



Part of East Rim Drive is Closed for Construction until Mid-September

Road alert! Part of the East Rim Drive is closed this summer for construction. It is closed to all traffic, including bicycles and pedestrians, to allow the contractor to work efficiently. The closure extends from Sun Notch to Reflection Point (see map on page 5) and may include temporary closures of Pumice Castle Overlook and the Mount Scott Trail parking lot. If all goes well, everything will reopen sometime in mid-September.

The Pinnacles Road will also be affected. While not part of the construction zone, it won't be reachable by automobile. To access the road and its trailheads, you'd need to bike or hike there via the 4.3-mile (6.9-km) Grayback Road (a sandy dirt road, closed to automobiles) or exit the park and use Forest Service Road 2304 (gravel) to reach Pinnacles Overlook from the southeast—a 1-hour drive from Park Headquarters, followed by a flat walk of 0.7 miles (1.1 km).

The roadwork is part of a 5-year, \$56 million effort to stabilize and repair 19 miles of the East Rim Drive, which was built in the 1930s. Funding for the project comes from the Great American Outdoors Act, passed by Congress in 2020 to address infrastructure needs on public lands.

Cleetwood Cove Trail to be Closed for Improvements in 2026-2028

Each year, around 10% of visitors to Crater Lake National Park descend the steep trail to the water's edge (see page 2). Maintaining this trail—inside the belly of a crumbling volcano—is not easy! To ensure safe access for future generations, the Cleetwood Cove Trail will be closed for construction in 2026, 2027, and 2028. It will be stabilized and improved, and the lake shore will receive a new bulkhead, marina, and restroom facility.

While it won't be possible to swim, fish, or take a boat tour during this major rehabilitation project, the rest of the park's trails, viewpoints, and facilities will remain open for your enjoyment and discovery.

For more details and project updates, visit the park's website: www.nps.gov/crla/planyourvisit/cleetwood-cove-trail-and-marina-rehabilitation.htm.

Escape to Wizard Island

Plus 10 Other Ways to Enjoy Your Park



Lidar Image of Wizard Island

Have you ever set foot on a volcano inside a volcano? Boat tours operate on Crater Lake from July to mid-September. While most don't stop at Wizard Island, about 200 people per day can purchase a ticket to be "stranded" on the island for 3 hours—to explore, swim, fish, and relax. See page 3 for more information and page 2 to learn about the steep hiking trail required to take a boat tour.

Wizard Island emerged from Crater Lake around 7,300 years ago in a shower of fiery cinders that piled into a symmetrical cone. Lava flows then pushed through the loose cinders, creating "tongues" of blocky lava that comprise the rest of the island. Today, hikers can cross a lava tongue on the Fumarole Bay Trail or explore the volcano's vent (known as the Witches Cauldron) by taking the Summit Trail. See page 4 for trail details. Visiting Wizard Island is a special experience, but there are many other ways to make your stay at Crater Lake memorable, meaningful, and fun. Here are 10 suggestions:

Watch the Park Film

Explore the park's violent past and its present tranquility in this 22-minute film, shown on the hour and half-hour at the Steel Visitor Center at Park Headquarters.

Walk Among Wildflowers

In July and August, flowers line many of the park's roads and trails. Take a short stroll on the Castle Crest Trail to view the park's premier display (see page 4).

Find the Phantom Ship

Anchored near the lake's south shore is an island that seems to be sailing away. To see it, walk to Sun Notch or drive to Reflection Point (see page 5).

Visit the Sinnott Overlook

Perched on a cliff at Rim Village, this historic overlook features a dramatic view of the caldera and exhibits that explain its geologic features (see page 3).

View the Lodge

For a glimpse into a bygone era, check out the history exhibits—and the Great Hall—of Crater Lake Lodge, renovated in the 1990s but first opened in 1915 (see page 3).



Rotary Plow at Rim Village

Climb a Peak

The summits of Watchman Peak, Garfield Peak, Union Peak, Crater Peak, and Mount Scott each offer panoramic—and very different—views of the park (see page 4).

Touch the Water

The trail to the lake shore is steep and can be crowded, but the water at the bottom is some of the world's purest. Swim, fish, or simply dangle your toes (see page 2).

Take a Trolley Tour

See the park with those who know it best. Narrated, 2-hour tours depart daily from Rim Village, stopping at overlooks as they travel along Rim Drive (see page 3).

Savor a Sunset

Sunsets in the park can be spectacular—especially from the top of Watchman Peak and from roadside pullouts high on the Rim Drive (see page 2).

See the Milky Way

On moonless nights, the park offers some of the darkest night skies in America. Look up to see meteors, satellites, planets, and the starry arms of our galaxy.

When is the Park Open?

The park is open year-round, 24 hours a day. No reservations are needed to enter. Some roads, however, are closed seasonally due to snow. The North Entrance and Rim Drive close for the season on November 1 (or earlier if there is significant snowfall). Highway 62 and the road to Park Headquarters are open year-round. Rim Village is also reachable year-round except during periods of heavy snowfall. In the spring, opening dates vary. The North Entrance and West Rim Drive open sometime between mid-May and late June. The East Rim opens between mid-June and late July.

Look Inside! →

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Park Profile

Crater Lake National Park protects the deepest lake in the United States. Fed by rain and snow (but no rivers or streams), the lake is considered to be the cleanest large body of water in the world. The water is exceptional for its clarity and intense blue color.

The lake rests inside a caldera formed 7,700 years ago when a 12,000-foot-tall (3,700-meter) volcano collapsed following a major eruption. The eruption may have been the largest in North America in the past 640,000 years. Later eruptions formed Wizard Island, a cinder cone near the southwest shore.

Today, old-growth forests blanket the volcano's slopes, harboring more than 700 native plant species and at least 72 types of mammals. The park is central to the cultural traditions of local American Indian tribes, whose ancestors witnessed the lake's formation.

