Crater Lake

National Park Service
U.S. Department of the Interior

Reflections

The official trip planner & newspaper of Crater Lake National Park

Summer/Fall 2008

Welcome!

Thank you for visiting your national park! In this age of rising transportation costs and shrinking summer vacations, I know that your time and money are more precious than ever. On behalf of our staff, I promise we'll do our best to ensure that your enjoyment of the park exceeds your investment in traveling here.

Here at Crater Lake, you'll find opportunities to refresh your spirit, awaken your senses, and engage your heart and mind. Opportunities this summer include ranger-guided hikes. We are pleased to announce that—for the first time in 5 years—rangers will be leading walks on some of the park's most popular trails. Turn to page 3 for a schedule of ranger-led activities.

This summer's guided hikes are the result of increased funding for seasonal rangers—funding made possible with the support of your congressional representatives through their approval of the "Centennial Initiative," a drive to improve our national parks in advance of the 100th anniversary of the National Park Service in 2016. For more information about the Centennial Initiative, visit www.nps.gov/2016.

In other news, we are pleased to report that—for the first time in its history—this park will soon be hiring a wildlife biologist. We've been monitoring the health of Crater Lake for 25 years, but relatively little is known about our terrestrial ecosystems. We don't know, for example, how many bears, elk, and mountain lions call the park home, nor do we know whether certain species, such as the wolverine, even exist here. Another task for our wildlife biologist will be to monitor species, such as the American pika, whose survival might be affected by our warming climate.

The National Park Service protects nearly 400 special places, saved by the American people so that everyone can experience our heritage. We at Crater Lake are proud to be stewards of this national treasure. Park rangers and maintenance staff are here to assist you in making your visit safe, rewarding, and fun. If there is anything we can do to help, please ask. Enjoy your park!

Craig Ackerman
Superintendent

Beyond the First "Wow"

Making the Most of Your Visit

People react in different ways to seeing Crater Lake for the first time. Some reach instinctively for their cameras, as though compelled to capture proof that such a remarkable lake exists. Others are moved to silence as they try to take it all in. Some people can't help but laugh at the surreal sight of a round, blue, mountaintop lake. Still others are roused to ask questions, curious about the lake's depth, color, origins, and features. But probably the most common response to seeing Crater Lake for the first time is to utter a single, simple word: "Wow!"

> *At the first view a dead silence fell upon our party. A choking sensation arose in our throats, and tears flowed over our cheeks. I do not pretend to analyze the emotion, but . . . to me it was a revelation.*
>
> – Frances Fuller Victor, author, describing her 1873 visit to Crater Lake

No matter what your reaction, after gazing down at the water for a few minutes you might find yourself at a bit of a loss. You've seen the lake, but now what? Is there more to the park than the thrill of the initial view? Is there anything to *do* here? Thankfully, the answer is yes. There is much more to explore—and there are other surprises in store—beyond the first "wow."

To get you started, here's a list of some recommended ways to make your visit to Crater Lake National Park more meaningful, memorable, and fun. While there's no "best" way to experience the park—that depends on your interests, time, and ambitions—these 10 activities are guaranteed to enhance your enjoyment and appreciation of this very special place. The only question is how many more "wows" will escape from your mouth!

Drive Around the Lake
Rim Drive is a 33-mile (53-km) road that encircles Crater Lake. More than 30 pullouts offer dramatic views of the park's volcanic scenery. Allow 2 to 3 hours *(see page 5)*.

Hike a Trail
From easy walks to challenging hikes, the park has something for everyone. Explore pristine forests, flower-filled meadows, and rocky peaks *(see page 4)*.

Attend a Ranger Program
Discover the wonders of Crater Lake with those who know the park best. Talks, hikes, kids programs, evening programs, and boat tours are offered daily *(see page 3)*.

Watch the Park Film
The park's rich human history is the topic of an 18-minute film shown every half hour at the Steel Visitor Center. Learn how others have been affected by Crater Lake *(see page 2)*.

Visit the Pinnacles Overlook
Formed during the same eruption that gave birth to the lake, these colorful volcanic spires are tucked away in the park's southeast corner *(see page 5)*.

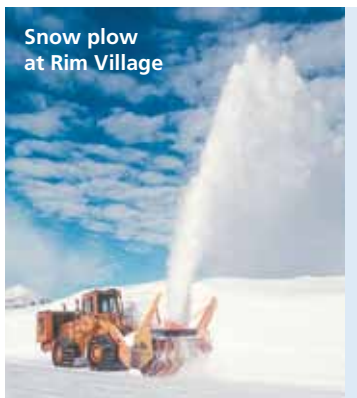
Tour Crater Lake Lodge
For a glimpse into an earlier era, check out the history exhibits—and walk through the Great Hall—of Crater Lake Lodge, renovated in the 1990s but first opened in 1915 *(see page 2)*.

Visit the Sinnott Memorial Overlook
With panoramic views and fascinating exhibits, this is the place to learn about the park's geologic story and history of scientific investigation *(see page 2)*.

Touch the Water
The trail to the lake shore is steep, dusty, and often crowded, but the water at the bottom is some of the world's purest. Swim, fish, or simply dangle your toes *(see page 3)*.

Relax
Find a peaceful spot and attune yourself to the sounds and rhythms of the park. The Lodge veranda and the quiet pullouts on the lake's north side are favorite spots to unwind.

Gaze at the Sky
With clean air and unobstructed views, Crater Lake is a great place to watch the sun go down, the moon rise up, and the stars twinkle in the sky *(see page 3)*.



Snow plow at Rim Village

When is the Park Open?

Crater Lake National Park is open year-round, 24 hours a day. Some roads, trails, and facilities, however, are closed seasonally due to snow. Much of the year, the park's North Entrance Road and Rim Drive are closed to cars. They close with the first significant snowfall, typically in late October or early November.

Crews begin plowing these roads in April, but opening dates vary. The North Entrance Road and West Rim Drive tend to open in early June. The East Rim Drive typically opens in early July. Highway 62 is open year-round. The road to Rim Village is also open year-round, except after heavy snowstorms.

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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 approximately 7,700 years ago when a 12,000-foot-tall (3,600-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 and open meadows blanket the volcano's outer slopes, harboring a variety of plants and animals, including several rare species. The area is central to the cultural traditions of local American Indian tribes, and the park provides unique opportunities for scientific study and public enjoyment.

- Park established: 1902
- Size: 183,000 acres (74,060 hectares)
- Visitors per year: About 500,000

- Lake depth: 1,943 feet (592 meters)
- Lake width: 4.5 to 6 miles (7 to 10 km)

- Annual snowfall: 44 feet (13.3 meters)
- Last time the lake froze over: 1949

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

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Crater Lake Reflections
Summer/Fall 2008

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Accessibility
With the exception of the Sinnott Memorial Overlook, developed areas in the park are generally accessible to individuals with mobility impairments. Wheelchair-accessible paths include the paved promenade at Rim Village, the Godfrey Glen Trail, and the Pinnacles Trail. Multiple scenic pullouts on Rim Drive have wheelchair-accessible wayside exhibits. Some ranger programs are accessible to people with impairments *(see page 3)*. A brochure with more detailed information is available at park visitor centers and entrance stations. We are working hard to improve our level of accessibility for all park visitors. We welcome your comments.

ATM
The Mazama Village Store has an ATM.

Drinking Water
Water faucets can be found at Rim Village, Mazama Village, Lost Creek Campground, and the Steel Visitor Center. Bottled water is available for purchase at the Rim Village Café, the Mazama Village Store, and at the top and bottom of the Cleetwood Cove Trail (when boat tours are operating).

Emergencies
Dial 911 to report any emergency, 24 hours a day. First aid is available at ether park visitor center or at the ranger station at Park Headquarters.

Entrance Fee
The entrance fee for Crater Lake National Park is $10 per family car, good for 7 days. The rate is higher for commercial vehicles. Your fees are put to work improving visitor services and facilities. Thank you for supporting your national parks!

Gasoline
A self-serve gas station at Mazama Village is open May 21 through October 13.

Lost & Found
If you lose or find an item, contact a ranger at either visitor center or call the park dispatch office at 541-594-3060.

Phones
Cell phone coverage in the park is spotty. Pay phones are located outside the Mazama Village Store, inside the Steel Visitor Center (open 9:00 a.m.–5:00 p.m.), and inside Crater Lake Lodge.

Picnic Areas
Picnic areas are found throughout the park *(see page 5)*. The Rim Village picnic area has fire grates.

Post Office
A United States Post Office is open Monday through Saturday in the Steel Visitor Center. Summer hours are 9:00 a.m.–noon and 1:00–3:00 p.m.

