

Who Depends on Oak Trees?

Grade 3-4

Supplies

- Hand lenses
- Magnifying bug boxes
- Plastic petri dishes
- Binoculars
- Paper with printed grid
- Pencils
- 6 inch rulers
- Bark samples from woodpecker 'granary tree' (or to scale picture)
- Acorns from a variety of oak trees (or to scale pictures)
- Twig samples with lichen (or pictures)

Background information

In California, oak woodlands are an ideal place in which to introduce concepts of biodiversity and the complex interactions that exist in ecosystems.

Research has shown that hundreds of different organisms are found in California's oak woodland habitats; many would not survive without oak trees. From epiphytic lichens and algae inhabiting the well-lit upper branches, to mycorrhizal fungi associated with the roots, oak trees support hundreds, if not thousands, of associated native organisms. Oak trees are a *keystone species* – a species that serves as the backbone of the ecosystem, and without which the ecosystem would fail. Gray squirrels and many different species of birds nest in the branches; wood rats build their middens from twigs and leaves on the woodland floor. Beneath the trees fungi, bacteria, worms, and many species of insects decompose leaf litter, while other fungi may reside within the living tissues of the trunk and branches. Salamanders live in the litter and prey upon insects that reside there. Mule deer find respite from the sun under the oaks, and mountain lions, bobcats, and many other mammals also spend time under the trees. Hundreds of species of insects rely exclusively on oak trees for survival. Oak moth caterpillars depend on oak leaves for food. Gall-forming wasps stimulate formation of swollen galls on the tree branches. Inside the galls the young wasp larvae grow and develop.

Activity: Oak Tree Exploration

This exploration can be done at school if you have the appropriate supplies and oak trees on your school campus or nearby, or conduct the activity at the Garden. Materials can be checked out from the Garden's Education Department if needed.

Ask students to sit under a mature oak tree and to close their eyes for a moment. Ask them to listen for any sounds of animals in the tree or around them. Students can share what they heard with a partner or with the group. Perhaps they heard birds or squirrels in the branches. Maybe they heard bugs or lizards rustling in the leaf litter.

Use binoculars to explore the branches and the sky around the tree. Can you see any birds or bird nests? Be careful to not look into the sun. Sometimes it is easier to find an object with the naked eye first, and then, without moving, put the binoculars up to get a closer look at the object.

Give each student a six-inch ruler and ask them to measure the woodpecker 'granary tree' bark. Ask them to measure the holes. Are they all the same diameter? Why do you think the holes might be different sizes? What is going into those holes? Are acorns all the same size or different sizes? Do acorns change sizes as they dry out? Woodpeckers move acorns to smaller holes as they shrink during the process of drying. Also, woodpeckers often live in areas where there are several oak species. Acorns from different oak species have different sizes and shapes and require different sized holes for storage. Show students a variety of acorns and pass around pictures.

Can students see any oak galls hanging on the leaves or branches? Are there any mushrooms growing at the base of the trunk or from the trunk itself? What other observations can students make about the tree and their surroundings?

See the **Leaf Litter Activity** for information on the surrounding leaf litter. There is a lot more going on than meets the eye!

Ask students to look for lichens on the branches. Are they all over the tree or are they only in particular places? Are there more lichens where the most sunlight hits the tree? If so, why? Give students hand lenses and lichen samples on twigs. Ask them to examine the lichens. Can they see the tiny round cup shaped structures (*apothecia*) where spores are produced?

What kinds of plants are growing in the shade of the mature oak tree? Are there any ferns? Ferns generally grow in the shade and are often found under oaks. Hummingbird sage is another plant that thrives under oak trees.

At the Santa Barbara Botanic Garden

Visit the Arroyo Section to see the woodpecker and sapsucker wood samples. Search the ground for acorns. Do they have holes in them? You can even crack them open and look inside. See the **Amazing Acorn Activity** for information on how the Chumash historically prepared the acorns as a staple food of their diet.

Between the Garden's courtyard and the Waterwise Home Garden, along the winding path, there is an old telephone pole next to a new one. What do students observe in the old one? The old pole (not covered in black tarp) is filled with holes from our local acorn woodpecker population. Wooden telephone poles in the area often need to be replaced due to acorn woodpecker activity.

Be aware of poison oak while exploring the Garden or your school grounds. It is very common in oak woodlands and an essential part of the oak woodland ecosystem (some birds relish the fruit), but can cause an itchy, painful rash on humans. An easy way to recognize it is to remember the saying: 'leaves of three, leave it be'. Poison oak is easy to spot in the summer because it turns red, but it drops its leaves in the winter, and during the spring it has green lobed leaves. Why do the leaves change color in the summer – not in the fall, like most trees? This is because poison oak is drought deciduous. It loses its leaves during the dry season, which, for California, is the summer.

The quieter you are, the more animals you will see and hear.

After your visit

Feel free to use the accompanying activity sheet (**Who Depends on Oak trees and Where Can You Find Them?**) for younger kids. Carefully color the big picture of the oak tree and each of the fourteen small pictures. Paste the picture of the oak tree in the middle of a large piece of paper. Cut out the small pictures and paste each one in its appropriate place on the picture. If there isn't enough room, draw a line pointing to where the animal would live around the oak tree.

See **Leaf Litter** for information on the importance of leaf litter (including that provided by oak trees) to healthy ecosystems.

See **Amazing Acorns** for more information on how the Chumash used acorns as a food source.

See **Weave a California Oak Woodland Web** for another, more advanced activity on food webs.

See **Oaks in the Garden** for more information on observations to make at the Garden.

See **Soil Experiment** to see how you can see the process of decomposition in your classroom over the course of one school year.

See **Springs and Seeps in the Garden** for information on mosses, fungi, and lichens.