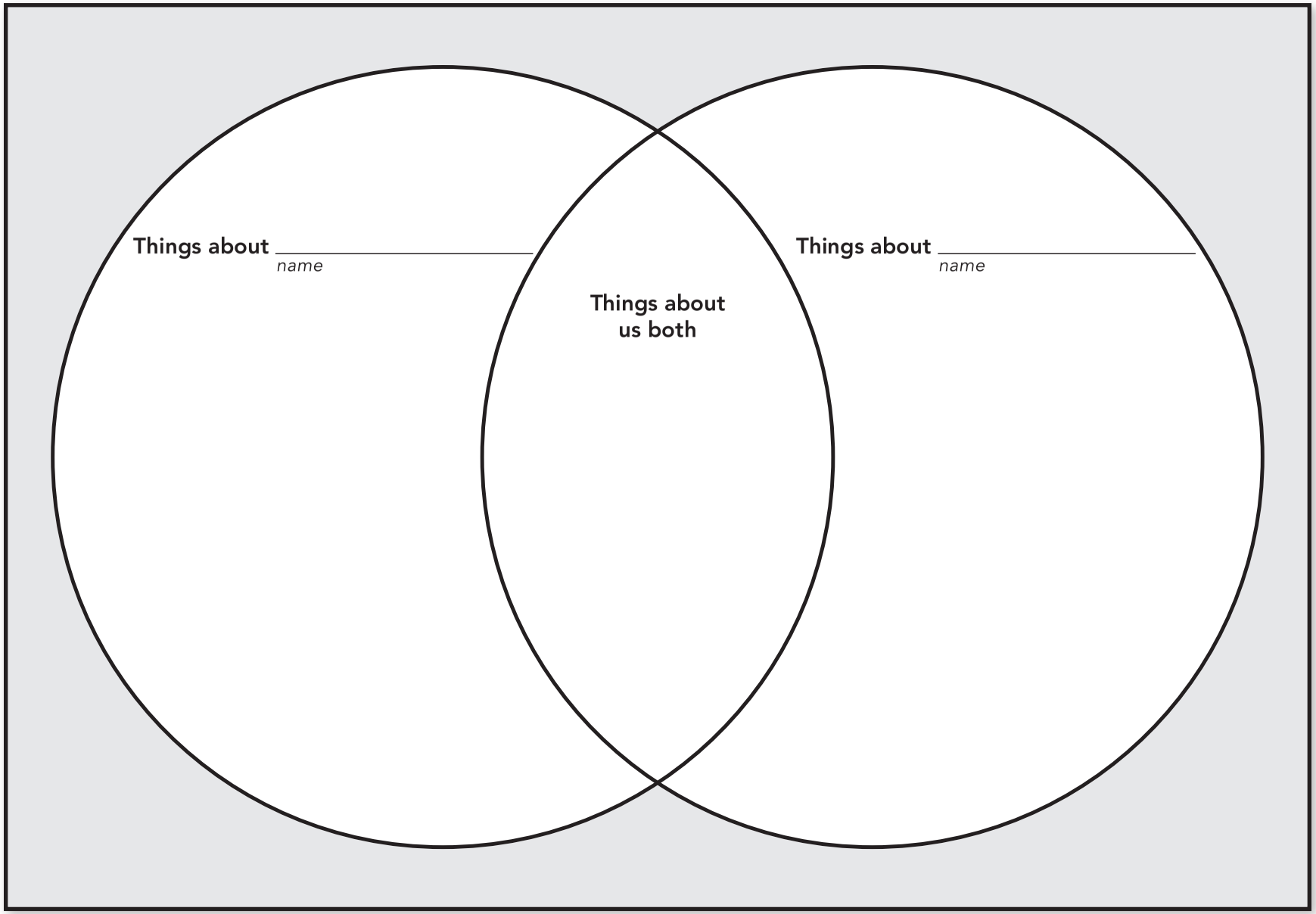
Where I live: *(city, country, house, apartment, condo)*

What I like to eat:

Other interesting information about me:

My Roles, Your Roles

Name_____



Interdependence and the Western Tanager

In this activity, students will be able to define the word interdependence using the western tanager as an example.

Background information: Interdependence and Niches section pages 30 to 32.

Materials:

- One copy of "A Day in the Life of a Western Tanager"
- One "Niches" worksheet for each student
- One western tanager sticker (provided in folder) for each student

1. Discuss with the class the concept of interdependence, which is that all living things depend on each other to survive. Also mention that the niches of living things also are linked. Explain that you cannot fill your role as a teacher without other people also filling their roles as principal, janitor, office staff, parents, and of course, students. If students do not do their chores or don't show up for their soccer game, how does this affect others?

2. Pass out a "Niches" worksheet and a western tanager sticker to each student. Have them fill out the worksheet for the niche of the western tanager while you read "A Day in the Life of a Western Tanager" out loud to the class. After reading the story, go through the worksheet and have your students share what they wrote. Then, have a class discussion about how the tanager's life is linked to that of other plants and animals: trees for nesting, perches and shelter; insects and berry bushes for food; sharp-shinned hawks eat tanagers; tanagers spread seeds that will become new berry bushes, etc. Discuss how these little birds have an important role in controlling insect populations and spreading seeds.

Optional extension: You and your class can create a play out of "A Day in the Life of a Western Tanager" and act out the different plant and animal roles.