- Park established: 1902
- Size: 183,224 acres (74,148 hectares)
- Number of visitors last year: 505,000
- Lake depth: 1,943 feet (592 meters)
- Lake width: 4.5 to 6 miles (7 to 10 km)
- Highest point: Mount Scott, elevation 8,929 feet (2,721 meters)



Artist Paul Rockwood's conception of Mount Mazama, the volcano that collapsed to form Crater Lake. If you gathered up the ash from the mountain's big eruption and spread it evenly across the state of Oregon, it would form a layer 8 inches (20 cm) thick.



Bicycling on the East Rim Drive



Relaxing on the Annie Creek Trail



Junior Rangers



Summer Sunset



National Park Service
U.S. Dept. of the Interior

Crater Lake Visitor Guide Summer/Fall 2025

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Park Phone: 541-594-3000

Website: www.nps.gov/crla

Mail: PO Box 7, Crater Lake, OR 97604

Email: craterlake@nps.gov



National parks belong to everyone. We all share responsibility in protecting them. Please take a moment to become familiar with these important regulations. For a full list of the park's rules, visit go.nps.gov/regs.

Drones

Operating remote-controlled aircraft in the park is prohibited.

Guns

Firearms are allowed in the park in accordance with Oregon state laws. They are prohibited, however, in all park buildings.

Marijuana

Possession of marijuana is prohibited. Oregon state laws allowing the use of marijuana do not apply in the park, an area of federal jurisdiction.

Overnight Parking

The park is open 24 hours, but overnight parking is not allowed except for people who are backpacking (permit required) or staying in the park's campground or hotels.

Feeding Animals

Do not feed wildlife, including birds and squirrels. Exposing them to our food alters their behavior, is bad for their health, and can be dangerous for you. Store food properly. Generally, this means in your vehicle or in a campground food locker. Backcountry campers should hang their food or use a bearproof canister.



Golden-Mantled
Ground Squirrel

**Help keep wildlife wild.
Please do not feed!**

Hiking and Climbing

Stay on trails. This prevents erosion, protects vegetation, and protects other hikers. The Cleetwood Cove Trail is the only legal access to the lake shore. Hiking and climbing inside the caldera is otherwise prohibited. The walls consist of unstable rocks and loose soil.

Park Features

Leave rocks, plants, animals, and artifacts undisturbed for others to enjoy. It is prohibited to collect, deface, disturb, or destroy natural or cultural features. Do not approach, touch, feed, or disturb wildlife.

Activities

Backpacking

More than 95% of the park is managed as wilderness. Although some trails and areas are closed to backcountry camping (for example, there is no camping in the summer with a view of the lake), exploring the park's old-growth forests and volcanic landscapes can be a rewarding experience. Generally, backpackers must travel at least 1 mile from their vehicle in order to camp.

Before setting out, all backpackers must obtain a permit, in person, from the Ranger Station at Park Headquarters. (The one exception is through-hikers on the Pacific Crest Trail, who may instead sign a trail register as they enter the park.) Backcountry permits are free of charge and are available 24 hours a day. They are not available online or over the phone.

Bicycling

Bicycles are allowed on paved roads and the dirt/sand Grayback Road. They are not allowed on trails or off-trail. Helmets are required for riders under 16 years of age and are strongly recommended for all cyclists. The park's paved roads are narrow with heavy automobile traffic. The most popular trip in the park is the 33-mile (53-km) Rim Drive, but making the full loop is not possible this summer due to road construction (*see page 1*). The road features spectacular views but also long climbs that gain a total of 3,800 feet (1,158 meters) of elevation. For a flatter, more relaxing ride, try the paved, 11-mile (18-km) bike path around Diamond Lake, 5 miles (8 km) north of the park. The closest place to rent bikes is Diamond Lake Resort.

The park's annual "Ride the Rim" event will be taking place on September 6 and September 13 this year. On those two days, the entire East Rim Drive will be closed to automobiles but open to bicyclists and pedestrians (including through the construction zone), giving them a chance to enjoy 24 miles (39 km) of scenic roadway without vehicle noise and traffic. Visit www.ridetherimoregon.com to learn more.

Enjoying the Park with Your Pet

Pets are welcome in the park, but only in certain areas. Pets on leash are allowed on the Godfrey Glen Trail, Pacific Crest Trail, and Lady of the Woods Trail (*see page 4*). They are also allowed on the Grayback Road (*see map on page 5*). Leashes must not exceed 6 feet, and only one pet per hiker is allowed. Pets are not permitted on other trails or off-trail. Pets on leash (or otherwise physically restrained) are also allowed in picnic areas, campgrounds, parking lots,



Best Friends at Rim Village

on paved surfaces, and up to 50 feet (15 meters) away from paved surfaces. Popular places to walk a dog include Rim Village and Mazama Campground. Pets are not allowed inside buildings, including Crater Lake Lodge and the Mazama Cabins. The preceding rules do not apply to service animals here to assist people with disabilities. Solid waste must be picked up immediately and disposed of properly, in a trash can or toilet.

Junior Ranger Program

Are you between 6 and 12 years old—or a kid at heart? Pick up a free Junior Ranger activity book! They are available 24 hours a day from dispensers outside the park's visitor centers. To become a Junior Ranger and earn an official badge, complete at least 7 pages as you explore the park. Then show your book to a ranger at the visitor center (*see hours on next page*).



Wildlife Viewing

The park is home to a variety of animals, but they can be difficult to spot. Many are active primarily at night or shy away from humans. The most commonly seen animals are squirrels, chipmunks, marmots, ravens, jays, and deer. Lucky observers might spot a pika, marten (a type of weasel), fox, coyote, bald eagle, or herd of elk. Bobcats, mountain lions, and wolves are present but are rarely seen. Approximately 50 black bears live in the park, but they also prefer to stay hidden. You might see one crossing a road. The only creatures that tend to pester people are mosquitoes (from mid-June through July) and yellowjacket wasps (in August and September). Three of the park's species are currently listed as threatened or endangered under the Endangered Species Act: the gray wolf, northern spotted owl, and bull trout (found in several creeks south of the lake). If you spot any wildlife during your visit, please let us know (*see page 8*).