Recycling
Recycling in the park is currently limited to aluminum cans and plastic bottles. Look for receptacles at Rim Village, Mazama Village, the Steel Visitor Center, and the Cleetwood Cove Trailhead. All receptacles can accept both aluminum and plastic. We are working hard to expand our recycling program.

Restrooms
Restrooms with flush toilets and running water are located at Rim Village, Mazama Village, the Steel Visitor Center (9:00 a.m.–5:00 p.m.), and Lost Creek Campground. Vault toilets are located at most picnic areas, at several roadside pullouts, and at the top and bottom of the Cleetwood Cove Trail.

Showers & Laundry
Coin-operated showers and laundry machines are available at Mazama Campground.

Happy hikers

The Rim Visitor Center

Exhibits at the Sinnott Memorial Overlook

Services & Facilities

Camping

There are 2 campgrounds in the park. Both are situated in forests south of the lake.

Mazama Campground (213 sites) is located 7 miles south of Rim Village near Highway 62. In 2008, it will be open from mid-June through September 28. Half of the campsites are reservable in advance by calling 1-888-774-2728. The rest are available on a first-come, first served basis. Generally there are plenty of sites available; the campground sometimes fills on weekends, but rarely before 5:00 p.m. There are tent sites ($19 per night) as well as RV sites ($22). Some of the RV sites have electric hookups ($25). There are many pull-through sites; some can accommodate RVs as long as 50 feet (15 meters).

Each site has a picnic table, fire ring, and food locker. Black bears are rarely spotted, but campers are advised to store all food in their locker or in their vehicle. The campground has running water, sinks, and flush toilets. There are coin-operated showers and laundry facilities. The nearby general store sells groceries, firewood, and gasoline. You can contact the campground directly during the summer at 541-594-2255 ext. 3705. Mazama Campground is operated by the park's concessioner, Xanterra Parks & Resorts.

Lost Creek Campground (16 sites) is for tent-camping only ($10 per night). It is located on the spur road to the Pinnacles Overlook. It is generally open from early July through early October, depending on snow conditions. Registration is self-service, and reservations are not taken. The campground tends to fill on weekends, but usually not before mid-afternoon. It offers running water, sinks, and flush toilets. Each site has a picnic table, fire ring, and food locker. Payment can be made by cash or check. Holders of a Senior Pass or Access Pass receive a 50% discount. Lost Creek Campground is operated by the National Park Service.

Food & Dining

The park has 3 restaurants and one store.

The **Crater Lake Lodge** dining room offers fine dining in a casual lodge atmosphere. The menu features Northwest cuisine made with Oregon-grown ingredients. Reservations are required for dinner but are not taken for breakfast or lunch. During the summer season, reservations can be made by calling 541-594-1184. In 2008, the dining room will be open from May 21 through October 12.

The **Annie Creek Restaurant**, located in Mazama Village, serves hearty meals, buffet-style. The buffet features a selection of entrees, specialty pizzas, soups, salads, and desserts. À la carte items are also available. The restaurant also offers take-out pizza service, an espresso bar, daily buffet breakfasts, optional patio dining, and a cocktail room with entertainment on selected evenings. The restaurant will be open in 2008 from May 30 through September 14. The restaurant is located adjacent to the park's south entrance station, just off Highway 62.

The **Rim Village Café** serves lighter fare including grab-and-go sandwiches, soup, salads, snacks, breakfast pastries, and hot and cold beverages. The café was closed for renovation from 2004 to 2007 but is now open, offering "quick eats" year-round.

The **Mazama Village Store** sells groceries, camping supplies, firewood, and gasoline. It will be open in 2008 from May 30 through September 29.

Lodging

The park has 2 lodging options. Both are operated by Xanterra Parks & Resorts. For information, call 1-888-774-2728 or visit www.craterlakelodges.com. You can check availability and make reservations online.

Crater Lake Lodge (71 rooms) is located at Rim Village, overlooking the lake. In 2008, it will be open from May 21 through October 12. Reservations are highly recommended well in advance. **The Cabins at Mazama Village** (40 rooms) are located 7 miles south of Rim Village. Operating dates for 2008 are May 30 through September 28.

Visitor Centers

There are 2 visitor centers in the park. Both are staffed by rangers who can assist you with trip planning and weather forecasts. Books, maps, and other educational materials are sold at both locations by the Crater Lake Natural History Association *(see page 8)*.

The **Steel Visitor Center**, located at Park Headquarters, is open daily from 9:00 a.m. to 5:00 p.m. An 18-minute film is shown every half hour. The film examines the human history of Crater Lake, from the American Indians who witnessed the lake's formation to the prospectors who stumbled across the lake in the 1850s to the citizens who campaigned for the lake's protection in the 1880s.

The **Rim Visitor Center**, located at Rim Village, is open daily from 9:30 a.m. to 5:00 p.m. from June through September.

Exhibits

The **Sinnott Memorial Overlook**, perched on a rock ledge behind the Rim Visitor Center, features an enclosed exhibit room and an open parapet with spectacular views of the lake. The overlook contains a relief model of the park and exhibits on the park's geologic story and history of scientific research. The overlook is open daily from 9:30 a.m. to 5:00 p.m. from late June through October (weather permitting). 20-minute ranger talks are given several times each day from July 4 through September 1. The overlook is located down a steep historic walkway with stairs and is not accessible to people with limited mobility.

Crater Lake Lodge features exhibits on the history of tourism in the park, along with a look at the history of the lodge and its renovation in the 1990s. The exhibits are open daily, around-the-clock, from May 21 through October 12. They are located on the ground floor, just west of the lobby.

Gifts & Books

The park has 2 gift shops. The **Rim Village Gift Shop** is open year-round. The **Annie Creek Gift Shop**, located in Mazama Village, is open from May 30 through September 14. In addition, the park's 2 visitor centers sell books and other educational materials.

Crater Lake National Park belongs to everyone. We all share the responsibility of protecting it. Please take a moment to become familiar with these important regulations.

Camping
Camping is limited to developed campgrounds and some backcountry areas. Permits are required for backcountry camping. Permits are free and are available at either visitor center or at the ranger station at Park Headquarters.

Driving
Use pullouts to enjoy the views. Do not stop in the road. Observe posted speed limits, and watch for wildlife, bicyclists, and pedestrians. Off-road travel is prohibited.

Food
Food must be properly stored when not eating or preparing meals. Generally, this means sealed in your vehicle, secured in food storage lockers in the campgrounds, or stored in bearproof containers or hung from a tree when backcountry camping. Exposing wild animals to human food alters their behavior, is bad for their health, and can be dangerous for you.

Hiking and Climbing
Hiking and climbing inside the caldera is strictly prohibited. The only exception is the Cleetwood Cove Trail, the only safe and legal access to the lake shore. Serious injuries and death have occurred from falls inside the caldera. The caldera walls consist of steep, unstable rocks and soils.

Stay on trails. This prevents erosion, protects vegetation, and protects other hikers. Shortcutting trails is prohibited.

Park Features
Rocks, plants, animals, and artifacts should be left undisturbed for others to enjoy. Collecting, destroying, defacing, or disturbing natural, cultural, or historical features is prohibited.

Pets
Pets on a leash—or otherwise physically restrained—are welcome in the park, but only in developed areas. They are allowed within 50 feet (15 meters) of roads, established parking areas, developed campgrounds, and designated picnic areas. Pets are not allowed inside buildings, including Crater Lake Lodge and The Cabins at Mazama Village. Pets are not allowed on park trails or in the backcountry. The presence of pets can confuse and frighten wild animals, affecting their behavior. The above rules do not apply to service dogs here to assist people with disabilities.

The best places to walk a dog are Rim Village and Mazama Campground. Solid pet excrement must be picked up immediately by the owner or person in control of the pet and disposed of in a trash or solid waste receptacle.

Viewpoints
Stay back from the rim of the caldera. Do not go beyond established fences and rock walls. Falling will cause injury or death.

Weapons
Firearms and weapons of any kind are prohibited in the park.

Wildlife
Never feed wildlife. This includes birds and squirrels. Feeding animals is dangerous for you, bad for them, and harmful to the ecosystem. Feeding, touching, disturbing, or approaching wildlife is prohibited.

Golden-Mantled Ground Squirrel

Help Keep Wildlife Wild

Bag of peanuts from the camper store.....**99 cents**

Penalty for feeding wildlife at Crater Lake.....**100 dollars**

Watching a squirrel pry seeds from a pine cone.....**PRICELESS**

Bicyclist on the East Rim Drive

Visitors enjoying a boat tour

Sunset over Crater Lake

Sky Calendar

Ask at a visitor center for additional sunrise and sunset times.