Synopsis: Students determine the niche of the western tanager

GLEs: S 1.1.6, S 1.2.7

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D

A Day in the Life of the Western Tanager

A flying ant was soaring through the evergreen forest of Olympic National Park. It was returning to its hive with news of a new food source it had discovered. Suddenly a songbird broke the silence of the forest, "pit-er-ick, tu-weep", and before the ant knew what was happening a brightly colored western tanager swooped down from above and caught the ant in mid-flight. The tanager had been silently watching the forest from her high perch, just waiting for some food to come along. She loved to eat flying insects like ants, termites, and wasps. After she grabbed the ant she flew back up onto a western hemlock branch to watch for another passing meal.

A few minutes passed during which she remained perfectly still, moving only her head to look for insects. The forest around the tanager was alive with plants and animals. The sun, an important part of life for all plants and animals, was shining brightly down on the tanager and the hemlock tree. The tree had collected carbon dioxide, water, and nutrients from the environment and was cooking these "ingredients" with the sun's energy to make sugar and oxygen. The sugar helps the tree from freezing in the winter and makes the needles taste good to hungry red tree voles. The oxygen would be released back into the air. Although she didn't know it, the tanager, the other animals of the forest, and even humans depend on this oxygen to live.

The tanager spotted a wasp buzzing around in the tree's needles. Again she swooped down from above and caught the wasp in flight. But this time she didn't swallow the insect. Instead she kept flying, holding the wasp in her beak as she soared through the forest.

The tanager landed on a branch of an old Douglas fir tree next to a beautiful nest that was shaped like a cup. The nest was built out of fir twigs, mosses, small roots, and animal hairs all woven together and cradled in the little nook where the branch joined the tree trunk. In the nest were two young birds, which had been born earlier that summer. Both were begging for food. All the tanager had was one wasp so she fed the hungriest chick first, knowing that their father would soon return with another tasty bug.

Soon after the female tanager had flown away in search of more food, a second tanager landed next to the nest. He was a bright yellow color like the first tanager, but unlike the female, his head was bright red. The hungry chick didn't notice the color of his father's head, all he could see was the wood-boring beetle in the adult tanager's beak. The tanager fed the beetle to the chick who quickly gobbled it up.

As the male tanager flew away from the nest he was careful not to let other animals see him. He didn't want to let any predators know where the babies were. Other birds, snakes, and small mammals out in search of food were always on the lookout for easy prey and the chicks were still too young to fly away from enemies.

The tanager went off in search of more food. He needed to be well fed because in less than two months he would begin his trip south to the rain forests of Costa Rica. Every year all the

tanagers living in the forests of western North America would migrate south looking for a warm place to spend the winter. He and the other birds would stay in Costa Rica until the next spring. Then they would making the long, 3000 mile, journey back to the Pacific Northwest. The tanager also had to make sure his babies were well fed because they would have to be big enough to fly south too.

Suddenly a loud, high-pitched "kiu kiu kiu" broke the silence of the forest and the tanager swerved under a branch just in time to miss being caught by a sharp-shinned hawk. The hawk was out hunting for food too, but she was interested in eating small birds, like the tanager, not insects. Luckily for the tanager, the hawk was a little careless today and missed her prey.

The tanager flew down into the understory of the forest to hide from the hawk who was still looking for dinner. He soared through the shrubs and landed on the thin branch of a blackberry bush. He waited silently while the hawk moved away in search of new prey, maybe a deer mouse or another small bird.

Sitting on the branch the tanager began to eat blackberries. First he squashed the berries in his beak, then he ate the juicy insides, including the seeds. He let the tough outer skin fall to the ground. The insects and mushrooms living on the forest floor would break down the berry skins and return the nutrients to the soil. After eating his fill of berries the tanager flew off into the forest. Later when the tanager went to the bathroom the berry seeds, which he could not digest, would be dropped in another part of the forest. Next year when he returned from Costa Rica there might be a new blackberry bush in the forest providing food for the tanager, as well as other birds, small mammals, insects, and humans hiking through the woods.

The sun was setting and the forest was quickly becoming dark. The night predators, like owls, would soon be coming out to hunt and they could see much better in the dark than the tanager could. It was time for him to return to the nest and sleep. He had another busy day ahead.

Woodland Park Zoo

Niche of the Western Tanager

What it eats	Where it lives
When it is most active	What eats it
How it gets its food	

Niche Quilt

In this activity, students will illustrate an animal and its respective niche.

Background information: Interdependence and Niches section pages 30 to 32.

Materials:

- Five squares of white paper for each student, approximately 5.5 x 5.5 inches
- One large piece of colored paper for each student, approximately 12 x 18 inches
- Pieces of Styrofoam (clean meat trays)—optional
- Crayons or markers
- Glue sticks

1. Each student will create a wildlife quilt based on what they have learned about niches. Students can use the animal they created a diorama for or can choose another temperate and tropical rain forest animal. Provide your students with five paper squares. Have them draw the following on each square:

   - The animal
   - The animal's habitat
   - When the animal is active (can be represented by sun, moon, sunrise, sunset)
   - What it eats
   - What eats it

2. Once the all the squares are drawn, have students glue the drawings of the habitat, when the animal's active, what the animal eats and what eats the animal in the four corners of the colored paper. Then, they can glue their animal in the middle of a larger piece of paper on top of the piece of Styrofoam (to give their animal picture prominence). Students should be able to look at one another's quilts and explain what niche that animal fills.

