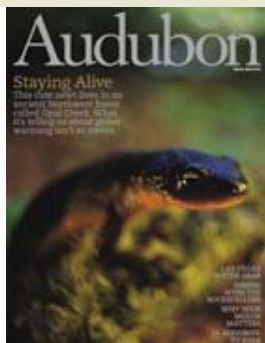


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## Habitat

### A Rare Jewel

The Opal Creek wilderness, just two hours from Portland, is one of the Pacific Northwest's last uncut old-growth forests. In spring "phib freaks" trek between the tall, massive trees, on the lookout for amphibians that date back to the age of dinosaurs and forecast an ominous future.

By Jane Braxton Little

Adam Mims is ankle-deep in a snowmelt stream, methodically turning over moss-covered rocks. Ignoring the teeth-chattering cold of the cascade, he slowly moves from stone to stone until he suddenly breaks his rhythm with the quick sweep of an arm. "Found one," he yells. Carefully cradled in his hands is a coastal giant salamander. Huge black eyes bulge out of a flat head mottled with brown splotches the color of the cobbles where Mims spied it.

Up and down the creek, a handful of people emerge from behind boulders and decaying logs to gather round and admire this creature. A larva barely the length of an index finger, it will grow to 14 inches, which makes it the largest terrestrial salamander in the world. Inside the water-filled plastic bag where Mims has placed it, the salamander's filigreed gills feather gently in rose-tinged undulations. Eventually it will lose these gills and move onto land, where it will feed on bugs, small rodents, even fellow salamanders. It could live for 40 years.



### The Logger Who Saved Opal Creek

Tom Hirons brought a peerless perspective to the Pacific Northwest's timber wars.

Mims, facilities director with the Opal Creek Ancient Forest Center, watches our fascination with the pride of a new father. Lanky and long-haired, he has spent days scouring the woods and water for salamander haunts to introduce to the class of six students now ogling this coastal giant.

No one is more excited about this first find than nine-year-old Evan Haning. He strains on tippy-toes to examine it, pointing out the branched gills to his sister and parents, who have driven with him from Portland for a weekend workshop at the Opal Creek center.

The coastal giant salamander is one of the most common of the amphibians that have drawn us to the pristine pools, dripping mosses, and ancient trees of the Opal Creek wilderness—35,000 acres of protected land within the Willamette National Forest. Just west of the Cascade crest in northwestern Oregon, this forest of Douglas firs, western hemlocks, and red cedars nurtures as many as 15 different species of salamanders and frogs. Each is spectacular enough to belong in a remote tropical rainforest. But this extraordinary amphibian array is thriving in a low-elevation temperate forest within a two-hour drive of metropolitan Portland and its 2 million residents.

Opal Creek's amphibians owe their abundance—in fact, their very existence—to this federal wilderness area. The forest, moist, dark, and dense with undergrowth, is a remnant of the vast timbered tracts that once covered the entire Pacific Northwest. Bobcats and river otters, silver-haired bats and endangered northern spotted owls also live here, even if in scarce numbers. For amphibians, this ancient refuge is a paradise in a world where paradise is all but lost, says Katie Ryan, the Ancient Forest Center's program director. As one of the last islands of temperate old-growth forest in the Lower 48, the Opal Creek Wilderness provides the canopy cover, surface water, and decaying debris amphibians need to survive. "This is the remaining jewel," says Ryan.

In addition to our amphibian workshop, she has organized weekend classes throughout the summer on butterflies, lichens, wildflowers, and geology. Attending them are families like the Hanings, agency officials seeking specialized identification skills, and the simply curious, from youths to 80-year-olds. Exposing the public to the best of what's left of the Cascades' ancient forests is part of the center's mission to promote stewardship of old-growth forests and all the creatures that depend on them.

Frogs and salamanders claim one of the season's first slots, a weekend in late April when soggy spring days draw the animals out of their hiding places into the moisture they need for foraging and migrating. Scientists consider this class of vertebrate animals one of the best indicators of the general health of an ecosystem. Seldom seen and rarely acclaimed, amphibians are the planet's canaries in the coal mine. At a time when scientific assessments are predicting their catastrophic decline worldwide, Opal Creek's population is increasing public awareness of the critical role these animals play, Ryan says.

"You can't talk about amphibians without talking about the entire ecosystem. Everything is connected," she says. "We're trying to show how."

