



Table Rock Curriculum

Home Sweet Oak!

Objective: Students will construct models of an oak tree. Students will learn about the *oak savannah* plant community and the ecological connections of *organisms* that depend on oak trees for their survival.

Benchmarks Targeted: 1, 2, and 3 (Grades 1-8)

Oregon Standards:

Subject Area: Life Science

Common Curriculum Goals: Organisms: Understand the characteristics, structure, and functions of organisms.

Benchmark 1: Recognize characteristics that are similar and different between organisms. Describe the basic needs of living things.

Benchmark 2: Group or classify organisms based on a variety of characteristics. Describe basic plant and animal structures and their functions.

Common Curriculum Goals: Diversity/Interdependence: Understand the relationships among living things and between living things and their environments.

Benchmark 1: Describe a habitat and the organisms that live there. Identify how some animals gather and store food, defend themselves, and find shelter.

Benchmark 2: Describe the relationship between characteristics of specific habitats and the organisms that live there. Describe how adaptations help a species survive.

Benchmark 3: Identify and describe the factors that influence or change the balance of populations in their environment.

Common Curriculum Goals: Heredity: Understand the transmission of traits in living things.

Benchmark 1: Describe how related plants and animals have similar characteristics.

Benchmark 2: Describe the life cycle of an organism.

Subject Area: Scientific Inquiry

Common Curriculum Goals: Forming the Question/Hypothesis: Formulate and express scientific questions or hypotheses to be investigated.

Benchmark 1: Make observations. Based on observations, ask questions or form hypotheses, that can be explored through simple investigations.

Benchmark 2: Make observations. Ask questions or form hypotheses based on those observations, which can be explored through scientific investigations.

Benchmark 3: Based on observations and scientific concepts, ask questions or form hypotheses that can be explored through scientific investigation.

Common Curriculum Goals: Designing the Investigation: Design safe and ethical scientific investigations to address questions or hypotheses.

Benchmark 1: Plan a simple investigation

Benchmark 2: Design a simple investigation to answer questions or test hypotheses.

Benchmark 3: Design a scientific investigation to answer questions or test hypotheses.

Subject Area: The Arts

Common Curriculum Goals: Create, present and perform: Use essential elements and organizational principals to create, present and/or perform works of art for a variety of purposes.

Benchmarks 1 and 2: Use experiences, imagination, observations, essential elements and organizational principles to achieve a desired effect when creating, presenting and/or performing works of art.

Length of Lesson: 3-8 hours depending on detail expected of students.

Materials:

- ✓ Paper mâché making materials
 - Recycled newspapers, old school papers, old notebook pages, etc.
 - Water
 - Flour
 - Bowls
 - cardboard, chicken wire, or other material for constructing framework
- ✓ Art and craft supplies
 - Colored modeling clay
 - Paint (tempera or poster paint is ideal)
 - Crayons, markers, and colored pencils
 - Construction Paper
 - Glue
 - Scissors
- ✓ List of oak dependent organisms (included at the end of this lesson)

Key Vocabulary: *ecosystem, ecology, food web, habitat, interdependence, mutualism, oak savannah, organism, parasitism, predator, prey*

Background:

See Chapter Introduction.

Procedure:

Preparation:

Discuss with students the concepts of *ecology* and *habitat* (see Chapter Introduction for more information). Focus on the necessary components of *habitat* (food, air, space, shelter, water) and the interconnectivity of species (*predator-prey* relationships, *mutualism, parasitism*). Discuss with students different types of *ecosystems* (desert, rainforest, grassland, coral reef, coniferous forest). Point out that *habitats* exist at many different scales: a single vernal pool is the extent of the *habitat* of a vernal pool fairy shrimp, while a mountain lion needs many square miles of *habitat*. You may wish to engage students in drawing a diagram of a Table Rocks *food web* (see the lessons “Fire and the Food Web,” “Food Web Freeze Tag,” and “Symbio” as well as the Chapter Introduction) to get them thinking about the *interdependences* between *organisms* of the Table Rocks.

Activity:

As a class, make a model of an oak tree. You might construct a 3-D model out of paper mâché or other assorted recycled materials, make a large drawing of an oak tree, or have individuals or groups of students make a clay model. Next, have a class discussion about why oak trees are important in the Table Rocks *habitat*. Have students brainstorm, (individually or in groups), a list of plants and animals that live in or depend on oak trees for survival. Document the plants and animals they listed.

Next, based on their ability, ask students (individually or in groups) to research an *organism* that lives on or around oak trees. Research might include field observations, either from a Table Rocks hike or from an exploration of a site with oak trees, as well as information from written or internet sources. Reference the list of oak-dependent

organisms at the end of this lesson. Last, have each student (or group) create models or drawings of the *organisms* they researched. Once the models are complete, have students place them in appropriate places on or around the model oak tree.