Synopsis: Students play a game in which they become different animals and different basic needs

GLEs: S 1.1.6, S 1.2.7

EALRs: A 3.2

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D

Musical Niches

In this activity, students will understand how animals' niches are connected and affected by natural changes in the animals' habitat.

Background information: Interdependence and Niches section pages ___ to ___.

Synopsis: Students play a musical chairs game in which they become an animal fulfilling its niche

GLEs: S 1.1.6, S 1.2.7

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D

Materials:

- One chair for each student
- Black paper circles, one for half the chairs
- Paper mushrooms, one for half the chairs
- Paper ants, one for half the chairs
- Paper leaves, one for half the chairs
- Tape recorder with cassette tape of music

1. In a circle, set out one chair for each student, facing out. Divide students into two groups, the woodpeckers and the banana slugs. (Students may want to create pictures of their animal to wear around their necks during the game.) On the backrests of half the chairs, tape black circles of paper representing tree holes. On the other chairs tape pieces of paper shaped like mushrooms. Ask students which chair a woodpecker would sit on (tree hole) and which chair a banana slug would sit on (mushroom). The symbols on the chairs represent an important component of each animal's niche.

2. Have students walk in a circle around the chairs while music is playing. When the music stops, each student has to find his/her correct niche and sit down. During the first round all students will find a seat.

3. For the second round, replace half the tree holes with insects and half the mushrooms with leaves. Discuss with your students that the woodpeckers also eat insects and slugs also eat leaves so they can sit in either chair because these are necessary components of their niche. Play the game again and each student should be able to find a seat when the music stops.

4. For the third round, explain how a big wind storm knocked down many of the trees and eliminated the number of tree holes. Take most of the tree hole chairs away and play again. Woodpeckers who can't find seats (necessary components of their niche) will die or move away (students sit out of game).

5. For the fourth round, explain how a big fire came through the area. After the fire, lots of mushrooms pop up all over the forest. Replace some chairs and label them with a mushroom. Tell a few students who are sitting out that they are now slugs who move into the forest to feed on the mushrooms. Make sure to add more slugs than available mushroom or leaf seats. During this final round, too many slugs will compete for food and some of them will have to sit out.

6. Finish this activity with a discussion of the natural changes in the forest environment and how each affected the diversity of vegetation and the available niches for the plants and animals.

Conservation

Conservation Learning Objectives:

Students will be able to:

- Demonstrate three ways in which people benefit from forests
- Communicate two things people can do to preserve forests

Beneficial Forests

In this activity, students will learn ways in which people benefit from forests.

Background information: Conservation section pages 33 to 41.

Materials:

- Blackboard and chalk
- Paper
- Crayons or markers

1. Brainstorm with your students about the benefits of forests. Write the list on the board. Make sure they include the following:

- Trees and other plants make oxygen
- Forests provide habitat for animals (including humans)
- Forests provide food for people
- Forests are a source of medicines
- Forests are a source of wood
- Forests provide recreation, including hiking, hunting and fishing

2. Ask your students to pick one of the benefits that is most important to them and draw a picture of it on a piece of paper. Label different walls of your classroom with each benefit and have students put their picture up underneath that benefit.

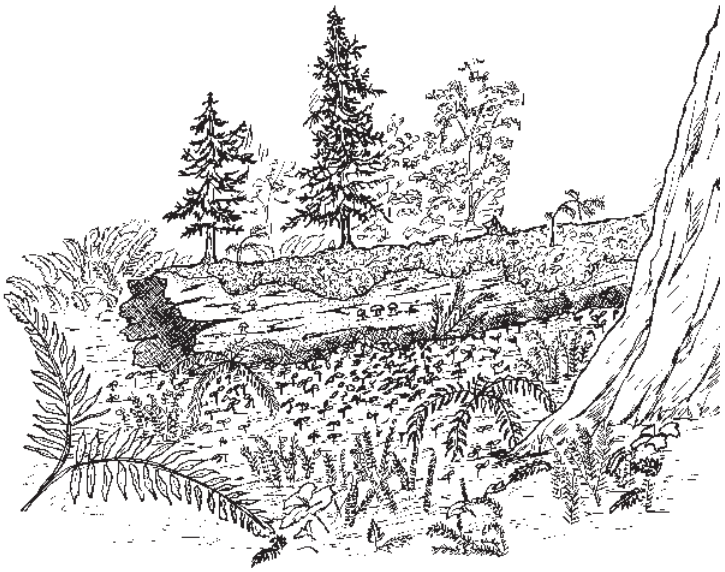
Synopsis: Students list and illustrate different ways that forests are beneficial

GLEs: S 1.1.6, S 3.2.4

EALRs: A 3.2

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: C; Strand 2.4: A, B, C



Forest Products

In this activity, students will understand that many products in their school and home come from forests.

Background information: Conservation section pages 33 to 41.

Materials:

- One "Forest Product" and one "Not a Forest Product" label for each student
- One "Checklist of Forest Products" worksheet for each student

1. Review with students the things temperate and tropical rain forests have in common. Point out to students that another thing these forests have in common is that they are used by people for many things. Ask your students to name things that are made from wood or wood pulp. Now ask them to name foods that come from or originate from the forest. Explain that many products that do not seem like forest products really are. List some of the products, including such things as photographic film, oils, adhesives and medications. To help students visualize these things, bring a few items from home to share.

