Crater Lake

National Park Service
U.S. Department of the Interior

Reflections
Visitor Guide

Summer/Fall 2012

Hike to a Hidden Waterfall

A new hiking trail opened up last summer at Crater Lake National Park. It's called the Plaikni Falls Trail, and it leads to a lush waterfall that, until recently, few people knew existed. The trail is an easy walk and can be completed in an hour—but you might want to linger longer to enjoy the wildflowers that flourish near the spray.

The trail starts from a small parking lot along the Pinnacles Road, a spur road off the East Rim Drive. In 2012, the trail will be open as snow conditions allow, probably from early July through late October. See pages 4-5 for trail details and a map.

"Plaikni" is a Klamath Indian word meaning "from the high country." The falls, which tumble over a glacier-carved cliff, originate at a spring nearly 7,000 feet (2,134 meters) above sea level. As you enjoy the falls, please stay on the trail to protect the fragile streamside vegetation.

Welcome!

Thank you for visiting your national park! Here at Crater Lake, you'll find opportunities to refresh your spirit, awaken your senses, and connect with the natural world. In this age of economic uncertainty, 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.

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

Find the Phantom Ship

Plus 10 Other Ways to Enjoy Your Park

Of the two islands in Crater Lake, Wizard Island is by far the more renowned *(see photo, top of page 2)*. A cinder cone that erupted out of the lake about 7,300 years ago, it dominates our attention when we first arrive at the rim. Hidden near the lake's south shore, however, is an equally interesting rock that goes undetected by many park visitors. As its name suggests, the Phantom Ship is elusive. This isn't because it travels around the lake—while resembling a sailboat, it's firmly anchored to the underlying bedrock. It's because, depending on your location, the angle of the sun, the presence or absence of clouds, and whether or not the lake is calm and mirrored, you may or may not be able to see it. When you circle the lake on the Rim Drive, the island might seem to come and go like a "phantom."

Despite its ghostly appearance, the Phantom Ship is solid lava, 400,000 years old—a resistant remnant of rock along a partially submerged ridge between two scalloped bays, as the view from the top of the Garfield Peak Trail illustrates *(see photo above)*. The island is also much larger than it looks. It's longer than a football field and as tall as a 16-story building! To spot the Phantom Ship, visit the overlook named in its honor *(see page 5)*. Alternately, walk to Sun Notch, hike the Garfield Peak Trail, or circle the island at close range on a boat tour. Here are 10 other suggestions for making your visit to Crater Lake meaningful, memorable, and fun:

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, walks, kids programs, boat tours, and trolley 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 at the Steel Visitor Center. A new park film on a variety of subjects will debut in late summer *(see page 2)*.

Visit the Pinnacles
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)*.

Have a Picnic
The viewpoints and picnic areas along Rim Drive are perfect for outdoor eating *(see page 5)*. Stop by the Rim Village Café for grab-and-go sandwiches, salads, and snacks.

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 for the season on November 1 (or earlier if there is significant snowfall).

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.

Wizard Island

Rim Visitor Center

Bicyclist on East Rim Drive

Exhibits at the Sinnott Memorial Overlook

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

Crater Lake Visitor Guide
Summer/Fall 2012

This is the official trip-planner and newspaper of Crater Lake National Park. It is published twice a year and funded by the Crater Lake Natural History Association through sales made in the visitor center bookstores.

Printed on 100% recycled paper. Please recycle again.

Park Mailing Address:
P.O. Box 7, Crater Lake, OR 97604
Phone: 541-594-3000
Website: www.nps.gov/crla
E-Mail: crla_information_requests@nps.gov

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 Rim Village promenade, the Godfrey Glen Trail, the Pinnacles Trail, and the Plaikni Falls Trail. Multiple pullouts on Rim Drive have wheelchair-accessible wayside exhibits. Some ranger programs are accessible to people with impairments *(see page 3)*. A brochure with detailed information is available at the 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 Rim Village Café & Gift Shop 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 can be purchased at the Rim Village Café, the Mazama Village Store, and 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 visitor centers and 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
Self-serve gasoline is available at Mazama Village from May 25 through October 15.

