



## A Glimpse Beneath The Leaves

**1** Boggs Lake is nestled within a dense forest, and the trees are primarily Ponderosa Pine and Black Oak. Everything is recycled in such a natural community. After the leaves and needles fall, they are broken down by fungi and other decomposers. If the soil is moist, and you scratch the needles aside, you'll see extremely tiny animals hop into the air. They are primitive insects called springtails, and feed on fungus spores and decaying plant matter. When one of these minute animals is startled, an appendage called a "furcula", which is usually clasped tightly to its abdomen, is released. This appendage slams into the ground, and the animal is catapulted up to several inches into the air. This is usually enough to get a springtail away from an approaching slender salamander, but it can't control where it falls. It might come back to earth in front of another salamander, a centipede, or some other hungry animal.

## Water and Birds Mix Well

**2** The trail to the right will lead you down to the lakebed and the floating observation platform. Take the time to walk all the way through the tule band for a different view of the lake. Once the rains have begun to fill the lake, the water birds make conspicuous use of the resource. Great Blue Herons and the white colored Great Egrets stalk through the water on their long legs, hunting

Pacific Tree Frogs, newts, and other aquatic life, while Belted Kingfishers dive from above for their prey. American Wigeons, Mallards, and Northern Pintails dabble and tip in the surface waters as they sieve the muck and plants for small food items, while Ring-necked Ducks, Common Mergansers, and Pied-billed Grebes dive deeper to hunt for larger fare. The dark colored American Coots are quite common on the lake, and feed both at and below the surface. Like the magnificently adorned Wood Ducks, they will also come out onto the land in search of prey.

## A Water Trap

**3** Although there are some small streams, like this one draining the meadow to the west, the bulk of the lake's water comes from rainwater that percolates through the soil or flows overland outside of stream channels. An old lava flow dams the waters within the Boggs lake basin, and more volcanic rock and ash seal the bottom. There is no outlet stream. The water can only escape by evaporation, or perhaps through one of the mysterious holes that periodically open at the bottom of the lake. No one knows where they lead, but they could represent old lava tubes that connect to streams in other watersheds.

## Primitive Plants Are Everywhere

**4** Mosses and lichens evolved early in earth's history, and the species encrusting the tree trunks and volcanic rocks at the Preserve show us that these life forms continue to do quite well in the right environments. Unlike Mosses, which are tiny plants, lichens (classified as belonging in Kindom Fungi, not the Plant Kingdom) are composite life forms made up of a symbiotic pairing of a photosynthetic organism such as algae or cyanobacteria, and fungi. They are more abundant in the drier locations. With many different shapes and colors, the separate lichen species are quite obvious, but a close examination will show that amongst the mosses there are also numerous distinguishable species. Mosses do better in the moister areas. They are dark green in color and, unlike the lichens, have distinguishable leaf- or stem-like structures. While growing on rocks contributes to the weathering of the rock, neither lichens nor mosses harm the trees on which they grow, as they are only using the bark as support. Although the sun is lower in the sky this time of year, and its rays weaker, mosses and lichens are actually getting more light than they do in the spring and summer. This is because the sun's energy can strike them more directly once the oak leaves have fallen.

## Tree Houses

**5** A broken branch like the one above you can make a nice home for an arboreal salamander, a small bird like a titmouse, or even a raccoon. If the cavity can hold rainwater, a miniature vernal pool is created. Only a few organisms can exist in the resulting acidic water, which looks like dark tea, but tree-hole mosquitoes are among them. The females lay their eggs above the waterline, so they will only hatch when a new rain fills up the tree hole even more. This insures that the larvae, feeding on microscopic aquatic organisms, will have plenty of time to complete their metamorphosis before the water dries up. As in all mosquitoes, the males are harmless nectar feeders. The females, however, also require a blood meal to provide the protein they need to develop their eggs.