Full Moons

Date	Moonrise
July 17	8:44 p.m.
Aug. 16	8:07 p.m.
Sept. 14	6:54 p.m.
Sept. 15	7:15 p.m.
Oct. 14	6:05 p.m.

Sunrises & Sunsets

Date	Sunrise	Sunset
July 1	5:34 a.m.	8:51 p.m.
July 15	5:44 a.m.	8:45 p.m.
Aug. 1	6:00 a.m.	8:29 p.m.
Aug. 15	6:15 a.m.	8:10 p.m.
Sept. 1	6:34 a.m.	7:42 p.m.
Sept. 15	6:49 a.m.	7:17 p.m.
Oct. 1	7:06 a.m.	6:49 p.m.
Oct. 15	7:23 a.m.	6:25 p.m.

Activities

Backcountry Camping

Over 95% of the park is managed as wilderness. Although some areas are closed to backcountry camping (for example, there is no camping within view of the lake), exploring the park's old-growth forests and volcanic landscapes can be a rewarding experience.

All campers not staying in the park's developed campgrounds must obtain a backcountry permit. The only exception is through-hikers on the Pacific Crest Trail, who may instead sign the trail register as they enter the park. Permits are free and are available at either visitor center. The group size limit is 8 people.

Bicycling

Bicycling at Crater Lake is allowed on paved roads and on the unpaved Grayback Drive. Bicycles are not allowed on park trails, with one exception: the Pinnacles Trail. Park roads are narrow with few shoulders and considerable automobile traffic. Helmets are required for persons under 16 years of age and are strongly recommended for all cyclists.

Bicycling on park roads is physically demanding yet can be exceptionally rewarding. The most popular route is the 33-mile (53-km) Rim Drive, featuring spectacular views but also long, steep grades and climbs totaling 3,800 feet (1,158 meters). For details, pick up a bicycling handout at either visitor center.

Fishing

Originally, Crater Lake contained no fish. Between 1888 and 1941, however, 6 species were introduced. Today, only 2 types remain: rainbow trout and kokanee salmon. The bottom of the Cleetwood Cove Trail provides about .25 miles (0.4 km) of rocky shoreline for angling. Wizard Island, accessible via a boat tour, is also open to fishing.

Fishing licenses are not required. There are no restrictions on the size, number, or species taken. Cleaning fish in the lake is prohibited; pack out your catch. To prevent the introduction of 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.

Sky Gazing

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

Swimming

Swimming is allowed in Crater Lake, but be warned—the water is cold! Most swimmers stay in the water for only a few seconds or minutes. Swimming is permitted only at Cleetwood Cove and at Wizard Island, which requires a boat tour to reach. The shoreline at both locations is narrow and rocky; there are no beaches.

Wildlife Viewing

The park is home to many animals, but they can be difficult to spot. The most visible animals are mule deer and squirrels. Herds of elk are sometimes seen in the meadows below Rim Drive. Bobcats and mountains lions are present but rarely seen. Lucky observers might spot a fox, black bear, marmot, porcupine, grouse, or bald eagle. Dawn and dusk are the best times to look.

Kids—You Can Become a Junior Park Ranger!

Are you between 6 and 12 years of age? Want to learn and have fun while exploring Crater Lake National Park? Follow these 3 steps to earn your official Junior Ranger badge:

1. Pick up an activity book at either visitor center. Complete at least 4 of the 6 pages, then return the book to a ranger.
2. Attend the Junior Ranger Program from 5:00 to 6:00 p.m. This is a fun, ranger-led activity for kids. Meet at the Mazama Campground Amphitheater (between loops D and E).
3. Attend one other ranger-led activity during your visit.

Boat Tours

Join a ranger for a 2-hour cruise around Crater Lake. See the green box, below, for departure times and ticket prices.

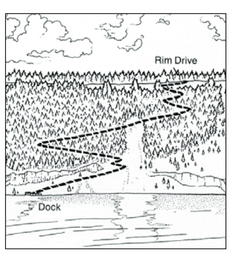
Tickets
Half the tickets for each tour are available for purchase in advance. Advance tickets are available only at Crater Lake Lodge, up to 2 days in advance, between 12:00 p.m. and 8:00 p.m. daily. The remaining tickets for each tour are available only on a first-come, first-served basis on the day of the tour. These "same-day" tickets can be purchased only at the ticket booth at the top of the Cleetwood Cove Trail. The ticket booth opens at 8:00 a.m. daily. Tickets must be purchased at least 45 minutes prior to departure to allow time to walk down the 1.1-mile (1.7-km) trail to the lake. Be aware that boat tours may sell out very early in the day.

Visiting Wizard Island
48 tickets each day are available for visitors wishing to disembark at Wizard Island to hike, fish, swim, and explore. Only 1 tour docks at Wizard Island: the 9:30 a.m. departure. The 3 standard tours do not stop. This year, Wizard Island visitors will be dropped off for a stay of 2½ hours before being picked up by a later boat to complete their tour. A limited number of tickets (8 per day) are available for visitors wishing to spend a full day (6½ hours) on the island.

From September 2–14, only the 10:00 a.m. tour will drop passengers on the island. Most visitors will be dropped off for a stay of 3 hours. A limited number of 5-hour stays are available (8 per day).

What to Bring
- ☑ Bring plenty of drinking water. Bottled water is available for purchase at both ends of the Cleetwood Cove Trail.
- ☑ Bring a lunch or snack, especially if visiting Wizard Island. Light snacks are available for purchase at the top of the Cleetwood Cove Trail.
- ☑ Sunscreen, sunglasses, and a hat are recommended for sun protection. The boats are not covered.
- ☑ Weather on the lake can be windy and chilly. A warm, water-resistant jacket is advisable.
- ☑ Wear sturdy footwear, especially if visiting Wizard Island.

Hiking to Cleetwood Cove
The Cleetwood Cove Trail is the only legal access to the shore of Crater Lake. The trailhead is located on the lake's north side *(see map on page 5)*. The hike is steep and strenuous: in 1.1 miles (1.7 km) the trail 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 should not be attempted by anyone with heart, breathing, or walking problems. It is not accessible for people with mobility impairments. Hikers should wear sturdy shoes and carry water. Vault toilets are located at the top and bottom of the trail. Depending on snow conditions, the trail usually opens in late June and closes in late October.



The Cleetwood Cove Trail drops 700 feet (213 meters) to the lake shore. Sketch from *Road Guide to Crater Lake*.

Ranger-Led Activities

		July 4–Sept. 1	Sept. 2–Oct. 12
Talks at Rim Village	**Discovering Crater Lake** Discover the origins of Crater Lake and explore its special qualities and features. Meet at the Sinnott Memorial Overlook. (20 minutes)	**11:00 a.m.** **1:00 p.m.** **3:00 p.m.**	Check posted schedules
	Ranger's Choice ♿ A different talk every time! Inquire at the Rim Visitor Center for today's topics. Meet on the back porch of the Crater Lake Lodge. (20 minutes)	**2:00 p.m.** **4:00 p.m.**	Check posted schedules
Programs at Mazama Village	**Junior Ranger Program** ♿ 6- to 12-year-olds learn about Crater Lake and work toward earning a Junior Ranger badge. Meet at the Mazama Campground Amphitheater (between loops D and E). (1 hour)	**5:00 p.m.**	Check posted schedules
	Evening Program ♿ Relax under the stars as you learn about the park. Check posted schedules for topics. Meet at the Mazama Campground Amphitheater (between loops D and E). (45 minutes)	July 4-31 **9:00 p.m.** August 1-20 **8:30 p.m.** Aug. 21-Sept.1 **8:00 p.m.**	Check posted schedules
Guided Hikes *(See page 4 for trail information. Be sure to bring drinking water, sun protection, and sturdy shoes.)*	**Garfield Peak Hike** Enjoy spectacular views on this climb to a high summit. Meet on the back porch of the Crater Lake Lodge. Consider bringing lunch or a snack to eat at the top. (2.5 to 3 hours)	Offered July 10-August 10 **10:00 a.m.**	—
	Annie Creek Hike Explore a beautiful canyon with abundant wildflowers and a cool mountain stream. Meet at the Mazama Campground Amphitheater (between loops D and E). (1.5 to 2 hours)	Offered July 18-August 17 **2:30 p.m.**	—
	Watchman Peak Sunset Hike Ascend to a breathtaking viewpoint and watch the sun go down over the Cascade Mountain Range. Meet at the Watchman Overlook, a parking area with wooden fences 3.8 miles (6.1 km) northwest of Rim Village. Bring a flashlight if you have one. (1.5 hours)	Offered Aug. 1-Sept. 14 August 1-10 **7:15 p.m.** August 11-20 **7:00 p.m.** Aug. 21-Sept.1 **6:45 p.m.**	Sept. 2-14 **6:30 p.m.**
Boat Tours	**Crater Lake Boat Tour** For a unique perspective on Crater Lake, take a ranger-narrated boat tour. Tours are offered by Xanterra Parks & Resorts in partnership with the National Park Service. See the right-hand column of this page for detailed information. Note: Taking a tour requires hiking down—and back up—one of the steepest trails in the park. Tours cover a variety of topics. (2 hours)	July 10-Sept. 1 Standard Tours: **10:30 a.m.** **2:00 p.m.** **4:00 p.m.** Tour with Wizard Island Drop-Offs: **9:30 a.m.** Additional tours may be offered; ask at a visitor center for the current tour schedule.	Sept. 2-14 Standard Tours: **11:00 a.m.*** **3:00 p.m.** Tour with Wizard Island Drop-Offs: **10:00 a.m.** *11:00 a.m. tour offered on Fridays, Saturdays, Sundays, and Mondays only