Internet
Wireless internet is free for guests of Crater Lake Lodge and The Cabins at Mazama Village. Public Wi-Fi is available at Crater Lake Lodge and the Annie Creek Restaurant for $4 per hour or $10 for 24 hours.

Lost & Found
Contact a ranger at either visitor center or call 541-594-3060.

Phones
Cell phone coverage in the park is unreliable. Reception depends on your location and provider. Pay phones are located outside the Mazama Village Store 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. Most picnic areas have vault toilets but no running water.

Post Office
A U.S. 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
Combination trash/recycling bins can be found around the park at more than 20 locations. Recycling is currently limited to aluminum cans and plastic bottles. All bins can accept both.

Restrooms
Restrooms with flush toilets and running water are located at Rim Village, Mazama Village, Lost Creek Campground, and the Steel Visitor Center (9:00 a.m.–5:00 p.m.). Vault toilets are located at most picnic areas, Watchman Overlook, and both ends of the Cleetwood Cove Trail *(see map on page 5)*.

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

Services & Facilities

Camping

There are two 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 2012, it will be open from June 8 through September 23 and possibly longer if weather permits. 75% of the campsites are reservable in advance by calling 1-888-774-2728. The rest are available on a first-come, first-served basis. Typically, there are sites available until late afternoon or early evening. The campground offers tent sites ($21 per night) as well as RV sites ($27). Some of the RV sites have electric hookups ($29). 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. A nearby general store sells groceries, firewood, and gasoline. You can contact the campground directly during the summer at 541-594-2255 ext. 3610. 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 opens shortly after the opening of the East Rim Drive, usually in early July, and closes in mid-October. Registration is self-service, and reservations are not taken. The campground often fills up, so arrive early to secure a site. 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 three restaurants and one store.

The **Crater Lake Lodge** dining room offers fine dining in a casual lodge atmosphere. The menu features gourmet Northwest cuisine made with Oregon-grown ingredients. Reservations are required for dinner but are not taken for breakfast or lunch. Dinner reservations can be made by calling 541-594-2255 ext. 3217. In 2012, the dining room will be open from May 18 through October 14.

The **Annie Creek Restaurant**, located in Mazama Village, was formerly a buffet-style restaurant but now offers menu-based dining. It is open for breakfast, lunch, and dinner. Lunch and dinner options include gourmet burgers, an all-you-can-eat soup & salad bar, vegetarian lasagna, and pizza. The restaurant also offers take-out pizza service, optional outdoor patio dining, a lounge with occasional entertainment, and wireless internet at $4 per hour. The restaurant will be open in 2012 from May 25 through at least September 16.

The **Rim Village Café** serves lighter fare including grab-and-go sandwiches, soup, salads, snacks, breakfast pastries, and a variety of hot and cold beverages. The café is open year-round.

The **Mazama Village Store** sells groceries, camping supplies, firewood, and gasoline. Dates of operation for 2012 are May 25 through October 8.

Lodging

The park has two 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. For a list of accommodations outside the park, ask at a visitor center.

Crater Lake Lodge (71 rooms) is located in Rim Village, overlooking the lake. In 2012, it will be open from May 18 through October 14. 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 2012 are May 25 through at least September 30.

Visitor Centers

There are two visitor centers in the park. Rangers are available to answer your questions and assist with trip-planning. The Crater Lake Natural History Association sells books, maps, postcards, and other items *(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 throughout the day. The subject is human history, from the American Indians who witnessed the crater's formation to the prospectors, scientists, and conservationists of the 19th century. A new, 22-minute park film on a variety of subjects is scheduled to debut in late summer.

The **Rim Visitor Center**, located in Rim Village, is open daily from 9:30 a.m. to 5:00 p.m. from June through late 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 and exhibits on the park's geologic story and lake research. The overlook is open daily (weather permitting) from mid-June through October. Hours are 9:30 a.m. to 6:30 p.m. in July and August, 9:30 a.m. to 5:00 p.m. in June and September, and 10:00 a.m. to 4:00 p.m. in October. 20-minute ranger talks are given daily from June 29 through September 3. 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 and the history and renovation of the lodge. The exhibits are open daily, around-the-clock, from May 18 through October 14. They are located on the ground floor, west of the lobby.