2. Give each of the students one "Forest Product" and one "Not a Forest Product" label and have each student label items in the classroom. Then, pass out a copy of the "Checklist of Forest Products" worksheet to each student. For homework, have the students work with their parents to check off as many items as they can find at home. Have each student bring in one interesting forest product they found at home to add to the class forest product collection.

Extension: Create a forest products museum. On a shelf or empty display case, display as many forest products as possible. If feasible, have one section for temperate forest products and one section for tropical rain forest products. If you created murals of each forest, the temperate forest products can be displayed near the temperate forest mural and the tropical rain forest products can be displayed near the tropical rain forest mural.

Synopsis: Students investigate which products in their school and home are derived from forests

GLEs: S 1.1.6, S 3.2.4

EEGs: Goal 1, Objective A

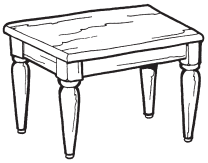
NAAEE Guidelines: Strand 2.4: A, C

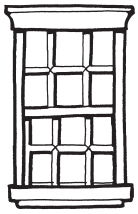
Checklist of forest products

Find as many of these forest products from home as you can:

WOOD PRODUCTS

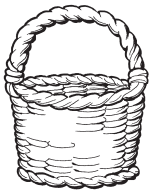
- ☐ table
- ☐ chair
- ☐ cabinet
- ☐ door
- ☐ door frame
- ☐ window sill
- ☐ garden furniture
- ☐ other furniture
- ☐ cutting board
- ☐ tool handle
- ☐ salad bowl
- ☐ wooden toy
- ☐ chop stick
- ☐ wood floor
- ☐ roof shingle





OTHER PRODUCTS

- ☐ bamboo or rattan basket
- ☐ rayon clothing
- ☐ burlap
- ☐ latex rubber glove
- ☐ photographic film
- ☐ latex golf ball cover
- ☐ string or rope made of jute or raffia
- ☐ lotion or soap with coconut, eucalyptus, patchouli or camphor oil
- ☐ rattan or wicker furniture
- ☐ tung oil or wood varnish
- ☐ Ping-Pong ball
- ☐ cellophane wrap

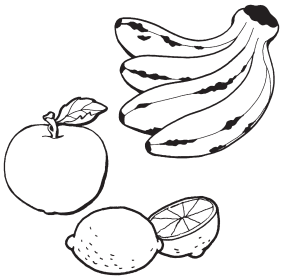


PAPER PRODUCTS

- ☐ books
- ☐ notebook paper
- ☐ paper towel
- ☐ disposable diaper
- ☐ tissue
- ☐ cardboard box
- ☐ poster
- ☐ calendar
- ☐ envelope
- ☐ magazine
- ☐ napkin
- ☐ paper plate
- ☐ toilet paper
- ☐ wrapping paper
- ☐ drawing or writing paper

FRUITS

- ☐ avocado
- ☐ banana
- ☐ coconut
- ☐ grapefruit
- ☐ guava
- ☐ lemon
- ☐ lime
- ☐ mango
- ☐ orange
- ☐ papaya
- ☐ passion fruit
- ☐ apple



SPICES

- ☐ allspice
- ☐ black pepper
- ☐ cayenne
- ☐ chili powder
- ☐ cinnamon
- ☐ cloves
- ☐ ginger
- ☐ nutmeg
- ☐ paprika
- ☐ vanilla
- ☐ tamarind (in sauces)

VEGETABLES, NUTS AND OTHER FOODS

- ☐ Brazil nut
- ☐ walnut
- ☐ hazelnut
- ☐ cane sugar
- ☐ cashew nut
- ☐ chocolate (cacao bean)
- ☐ coffee
- ☐ macadamia nut
- ☐ pepper
- ☐ soft drink (cola nut)
- ☐ tea
- ☐ bamboo shoot
- ☐ chestnut
- ☐ tapioca

NOT A FOREST PRODUCT	NOT A FOREST PRODUCT	NOT A FOREST PRODUCT	NOT A FOREST PRODUCT
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FOREST PRODUCT

Each Two Teach Two Conservation Tips

This activity takes a bit of organization but is a wonderful way for students to learn by teaching others. The students will teach each other about ways to help save forests and natural resources using a method called "each two, teach two." This activity should be done in an area where students can spread out into approximately 14-15 teaching stations. The stations need only be designated spots in the classroom or outside where students can share their information. A parent helper might be useful for this activity to keep the students organized.

Synopsis: Students teach each other conservation tips

GLEs: S 1.1.6, S 3.2.4

EALRs: A 3.2, C (2.1, 2.2, 2.3, 2.4, 2.5, 3.2)

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: C; Strand 2.4: C, E; Strand 3.2: A, C; Strand 4: C, D

Preparation: Cut the "Conservation Tips" into individual strips with one tip on each slip or create your own tips.