Accessibility

Except for the Sinnott Overlook, developed areas in the park are generally accessible to individuals with mobility impairments. The most accessible path for people using wheelchairs is the paved promenade at Rim Village. The Godfrey Glen, Sun Notch, Pinnacles, and Plaikni Falls trails are accessible to all-terrain wheelchair users with assistance (*see page 4*). Many pullouts on the Rim Drive have wheelchair-accessible wayside exhibits. We are working to improve our level of accessibility for all park visitors. We welcome your comments.



Black Bear Crossing the Pinnacles Road

Sky Gazing

With clean air and unobstructed views, the rim of Crater Lake is a great place to observe astronomical events. Discovery Point is a favorite spot to watch the sunrise. For sunsets and moonrises, try Watchman Overlook, Cloudcap Overlook, or hike to the top of Watchman Peak.

Fishing

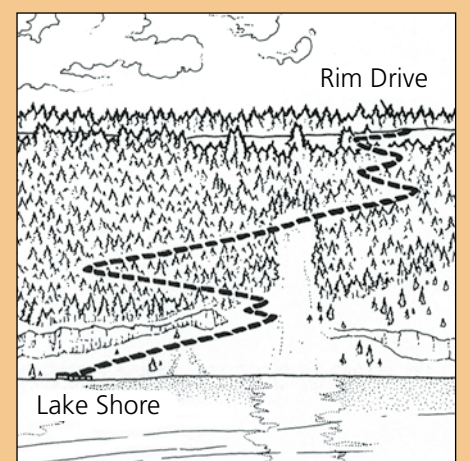
Crater Lake is home to rainbow trout and kokanee salmon. Neither is native to the lake. Fishing is allowed at the bottom of the Cleetwood Cove Trail, where you'll find a short stretch of rocky shoreline. Wizard Island, reachable by tour boat, is also open to fishing. Licenses are not necessary. There are no restrictions on the size, number, or type of fish taken. Fish may be released or kept. To prevent the introduction of other non-native organisms, no organic bait of any kind may be used. This includes fish eggs, PowerBait, and live or dead fish. Fishing is limited to artificial lures and flies only.

Swimming

Swimming is allowed in Crater Lake, but the water is cold! Most people swim for just a few minutes. Swimming is permitted only at Cleetwood Cove and Wizard Island (which requires a tour boat to reach). The shoreline at both locations is rough and rocky. There are no beaches, and no lifeguards are on duty. Swimmers must stay within 100 yards (91 meters) of shore and not venture out of Cleetwood Cove or away from Wizard Island. Long-distance swimming is prohibited. To prevent the introduction of non-native organisms, the use of equipment other than standard swimsuits is forbidden. Wetsuits, snorkels, fins, goggles, life jackets, and other flotation aids are not allowed, as well as other gear—such as rafts, canoes, kayaks, and paddleboards—that could serve as potential vectors for invasive species.

Hiking to Cleetwood Cove

The Cleetwood Cove Trail is the only legal access to the shore of Crater Lake. The hike is steep and strenuous: in 1.1 miles (1.7 km) it drops 700 feet (213 meters) in elevation. Walking back up is equivalent to climbing 65 flights of stairs! The trail is recommended only for those in good physical condition. It is not accessible for people with mobility impairments. Hikers should wear sturdy footwear and carry water. Vault toilets are located at the top and bottom of the trail. Depending on snow conditions, the trail is usually open from mid-to-late June to late October.



The strenuous trail to Cleetwood Cove drops 700 feet (213 meters) in elevation.

How Did Crater Lake Get Its Name?

“Crater Lake” might seem like an obvious moniker, but it was hardly the first name to be applied to this park’s largest body of water. In fact, over the years, it has proven to be somewhat controversial. Does it accurately reflect the lake’s true origins? And to which crater does the name actually refer? This year marks the 156th anniversary of the expedition that bestowed the title. Let’s recount the events that led to the christening and attempt to shed light on these longstanding questions.

The first party of European Americans to stumble across the lake, in 1853, dubbed it “Deep Blue Lake.” The second, in 1862, simply called it “Blue Lake.” Over the next few years, it would be hailed by other visiting groups as “Great Sunken Lake,” “Hole-in-the-Ground,” and “Lake Majesty.” The Klamath Tribes, whose ancestors witnessed the lake’s formation, know it as “Giwas.” (Unfortunately, the meaning of that word has been lost to time.)

James McCall Sutton was a resident of Jacksonville, Oregon, a gold-rush town 60 miles (97 km) southwest of the lake. Sutton had met some of the lake’s early visitors, and had read stories about it in *The Oregon Sentinel*, the

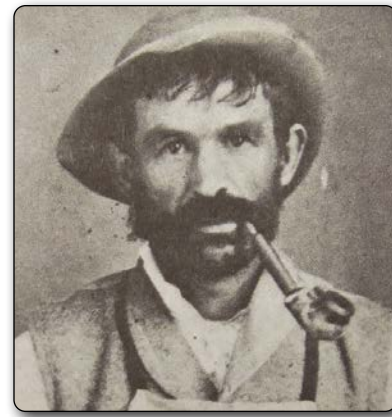
local newspaper at which he was a writer and editor. Determined to see the ballyhooed wonder for himself, he organized a midsummer excursion in 1869 for a group of five men, five women, and six children.

The excursion was, more accurately, an expedition. The party traveled slowly in three horse-drawn wagons on a primitive road blazed four years earlier by the US Army (a route now followed by Highway 62). They endured lightning storms, yellowjacket swarms, wildfire smoke, creek crossings, and a rough and rocky road punctuated with tree stumps. They reached the lake on August 3rd, after an eight-day journey, maneuvering their wagons off-road to climb the last three miles to the rim.