Gifts & Books

The **Rim Village Gift Shop** is open all year. The **Annie Creek Gift Shop** in Mazama Village is open May 25 through at least September 16. You can also shop online at www.craterlakelodges.com/shop/. The park's two visitor centers also sell books and gifts.

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 you are 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 are strictly prohibited. The only exception is the Cleetwood Cove Trail, the only safe and legal access to the lake shore. Serious injuries and deaths 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 other people 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.

Good places to walk a dog include Rim Village, Mazama Campground, and Grayback Drive. 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 are prohibited in all posted park buildings.

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.

Help Keep Wildlife Wild. Please—DO NOT FEED!

Boat Tour on Crater Lake

Sunset over Crater Lake

Trolley Tour on Rim Drive

Trolley Tours

Rim Drive is one of America's most scenic byways, but it's hard to appreciate the views with your eyes on the road. Fortunately, you can leave the driving to someone else. Ranger-guided trolley tours circle Crater Lake daily. Tours begin and end at Rim Village, spend 2 hours traveling clockwise around the lake, and stop at a minimum of 4 scenic overlooks. See below for departure times and ticket prices. The buses are enclosed, climate-controlled, wheelchair accessible, and seat 25 passengers. They resemble old streetcars, but they run on modern technology: powered by compressed natural gas, they emit 30-40% less pollution than gasoline-powered vehicles. The trolleys are owned and operated by The Shuttle Inc. of Klamath Falls.

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 with a 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 or at the ranger station at Park Headquarters.

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 rainbow trout and kokanee salmon remain. Fishing is allowed at the bottom of the Cleetwood Cove Trail, where you'll find .25 miles (.4 km) of rocky shoreline. Wizard Island, reachable by tour boat, 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 events. Discovery Point is a favorite spot to watch the sunrise. For sunsets and moonrises, try Watchman Overlook or hike to the top of Watchman Peak. Ask at a visitor center for sunrise and sunset times.

Swimming

Swimming is allowed in Crater Lake, but the water is cold! Most people swim for only a few 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 rocky; there are no beaches. Snorkeling, scuba diving, and long-distance swimming require a permit.

Wildlife Viewing

The park is home to many animals, but they can be difficult to spot. The most visible animals are deer and squirrels. Herds of elk are sometimes seen in the meadows along Rim Drive. Bobcats and mountain 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 old? Do you want to learn while having fun at Crater Lake National Park? Here are 2 different ways:

• Pick up a free activity book at either visitor center. Explore the park, then return the book to a ranger. Finish 4 pages to earn a STICKER; complete 8 pages to earn a Junior Ranger BADGE.

• Meet behind the Rim Visitor Center at 1:30, 2:30, 3:30, or 4:30 p.m. (June 29-Sept. 3) and participate in a free, ranger-led activity. Complete one activity to earn a Junior Ranger PATCH.

Boat Tours

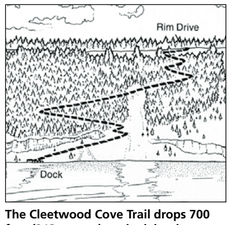
Join a park ranger for a 2-hour cruise around Crater Lake. See the box below for departure times and ticket prices. Boat tours on Crater Lake are operated by Xanterra Parks & Resorts in partnership with the National Park Service.

Tickets
Each boat holds 37 passengers. 20 tickets for each tour (July 7-Sept. 3 only) are available for advance purchase over the phone. They can be purchased by calling 1-888-774-2728. The remaining 17 tickets for each tour (and all tickets from June 29-July 6 and Sept. 4-Sept. 16) are available only in the park from automated kiosks inside Crater Lake Lodge and the Annie Creek Gift Shop. For each tour, these tickets go on sale exactly 24 hours in advance. Sales continue until the tour is sold out or until 2 hours remain before departure. (Example: tickets for the 3:30 p.m. tour are available from 3:30 p.m. the day before until 1:30 p.m. the day of.) If a tour does not sell out, remaining tickets can be purchased from 2 hours to 45 minutes before departure from a ticket booth (open daily at 8:30 a.m.) at the top of the Cleetwood Cove Trail. Ticket holders should arrive at the trailhead at least 45 minutes before their tour to allow time to hike down the 1.1-mile (1.7-km) trail to the lake.