Ticket Prices	
$26.00	Adult
$36.00	Adult with Wizard Island Drop-Off
$15.50	Child (age 2 through 11)
$19.50	Child with Wizard Island Drop-Off
Free	Infant (under 2 years)*

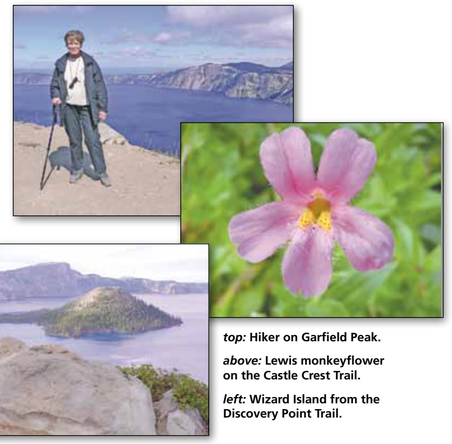
*Tours are not recommended for infants due to noisy, windy, and sometimes rough lake conditions.

Programs are free of charge except for boat tours. All programs are subject to cancellation due to inclement weather or other unforeseen circumstances.

Let's Go Hiking!

Hi, I'm Ranger Karen. We have 90 miles (145 km) of hiking trails here at Crater Lake. Our most popular day hikes are listed on this page. To help you choose, I've given them a rating, but keep in mind this is just one ranger's opinion! If you are visiting in June or July, some trails might still be closed by snow, so ask a ranger which trails are open. Please help us protect this special place by following a few important rules:

- No hiking or climbing inside the caldera! The walls are dangerously steep and unstable. The one exception is the Cleetwood Cove Trail. It is the only legal access to the lake shore.
- Overnight backpacking requires a permit. Permits are available at either visitor center, free of charge. Some areas are not open to backcountry camping.
- Leave all rocks, plants, animals, and artifacts undisturbed for the enjoyment of future hikers.
- To protect vegetation and prevent erosion, please stay on the trails.
- Pets are not allowed on park trails.

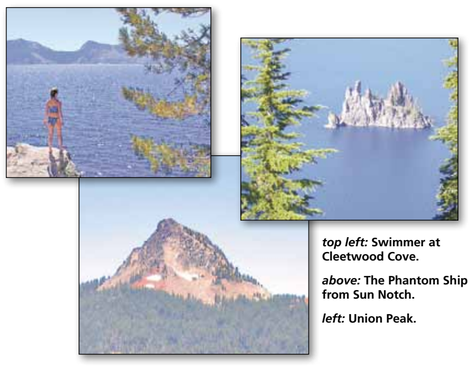


top: **Hiker on Garfield Peak.**

above: **Lewis monkeyflower on the Castle Crest Trail.**

left: **Wizard Island from the Discovery Point Trail.**

Pinnacles Trail ♿	Godfrey Glen ♿	Castle Crest	*Trail*	Sun Notch	Discovery Point	Annie Creek
1 mile (1.6 km)	1 mile (1.6 km) loop trail	0.5 miles (0.8 km) loop trail	*Total Distance*	0.5 miles (0.8 km)	2.2 miles (3.5 km)	1.7 miles (2.7 km) loop trail
10 feet (3 meters)	50 feet (15 meters)	100 feet (30 meters)	*Elevation Gain*	115 feet (35 meters)	100 feet (30 meters)	200 feet (61 meters)
30 minutes	**30 minutes**	**30 minutes**	*Time*	**30 minutes**	**1 hour**	**1½ hours**
Volcanic Spires	**Peaceful Forest**	**Flowers, Meadow, Creek**	*Highlight*	**Views of Phantom Ship**	**Lake Views**	**Creek, Canyon, Flowers**
Easy walk along the rim of Pinnacle Valley. Great views of volcanic spires. Use caution near cliffs. Trail ends at park boundary. Accessible to wheelchairs with assistance. Open to bicycles.	Easy stroll through an old-growth forest, with some canyon views. Dirt path; accessible to wheelchairs with assistance. Self-guiding brochures are available at the trailhead.	Loop trail through a beautiful meadow. Abundant wildflowers from mid-July to mid-August. The trail is rocky and slippery in places. Self-guiding brochures are available at the trailhead.	*Description*	Short uphill walk through a meadow to the rim of Crater Lake. Walk along the rim path for great views of the Phantom Ship. Use caution near cliff edges.	Easy-to-moderate trail along the rim of Crater Lake, connecting Rim Village with Discovery Point. Fine views of the lake and Wizard Island. Use caution near cliff edges.	Moderately strenuous trail through a deep, stream-cut canyon. Lots of water, wildflowers, and sometimes wildlife. Self-guiding brochures are available at the trailhead.
End of the Pinnacles Spur Road, 7 miles (11.3 km) southeast of the Phantom Ship Overlook.	2.4 miles (3.9 km) south of Park Headquarters.	East Rim Drive, 0.5 miles (0.8 km) east of Park Headquarters. Can also access from the Steel Visitor Center.	*Trailhead Location*	East Rim Drive, 4.4 miles (7.1 km) east of Park Headquarters.	West end of Rim Village, where the paved walk becomes a dirt path. Can also start from Discovery Point.	Mazama Campground, behind the amphitheater, located between loops D and E. Limited parking in E Loop.
The Pinnacles are chimneys formed when hot ash cooled after the big eruption.	Trail is named after William Godfrey, a ranger who died in a blizzard here in 1930.	The flowers here are nourished by springs emerging from the hillside.	*Nature Note*	Sun Notch lies in an old glacial valley truncated by the collapse of Mt. Mazama.	Gold prospector John Wesley Hillman first spotted Crater Lake from this point in 1853.	The creek provides the park's drinking water, named the best tasting in Oregon in 2004.
★★★	★★	★★★★	*Ranger Karen's Rating*	★★★★	★★★	★★★★
Easy Walks				**Easy-to-Moderate**		