“To say that this wonderful lake is grand, beyond description, is to give no idea of its magnificence,” Sutton reported, in an article he penned later that month for *The Oregon Sentinel*. “Everyone gazes at it for the first time in almost tearful astonishment.” The silence of his party, however, was soon broken by exclamations of maternal concern: “Look out for the children! Stand back Cora! Look out for Zetta! Come back Jimmy! Come back Peter!”

None of the kids went over the brink, but before long, the men did, intentionally. In their wagons, they’d brought along a supply of wooden planks, nails, and tar. Wrote Sutton: “Each man now shouldered up a portion of our boat material, and after a few timid glances down the fearful incline, started boldly over the loose, crumbling bank, starting bevvies of loose boulders at every step, at the eminent danger of any one who dared venture ahead of the party.” They spent the afternoon assembling their rowboat at the shore.

The next day, they launched the vessel into a stiff headwind and rowed for an hour to reach the lake’s conical island, two miles distant. “This island is but a loose pile of cinders,” lamented Sutton, though they succeeded in scrambling to its summit. There, they discovered a “basin-like crater,” 90 feet (27 meters) deep, with a snowbank at the bottom, and they proclaimed themselves the first humans ever to set foot on the isle. They scrawled their names on a scrap of paper, which they placed in a glass bottle and left inside the crater.



Historians credit James Sutton (1830-1878) with giving Crater Lake its present name. His 1869 article in *The Oregon Sentinel* marked the first time the name was seen in print. Born in Illinois, Sutton traveled to Oregon at the age of 20 in search of gold. Later he ran a drugstore, served as a postmaster, and worked as a writer and newspaper editor.

Sutton had hoped to circumnavigate the lake and measure its depth at different points, but “owing to the frail nature of our boat, and strong wind,” the party chose to forgo that objective. Still, they did take one sounding, half a mile from the island, and determined the water to be 550 feet (168 m) deep. “Could we have reached the deepest part, no doubt we would have found it 1,500 or 2,000 feet deep.” Sutton’s prediction would be confirmed in 1886 when the lake was plumbed by scientists from the US Geological Survey.

The adventurers returned to Jacksonville in mid-August. When Sutton’s two-part story about (*continued on page 8*)

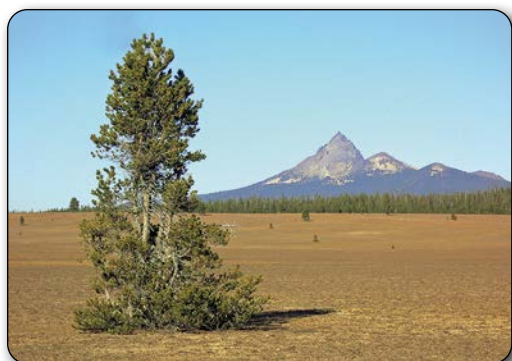


James Sutton’s party may have been the first to launch a boat on Crater Lake, cross to Wizard Island, and reach the island’s summit. There, they discovered a crater 90 feet (27 meters) deep and 470 feet (143 m) across. The island is a cinder-cone volcano that emerged from the lake around 7,300 years ago.

OREGON’S GREAT CURIOSITY

Several of our citizens returned last week from a visit to the Great Sunken Lake. It is thought to average 2,000 feet down to the water all round. The walls are almost perpendicular, running down into the water and leaving no beach. No living man ever has, and probably never will, be able to reach the water’s edge. It lies silent, still, and mysterious in the bosom of the hills, like a huge well scraped out by the hands of the giant geni of the mountains. The lake is certainly a most remarkable curiosity.

In the 1860s, newspapers began trumpeting the existence of a mysterious lake at the crest of the Cascade Mountains. Vivid language was their only tool; the lake wouldn’t be photographed until 1874. This passage comes from an 1865 story in *The Oregon Sentinel*.



Trees are few and far between in the Pumice Desert RNA, but lodgepole pines are slowly encroaching. Given more time—perhaps a few thousand years—the forest will likely recover.



The round-leaved sundew (*Drosera rotundifolia*) lures insects with sugary drops of sticky fluid. It is one of 5 carnivorous plants found in the Sphagnum Bog RNA.



The Sphagnum Bog RNA is a botanist’s delight, with more than 170 plant species. But watch your step, or you’ll sink waist-deep into the mire.



Llao Rock is a vertical cliff capped by pumice from the caldera-forming eruption. To protect the fragile plants that grow here, summer hiking in the Llao Rock RNA is prohibited.

Meet the Park’s Research Natural Areas

While Crater Lake may be the scenic and scientific centerpiece of the park that bears its name, it’s not the only feature of national importance to be found here. The park is also home to four Research Natural Areas (RNAs). RNAs are federal lands that have been singled out because they represent prime examples of particular habitats. In Oregon, there are more than 160 such sites, on lands managed by the Department of the Interior, Department of Agriculture, and Department of Defense. Each one safeguards a different type of environment in a relatively undisturbed state.

RNAs are selected administratively, rather than established legislatively. Ours were designated in 1994 by the park’s superintendent. They are managed to preserve natural features and processes, protect genetic diversity (including rare species), and promote non-manipulative scientific research (i.e. research that

observes, but does not alter, existing conditions). Roads, trails, and camping are not allowed. At a few sites, public entry is excluded altogether, where recreational pursuits could have negative impacts. Otherwise, off-trail exploration is permitted—and can be of great interest to someone with a background in botany or ecology.