Materials:

- One Conservation Tip per pair of students
- Materials for creating posters and props: poster paper, markers, crayons

1. A few days before you do the activity, have a discussion about conservation actions with your students. What do they already do at home? What do they already do as a class? What other actions can they do? Write these actions down and include some as Conservation Tips. Divide the students into pairs and hand each pair of students a Conservation Tip. Each pair should discuss how their tips help wildlife and/or forests and how they want to teach their tip to their classmates. Students can then illustrate their tips, preparing a picture or poster, or bringing props from home to use as visual aids.
2. On the day of the activity, ask the first pair of students to come to the first station and prepare their teaching tip. Have the second pair of students come forward to station #1 so the first group can teach the second pair their tip.
3. After a full minute have the second pair move to station #2 and prepare to teach their own tip. At the same time pair #2 is preparing at station #2, a third pair of students approaches the first pair of students to be taught at station #1.
4. After another minute, learners at station #1 move to station #2 to be taught and the fourth group starts at station #1. In this way, students progress through the stations and when they get to the end they become the next station. After the last pair moves on to station #2, the first pair now becomes the learners. The first pair will now move on to station #2, then #3 and so on to hear the tips at each station. As the first group moves through the stations, they bring the pair at each station with them to the next station so they too become learners at the following stations. The groups progress through the chain until the last pair has taught their tip to the group.
5. After completing the "each two, teach two" activity, ask students to make a conservation pledge of one thing they will do differently in their lives to help protect the environment. Have the class as a whole make one pledge that will represent the daily conservation efforts of students while they are at school. If you make recycled paper (included in Conservation projects), pledges can be mounted and displayed on the recycled paper.

Conservation Tips

Use a sponge or cloth rag instead of paper towels for cleaning. This helps save trees and makes less garbage.	Don't keep wild animals as pets. Wild animals are hard to keep healthy at home because we can't meet all their needs. Make a bird feeder or bird house or plant native plants so you can watch wild animals in their natural habitat instead.
Don't buy food for your lunch that has lots of packaging. All that packaging is made from trees and other resources that just end up in the garbage.	Don't let the water run when you brush your teeth or wash your hands. You can save five gallons of water for fish and other wildlife each time you brush or wash.
When you bring your lunch to school, use a lunch box and pack your food in reusable containers. Paper and plastic bags are made of forest products. Once they have food on them, bags can't be recycled.	To save trees, use both sides of a piece of paper, not just one side. Recycle the paper when you are through with it instead of throwing it in the garbage.
When you help your parents clean the house, use safe cleaners, such as baking soda, vinegar and lemon juice instead of chemical cleaners. Safe cleaners don't harm our lakes and rivers like chemical cleaners do.	For lunches away from home, bring juice from home in a water bottle. Or buy juice in recyclable containers. This way you are both reusing something and then recycling it. Either way you are consuming less!
Take care of your toys, books and clothes. If you take care of your things, they last longer. Then you won't have to buy new ones and use up more resources.	Put bird seed and nesting boxes out for the birds, especially during the cold times of the year. This will help wild birds live in our neighborhoods.
Think before you buy things. Buy things that will last; don't buy throw-away or disposable things. It takes almost as much energy and materials to make disposable things as it does to make things that last.	When you learn new things about nature and how to help save animals and their habitats, tell your friends what you've learned. Your friends will see your excitement and want to help too.
Use cloth napkins instead of paper napkins. Cleaning napkins uses less energy than making paper ones. It saves paper, too.	Even if you can only do a little bit to save forests, do what you can; every little bit helps. Someone will notice the things you to do help protect the environment and that friend or relative might copy your behavior and then they might help change someone else's behavior.
When you buy things at the store, take a backpack or canvas bag from home to carry your things home. You can also reuse your grocery bags over and over again. Using cloth bags or reusing grocery bags both save lots of trees.	Visit nearby temperate forests. Many city or county parks have temperate forests that you can explore with your family.

Return to Wants vs. Needs

In this activity, students will understand that many of their needs and wants come from forests.

Background information: Conservation section pages 33 to 41.

Materials:

- One page of "Forest Product" and "Not a Forest Product" slips
- One copy of "Checklist of Forest Products"
- List of wants and needs created during the Wants vs. Needs activity

Preparation: Cut out more "Forest Product" and "Not a Forest Product" slips.

1. Reintroduce the topic of basic needs, secondary needs and wants. Have them list off every organism's basic needs (food, water, air, shelter, space), a few secondary needs (soap, bed, school) and wants (toys, cell phones, fancy clothes).

2. Post the list of wants and needs created during the Wants vs. Needs activity and ask your students if any of the items are forest products (keep the "Checklist of Forest Products" handy to refer to). Discuss each item and where they think it comes from. Tape a "Forest Product" slip next to those that are forest products and a "Not a Forest Product" slip next to those they think aren't forest products. Talk about how lucky we are to have forests and how they supply not only many of our basic needs, but also many of our secondary needs and wants.

Synopsis: Students examine the list they created of needs and wants and determine which are derived from forest products

GLEs: S 1.1.6, S 3.2.4

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A; Strand 2.3: A; Strand 2.4: A, B, C

Hands-on Conservation Projects

Our action, or inaction, and the choices we make can have significant effects on the environment and natural systems. The following activities are ideas to help students understand that they play an important role in conservation and that their efforts can benefit the natural environment. Each project can be accompanied by a discussion of how this action helps wildlife and forests. Students can also be encouraged to do some of these projects with their families at home.

Worm Bin

In this activity, students will directly observe the conversion of food waste into usable soil.

Worm bins can be an excellent teaching tool to demonstrate decomposition, soil creation, and resource conservation. For more information on worms and worm bins, check out the book Worms Eat My Garbage by Mary Appelhof. Note: if cared for properly, worm bins should not give off unfavorable odors and can be stored inside. If stored outside, take precautions such as a latch on your lid to ensure that rodents don't have access to your worm bin.