Visiting Wizard Island
Up to 74 tickets each day are available for visitors wishing to disembark at Wizard Island to hike, fish, swim, and explore. Only 2 tours dock at Wizard Island: the 9:30 a.m. and 12:30 p.m. departures. The 6 standard tours do not stop. Most Wizard Island visitors will be dropped off for a 3-hour stay, then picked up by a later boat to complete the tour of the lake. A limited number of tickets (6 per day) are available for visitors wishing to spend 6 hours on the island. See page 4 for information about the island's 2 hiking trails.

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 both ends of the Cleetwood Cove Trail.
- ☑ Sunscreen, sunglasses, and a hat are recommended for sun protection. The boats are not covered.
- ☑ Bring a jacket. Weather on the lake can be windy and chilly.
- ☑ 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 *(see map on page 5)*. 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 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*.

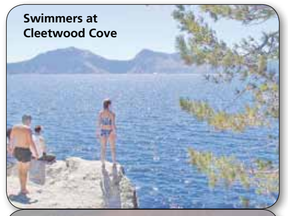
Ranger-Led Activities

	June 29–Sept. 3	May 18–June 28 & Sept. 4–Oct. 14
Crater Lake Talk Learn about the origins of Crater Lake and discover 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 Talk A different topic every time! Meet on the back porch of Crater Lake Lodge. For today's topics, check the sign on the Lodge back porch or ask at the Rim Visitor Center. (20 minutes)	**2:00 p.m.** **4:00 p.m.**	Check posted schedules
Junior Ranger Activity Kids participate in a ranger-led activity to learn about Crater Lake and earn a Junior Ranger patch. Meet behind the Rim Visitor Center. Recommended for ages 6 to 12. (20 minutes)	**1:30 p.m.** **2:30 p.m.** **3:30 p.m.** **4:30 p.m.**	Check posted schedules
Afternoon Hike Hike with a park ranger to explore and learn about Crater Lake. Check posted schedules for the "trail of the day." Distance, duration, and meeting place will vary depending on the trail.	**2:00 p.m.**	Check posted schedules
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. Flashlights are not needed. See page 4 for trail details. (1.5 hours)	July 20-31 **7:30 p.m.** August 1-10 **7:15 p.m.** August 11-20 **7:00 p.m.** August 21-31 **6:45 p.m.**	(Hike offered from July 20-Sept. 10) Sept. 1-10 **6:30 p.m.**
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)	June, July **9:00 p.m.** August 1-20 **8:30 p.m.** Aug.21-Sept.3 **8:00 p.m.**	Check posted schedules
Rim Drive Trolley Tour Circle the lake on a ranger-guided tour of Rim Drive. See the top of this page for more information. Tours leave from, and tickets are sold at, the Community House in the middle of Rim Village. Tickets may be purchased the day of the tour, or the day before, from 9:30 a.m. to 3:00 p.m. Alternately, call 541-882-1896 or visit www.craterlaketrolley.com to make a reservation. Tours cover a variety of topics. (2 hours) **Ticket Prices**: $25 Adult (age 14 through 59); $22 Senior (age 60 and up); $15 Child (age 5 through 13); Free Young Child (under 5 years); $70 Family Rate (2 adults plus kids)	**10:00 a.m.** **11:00 a.m.** **12:00 p.m.** **1:00 p.m.** **2:00 p.m.** **3:00 p.m.**	Check posted schedules
Crater Lake Boat Tour For a different perspective on Crater Lake, take a ranger-narrated boat tour. See the right-hand column of this page for detailed information. Note: Taking a boat tour requires hiking down—and back up—one of the steepest trails in the park. Tours cover a variety of topics. (2 hours) **Ticket Prices**: $32 Adult (age 12 and up); $42 Adult with Wizard Island Drop-Off; $21 Child (age 3 through 11); $27 Child with Wizard Island Drop-Off; Free Infant (under 3 years)* *Tours are not recommended for infants due to boat noise, sun exposure, wind, and occasional rough water.	Standard Tours: **9:35 a.m.** **10:30 a.m.** **11:30 a.m.** **1:30 p.m.** **2:30 p.m.** **3:30 p.m.** Tours with Wizard Island Drop-Offs: **9:30 a.m.** **12:30 p.m.**	Weather permitting, boat tours will operate from June 29 through September 16

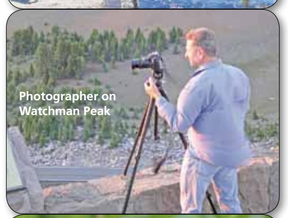
Activities are free of charge except for trolley & boat tours. Programs are subject to cancellation due to weather or unforeseen circumstances.