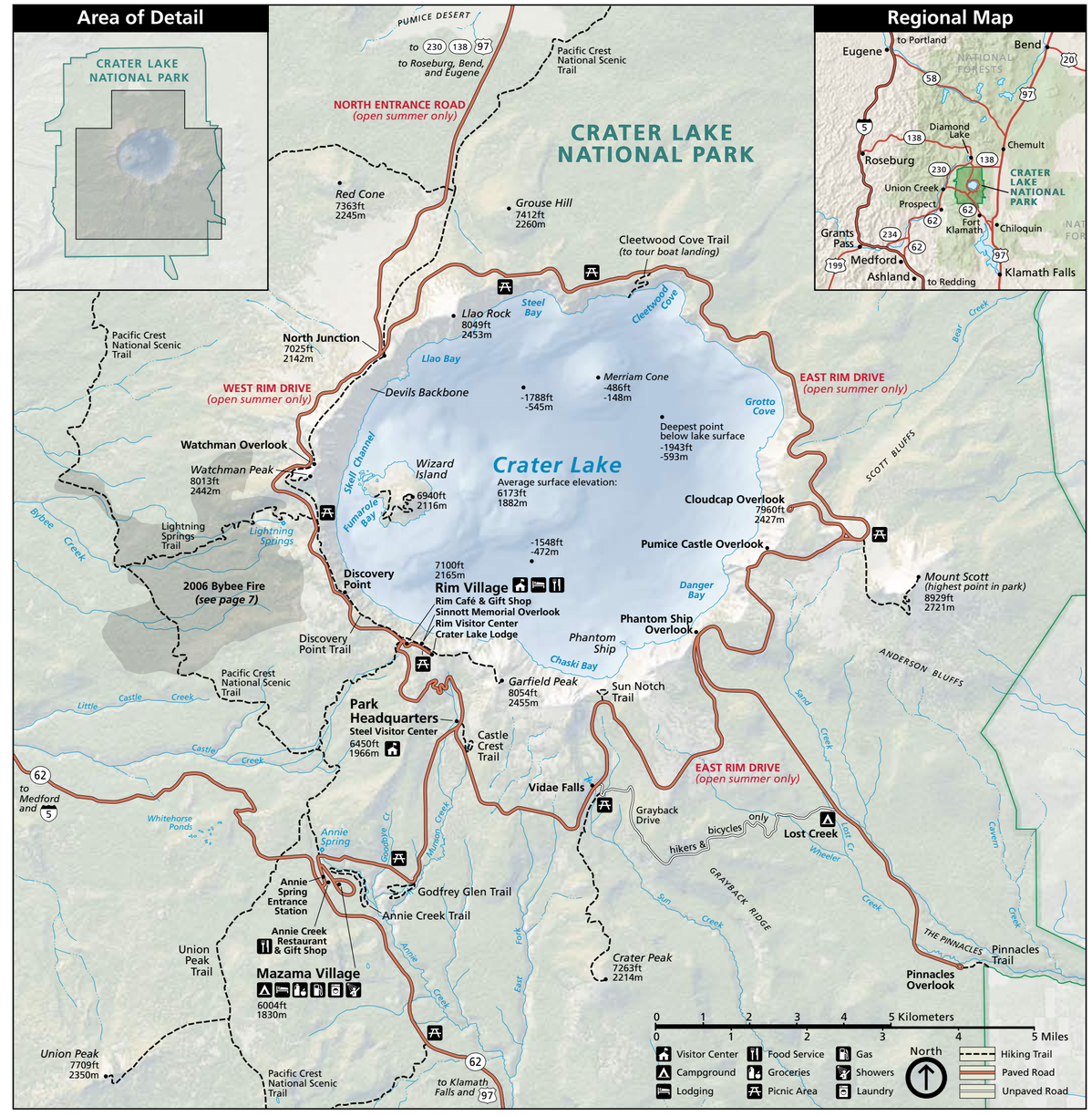
top left: **Swimmer at Cleetwood Cove.**

above: **The Phantom Ship from Sun Notch.**

left: **Union Peak.**

Trail	Watchman Peak	Garfield Peak	Mount Scott
Total Distance	1.6 miles (2.6 km)	3.4 miles (5.5 km)	5 miles (8.1 km)
Elevation Gain	420 feet (128 meters)	1,010 feet (308 meters)	1,250 feet (381 meters)
Time	**1 hour**	**2 to 3 hours**	**3 hours**
Highlight	**Panoramic Views**	**Panoramic Views**	**Panoramic Views**
Description	Moderate ascent to a lookout above Wizard Island. Spectacular views in all directions. Great place to watch the sunset. Trail may be closed until August due to snow.	Rocky climb to a high peak. Spectacular views along the way and at the top. Diverse plant life, many wildflowers. Top section may be closed until late July due to snow. Use caution near cliff edges.	Moderately strenuous ascent of the park's highest peak. Spectacular views in all directions. Best in morning, when the light is ideal for lake viewing. May be closed until late July due to snow.
Trailhead Location	3.8 miles (6.1 km) northwest of Rim Village. Park at the viewpoint surrounded by wooden fences.	East end of Rim Village. Walk behind Crater Lake Lodge along the paved promenade.	East Rim Drive, 14 miles (22.5 km) east of Park Headquarters.
Nature Note	Built in 1932, the peak's historic fire lookout is still staffed by rangers today.	Rocky slopes along the trail are home to American pikas and yellow-bellied marmots.	Mt. Scott is the park's highest peak—8,929 feet (2,721 meters) in elevation.
Ranger Karen's Rating	★★★★★	★★★★★	★★★★★
	The View from Above		

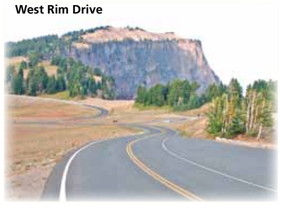
Cleetwood Cove	Wizard Summit	Fumarole Bay	*Trail*	Crater Peak	Union Peak	Boundary Springs
2.2 miles (3.5 km)	2 miles (3.2 km)	1.8 miles (2.9 km)	*Total Distance*	6.4 miles (10.3 km)	11 miles (17.7 km)	5 miles (8.0 km)
700 feet (213 meters)	760 feet (232 meters)	150 feet (46 meters)	*Elevation Gain*	765 feet (233 meters)	1,600 feet (448 meters)	400 feet (122 meters)
1½ hours	**1½ hours**	**1 hour**	*Time*	**3½ hours**	**5 to 6 hours**	**2½ hours**
Swim, Fish, Boat Tours	**Views, Summit Crater**	**Swimming, Fishing**	*Highlight*	**Forest, Views, Solitude**	**Panoramic Views**	**Springs, Stream, Flowers**
The only legal access to the shore of Crater Lake. Strenuous trail with a steep grade. The trail descends to a rocky shoreline at Cleetwood Cove. See page 3 for detailed information.	Rocky climb to the top of Wizard Island. Spectacular lake views, interesting geology. A path leads around the 90-foot-deep (27-meter) crater at the summit.	Rocky trail along the shore of Wizard Island. Becomes hard to follow after reaching Fumarole Bay. The shallow, clear water is good for fishing and swimming.	*Description*	Moderately strenuous walk to the summit of a small volcano. No lake views, but fine views of the Klamath Basin to the southeast. A peaceful walk through forests and meadows.	Long forest walk followed by a very steep climb. Spectacular views from the top and interesting geology, but no view of the lake. Top section may be impassable until late July due to snow.	Easy-to-moderate walk to the headwaters of the Rogue River. May not be well-marked; see published guidebooks for trail details. Please stay off fragile streamside vegetation.
North side of the lake, 11 miles (17.6 km) from Rim Village if traveling clockwise on Rim Drive.	Wizard Island dock, accessible only via a boat tour from Cleetwood Cove. See page 3 for information.	Wizard Island dock, accessible only via a boat tour from Cleetwood Cove. See page 3 for information.	*Trailhead Location*	East Rim Drive, 3 miles (4.8 km) east of Park Headquarters at the Vidae Falls Picnic Area.	Highway 62 at the Pacific Crest Trailhead, 1 mile (1.6 km) west of the Crater Lake road junction.	Pullout on Highway 230 near milepost 19, 5 miles (8 km) west of the junction with Highway 138.
Below 200 feet (61 meters), the water in Crater Lake stays 38°F (3°C) year-round.	The dead trees at the summit have been killed by dwarf mistletoe, a parasitic plant.	Abundant lichen on the tree trunks is an indication of excellent air quality.	*Nature Note*	Upper Klamath Lake is the largest in Oregon, but its average depth is only 14 feet.	Union Peak is the core of an old volcano eroded by glaciers during the last Ice Age.	Snowmelt, not Crater Lake, is the source of Boundary Springs' water.
★★★	★★★★★	★★★	*Ranger Karen's Rating*	★★★	★★★★	★★★
On the Water				**Off the Beaten Path**		



Highlights of the Rim Drive

Rim Drive is a 33-mile (53-km) road that encircles Crater Lake. Typically open in its entirety from early July to late October, it provides dramatic views of the lake's most interesting features as well as the jagged peaks, subalpine forests, and open meadows on the caldera's rim. It can be driven in about an hour, but at least 2 to 3 hours are necessary to enjoy the varied sights. There are more than 30 scenic pullouts along the route, many of which have roadside exhibits. Be sure not to miss these 6 "must-see" stops. For more information, pick up the excellent *Road Guide to Crater Lake National Park* (48 pages, $5.95) at either visitor center.

West Rim Drive



Watchman Overlook

This pullout offers an unmatched view of Wizard Island, a cinder-cone volcano named for its resemblance to a sorcerer's pointed hat. Wizard Island erupted out of the lake around 7,300 years ago and features a 90-foot-deep (27-meter) crater in its rocky summit. To find this unmarked pullout, drive 3.8 miles (6.1 km) west of Rim Village and look for a viewpoint lined with wooden fences.

Cloudcap Overlook

Reached by a 1-mile (1.6-km) spur road, Cloudcap Overlook is the highest point on Rim Drive, 1,790 feet (545 meters) above the water. Whitebark pines cling for survival here, dwarfed and contorted by the harsh winds.