The park’s largest RNA can actually be seen from the road—no hiking required! The Pumice Desert RNA abuts the North Entrance Road and covers 2,950 acres (1,190 hectares). It’s an outstanding example of a subalpine pumice field, a treeless plain that has yet to recover from the eruption of Mount Mazama 7,700 years ago. The collapse of the mountain filled this valley with a fiery flow of ash and pumice that’s estimated to be 200 feet (60 meters) thick. Today, researchers come here to study plant succession and adaptation. Only 15 plant species are managing to

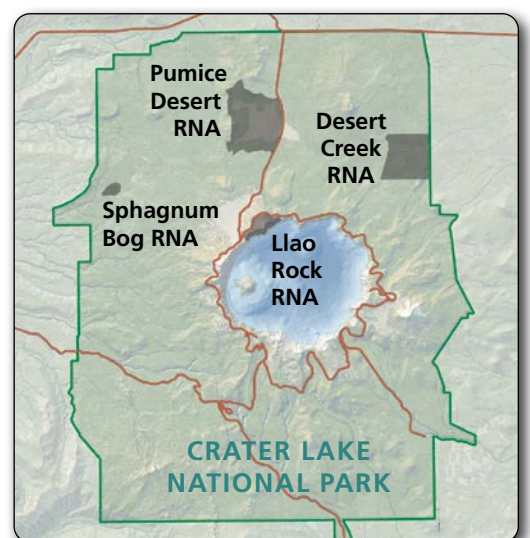
tolerate the Pumice Desert’s infertile soil, short growing season, temperature extremes, and voracious pocket gophers.

A greater variety of plants can be found 5 miles (8 km) to the west, in the much smaller Sphagnum Bog RNA. At least 170 species have been identified in this 160-acre (65-hectare) wetland, including carnivorous sundews and bladderworts. The bog, fed by springs, is a complex mosaic of habitats: 8 distinct plant communities, 2 forest types, and 3 aquatic environments are represented. It’s also an easy place to get lost—and a guaranteed place to get your feet soaked—so prospective visitors should be cautious. Atop its foundation of Mazama pumice, a layer of spongy peat, 3 to 6 feet (1-2 meters) deep, has developed over the past 3,000 to 4,000 years.

Setting foot in the Llao Rock RNA won’t get you wet, but it will get you fined: this 435-acre (175-hectare) RNA has been off-limits to summer hiking since 2013 to protect several rare and sensitive plant species. Llao Rock is a prominent peak that towers almost 1,900 feet (580 meters) above the northwest shore of the lake. It’s capped by a layer (*continued on page 8*)

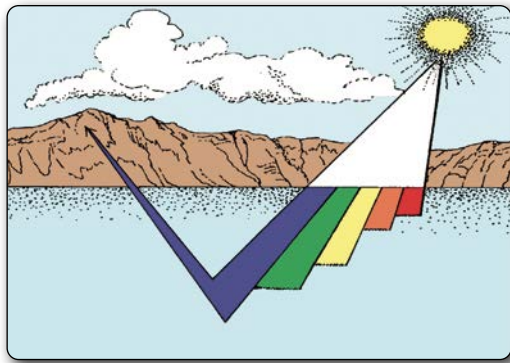


Pumice moonworts are 2-inch-tall ferns that live on Llao Rock. They are also known as “grapeferns”—their reproductive spores are held in capsules that resemble green grapes.





Moss



Crayfish (Non-Native)



Rough-Skinned Newt



Ask the Ranger

How deep is Crater Lake?

Crater Lake is 1,943 feet (592 meters) deep. It's the deepest lake in the USA—300 feet (91 m) deeper than Lake Tahoe, which ranks second. It's the deepest lake in the world formed by volcanic activity.

Where does the water come from?

About 83% of the water comes from rain and snow falling directly on the surface. The rest is runoff from precipitation landing on the slopes above the lake.

Does the water level vary?

The level of Crater Lake fluctuates just a few feet each year. Winter storms make it rise a little; dry summers cause it to fall. The lake experiences about twice as much precipitation as evaporation, but the surface remains far below the rim because water continuously seeps out through a porous layer of rock along the north shore. Crater Lake is just like your bathtub—halfway up the side, there's a drain! Water leaks from the lake at a rate of 2 million

gallons (7.6 million liters) every hour. It goes deep underground and is not believed to feed any nearby rivers or springs.

Does Crater Lake freeze?

Ice rarely forms on the lake, except during the coldest of winters. The lake contains a tremendous amount of water—5 trillion gallons (19 trillion liters)—but it has a relatively small surface area of 21 square miles (54 km²). The lake has not frozen over completely since 1949.

How clean & clear is the lake?

Since there are no inlets carrying sediment or pollution into Crater Lake, its water is very clean: cleaner than the water that comes out of your faucet at home! When an 8-inch-wide (20-cm) instrument called a Secchi disk is lowered into the lake, the average depth at which it disappears is 103 feet (31 meters). Some days, readings exceed 130 feet (40 m).



Why is the water so blue?

The lake appears blue because it is very clean and very deep. When sunlight enters the lake, most of the light waves (the red, orange, yellow, and green ones) are absorbed by the lake and converted into heat. The blue light waves are not absorbed; they are scattered by the water molecules in all directions. Some are scattered out of the lake and into our eyes. If the water in

Crater Lake was dirtier (or shallower), light waves of other colors would be returned to our eyes, too. They would be scattered by particles (or reflected off the bottom) before being absorbed.

How did Crater Lake form?

Crater Lake occupies the shell of Mount Mazama, a collapsed volcano. The volcano once stood 12,000 feet (3,700 m) tall, but its summit imploded after a major eruption 7,700 years ago. The eruption was 100 times the magnitude of the 1980 blast at Mount St. Helens. In just a few days, vast quantities of ash and pumice—approximately 24 cubic miles (100 km³)—were ejected from the magma chamber, which, as a result, could no longer support the weight of the mountain above it. Ash from the eruption traveled all the way around the world; a layer has been found in ice cores in Greenland.

How do we know the eruption happened 7,700 years ago?

The eruption produced pyroclastic flows of ash and pumice that flattened the forests growing on the mountain's slopes. The age of the eruption has been determined by carbon-dating tree remains buried in the ash deposits.