**As Mims returns the coastal giant** salamander to the underwater nook where he found it, another “eureka” rings out up the creek. Tom Titus, a University of Oregon research associate and our class instructor, has found a Dunn’s salamander in a wet rock crevice near the splashing stream. A dorsal stripe runs along its back in variegated tans, greens, and yellows. The tip of its tail is distinctly black.

After we admire the salamander, Titus puts it back with the care of a parent tucking a child into bed. “I’ve engendered enough karmic debt already,” he mutters.

During our three-mile hike from the parking area at the wilderness boundary to the Opal Creek Ancient Forest Center, where we will spend the night, our class finds western red-backed salamanders, whose dorsal stripe is more yellow than red, and ensatinas, distinguished by their gorgeous golden arm-pits. Evan Haning, in constant motion turning over stones and peeking into wet fissures, is keeping our score. His goal for the day is five “phibs,” the jargon we have already adopted.

Titus spots a rough-skinned newt crawling along the trail with a determined look. It has little to fear from predators. Each of these newts packs enough poison to kill two humans. As we study this one, it lifts its chin and elevates its tail to display a bright-orange belly—a warning to any would-be predator. If you see a milky white secretion from the bumps on its back, says Titus, “watch out! And wash your hands.”

The trail winds past fern-cloaked springs and puddles yellow with pollen. A winter wren follows us from the safety of the deep woods. We sally off the trail at every amphibian-promising seep as the walk draws us ever deeper into the emerald-green magic of the forest. Lichens cling to our clothes as we brush past them. Fawn lilies beckon us with shy beauty. By the time we arrive at the cabins of the Ancient Forest Center compound, we have left behind homework, deadlines, and the detritus of our workaday worlds. Under the canopy of trees that began life before Christopher Columbus, we are learning to sense which streams will likely harbor coastal tailed frogs, which decaying logs might hide clouded salamanders. We are becoming phib freaks.

Everyone has a favorite. For Titus, a lean marathon runner, it’s the Oregon slender salamander. A beautifully marked creature with large white flecks on a black belly, it relies on downed and decaying wood. This salamander is found exclusively on the west flank of the Oregon Cascades, where only the old-growth Douglas fir forests provide the variety and depth of organic debris it needs, he says. This fetching creature, whose home range is likely just a few square feet, is Titus’s candidate for Oregon state amphibian.

Mims dotes on the cascade torrent salamander, a species limited to the mountains of the Pacific Northwest whose brilliant lemon-yellow underbelly makes it seem more suited to the tropics than this moderate zone. Restricted to cold seeps and small streams, cascade torrents are rarely seen, he says, but when they are found it’s in a remote and idyllic spot—“the kind of place where I would want to live.” Besides, says Mims, with their curious eyes and salt-and-pepper backs, “they’re just so damn cute.”

Carved by glaciers 2 million years ago, the Opal Creek watershed has evolved over millennia to its current hushed tranquility. But its serenity belies the very recent past. This

lush landscape and its centuries-old trees came within a chainsaw's length of being reduced to a tree farm. The area was first occupied by Native Americans at least 2,000 years ago; in the 1850s miners began staking claims to the lead, zinc, copper, and silver in the rocks. In the 1960s the U.S. Forest Service began erecting clear-cut boundary markers around the four-foot-diameter trees and surveying for logging roads on this most pristine part of the Willamette National Forest. When the forest's Detroit District became the agency's number one timber-producing district in the 1980s, pressure on Opal Creek intensified, as Congress ordered the Forest Service to "get out the cut."

For local and national environmentalists dedicated to saving ancient forest ecosystems at the height of the spotted owl conflict, the fight was on. As public outrage over logging policies on public lands spread across the country during the next two decades, Opal Creek became a national symbol on television and in newspapers and magazines. Visitors came in droves, sleeping in the damp company of Pacific yews and vine maples, bathing in the mist of unnamed waterfalls, hiking into a grove of 800-year-old cedar trees. For them, Opal Creek made an abstract issue real.

For George Atiyeh, saving Opal Creek from clear-cutting was a lifelong mission. He and his cousins grew up spending their summers at the mining camp at Jawbone Flats, then owned by Jim Hewitt and now by the Ancient Forest Center. When Atiyeh began living there year-round in the late 1960s, he launched a tireless campaign aimed at designating the entire watershed a federal wilderness area.

During the late 1980s—a tumultuous period of legislative proposals by environmentalists and counters by the Forest Service and its timber industry allies in Washington—Earth First! mounted road blockades, including one that buried a protester up to his neck in rocks. The country's first sustained tree-sitting occurred nearby, at North Roaring Devil Ridge. The 250-plus arrests for civil disobedience bolstered national support for the ancient forest campaign and Opal Creek, its flagship.