Pumice Castle Overlook

Stop here to see one of the park's most colorful and fanciful features: a layer of orange pumice rock that has been eroded into the shape of a medieval castle. Watch carefully for this unmarked viewpoint; it's easy to miss. The pullout is located 1.1 miles (1.8 km) west of the Cloudcap Overlook road junction and 2.4 miles (3.9 km) east of Phantom Ship Overlook.

Phantom Ship Overlook

Nestled against the southeastern shore, Crater Lake's "other island" escapes detection by many park visitors. Though it resembles a small pirate ship, the island is as tall as a 16-story building. It's made of erosion-resistant rock, 400,000 years old—the oldest exposed rock within the caldera. This overlook offers a great view of the Phantom Ship framed through the trees.

Pinnacles Overlook

Located at the end of a 7-mile (11-km) spur road, the Pinnacles are well worth the detour from Rim Drive. A colorful collection of 100-foot-tall (30-meter) spires are being eroded from the canyon wall. The spires are "fossil fumaroles," each marking a spot where volcanic gas rose up through hot ash deposits, cementing the ash into solid rock.

Vidae Falls

Look for this cascading waterfall between Phantom Ship Overlook and Park Headquarters. A spring-fed creek tumbles over a glacier-carved cliff and drops 100 feet (30 meters) over a series of ledges. In summer, wildflowers flourish in the cascade's spray.

The Pinnacles

Behind the Scenes:

A Conversation with the Park's Chief Scientist

Mac Brock is the park's Chief of Resource Preservation and Research. This is his 14th year at Crater Lake, but he has also worked in other national parks, including Everglades, Great Smoky Mountains, Hawaii Volcanoes, Haleakala, Great Basin, and Voyageurs. Mac holds degrees in Zoology and Environmental Sciences. Originally from Mississippi, he now resides in Klamath Falls, Oregon.

Q: What percentage of the park's budget is devoted to science?

Mac: This year our operating budget for natural resources is $907,000. Additionally, we are allowed to apply for grant funding within and outside of the National Park Service.

Q: How many natural resource staff work at Crater Lake?

Mac: We have 9 year-round employees, 9 seasonal employees, and several volunteers. We also have the help of partners. This summer, researchers from Southern Oregon University, Oregon State University, and the Oregon Institute of Technology will be conducting studies here.

Q: What projects are taking place in the park this summer?

Mac: The summer field season is brief, but we try to accomplish a lot. With respect to the lake, this will be our 25th summer of lake monitoring. We measure the lake's chemical and physical parameters and look for potential impacts to water quality. We are also excited about a research project that hopes to expand our knowledge of the lake's moss communities. With respect to wildlife, we monitor rare species such as the northern spotted owl. These endangered owls are year-round residents of the park's old-growth forests. Our surveys, now in their 16th year, measure owl reproduction and survivorship to understand long-term trends in population. Another long-term project is the restoration of bull trout, the park's only native fish species. Found in several park streams, they are under threat from non-native brook trout as well as habitat loss. We are also working to protect the park's whitebark pines. These trees are dying from a non-native disease as well as from mountain pine beetles. We are searching for disease-resistant trees in order to grow replacements. Another project concerns non-native plants. With funding from

(continued on next page)

Northern spotted owl. Surveys indicate that the park's old-growth forests are home to 17 pairs of these endangered birds.

Beetle Outbreak Threatens Park Trees

Researchers Say Global Warming May Be To Blame

Take a walk through Rim Village this summer and you will notice several things: fantastic views, smiling park visitors, and—from one end of the village to the other—dead pine trees. The dead trees are obvious, but the cause of death may not be. A tiny beetle, rarely seen, is responsible for most of the damage. Scientists indicate, however, that the real culprit may be our warming climate.

The mountain pine beetle (*Dendroctonus ponderosae*) is a native insect that goes unnoticed by even the most observant of us. It spends almost its entire life hidden beneath the bark of pine trees. Beetle larvae feed in the phloem tissue, or inner bark, of their hosts. This activity damages the phloem layer, cutting off the flow of nutrients and water. The trees literally starve to death. As the trees die, their needles discolor, turning red.

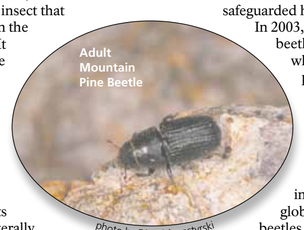


photo by Dion Manastyrski

According to park ecologist Dr. Michael Murray, mountain pine beetles have thrived in the forests of western North America for millennia. Usually, they occur in low numbers, but when environmental conditions are favorable, their populations explode. The last outbreak at Crater Lake was in 1923. By the time it ended around 1930, thousands of acres of lodgepole pines had been killed. The current outbreak began in 2003. "Right now," reports Murray, "we're in the midst of a moderate epidemic."

Unfortunately, the current epidemic has a new—and disturbing—twist. "The beetles have found a new favorite target," explains Murray. "They have turned their attention away from lodgepole pines and toward our majestic whitebark pines."

Whitebark pines are a "keystone" species at Crater Lake National Park, critical to the survival of many other species of plants and animals. They are the only trees that grow at the park's highest elevations, thereby anchoring the high-elevation forest community. The trees provide large, nutritious seeds for bears, squirrels, and birds.

So why have the beetles changed their diet? Murray explains: "Whitebark pines are well-adapted to cold weather, whereas mountain pine beetles are not." In the past, the insect's intolerance of cold weather has generally safeguarded high-elevation forests. In 2003, however, when beetles began infesting whitebark pines in parks across the west, from Crater Lake to Yellowstone, scientists realized that what these diverse locations all shared was a warming climate. Because of global warming, it seems, beetles are now able to survive winter at higher elevations.

Early spring thaws also help beetles. In 2007, spurred by unusually warm temperatures, adult beetles were observed attacking trees in Rim Village during the third week of May—earlier in the season than ever before.

Beetles are attacking the park's whitebark pine trees in increasing numbers. Larvae tunnel through the inner bark, killing the trees.

Mountain pine beetles spell double trouble for the whitebark pine, a species already under attack from a non-native fungus. The fungus, introduced from Eurasia, causes a fatal disease called "white pine blister rust." Michael Murray's research indicates that Crater Lake's beetles are now outpacing white pine blister rust in a race to destroy these valuable trees.

While the park tries to combat the non-native fungus—a process that involves identifying disease-resistant trees and harvesting their seeds for eventual re-planting—a decision has been made to protect the whitebark pines at Rim Village from further beetle attack. In 2004, Michael Murray began stapling small packets to the trunks of the trees. The packets contain a non-toxic gel that mimics a hormone that mountain pine beetles emit to repel other beetles.

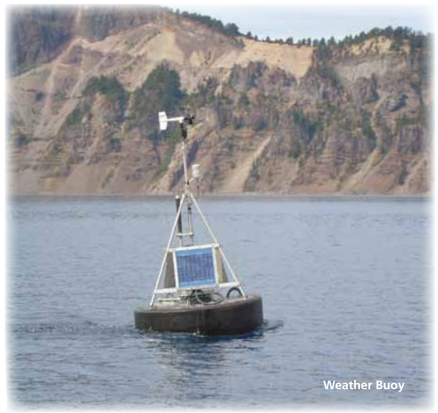
The future of whitebark pine communities at Crater Lake is uncertain. For now, park staff continue to seek an understanding of the complex interrelationships between beetles, high-elevation forests, and our warming climate.

Is Crater Lake Getting Warmer?

Air temperatures at Crater Lake National Park have been trending upward since the 1980s—particularly in the summer and especially at night. Since 1983, summer nighttime air temperatures have been rising at an average rate of 1.1°F (0.6°C) per decade. This increase is consistent with patterns observed throughout western North America.

When it comes to Crater Lake itself, the answer is less clear. The overall temperature of the water column is not showing an upward trend. There is some indication, however, that surface water temperatures in the summer have been rising. It is unknown how warmer water temperatures might affect the lake's ecology.

A weather buoy on the lake monitors air temperature, water temperature, humidity, wind speed, and wind direction. The buoy is anchored above the lake's deepest point and is visible from many places on the rim—see if you can spot it! The data is transmitted via radio signal to Park Headquarters and is available online at www.crater-lake.dri.edu.



Park Weather

Summers at Crater Lake are short, but generally warm and sunny. Even so, there are occasional days when the lake is completely shrouded by clouds and not visible from the rim. The weather is most variable in May, early June, late September, and October, when sunny periods alternate with days of rain and snow. July, August, and early September are your "best bets" for warm, dry weather.