Synopsis: Students participate in a classroom worm bin

GLEs: S 1.1.6, S 3.2.4

EEGs: Goal 1, Objective A, D

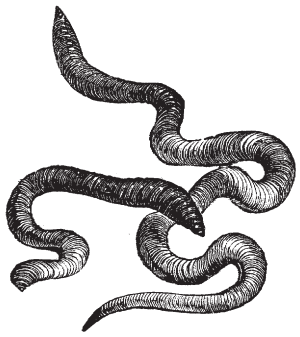
NAAEE Guidelines: Strand 2.2: C, D

Materials:

- Worm bin
- Worms
- Soil
- Newspaper
- Food scraps

1. With your students or on your own, build a worm bin for use in your classroom. Any solid wood or non-clear plastic bin with a lid will do. Holes should be cut in the lid to allow air circulation. For more detailed information on worm bins, including worm bin plans, see Seattle Tilth's Web site: http://www.seattletilth.org/resources/compost
2. Start your worm bin by placing a thin layer of dirt and several inches of dried leaves or shredded newspaper at the bottom of the bin. Now add worms. Worms can be obtained from specialty garden centers or from a friend with a worm bin.
3. Feed lunch scraps to your worms about once a week, avoiding meat and greasy foods. Apple cores, bread, lettuce and bruised fruit all work well. Food broken into small pieces or diced up will be broken down more quickly. If the contents of the bin begin to dry out, sprinkle water over the top or spray with a water bottle. Do not pour in large volumes of water in your bin or you may drown your worms.
4. Have your students observe the bin regularly and note how the food scraps are being converted into fertile soil. As soil builds up, some can be removed and used to plant seeds in the classroom or outside if you have a school garden.

Extension: Students can weigh and tally the amount of food waste that is being fed to the worms instead of being thrown in the garbage.



Educate Others

In this activity, students will take ownership of conservation issues by educating others

Background information: Conservation section pages 33 to 41.

Materials: varies

Have the class choose a conservation issue to study and present to the school. They can make conservation posters or banners to hang in the hallways showing green choices (environmentally friendly actions) vs. red choices (less environmentally friendly actions). Your class could also write and perform skits or songs for other classes demonstrating some of the information they have learned about forests and conservation.

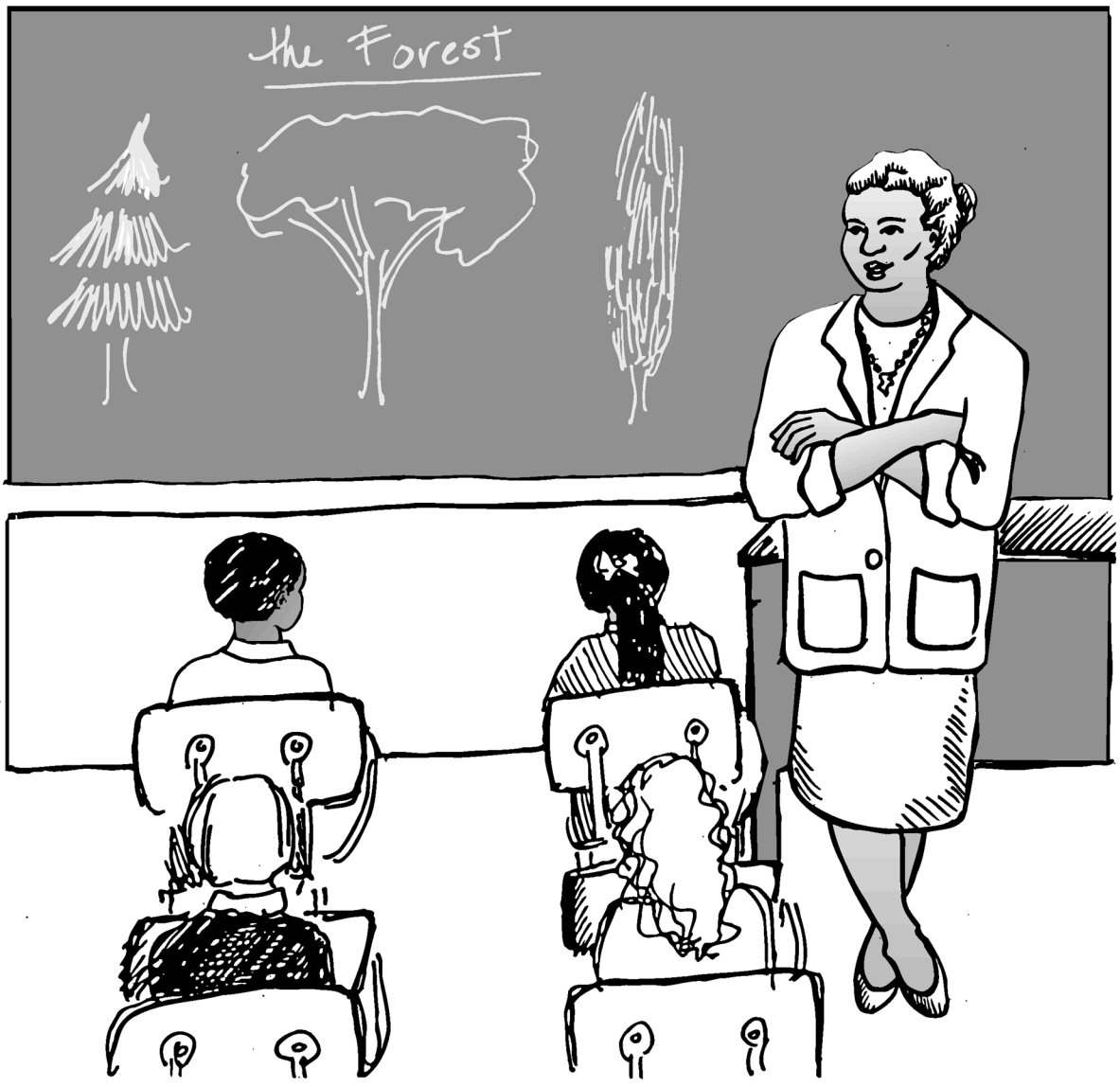
Synopsis: Students education others on conservation issues