Have students (or groups):

- Write the name of the *organism* and a fact about it on an index card and place it in the model.
- Use yarn or string to show ecological connections between *organisms* in the model.
- **Grades 4-5:** Write a paragraph about the *organism* and its place in the *oak savannah habitat*.
- **Grades 6-8:** Write a paragraph describing any and all ecological connections between their *organism*, their classmates' *organism*, the oak tree, and any other *organisms* found in the *oak savannah*.

Adaptation:

Ask students to name a few plants or animals with a direct need for oak trees. Next, ask students to consider what other *organisms* depend on the *organisms* that have a direct need for oak trees. In this way, guide students to the understanding that many *organisms* may depend on oaks indirectly even if they have no direct connection. For example, gopher snakes may not make use of the oak tree itself, but they eat rodents which depend on acorns or the eggs of cavity-nesting birds.

Grades 4-8: Have students participate in the creation of a *food web* diagram (see the lessons "Fire and the Food Web" and "Food Web Freeze Tag," as well as the Chapter Introduction) with an oak tree as the base.

Grades 5-8: Allow students to create models of *organisms* that are dependent on oak trees either directly or indirectly. Have them write a paragraph discussing the variety of connections.

Extensions:

- Have students write a diary entry from the point of view of an oak tree in the *oak savannah*: "A Day in the Life of an Oak." Entries should include examples of interaction between the oak and other *organisms* that depend on it (or that it depends on). Encourage students to be imaginative and to picture how things "look" and "feel" from the oak's perspective.
- **Grades 4-8:** Have students research *organisms* in other *ecosystems* that have central roles similar to that of the oak in the *oak savannah*. For example, the saguaro cactus in the deserts of Arizona, the kelp in the kelp forests of California's coastal waters, coral in coral reefs, or mangroves in mangrove swamps. Students should try to find information on the ecological *interdependences* between each central *organism* and others in its *ecosystem*. Their findings could be presented in written form or as a *food web* diagram. In the latter case, have them illustrate the diagram with photos or drawings of the *organisms* in the *food web*.
- **Grades 6-8:** Have students research Sudden Oak Death Syndrome, a disease caused by a fungus-like microorganism afflicting oaks in Oregon and California. Where did it come from? How is it spread? How does it affect oaks and what

other species can it affect? What ecological repercussions might we see if Sudden Oak Death Syndrome were to infect the oaks at the Table Rocks? How might this affect the Table Rocks hikes?

Discussion Questions:

This lesson emphasizes the ways in which various *organisms* depend on oak trees.

Can you think of some ways oaks depend on other *organisms* too?

*Oaks depend on acorn-eaters such as squirrels, voles, and Jays to disperse their seeds. An acorn which germinates some distance away from the parent tree has a much better chance of survival than one that germinates right under the parent tree. Students might also mention **predators** (especially birds) that control populations of oak-eating insects. Also, a fungi that grows on oak tree roots helps the oak absorb water and nutrients from the soil in exchange for sugars it obtains from the oaks. This symbiotic relationship between the oak and the fungi is an example of **mutualism**.*

How would it affect the *oak savannah habitat* if a species were removed?

*The **organisms** found in the **oak savannah** live in balance with each other; if a species were removed, this balance would be upset, at least temporarily. Populations of certain other species might increase, while others might decline. If Red-tailed Hawks were removed, populations of their **prey** species, such as ground squirrels, snakes, and lizards, would likely increase. An increase in ground squirrels might have a negative impact on the plants they eat, and so on; students will quickly see that removing one species will have repercussions throughout the **food web**.*

References:

The Birds of North America Online. 2005. Cornell Lab of Ornithology. 17 October 2007
<<http://bna.birds.cornell.edu/BNA>>.

Table Rocks Environmental Education. 2007. USDI BLM. 16 October 2007
<<http://www.blm.gov/or/resources/recreation/tablerock/index.php>>.

The Oak Tree Community

Listed below are some *organisms* found at the Table Rocks that live in or around oak trees. In what ways do these *organisms* need oak trees? Can you think of ways the oak tree might depend on these *organisms* as well?