Winters at Crater Lake are long and snowy. Storms from the Pacific Ocean dump an average of 44 feet (13.3 meters) of snow at Park Headquarters. The park's tremendous snowfall is a result of its position at the crest of the Cascade Mountain Range.

FAHRENHEIT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Daily High (°F)	34	35	37	43	50	58	69	69	63	52	40	35
Average Daily Low (°F)	18	18	19	23	29	34	41	41	37	31	24	20
Extreme High (°F)	58	66	67	70	80	84	90	90	87	80	75	64
Extreme Low (°F)	-21	-18	-7	0	5	10	18	21	11	8	-7	-13
Avg. Snowfall (inches)	105	84	84	45	20	4	0.2	0.1	3	22	64	94
Avg. Snow Depth (inches)	80	104	117	112	77	24	1	0	0	2	17	49
Avg. Precipitation (inches)	10.5	8.1	7.8	4.9	3.3	2.2	0.8	1.0	2.0	5.0	9.4	11.4
Avg. Lake Surface Temp. (°F)	38	37	37	38	40	45	55	59	57	51	44	40

CELSIUS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Daily High (°C)	1	2	3	6	10	14	21	21	17	11	4	2
Average Daily Low (°C)	-8	-8	-7	-5	-2	1	5	5	3	-1	-4	-7
Extreme High (°C)	14	19	19	21	27	29	32	32	31	27	24	18
Extreme Low (°C)	-29	-28	-22	-18	-15	-12	-8	-6	-12	-13	-22	-25
Avg. Snowfall (cm)	267	213	213	114	51	10	0.5	0.3	8	56	163	239
Avg. Snow Depth (cm)	203	264	297	284	196	61	3	0	0	5	43	124
Avg. Precipitation (cm)	27	21	20	12	8	6	2	3	5	13	24	29
Avg. Lake Surface Temp. (°C)	4	3	3	3	4	7	13	15	14	10	7	4

Air temperature and snowfall data is from Park Headquarters. Period of record: 1931-2005.

Water temperature data is from the weather buoy. Period of record: 1992-2000.

Lightning Starts 3,000-Acre Blaze

Managed Fire Hailed As a Success

"Is that column of smoke from the volcano?"

In the summer of 2006, visitors to Crater Lake National Park could be excused for thinking an eruption was taking place. On some days, smoke clouded the skies and even darkened the caldera. Was Mount Mazama—the volcano that gave birth to Crater Lake—awakening after thousands of years of dormancy?

On July 23, a lightning strike west of the lake initiated a wildfire that burned for nearly two months. By the time it was extinguished by a snowstorm on September 14, it had burned nearly 3,000 acres (1,214 hectares) and led some visitors to ask, "Where's the lava?"

Like volcanic eruptions, wildfires are natural occurrences that play an important role in shaping the beauty and character of the park. "This park affords us the opportunity to experience natural processes firsthand," notes Brad Reed, the park's Fire Management Officer. "Disturbance mechanisms—from winter avalanches to summer wildfires—are natural ecological processes, critical to the beauty we presently enjoy."

Rather than suppress the blaze, park officials decided to manage it for the benefit of the ecosystem. It was allowed to spread naturally to the north, while crews constructed control lines on the west and south to protect developed areas and to prevent the fire from escaping park boundaries. More than 150 personnel participated in the management of the fire, including experts in fire ecology, meteorology, communication, logistics, resource protection, and education.

A fire information officer introduces young park visitors to the tools of his trade.

Throughout the summer, visitors were treated to spectacular views of the fire from the West Rim Drive *(see map on page 5)*. Occasionally, whole trees could be seen "torching." These skeleton trees are now becoming homes for insects, birds, and small mammals. One visitor said it was the "chance of a lifetime" to watch an active wildfire at such close range.

This summer, visitors will have an opportunity to get even closer. Hiking trails through the burned area have been reopened, allowing visitors to explore the altered forest on foot. The easiest access is via the Lightning Springs Trail, which begins 2.5 miles (3.6 km) west of Rim Village on the West Rim Drive. The trail is moderately strenuous, descending into the burned area within 20 minutes. What will hikers find there? "Lots of herbs and grasses, and forbs coming in," says Brad Reed, "and a mosaic of living and dead trees." As time progresses, meadows will develop, creating forage for wildlife.

Last summer, a team of "fire effects monitors" hiked through the area. In 3 weeks of work, they established 200 vegetation plots and assessed the intensity at which the fire burned at each location. Researchers will revisit these plots in the future to gain insight into forest regeneration and species succession. Relatively little is known about the role of fire in forests composed primarily of mountain hemlock trees.

The Bybee Fire—named for a creek in the vicinity of the burn—has been hailed as a success by observers around the country. The fire was large enough to have a meaningful impact on the landscape, and researchers are excited to study the fire's effects. Park ecosystems, park wildlife, and park visitors all benefit when natural processes are allowed to flourish.

Scientists Probe Crater Lake's Moss

Thick Beds of Ancient Moss May Hold Clues to the Lake's History, Ecology

The placid waters of Crater Lake hide a secret deep below. Invisible from the surface, a giant community of deep-water moss has researchers excited, but also perplexed, about the history of these massive mats and what they might tell us about the lake's past and present.

Although Crater Lake's moss beds were first discovered in the 1950s, not until 2006 was their extent fully appreciated. Using a high-definition camera mounted to a small, unmanned submarine, scientists captured stunning video footage of the moss communities. This footage confirmed what sonar mapping data in 2000 had suggested: the moss is thick, widespread, and growing to depths of 460 feet (140 meters). According to preliminary calculations, the moss may have a biomass equal to 50 times that of the lake's other life forms combined.

Scientists are also realizing that the moss beds contain more than just moss. In fact, they are diverse communities made up of many plants and animals. So far, more than 10 species of moss, liverwort, and macroscopic algae have been identified, along with worms and other invertebrates that call the beds home.

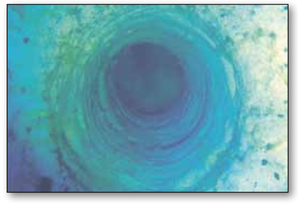
Two types of moss predominate. Lush, green mats of *Drepanocladus* grow to 6 feet (1.8 meters) thick. "This moss cascades from the cliff walls," reports Mark Buktenica, the park's aquatic ecologist, "and grows in verdant fields on the shelf surrounding Wizard Island. It's as beautiful as it is interesting." Unfortunately, we can't see this moss from the surface because it grows no shallower than 100 feet (30 meters). Owing to the lake's exceptionally clear water and high elevation, harmful ultraviolet light waves are thought to penetrate deep into Crater Lake and inhibit the growth of organisms near the surface.

The other abundant moss is of the genus *Leptodictyum*. Unlike its green neighbor, the *Leptodictyum* is brown and matted—by all appearances, dead. Researchers were able to revive pieces of it in a growth chamber at Southern Oregon University, but it would seem that the lake's *Leptodictyum* mats are not faring well at the present time. In many places, researchers found verdant *Drepanocladus* moss growing on top of the brown *Leptodictyum*. Does this indicate that a shift in the lake's ecology has occurred, favoring one type of moss over another? "We don't know," says Mark Buktenica, "but it's an intriguing possibility."

Even more intriguing are hundreds of vertical holes discovered in the *Leptodictyum*. The holes, cylindrical in shape, are up to 20 feet (6 meters) deep, revealing the astonishing thickness of the *Leptodictyum* beds. How the holes formed is a mystery. Inside the holes, horizontal layers are visible within the moss. Do these strata represent annual or periodic events in the growth of the moss or in the ecology of the lake? Can we find a record of plant and animal life within the moss beds? If so, it may be possible to reconstruct a detailed history of the lake's evolution.

Last summer, Mark Buktenica and his team extracted core samples from the *Leptodictyum* beds. Scuba divers collected samples from the shallower mats, while special coring devices were used to probe the deeper moss. "It was like trying to core a soggy bale of hay," reports Buktenica. The core samples, currently in storage and awaiting analysis, will hopefully shed light on the moss's age. Researchers plan to carbon-date grains of terrestrial pine pollen that settled on top of the moss and became embedded within it. Some think that the bottommost layers of *Leptodictyum* will turn out to be ancient—4,000 to 7,000 years old.

We are only beginning to decipher the story of this fascinating underwater community.