Hi, I'm Ranger Emily. We have 90 miles (145 km) of hiking trails here at Crater Lake. Our most popular day hikes are listed on this page. If you are visiting in June or July, be aware that some trails might still be closed by snow. Please help us protect this special place by following a few important rules:

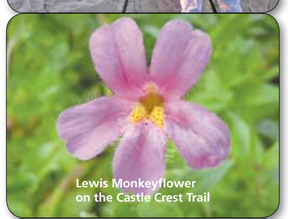
- No hiking or climbing inside the caldera! The walls are dangerously steep and unstable. The one exception is the Cleetwood Cove Trail. It is the only legal access to the lake shore.
- Overnight backpacking requires a permit. Free permits are available at either visitor center or at the ranger station at Park Headquarters. 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 *(see page 2)*.



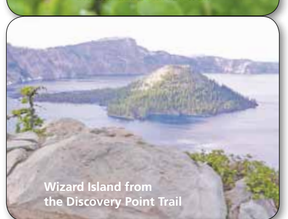
Swimmers at Cleetwood Cove



Photographer on Watchman Peak



Lewis Monkeyflower on the Castle Crest Trail



Wizard Island from the Discovery Point Trail

Hiker atop Garfield Peak

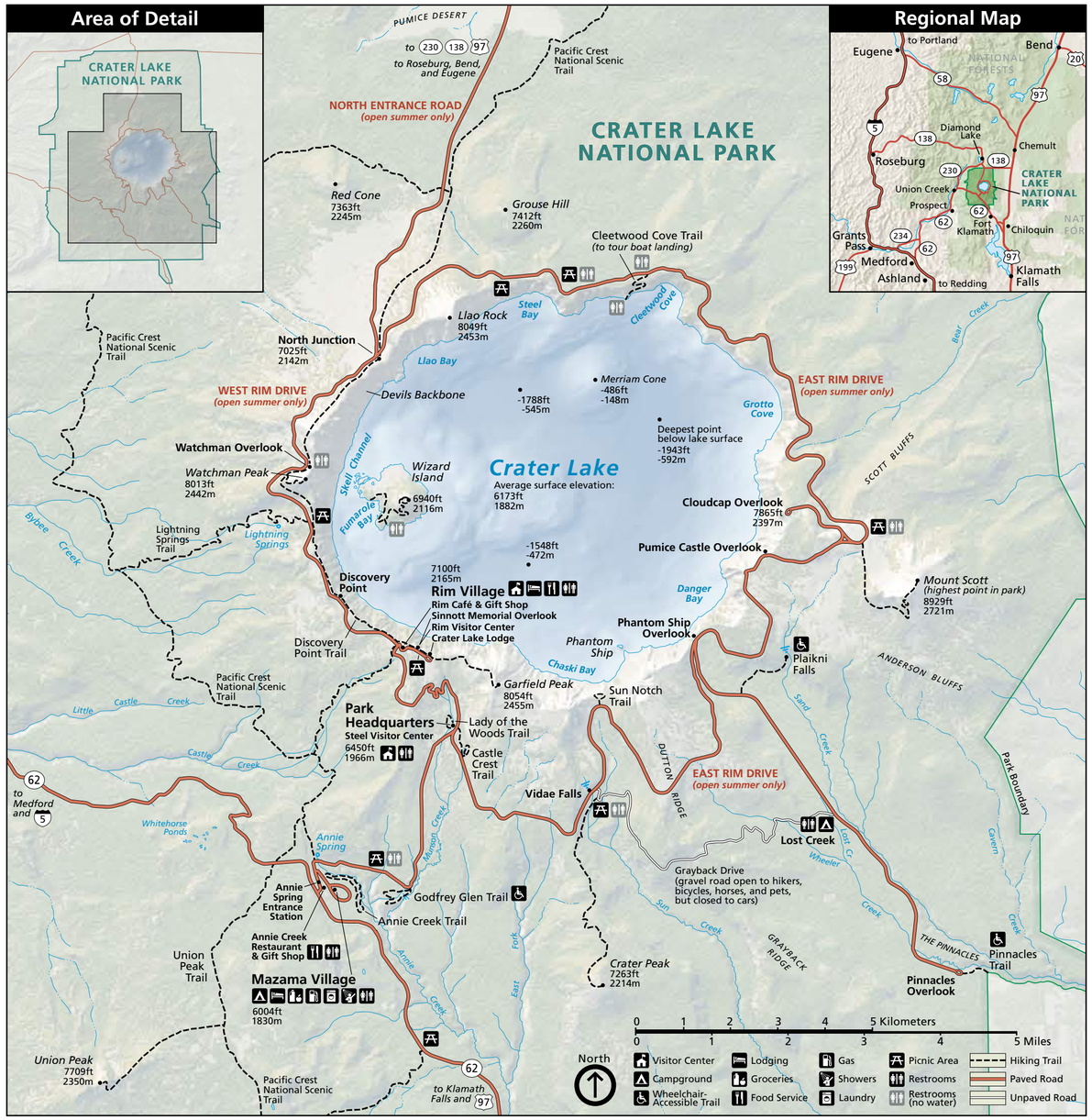
Let's Go Hiking!