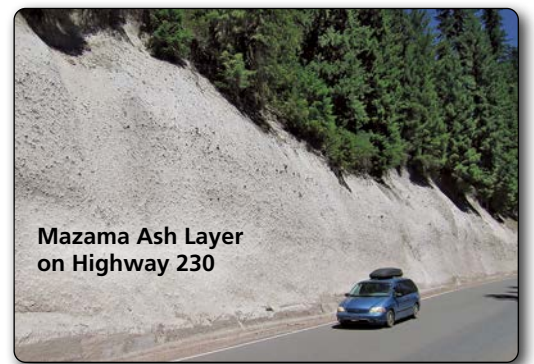
Does anything live in the lake?

Crater Lake is home to a variety of insects, worms, snails, crustaceans, and amphibians, including a type of salamander found nowhere else in the world—the Mazama

newt, a proposed subspecies of the rough-skinned newt. Most of the lake's biomass, however, is plant-based: aquatic moss thrives on the lake floor at depths of 80 to 460 feet (24 to 140 meters). Nowhere else in the world does moss grow so deep underwater, a testament to Crater Lake's clarity and transparency to sunlight.

Are there fish in the lake?

Crater Lake had no fish until it was stocked for fishing between 1888 and 1941. Six species were introduced, but only two have survived: rainbow trout and kokanee salmon. In 1915, crayfish were also added to the lake (as trout food). Recently, their population has exploded: crayfish now dominate 90% of the shoreline, and they have been found living at depths of up to 800 feet (244 m). Like miniature vacuum cleaners, they eat everything in their path, reducing the abundance and diversity of native organisms. Sadly, crayfish are pushing the lake's native newts toward extinction.



Mazama Ash Layer on Highway 230

The Journeys of Deep Rover, Remembered

Visitors to Crater Lake often find themselves wondering if anyone has explored its depths. The answer is yes! In the summers of 1988 and 1989, a one-person submarine made 47 dives to the bottom. They were not sightseeing trips—their purpose was to collect data on the lake's hydrology, biology, and geology and to resolve a controversy over geothermal energy development that was brewing on the borders of the national park. Today, the journeys of Deep Rover stand as a milestone in our understanding of the lake's ecology and our efforts to protect it. Let's revisit the discoveries and examine the legacy of this fascinating and important expedition.



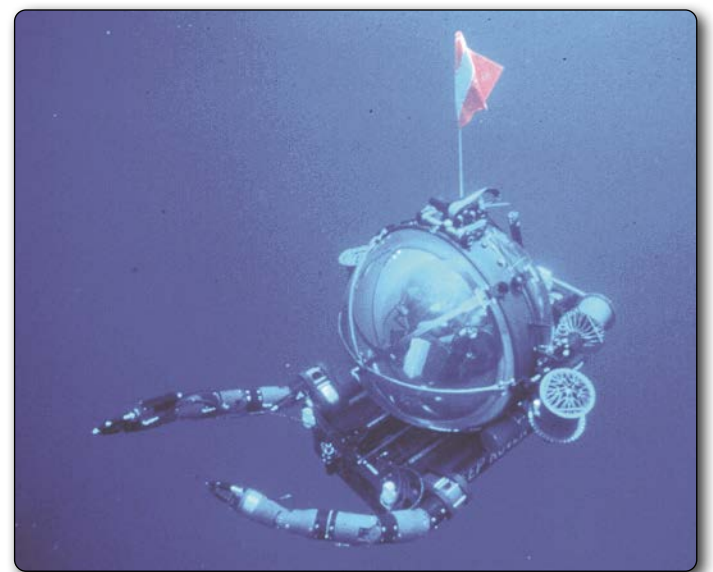
Mark Buktenica was the park's aquatic ecologist from 1985 through 2017. Seen here at the controls of Deep Rover, he remembers the expedition as the experience of a lifetime: "What we found was not only scientifically interesting, it was spectacular—as spectacular as the scenery above the lake's surface."

Beneath Crater Lake National Park lies a reservoir of restless magma. In the mid-1980s, a company from California announced its desire to build a power plant on public lands adjacent to the park. The plan was to use geothermal heat (in the form of steam) to spin turbines to produce electricity for San Francisco. They drilled an exploratory well, half a mile outside the park's eastern

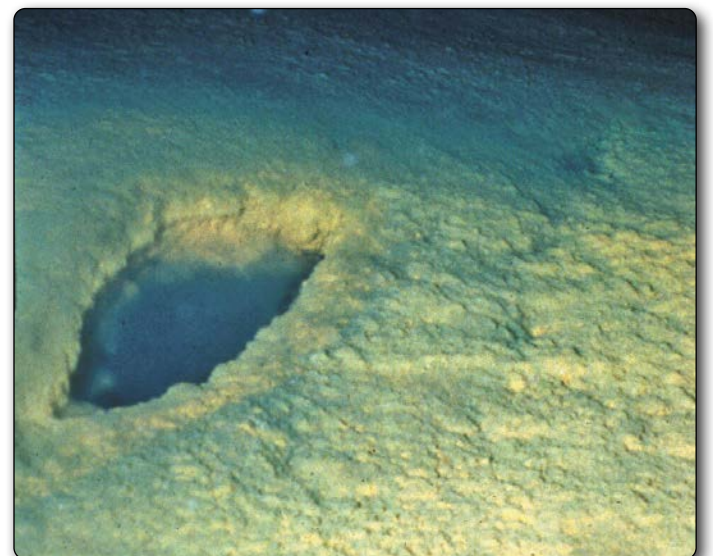
boundary, and reported temperatures above the boiling point of water just 1,350 feet (410 meters) below ground. The project aroused widespread concern. Might it adversely affect the plumbing of Crater Lake? The United States Congress stepped in, authorizing the Department of the Interior to suspend all drilling while the park investigated two unknowns: Are there any hydrothermal inputs into Crater Lake? And if so, are they significant in any way to the lake's ecology?