## Natives Fit Into The Community Better

**6** The clumpy plants in front of you are California Fescue, a native bunch-grass species. The woodland environment of the forest around Boggs Lake is an area where native bunch grasses are still doing quite well in California, unlike many other ecosystems where the disruptive effects of invasion by non-native species, overgrazing, and agriculture, have drastically altered California's natural grasslands, meadows, savanahs, and prairies. Any Native American or early pioneer would be shocked to see the dramatic changes in the flora throughout the state. Native species of grasses, most of which are perennial bunch-grasses, have gradually disappeared in most areas and been replaced by annual species from Europe and Asia. These introduced species do well because they are adapted to human disturbance (and often have been encouraged by people who sowed them as preferred forage for grazing livestock), and ecologically they may have escaped their normal predators and competitors. Boggs Lake native grasses include Slender Hairgrass, Big Squirreltail, California Brome, and Blue Wild Rye. A whole host of insect species has coevolved with these native grasses, and with the rich community of other native plants in the forest understory. The caterpillar, grasshoppers, and other insects that eat the grasses and neighboring plants become food for birds, lizards, spiders, small mammals, and other insects. In ecosystems dominated by native species, food webs (or Interaction Webs, as many contemporary scientists consider them) tend to be more complex than those of ecosystems which have been heavily impacted by invasion from non-native species. Usually, invaded systems have fewer "strands", and often weaker "links", in the web, and are less stable during times of stress. This makes ecosystems that have reduced populations of native species, or have lost native species altogether, more likely to lose connections in the web....which means increased risk of loss of even more active species in that system.

## Life Follows Death

**7** A band of dead trees can be seen around the perimeter of the lake. Unusually wet winters in 1982 and 1983 raised the lake so high that it extended into the forest. The forest species are not adapted to wetland conditions, and with the water lapping about the trunks, the roots couldn't get enough oxygen. The pine trees began to die. Bark beetles arrived and laid their eggs, taking advantage of the weakened trees, which are a food source for their larvae. Beetle numbers quickly built up as the trees were unable to defend against them. Healthy trees can direct sticky sap into the beetle tunnels and drown the insects. Stressed trees, however, cannot produce enough sap. The attack soon escalated, as beetles excavating in the sick trees released pheromones into the air. These chemical messengers attracted other beetles to the dying pines. Although it was hard to notice the increased insect density, the subsequent abundance of woodpeckers was much more evident. For several years, the numbers of Downy, Hairy, and Nuttall's Woodpeckers was higher than normal. By 1989, as the trees died and insect populations had dropped off, most of the woodpeckers had moved on to other areas where it was easier to find food.

## Fallen Giants Remain Useful

**8** Weakened from the weather, fungal attacks, and the tunneling of the insects, the dead pine trees around the lake have fallen. New species of animals and fungi are attracted to them at this stage. Termites can process the wood quicker now that it is closer to the moist ground, and scorpions feed on them and the other insects attracted by the decaying trees. Salamanders and newts take refuge under the bark and logs. By counting the growth rings, we have found that some of the trees were over sixty years old. Mountain and California quail can now use the debris as handy cover to hide their ground nests. Their young are precocial, or sufficiently mature to run and feed themselves almost as soon as they hatch, which makes ground-nesting a more successful strategy than if the young required extended care in the nest, where kingsnakes, skunks and other predators would find such nestlings too easily.

## Bells Of Nectar

**9** Although sticky fruits still hang from the manzanita bushes in early winter, the shrubs are among our first wildflowers to bloom. Many different types of pollinators, including hummingbirds, come to the blooms to extract sugary nectar or protein rich pollen. The bell-like flowers have relatively tiny openings. This is no problem for the animals most likely to cause pollination, such as long tongued bees, butterflies, and bee flies – unlike many other insects which can't reach the rewards within the blooms. However, short tongued bees, which can't get the nectar through the proper opening, sometimes bite holes at the base of the flowers to gain access.