Pinnacles Trail	Godfrey Glen	Trail	Castle Crest	Lady of the Woods
1 mile (1.6 km)	1 mile (1.6 km) loop trail	*Total Distance*	0.5 miles (0.8 km) loop trail	0.5 miles (0.8 km) loop trail
10 feet (3 meters)	50 feet (15 meters)	*Elevation Gain*	100 feet (30 meters)	120 feet (37 meters)
30 minutes	**30 minutes**	*Time*	**30 minutes**	**30 minutes**
Volcanic Spires	**Peaceful Forest**	*Highlight*	**Flowers, Meadow, Creek**	**Historic Architecture**
Easy walk along the rim of Pinnacle Valley. Great views of volcanic spires. Use caution near cliffs. Trail ends at park boundary. Accessible to wheelchair users with assistance. Open to bicycles.	Easy stroll through an old-growth forest, with some canyon views. Dirt path; accessible to wheelchair users with assistance. Self-guiding brochures are available at the trailhead.	*Description*	Loop trail through a beautiful meadow. Abundant wild-flowers from mid-July to mid-August. The trail is rocky and slippery in places. Self-guiding brochures are available at the trailhead.	Loop trail around Park Headquarters. Self-guiding brochures, available at the trailhead, describe how early park architects integrated their designs with the natural landscape.
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.	*Trailhead Location*	East Rim Drive, 0.5 miles (0.8 km) east of Park Head-quarters. Can also access from the Steel Visitor Center.	Behind the Steel Visitor Center, on the south side of the building.
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.	*Nature Note*	The flowers here are nourished by springs emerging from the hillside.	The trail's name refers to a sculpture of a woman carved into a boulder along the trail.
Easy			**Easy**	

Plaikni Falls	Sun Notch	Trail	Discovery Point	Annie Creek
2.2 miles (3.5 km)	0.5 miles (0.8 km)	*Total Distance*	2.2 miles (3.5 km)	1.7 miles (2.7 km) loop trail
100 feet (30 meters)	115 feet (35 meters)	*Elevation Gain*	100 feet (30 meters)	200 feet (61 meters)
1 hour	**30 minutes**	*Time*	**1 hour**	**1½ hours**
Waterfall, Flowers	**Views of Phantom Ship**	*Highlight*	**Lake Views**	**Creek, Canyon, Flowers**
Quiet walk through an old-growth forest to a waterfall. See page 1 for details. Dirt path; first ¾ is accessible to wheelchair users with assis-tance, but the final ascent to the falls might be too steep.	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.	*Description*	Mostly level 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.
Pinnacles Road, 1.2 miles (1.9 km) southeast of the Phantom Ship Overlook.	East Rim Drive, 4.4 miles (7.1 km) east of Park Headquarters.	*Trailhead Location*	West end of Rim Village, where the paved walk be-comes 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.
Snowmelt, not Crater Lake, is the source of Plaikni Falls' water.	This U-shaped valley was carved by glaciers that once flowed down Mt. Mazama.	*Nature Note*	The trees along the trail are mountain hemlocks and whitebark pines.	The creek provides the park's drinking water, named the best tasting in Oregon in 2004.
Easy to Moderate			**Moderate**	