GLEs: S 3.2.4

EALRs: A 3.2, C (2.1, 2.2, 2.3, 2.4, 2.5, 3.2)

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: C; Strand 2.4: C, E; Strand 3.2: A, C; Strand 4: C, D



Make Recycled Paper

In this activity, students learn how to make new paper from used paper.

By reusing and recycling paper and paper products, you can help to ease the demand for pulp from trees to make new paper and paper products and also help to decrease the volume of garbage put into landfills.

Synopsis: Students make new paper from waste paper

GLEs: S 3.2.4

EEGs: Goal 1, Objective A, D

NAAEE Guidelines: Strand 2.2: D; Strand 2.4: C

Materials:

- Waste paper
- Tub
- Blender
- Natural dyes, food coloring or bits of flowers and leaves
- Dishpan
- Screen
- Dish towel or newspaper
- Sponge

1. Tear waste paper into small pieces and put in a tub of warm water to soak overnight.
2. Place a few handfuls of the soaked paper in a blender half-filled with water. Blend the paper using short bursts of speed to create a watery paper pulp.
3. Stir in natural dyes, food coloring or bits of flowers and leaves.
4. Pour the pulp into a dishpan with about three inches of water on the bottom. Repeat the process until there is an ample supply of pulp. You may want to use several dishpans, adding different colors to each or using different types of waste paper such as writing paper or construction paper.
5. Have students stir the pulp with their hands then lower the screen into the dishpan and slide it back and forth through the pulp and then lift the screen straight up. There should be a thin layer of pulp distributed evenly on the screen.
6. Lay the screen on a dish towel or newspaper to drain. Place a piece of old sheet or dish towel over the pulp and screen and press firmly with a sponge to absorb excess water. Wring out the sponge and repeat until most of the water has been removed from the pulp. Turn the screen over onto a piece of newspaper or sheeting to release the paper.
7. Dry the recycled paper on a flat surface overnight and gently peel it the surface in the morning. Students can use their recycled paper to mount a forest poem or a conservation pledge.

Creating and Restoring Habitats

In these activities, students receive hands-on experience at creating and restoring habitat.

Creating habitat in backyards and schoolyards and restoring habitat in local parks combat some of the biggest threats to wildlife: habitat fragmentation, pollution, invasive species, and a growing disconnect with nature. Creating and restoring habitat can reach many cross-curricular goals and gives students excellent hands-on experience.

Synopsis: Students create or restore habitat

GLEs: S 3.2.4

EEGs: Goal 1, Objective A, C

NAAEE Guidelines: Strand 2.2: A, C, D; Strand 2.3: A; Strand 2.4: A

- Involve your students in the joy of gardening and the excitement of watching something grow. In your schoolyard, find a place to create a native plant garden that will attract bees, butterflies and birds. Hang bird feeders, but talk about how native plants provide the best food for local wildlife. Build nestboxes and bat boxes to hang. Have your students observe and maintain their garden over different seasons. National Wildlife Federation can help with resources. Washington Native Plant Society has grants available to educators to develop projects about native plants and plant habitats for their classes. Past projects include help with native plant schoolyard gardens and funding for habitat restoration projects.
- Or, get your students involved in a local habitat restoration project. EarthCorps offers classroom and field projects for schools to get involved in habitat restoration. Washington Native Plant Society has Ivy Out programs in which volunteers remove invasive English ivy from various parks around King County.

Make Bird Feeders

In this activity, students learn how to provide supplemental food for local birds.

The best way to provide food to local wildlife is by planting a variety of plants that provide flowers, fruit and seeds throughout the year. However, supplemental food from bird feeders is often beneficial, especially in the winter. Here are three different ways to provide food for schoolyard birds. To prevent squirrels and rats from eating at your feeders, punch a hole in a pie pan and hang it upside down on the same string over each feeder.