## Silent Factories

**10** Even in winter, there are plenty of green leaves to look at. Even though some plants lose their leaves in the winter, the leaves of evergreen shrubs and trees are very active, especially on warm days. If we could look within the leaves, and actually see the molecules in motion, their true nature would be instantly revealed. Every leaf is a marvelous factory, using photosynthesis to convert carbon dioxide gas (from the air) and water (taken up by roots) into sugar and oxygen. The complex chemical processes are powered by the energy of the sun, which is trapped by the green chlorophyll molecules and initiates the chemical reactions that build the sugar molecules and liberate oxygen. Herbivores feeding on the plants are subsequently fed upon by predators and decomposers. Food webs leading from green plants connect almost all the life on earth. You should be grateful every time you eat a meal, or maybe even whenever you take in a breath of oxygen. You owe a lot to these silent factories.

## Non-conformist Woodpeckers And Acorn Banks

**11** When Acorn Woodpeckers drill holes in trees, they aren't searching for hidden insect larvae like their relatives. These unusual birds are creating a cavities for food storage! When the holes are just right, they hammer acorns into the new space in the wood, caching the acorns which are a source

of dietary carbohydrates for the woodpeckers. As the acorns dry out and shrink, the woodpeckers move them to smaller cavities. They will also store the acorns in other cavities such as cracks in trees. Other animals, such as White-breasted Nuthatches and Western Grey Squirrels, will try to pull the acorns out of the cavity...but they usually fail if the acorn is tightly fit into the hole. Unlike other woodpecker species, these woodpeckers also are communal, helping one another to feed the offspring and protect the storage trees. Acorn-larder trees such as the ones we can see at the Boggs Preserve are truly impressive ... but even more impressive can be the accidental filling with seemingly countless acorns of hollow spaces from which the acorns can't be retrieved, such as a hollow tree or, much to our dismay, a hollow wall or a storage shed!

## A Meadow Of Floral Gems

**12** The meadow in front of you is bedecked with jewels of the plant world. This is one of the places on the preserve where the rare plants grow. Please don't walk in this open area; compacting the soil in the wet season can damage the plants' wet-meadow habitat and decrease their ability to survive. Amongst the special species are Many-flowered Navarettia and several species of Downingia, which germinate with early rains and likely are abundant now as seedlings in the meadow. They are adapted for seasonally wet areas, habitats that dry out completely later in the year. Every year The Nature Conservancy monitors the populations to determine how well populations of these rare species are doing, and whether or not some management change is needed. Their uniqueness, together with their role in maintaining a healthy ecosystem, should be enough to motivate us to protect them, although their preservations could also additionally reward us if humankind someday discover a medicinal or other value to the chemicals that they manufacture within their tissues. These rare species, and the rare habitats in which they exist, are ecologically fragile with a tenuous hold on existence, but with the help of sound management and scientific insights, and especially your cooperation in respecting their habitats and educating others on how to appreciate and respect these species, we will be able to insure that they will survive.

# BOGGS LAKE

SELF GUIDED NATURE TRAIL

## WINTER GUIDE

by

**Larry Serpa**

(The Nature Conservancy)

and

**Cathy Koehler**

(Lake County Land Trust)

Descriptions in this trail guide correspond to a series of twelve numbered signposts. The approximately ¾ mile long route proceeds through the forest, and provides excellent views of the lake and other natural communities before it loops back to the parking lot. Hiking it will give you a little exercise in a beautiful environment, and the information in this guide highlights some of the wonderful natural history that you will encounter as you enjoy the hike.

**We ask that you stay on the marked trails and keep all dogs on a leash. Thank you**

Boggs Lake Preserve has been owned and managed by The Nature Conservancy since 1972 and has been co-managed by the Lake County Land Trust since 2011.

For donations and further information about the

Lake County Land Trust

please call: (707) 262 0707

or email: [lclt@lakecountylantrust.org](mailto:lclt@lakecountylantrust.org)