- **Plants**
 - Moss
 - Poison oak
 - Mistletoe
- **Reptiles**
 - Western fence lizard
 - Gopher snake
- **Birds**
 - Acorn Woodpecker
 - Pileated Woodpecker
 - Oak Titmouse
 - Western Bluebird
 - Western Scrub-Jay
 - Violet-green Swallow
 - Northern Flicker
 - Yellow-rumped Warbler
 - Western Screech Owl
 - American Kestrel
 - Red-tailed Hawk
 - Wild Turkey
- **Mammals**
 - Valley pocket gopher
 - Western vole
 - Ringtail
 - California ground squirrel
 - Western gray squirrel
 - Black-tailed deer
 - Black bear
 - Coyote
 - Dusky-footed woodrat
 - Bat
 - Human
- **Insects**
 - Ant
 - Oak Gall wasp
 - Beetle (bark beetle, weevil)
 - Honeybee
 - Butterfly and moth
- **Other:**
 - Lichen
 - Bacteria
 - Mycorrhizal fungus

The Oak Tree Community: Answer key for teachers

• Plants

- **Moss** – grows on the bark of oaks, but does not harm the trees
- **Poison oak** – sometimes behaves like a vine, using an oak for support
- **Mistletoe** – a parasite that grows on oak branches; sinks its roots into the tree and steals water and nutrients

• Reptiles

- **Western fence lizard** – often found climbing or basking on oaks; eats insects that live on the oaks
- **Gopher snake** – eats rodents and western fence lizards, which depend on oaks, as well as the eggs of birds which nest in cavities in oaks

• Birds

- **Acorn Woodpecker** – excavates cavities in oak trees for nesting; eats insects when available, but at least half its diet is acorns, especially in winter
- **Oak Titmouse** – nests in tree cavities, usually oak; eats insects and fruits, including acorns
- **Pileated Woodpecker** – excavates cavities in trees for nesting (in our region, usually in dead conifers, but may use oaks); eats ants and beetles found in the dead wood of oaks
- **Western Bluebird** – nests in tree cavities, often oak; may use moss from oaks to line nest; in spring and summer eats insects, many of which live on oaks; in winter feeds largely on mistletoe berries
- **Western Scrub-Jay** – often nests in oaks; eats insects and fruits (including acorns); serves as an acorn disperser
- **Violet-green Swallow** – nests in tree cavities, often oak
- **Northern Flicker** – excavates cavities in (usually dead) trees, for nesting; eats insects (especially ants) and, during winter, some seeds and fruit (including poison oak berries which can be found growing on oaks)
- **Yellow-rumped Warbler** – eats insects, mostly gleaned from bark and foliage of oak trees, and some fruit, including poison oak berries; nests mostly in conifers, but may use oak; may line nest with moss and lichen found on oak trees
- **Western Screech Owl** – nests in tree cavities; perches in a concealed spot beneath canopy to wait for *prey*; *prey* includes small birds and mammals and insects which may depend on oaks
- **American Kestrel** – nests in tree cavities; eats small mammals and large insects which may depend on oaks
- **Red-tailed Hawk** – eats small mammals and reptiles that may depend on oaks
- **Wild Turkey** – acorns are an important food

• Mammals

- **Valley pocket gopher** – diet includes acorns; serves as an acorn disperser

- **Western vole** – diet includes acorns; serves as an acorn disperser
- **Ringtail** – nests in tree cavities; eats small mammals and insects that may depend on oaks
- **California ground squirrel** – diet includes acorns; serves as an acorn disperser
- **Western gray squirrel** – diet includes acorns; serves as an acorn disperser
- **Black-tailed deer** – diet includes acorns; takes shelter in shade of oaks; eats rich vegetation that grows in the *oak savannah*
- **Black bear** – diet includes acorns; hunts animals that eat acorns
- **Coyote** – diet includes acorn eaters such as squirrels, voles, and wild turkeys
- **Dusky-footed woodrat** – diet includes acorns; serves as an acorn disperser
- **Mountain lion** – diet includes acorn eaters such as deer and wild turkeys
- **Bat** – eat flying insects that may depend on oaks
- **Human** – Native peoples of the region used acorns as a food staple and hunted deer and squirrels, which eat acorns; *oak savannah* plant community has a great diversity of edible and medicinal plants used by Native Americans

- **Insects**

- **Ant** – sometimes make nests in oak cavities
- **Oak Gall wasp** – lays eggs in oak bark; the tree produces a gall around the eggs that serves as a shelter and food source for the wasp larvae
- **Beetle (bark beetle, weevil, etc.)** – feed on wood and acorns from oak trees
- **Honeybee** – feeds on nectar of poison oak; are important pollinators of poison oak; build hives in hollow oaks.
- **Butterfly and moth** – larval stages (caterpillars) of many species eat oak leaves

- **Other**

- **Bacteria** – decompose fallen leaves
- **Mycorrhizal**– nourished by carbohydrates from oak tree roots; helps the oak tree absorb water and nutrients from the soil
- **Lichen**– grows on the bark of oaks, but does not harm the trees. May actually benefit oaks and other plants by fixing nitrogen; the resulting nitrogen compounds leach into the soil via rainwater that has passed over the lichens.