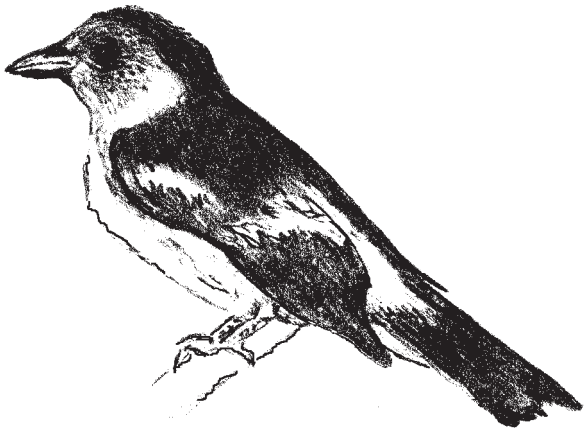
- Scoop the flesh out of grapefruit halves. Using a yarn needle, string yarn or cord through two sides to hang the feeder from a tree. Fill the half-rind with bird seed, nuts and cranberries.
- Combine one cup suet and six cups water. Heat to boiling. Add two cups cornmeal and 1⁄2 cup flour. Cool. Pour into greased cupcake tins or old yogurt containers. Using a stick or pencil make a hole through the center of the mixture. Let stand to dry. Remove mixture from containers, string yarn or cord through the hole and hang outside. Note: not recommended for usage during the summer because suet melts in high temperatures.
- Coat a pine cone with peanut butter, roll it in bird seed and hang it from a tree with string. **Note:** not recommended for usage during the summer because peanut butter goes rancid quickly.

Synopsis: Students make bird feeders for schoolyards

GLEs: S 3.2.4

EEGs: Goal 1, Objective A

NAAEE Guidelines: Strand 2.2: A, C, D



Forest Conservation

If you and your students would like to help conserve an area of forest or to help Woodland Park Zoo care for forest animals at the zoo, work together as a class to determine some ways to raise money to support these conservation efforts. Here is information about a few organizations that support purchasing acreage in specific forest areas and about Woodland Park Zoo's Zoo Parent program:

Synopsis: Students raise funds for forest conservation

GLEs: S 3.2.4

EEGs: Goal 1, Objective A, C

NAAEE Guidelines: Strand 2.3: A; Strand 2.4: A, E

Adopt An Acre program
Center for Ecosystem Survival

Through the Center for Ecosystem Survival's Adopt An Acre program, you can be a Rainforest Ranger© and save tropical rainforests and endangered species by participating in the Adopt An Acre Program. Habitat destruction is the greatest threat to wildlife today. Wildlife and wild places cannot survive without the preservation and protection of habitat. Your support will help insure the survival of millions of species of animals and plants throughout the world for future generations. Funds raised go directly to the purchase and protection of critical habitat of endangered and threatened animals, plants, and ecosystems in the tropics.

Center for Ecosystems Survival
699 Mississippi, Suite 106
San Francisco, CA 94107
Phone/Fax: (415) 648-3392
Email: info@savenature.org
Web site: http://www.savenature.org

Adopt An Acre® Program
The Nature Conservancy

Adopt an Acre® provides critical funds for rainforest acquisition and protection. This support enables the Conservancy and its partners to achieve their mission of protecting biological diversity. Every year, Adopt an Acre® chooses two to three imperiled sites that are in critical need of protection. Adopt an Acre® works with other like-minded conservation organizations to raise funds for the protection of additional Adopt an Acre® sites. Since its beginning, the Adopt an Acre® program has protected more than 600,000 acres of rainforests in Latin America and the Caribbean! Once you adopt your acre(s), you'll receive an honorary certificate from The Nature Conservancy specifying the location of your adopted acreage. Although you won't personally own the land you've adopted, you will directly provide for its protection. Your commitment represents a critical investment in the health of the global environment. By adopting one or a dozen acres you are helping to protect these Last Great Places for generations to come.

The Nature Conservancy
Adopt an Acre®
4245 N. Fairfax Drive, Suite 100
Arlington, VA 22203-1606
Phone: (800) 84-ADOPT
Web site: http://nature.org/joinanddonate/adoptanacre/

Protect-An-Acre Program
Rainforest Action Network

Rainforest Action Network established the Protect-an-Acre (PAA) program in 1993 as a tool to protect the world's rainforest and the rights of their inhabitants by providing financial aid to traditionally under-funded organizations and communities in rainforest regions. PAA projects prioritize gaining legal recognition of indigenous territories (a process called "demarcation"), the development of locally-based alternative economic initiatives, community organization, and resistance to destructive practices such as logging, fossil fuel development, and large-scale infrastructure projects in the rainforests.

Rainforest Action Network
Membership Department
221 Pine St., fifth floor
San Francisco CA 94104
Phone: 415 398 4404
Fax: 415 398 2732 fax
Email: answers@ran.org
Web site: http://ran.org/what_we_do/protectanacre/

Woodland Park Zoo's Zoo Parent Program

The ZooParent Program at Woodland Park Zoo is an excellent way for aspiring young conservationists to see their dollars put immediately to work. As our mission is to inspire people to learn, care and act, ZooParent helps instill a life-long passion for caring about animals and the wild spaces they inhabit in our natural world.

Funds from our ZooParent Program support a variety of zoo initiatives including nationally recognized conservation education programs, award-winning exhibits for the zoo's wildlife residents, a variety of regional, national and international conservation efforts that are happening now... and are changing the world!

Donate $200 or more by raising funds in your community. You receive:

- A picture of your animal
- An official ZooParent adoption certificate
- Information about the species of your choice
- ZooParent window static cling for each child
- A handout of the international conservation initiatives you are helping
- Woodland Park Zoo pencils
- Recognition for one year on ZooParent sign at the entrance of the Habitat Discovery Loop play area (Please note the sign is updated each March with prior year's donors)

Woodland Park Zoo
601 N. 59th Street
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Phone: 206.615.1024
Email: membership@zoo.org
http://www.zoo.org/zoocart/adoptions.html