***above:* Scientists are puzzled by vertical holes in the thick beds of *Leptodictyum* moss. Some of the holes are 20 feet (6 meters) deep.**

***left:* Park ecologist Mark Buktenica inspects a clump of *Drepanocladus* moss retrieved from the depths of Crater Lake.**

(continued from previous page)

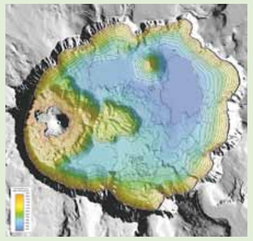
park entrance fees, we will be using new control methods to curtail invasive plants such as St. Johnswort, sheep sorrel, mullein, and thistle, which threaten native flora and fauna. Entrance fees will also be used to restore disturbed areas, such as construction sites, with native plants.

Q: What are the park's long-term goals with respect to science?

Mac: Our job is to make sure the natural resources of the park are preserved and that natural processes continue unimpaired, so that everyone who comes here can experience the park's wonders. It's a tall order sometimes. The park is not an isolated island and the threats here are many and diverse. We inventory and continually monitor key resources to detect adverse changes. If we find problems, such as declining wildlife populations or pollution, and if we have the tools to intervene, we restore these resources. If we don't know what's causing a problem or how to fix it, we focus research on the issue to find answers.

Q: What is the most exciting discovery that's been made here recently?

Mac: If I had to pick just one, I would say the results of the sonar survey in 2000. A multi-beam sonar unit, mounted on a research boat, collected more than 16 million soundings from the lake floor. That's one reading every 2 meters. The survey gave us our first detailed look at the bottom of the lake. We discovered ancient underwater lava flows, ancient lake shores, ancient volcanic vents, and evidence of large-scale landslides from the caldera wall. The survey increased our understanding of how the lake formed and how it continues to evolve.



A topographic map of the bottom of Crater Lake. Color indicates depth—blue represents the lake's deepest waters.

Q: What's the most compelling question that has yet to be answered?

Mac: Probably the role that large communities of moss play in Crater Lake. Moss is the largest biological component of the lake, yet we know little about its ecology. We also want to learn more about the dynamics of the lake in winter. Equally compelling are the potential consequences of global climate change on park resources.

Q: What do you consider to be your greatest accomplishment?

Mac: Hands down—contributing to the establishment of the Crater Lake Science and Learning Center, which opened in 2006. We worked for over a decade with many partners to see this new facility through to completion. The center provides work space and living quarters for researchers and educators. It will help us support independent research in the park and will connect teachers, students, and the visiting public with discoveries being made here. The center will operate from proceeds derived from the sale of Crater Lake Centennial license plates.

Q: What can the public do to support science in the parks?

Mac: If you live in Oregon, you can buy a Crater Lake license plate for your car. More importantly, I suggest that folks cultivate their own curiosity about the natural world and encourage the curiosity of their children. Never stop learning and never lose the joy of discovery. Nature is a great teacher and national parks are exceptional outdoor laboratories and classrooms.

Recommended Reading

A Guide to Crater Lake: The Mountain That Used To Be
A great introduction to the park. Inexpensive yet informative, with beautiful photos. 48 pages, $5.95.

Crater Lake: The Story Behind the Scenery
Large photos with detailed captions accompany the text of this popular book. 48 pages, $9.95.

Road Guide to Crater Lake National Park
Consult this handy guide as you drive the park's roads for a deeper understanding of the sights along the way. 48 pages, $5.95.

Hiking Oregon's Southern Cascades and Siskiyous
A detailed guide to 90 hiking trails in the park and surrounding areas. 339 pages, $18.95.

Exploring Crater Lake National Park: A Family Activity Book
Fun, educational puzzles and activities for kids. 103 pages, $12.95.

Pacific Northwest Wildflowers
Detailed descriptions and vivid photos of more than 300 flower species, organized by color and family. 229 pages, $24.95.

Trees To Know in Oregon
Tree identification is easy and enjoyable with this photo-packed, fact-filled guide. 151 pages, $12.00.

Crater Lake: Gem of the Cascades
A comprehensive guide to the park's geologic story. 168 pages, $15.95.

Other Useful Items

The Mountain That Became a Lake CD
Listen to this CD as you drive the park's roads. Park rangers and American Indians share facts, stories, and insight about Crater Lake. 60 minutes, $16.95.

Crater Lake Topographic Map
1:55,000 scale. Waterproof and tearproof. $11.95.

Plants & Animals of Crater Lake Nat'l Park
This folding, waterproof pocket guide will help you identify the park's most visible species. 11 pages, $6.95.

Crater Lake: Mirror of Heaven DVD
Expanded version of the film shown at the Steel Visitor Center. Traces the lake's human history from American Indian narratives to the protection of the lake as a national park. 27 minutes, $19.95.

Crater Lake Journal
Blank (lined) pages with a spiral binding for recording your journey through the park. 210 pages, $14.95.

Star and Planet Guide
Rotating "planisphere" for locating stars, planets, and constellations in the night sky. $11.95.

Crater Lake Patch
3.7 x 2.2 inches (9.4 x 5.6 cm), $2.95.

Crater Lake Cap
Navy and tan ballcap will protect your head from the sun's rays. 100% cotton, embroidered. $16.95.

EXPERIENCE YOUR AMERICA™

National Park Service
U.S. Department of the Interior

Crater Lake National Park
P.O. Box 7
Crater Lake, OR 97604

Support Your Park—

Shop in the Visitor Center Bookstores

When you shop in the Steel Visitor Center or Rim Visitor Center, all proceeds from your purchase are invested back into the park. The visitor center bookstores are operated by the Crater Lake Natural History Association, a non-profit organization established in 1942 to support the park's educational and scientific programs. Money generated from bookstore sales goes to fund a variety of important projects, including the printing of this newspaper!

Some of the bookstores' offerings are described above. For a complete list of merchandise and to buy items online, visit the Association's website: www.craterlakeoregon.org. Items can also be purchased over the phone by calling 541-594-3111.

CRATER LAKE
NATURAL HISTORY ASSOCIATION

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 $20, you can outfit your car with these beautiful plates while supporting park projects. You can purchase Crater Lake plates at any time, not just when buying a new vehicle or renewing your registration. Visit www.craterlakeplates.com or any Oregon DMV office for details.

Science and Learning Center

Money from license plate sales goes into an endowment created to fund the operation of the park's new Science and Learning Center. The center opened in 2006 and consists of two newly renovated historic structures: the original Superintendent's Residence and original Chief Naturalist's Residence. These buildings, located near Park Headquarters, have been redesigned to provide living and working space for visiting scientists, teachers, and artists.

The Science and Learning Center will draw researchers and educators to Crater Lake from around the world, encouraging them to use the park as an outdoor laboratory and classroom. This August, for example, teams of botanists, students, and volunteers will be conducting a "Lichen BioBlitz" in the park in an attempt to inventory the park's various lichen species. For more information about the Science and Learning Center and its programs, visit www.nps.gov/crla/slc.htm.

Contribute to the Crater Lake Trust

Share your love of the park by making a tax-deductible gift to the Crater Lake National Park Trust. The Trust is a non-profit organization that raises private funds to support a variety of projects—creating educational opportunities for kids, restoring historic buildings, and strengthening connections between the park and surrounding communities. Each year, for example, the Trust makes it possible for thousands of 4th- and 5th-grade students to experience this spectacular "classroom without walls" in a program called Classroom at Crater Lake. Most of the children have never been to the park before—and likely would not be able to visit without Trust support.

The Trust also produces a free, monthly, e-mail newsletter than can help you keep in touch with the park and learn about upcoming events. To sign up, drop a card in the Trust display at Crater Lake Lodge or Annie Creek Restaurant, or visit www.craterlaketrust.org. You can also give online, or mail donations to: Crater Lake National Park Trust, P.O. Box 62, Crater Lake, OR 97604.

CRATER LAKE
NATIONAL PARK TRUST

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 throughout the year to help staff visitor centers, present interpretive programs, and assist with research and monitoring projects. Opportunities are advertised at www.volunteer.gov/gov. Volunteers are provided free housing and a small stipend in exchange for 3 months or more of service.

To assist with special projects or volunteer periodically, join The Friends of Crater Lake, a non-profit organization founded in 1993. Members remove non-native plants, build and maintain trails, contact visitors at park viewpoints, and much more. For more information, visit www.craterlakeskipatrol.org and click on The Friends of Crater Lake link.

The Crater Lake Ski Patrol has been assisting winter visitors and maintaining the park's cross-country ski trails since 1983. Members, identifiable by their bright red parkas, receive training in wilderness first aid, survival skills, search and rescue, map and compass use, and avalanche forecasting in exchange for at least 6 days of service each winter. For more information, visit www.craterlakeskipatrol.org.

—Thank You!