The National Park Service, US Geological Survey, and National Geographic Society teamed up to lease a submarine, called Deep Rover, from a company in Vancouver, Canada. Flown by helicopter onto the lake, it was powered by batteries and could stay underwater for six hours at a time. Its hollow, plastic hull had room for only one occupant, who served both as pilot and scientist. Three men—two oceanographers from Oregon State University and Mark Buktenica, the park's aquatic ecologist—alternated dives. "As I slowly sank into the depths of the lake, I was engulfed in blue that eventually turned to darkness," recalls Buktenica of his half-hour commutes to the lake floor. "The only sounds in the submarine were the creaking and popping of the hull as it adjusted to the increasing water pressure and the persistent hum of the carbon dioxide scrubbers cleaning the air."

Fortunately, a radio allowed the men to communicate with the surface, and headlights on the sub allowed them to see. What they found was surprising—and spectacular! Colonies of yellow-gold bacteria grew in vast, puffy mats, often around pools of aqua-blue water (see photo at right). Probes inserted into the bacteria mats registered temperatures as high as 66°F (18.9°C), much warmer than the surrounding 38°F (3.5°C) lake water. The bacteria were surviving in the darkness by oxidizing iron for energy—iron introduced to the lake in warm, hydrothermal fluids from below. Some of the fluids then trickled into the aqua-colored pools, where, laden with minerals, they could not mix freely with the waters above them. The fluids were greatly enriched in elements such as manganese, radon, lithium, and helium-3, indicating that they had once been in contact with hot, subterranean rock. Elsewhere in the lake, the team found 30-foot-tall (9-meter) (continued on next page)



More than 30 years after it explored Crater Lake, the submarine named Deep Rover still captures our imagination. The pilot sat alone inside a clear acrylic sphere and collected samples using two robotic arms.



"It's bizarre... remarkable.... I've never seen anything like it before!" So radioed oceanographer Jack Dymond on August 10, 1989, when he discovered the first of many "blue pools" on the floor of Crater Lake. This is the only lake in the world in which subsurface pools of high-density water have been detected.

Support Your Park—

Volunteer Your Time

Looking for a hands-on way to help the park? Consider sharing your time and talents as a Crater Lake VIP (Volunteer-In-Parks). Full-time volunteers are needed to help staff visitor centers, present interpretive programs, and perform PSAR (preventive search and rescue). Opportunities are advertised several times each year at www.volunteer.gov. Volunteers are provided free housing in exchange for 3 months of service. To volunteer periodically, join The Friends of Crater Lake, a nonprofit whose members help with special events and operate a winter information desk at Rim Village. Learn more at www.friendsofcraterlake.org.

Report Your Wildlife Sightings

If you spot any interesting animals during your visit or witness unusual behavior, please let us know! Your observations will help us learn which animals live in the park and how they use it. Species reported recently include the sooty grouse, western skink, northern saw-whet owl, police-car moth, short-tailed weasel, black-tailed bumble bee, elk, bobcat, and mountain lion. To share your sighting, email craterlake@nps.gov. Let us know the date and location of your encounter, a detailed description of what you saw, and your name and contact info, in case we have follow-up questions. And if you captured any photos, send them along—ideally with permission for us to use them in reports and publications. Photographic evidence can be very important in confirming the identity of some species. Just remember that approaching, feeding, or disturbing wildlife is prohibited—so please keep your distance. Thanks for your help!

Buy Crater Lake License Plates

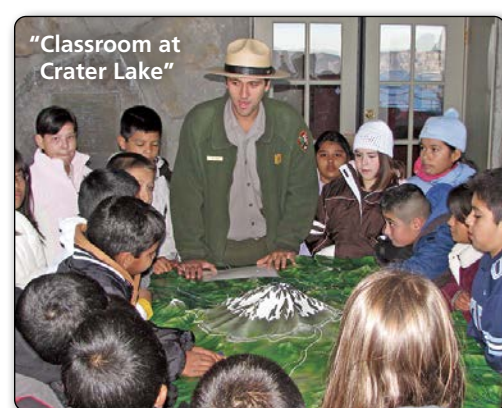
If you live in Oregon, consider choosing Crater Lake license plates for your vehicle. For a one-time charge of \$30, you can outfit your car with these beautiful plates while supporting park projects. You can purchase them at any time, not just when buying a new vehicle or renewing your registration. Visit any DMV office or www.oregon.gov/odot/dmv for details. Proceeds go into an endowment that funds the operation of the park's Science and Learning Center, a facility that provides living and working space for visiting scientists, teachers, and artists. For more information, visit go.nps.gov/slc.

Contribute to the Crater Lake Trust

The nonprofit Crater Lake National Park Trust raises private funds to support park projects and connect the park with surrounding communities. Most years, for example, it helps fund field trips to the park for more than 5,000 students. In a program called “Classroom at Crater Lake,” kids engage in hands-on science and learn about wildlife, old-growth forests, and winter ecology. Learn more at www.craterlaketrust.org. Share your love of the park by making a tax-deductible gift.



Park visitor Kari Bertram spotted this red fox in Mazama Village. Red foxes are not always red—most at Crater Lake are silver to black.



Naming of Crater Lake

(continued from page 6)

the expedition, “Trip to Crater Lake,” ran in the August 21st and 28th editions of *The Oregon Sentinel*, it marked the first time the name “Crater Lake” had appeared in print. Sutton was thus credited with naming the lake, although it’s not clear he ever claimed that distinction. Either way, his entertaining account seems to have cemented the name in the public consciousness.

So, what inspired the moniker? Well, that’s been a persistent mystery. In his article, Sutton offers no explanation, which has led some observers to conclude that the “crater” in the title refers not to the basin in which the lake rests but to the cavity the men found at the summit of the island. Two pieces of evidence support this theory. First, while Sutton’s article twice refers to the island’s “crater,” it not once uses the term to describe the larger gulf. Second, a contemporary of Sutton’s, Orson Stearns, recalled in an 1896 memoir that Sutton had “renamed the lake after the crater discovered in the top of Wizard Island.”