Atiyeh, who once dressed for Halloween as "old-growth man" in tree limbs, lungwort, and moss, had a recurring nightmare: Logging had begun on Stony Ridge just above Jawbone Flats. "Trees were falling all around me," he says.

His nightmare ended in 1996. Congress, led by Republican Mark Hatfield—a staunch timber ally—made one of his final acts as a U.S. senator the designation of 20,300 acres as the Opal Creek Wilderness area, protecting it from logging and road building. Combined with a scenic recreation area and wild and scenic river areas, the public won 35,000 acres of spectacular ancient trees and unspoiled waters. "It proves there are no impossible battles," says Atiyeh. "If enough people are willing to stand up, we can turn around some of the horrible things happening to the planet."

**Meanwhile, scientists were** catching up with conservationists. Jerry Franklin, a University of Washington forest ecologist who specializes in old-growth forests, demonstrated the interdependence of a myriad of plant and animal species on closed canopies, unfettered streams, and forest floors steeped in centuries of decaying leaves, limbs, and

trunks. It is not only the flora and fauna that make an intact forest, the scientists said; it is also the processes of birth, life, death, and decay.

With as little as 20 percent remaining of the old-growth forests that once thrived in the Pacific Northwest, the Opal Creek watershed becomes even more precious. Although it is federally protected from commercial logging, adjacent old-growth roadless areas remain vulnerable, particularly under the Bush administration's current push to remove these areas' dead and dying trees. For amphibians, this old-growth forest is essential. The rare health of this intact ecosystem and its sheer size are without doubt the reasons they are flourishing here.

Amphibians were not a cause célèbre for the defenders of Opal Creek. Most who dedicated days to sitting in trees and years to legal battles were not even aware of the presence of these animals, which link the worlds of invertebrates and vertebrates. With most of them naturally hard to find, the area's salamanders all but eluded scientists, too. It was not until 1996, when the watershed had officially become a federal wilderness, that Josh Kling conducted the first targeted surveys focused solely on frogs and salamanders. Kling, who was then a U.S. Forest Service biological field technician specializing in woodland salamanders, sampled several different areas and established the presence of 11 different species. To his delight he found Dunn's salamanders, previously unknown in this part of the Cascades and a new addition to his personal life list.

Discoveries about amphibians continue. No one knew where cascade torrent salamanders laid their eggs until 2004, when a biologist found the first nest just over the state line in Washington. The excitement of what else might be out there, unknown to humans, is what keeps Mims looking under rocks, he says.

It's hard to observe amphibians' behavior because most of them spend large portions of their lives dug deeply into the deadfall and duff that carpet the forest floor, says John Villella, who was the Ancient Forest Center's naturalist for five years. The most complete listing is his *A Field Guide to Amphibians of Opal Creek*, a lavishly illustrated book he coauthored with Mims that was published by the center in 2006. It presents the area's 15 frog and salamander species with color photographs and vivid descriptions.

Although scientists are just learning about Opal Creek's amphibians, they have resided here for aeons. An ancient class of animals, amphibians evolved at least 350 million years ago from a fishlike ancestor; modern amphibians (frogs, salamanders, and caecilians) appeared some 210 million years ago. They were the first vertebrates to inhabit the terrestrial world, and survived the dinosaur extinctions of the Jurassic and Cretaceous eras. The vast quantities of bugs they consume make them a crucial part of the food web, moving the energy of invertebrates up to higher animals as amphibians, in turn, are eaten by garter snakes, herons, kingfishers, and river otters. At Opal Creek, where no salmon and few other large fish make it past a series of natural barriers, salamanders and frogs are among the top aquatic predators.

Named for their ability to live both on land and in water, some amphibians lay their eggs in ponds or streams but spend their adult lives in the dense debris of the forest floor. Others breed on land but need moist cavities in which to lay their eggs. This complex life pattern, which requires favorable conditions in both aquatic and terrestrial habitats, is one of the

characteristics that make amphibians useful to scientists measuring the effects of environmental changes. Amphibians are also considered bioindicators because they breathe through their skin, responding quickly to contaminants and pathogens coming from the air as well as the land and water. And because they are sensitive to the slightest changes, they live and die by temperature and moisture gradients. "Take away their moisture, and they're toast," says Titus.