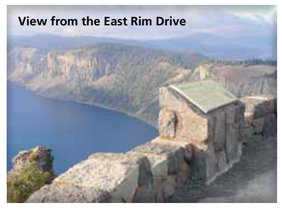
Watchman Peak	Crater Peak	Trail	Garfield Peak	Mount Scott
1.6 miles (2.6 km)	6.4 miles (10.3 km)	*Total Distance*	3.4 miles (5.5 km)	5 miles (8.1 km)
420 feet (128 meters)	765 feet (233 meters)	*Elevation Gain*	1,010 feet (308 meters)	1,250 feet (381 meters)
1 hour	**3½ hours**	*Time*	**2 to 3 hours**	**3 hours**
Panoramic Views	**Forest, Views, Solitude**	*Highlight*	**Panoramic Views**	**Panoramic Views**
Moderate ascent to a lookout above Wizard Island. Spectacular views in all directions. Great place to watch the sunset. Trail may be closed until mid-July due to snow.	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.	*Description*	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 mid-July due to snow. Use caution near cliff edges.	Gradual ascent of the park's highest peak. Great views in all directions. Best in morning, when the light is ideal for lake viewing. May be closed until mid-July due to snow.
3.8 miles (6.1 km) northwest of Rim Village. Park at the viewpoint surrounded by wooden fences.	East Rim Drive, 3 miles (4.8 km) east of Park Headquarters at the Vidae Falls Picnic Area.	*Trailhead Location*	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.
Built in 1932, the peak's historic fire lookout is still staffed by rangers today.	Upper Klamath Lake is the largest in Oregon, but its av-erage depth is only 14 feet.	*Nature Note*	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.
Moderate to Strenuous			**Strenuous**	

Union Peak	Cleetwood Cove	Trail	Wizard Summit	Fumarole Bay
11 miles (17.7 km)	2.2 miles (3.5 km)	*Total Distance*	2 miles (3.2 km)	1.8 miles (2.9 km)
1,600 feet (448 meters)	700 feet (213 meters)	*Elevation Gain*	760 feet (232 meters)	150 feet (46 meters)
5 to 6 hours	**1½ hours**	*Time*	**1½ hours**	**1 hour**
Panoramic Views	**Swim, Fish, Boat Tours**	*Highlight*	**Views, Summit Crater**	**Swimming, Fishing**
Long forest walk followed by a very steep climb. Great views from the top and interesting geology, but no view of Crater Lake. Top section may be impassable until mid-July due to snow.	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.	*Description*	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.
Highway 62 at the Pacific Crest Trailhead, 1 mile (1.6 km) west of the Crater Lake road junction.	North side of the lake, 11 miles (17.6 km) from Rim Village if traveling clockwise on Rim Drive.	*Trailhead Location*	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.
Union Peak is the core of an old volcano eroded by gla-ciers during the last Ice Age.	Below 200 feet (61 meters), the water in Crater Lake stays 38°F (3°C) year-round.	*Nature Note*	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.
Strenuous			**On Wizard Island**	



Highlights of the Rim Drive

Rim Drive is a 33-mile (53-km) road that encircles Crater Lake. It is one of America's most scenic byways, with spectacular views in all directions. The loop is typically open from early July to late October. It can be driven, without stopping, in about an hour, but at least 2 to 3 hours are necessary to enjoy the varied sights. The road is narrow, so buses and motorhomes should use caution. There are more than 30 scenic pullouts along the route, many of which have roadside exhibits. Be sure not to miss these 7 "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.