Still, it seems more likely that the crater on Sutton’s mind was indeed the one occupied by the lake. His lack of commentary on the subject suggests that the more obvious explanation is the correct one. And, while he may not have labeled it a “crater,” he clearly recognized the lake’s volcanic setting, noting that the water was “entirely surrounded by walls of light-colored basalt, scoria, and almost every conceivable variety of volcanic productions.” Further, Sutton refers to the island as “Crater Lake Island,” implying that he named the lake prior to naming the cone. (It would not acquire the name “Wizard Island” until 1885.)

The other enduring controversy about the Sutton expedition relates to the meaning of the word “crater.” In modern geologic parlance, a “crater” is a vent (like the one on Wizard Island) formed from the ejection of volcanic material. The lake, properly speaking, sits inside a “caldera,” a depression formed from the collapse of a volcanic peak. So, some would argue, shouldn’t we call it “Caldera Lake”? Perhaps, but in the 19th century, the term “caldera” was not commonly used, even among geologists. It had been added to the lexicon by a German geologist in 1825 but was not yet widespread. It’s hard to fault Sutton’s word choice, especially since geologists had yet to visit the lake and come to understand that it was the legacy of a catastrophic implosion.

James Sutton died at the age of 48 and is buried in Ashland, Oregon. We may never know for sure how Crater Lake got its name, but thanks to Sutton’s colorful report, we know much about the thrills and travails experienced by the members of his expedition 156 years ago.

Research Natural Areas

(continued from page 6)

of beige pumice, which is home to a natural garden of miniature plants that somehow survive in this windswept location. One species of concern is the Crater Lake rockcress (*Boechera horizontalis*), a flower found almost exclusively in Crater Lake National Park. Another is the pumice moonwort (*Botrychium pumicola*), a fragile fern that is vulnerable to trampling.

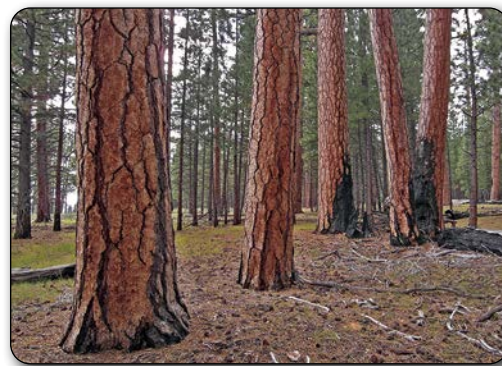
Last but not least, the 1,830-acre (740-hectare) Desert Creek RNA protects two habitats that are rarely found in such

pristine condition. First is a spectacular, old-growth ponderosa pine forest. Unlike most ponderosa stands in the Cascades, this one was never logged, owing to the park’s early establishment in 1902. Second is a dry grassland dominated by bitterbrush shrubs. Bitterbrush grasslands were once common along the eastern slope of the Cascades but have been decimated due to livestock grazing and fire suppression.

By saving remnant biological communities like these—and encouraging scientific investigation—the nationwide network of Research Natural Areas plays an important role in protecting our natural heritage.



Pronghorn antelope are sometimes spotted in the Desert Creek RNA, browsing on bitterbrush. The shrub’s trident-shaped leaves taste bitter to humans but are favored by wildlife.



Ponderosa pines need fire to keep rival species at bay. At Desert Creek, the park manages fire—both prescribed and natural—to mimic the burns that occurred here historically every 10-30 years.



Shop at the Park Stores

When you shop at the Rim Visitor Center or Steel Visitor Center, all proceeds from your purchase are invested back into the park. The stores are operated by the Crater Lake Natural History Association, a nonprofit partner of the National Park Service that supports the park’s educational and scientific programs. Many important projects are funded by the Crater Lake NHA, including the printing of this visitor guide! The stores offer a wide range of books and gifts, as well as Junior Ranger products for kids. You can also shop online at www.craterlakeoregon.org.



CRATER LAKE
NATURAL HISTORY ASSOCIATION

Share Your Comments

Whether you have a compliment, concern, or suggestion, we’d like to hear from you! This is your park, and we value your input on how to manage it. To provide feedback, send an email or letter to the park’s superintendent (see addresses on page 2).

—Thank You!

Journeys of Deep Rover

(continued from page 7)

rock spires, chimneys made of silica that had precipitated out of other upwelling fluids at some point in the past.

Bacteria were not the only life forms found to be thriving at great depths in Crater Lake. A variety of worms, insects, and tiny crustaceans were spotted as well. Although not dependent on the hydrothermal vents, they were remarkable for their ability to tolerate the extreme water pressures found in the lake’s deepest basin, 1,943 feet (592 meters) below the surface. Some were also notable for their life history. Adult flies of the genus *Heterotrissocladius*, for example, drop their eggs into the lake. The eggs sink slowly to the bottom, hatch into larvae, feed on lake floor sediments for perhaps two to three years, swim back up to the surface (pupating along the way), then emerge as winged adults. Two to three days later, the adults lay eggs and die, and the cycle starts again.

The discoveries of Deep Rover allowed Crater Lake to join a list 15 other National Park Service units deemed to have “significant thermal features” worthy of protection under the Geothermal Steam Act, a law passed by Congress in 1970. Any future drilling or geothermal development on nearby public lands won’t be permitted if it’s likely to adversely affect those features. Deep Rover also furthered, by leaps and bounds, our understanding of the lake’s evolution and ecology. Even so, the sub visited only 2% of the lake floor. Many secrets surely remain in the dark, watery depths of this collapsed volcano. Hopefully, someday, humans will return to explore the rest of the bottom of our nation’s deepest lake.