As indicator species, frogs and salamanders are forecasting an ominous future for the global environment. Almost one-third of the world's 5,743 known amphibians are at risk of extinction, according to the 500 scientists who compiled the 2004 Global Amphibian Assessment. At least nine species have slipped over the edge to oblivion since 1980, says Russell Mittermeier, president of Conservation International. "Their catastrophic decline serves as a warning that we are in a period of significant environmental degradation," he says.

Most scientists who study amphibians are convinced that the dramatic declines are the result of human activity. They list the usual causes: habitat loss, chemical contamination, and increased air and water temperatures resulting from local logging. But recent studies, including those documenting the apparent demise of Costa Rica's golden frog, are finding even more sinister causes in a combination of events ultimately linked to climate change.

In the Cascades Range, researchers have traced amphibian declines in Oregon to the South Pacific. As climate changes warm ocean waters, they are affecting circulation patterns, eventually reducing winter precipitation in the Pacific Northwest, says Andrew Blaustein, a professor of zoology at Oregon State University. He and Joseph Kiesecker, an ecologist with The Nature Conservancy, have attributed the effects of low precipitation and reduced water depths in Cascades lakes to higher levels of mortality among western toads.

At first Blaustein and his colleagues thought it was simply the depletion of the earth's ozone layer that caused higher levels of radiation, which the toad embryos could not tolerate. But further research led them to the synergistic effects of radiation, lower water levels, and pathogens. Toads' eggs, weakened by radiation exposure due to shallow water depth in pools, were vulnerable to a fungus that ultimately killed thousands of them.

These and related studies are prompting scientists to look beyond a single species in a specific ecosystem to processes that are affecting the entire earth, says Blaustein. "If we are to predict how climate change may translate into species losses," he says, "we must link global and local interactions."

Opal Creek's amphibians enjoy the security of a 35,000-acre deep-forest ecosystem big enough and healthy enough for all its processes to function as a whole. But even this sanctuary has its limits. Villella, the Opal Creek amphibian field guide coauthor, is concerned about the cycle of lower water depths, higher radiation exposure, and vulnerability to pathogens.

All three Opal Creek frogs are considered species of concern by the federal government. State officials regard all 15 local amphibians as sensitive. Villella suspects that only the frogs—and no salamanders—are on the federal list because so little is known about local salamanders. The doom and gloom of global warming and other trends are hard to dismiss, says Kling, now project manager for the Western Rivers Conservancy in Portland and a member of the Ancient Forest

Center's board of directors. "The whole planet is affected. We can't shield Opal Creek."

But if these charismatic creatures are in danger, no one told them. In a pond flush with spring rain, our group of newly anointed phib freaks watches a rough-skinned newt arch through the water toward a female. He pokes her with his snout, then climbs on her back. For one long moment they are locked in an embrace designed to perpetuate their species. His bright-orange underbelly glows in beautiful complement to her dark-red back.

Across the pond a pair of Pacific chorus frogs float near the bottom, united in apparent bliss. Suddenly they erupt in motion, eight legs pumping as they burst to the surface. Two adjacent heads rest just out of the water, one a glistening gray, the other neon green. An abrupt kick in eight-legged unison sends them back to the bottom, where they resume their leisurely mating.

Mims, grinning, watches us watching this rite of spring. He knows we're hooked. Opal Creek is a place where time moves with the seasons and life responds intuitively. It instills the wonder of places and processes far older and wilder than any of us could have imagined. Says Mims, "It shows how the world could be."

Jane Braxton Little *shares her home in California's northern Sierra Nevada with western skinks and fence lizards. Her most recent story for Audubon was "Treasure Island" (September-October 2006), on seabird restoration efforts off the coast of Baja California.*

### What You Can Do

For more information on the amphibian workshop, go to [www.opalcreek.org](http://www.opalcreek.org). To buy *A Field Guide to Amphibians of Opal Creek* (\$10, plus shipping and handling), which has more than 100 color photos of rare and common species, call 503-892-2782. The Opal Creek Ancient Forest Center also offers courses on birds; mosses, lichens, and liverworts; medicinal plants; wildflowers; butterflies; mushrooms; and geology. To reach Opal Creek, follow Highway 22 (east from I-5 or west from Bend) toward North Fork Road in Lyons (the Swiss Village Restaurant is on the opposite corner) and turn north. After 20 miles you will enter the Willamette National Forest, and the road turns to gravel. Follow Forest Service No. 2209 to the left at the fork in the road and drive four miles to the parking area at the gate. If you are renting a cabin for the night, a shuttle bus will meet you at the gate. Otherwise, visitors are encouraged to take the gentle 3.1-mile hike on an old mining road, which cuts through some of Opal Creek's most spectacular trees.

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