View from the East Rim Drive

Discovery Point

Imagine seeing Crater Lake by accident. It was near this spot, on the back of a mule in 1853, that gold prospector John Hillman became the first European-American to stumble across what he called "Deep Blue Lake."

Watchman Overlook

This pullout offers an unmatched view of Wizard Island, a cinder cone that erupted out of Crater Lake approximately 7,300 years ago. 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

This overlook sits at the end of a 1-mile (1.6-km) spur road, the highest paved road in Oregon. 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 features: a layer of orange pumice rock that has been eroded into the shape of a medieval castle. Watch carefully for this unmarked viewpoint, located 1.1 miles (1.8 km) west of the Cloudcap Overlook junction and 2.4 miles (3.9 km) east of the Phantom Ship Overlook.

Phantom Ship Overlook

Nestled against the shore, Crater Lake's "other island" escapes detection by many park visi-tors. Though it resembles a small sailboat, the island is as tall as a 16-story building. It's made of erosion-resistant lava, 400,000 years old—the oldest exposed rock within the caldera.

Pinnacles Overlook

This overlook is well worth the 7-mile (11-km) detour from Rim Drive. Colorful spires, 100 feet (30 meters) tall, are being eroded from the canyon wall. The Pinnacles are "fossil fumaroles" where volcanic gases rose up through a layer of volcanic ash, cementing the ash into solid rock.

Vidae Falls

Look for this cascading waterfall between Phantom Ship Overlook and Park Head-quarters. 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

RICHARD SNIEZKO USFS

Ancient whitebark pines grow along the rim of Crater Lake. Here in the Cascades, some of them live for over 500 years. A whitebark pine in central Idaho is thought to be 1,285 years old. In bright sunlight, the tree's gray bark sometimes appears white, hence the common name.

This tree has been invaded by blister-rust fungus. As the fungus grows within the tree, it ruptures the bark, allowing orange-colored fruiting bodies to release spores into the wind. Eventually, when the fungus encircles the tree's trunk, cutting off the flow of water and nutrients, the tree will die.

Can We Stop the Decline of the Whitebark Pine?

Whitebark pines have long stood sentinel on the rocky rim of Crater Lake. Twisted and gnarled, they are able to withstand cold temperatures, strong winds, and heavy snows. Lately, however, these hardy trees have been dying at an alarming rate. Drive around the lake this summer and you'll witness the carnage: 25% of the park's whitebark pines are dead, 25% of the rest are dying, and the fate of the entire species is in jeopardy. "At this point," says park botanist Jen Beck, "their decline seems irreversible." What's behind the destruction of these majestic trees, and can anything be done to save them?

The culprit is a lethal fungus *(Cronartium ribicola)*, although human beings are really to blame. We imported the non-native fungus by accident in 1910, when trees from a nursery in France were shipped to a landowner in British Columbia, Canada. Now a permanent resident of North America, the fungus travels short distances on the wind via microscopic spores, infecting all pines that have 5 needles per bundle, including sugar pines, limber pines, and western white pines. Trees infected with the fungus develop a disease called "white pine blister rust," evident by rust-colored cankers that form on the branches and trunk. The disease has no cure; death follows infection in 5 to 15 years.

Whitebark pines *(Pinus albicaulis)* are particularly susceptible to blister rust. Across their range, from California east to Wyoming and north to British Columbia, their numbers are in rapid decline. In July of 2011, the U.S. Fish & Wildlife Service announced that the species is on a path toward extinction and that it warrants protection under the Endangered Species Act. Unfortunately, a lack of funding precludes the agency from listing the tree as endangered at this time.

If we lose our whitebark pines, we'll lose more than just some picturesque trees. An entire forest community is at risk. "The whitebark pine is a 'foundation species' at Crater Lake," explains Beck. "A lot of other species depend on it." Whitebark pines are the only trees that grow at the park's highest elevations. They stabilize the soil on steep slopes, helping wildflowers and other plants gain a foothold. They provide nutritious seeds and sheltered habitat for squirrels, grouse, and other creatures. And by shielding snowbanks from the sun, they retain soil moisture and reduce spring flooding at lower elevations.

Now for the good news: within most populations, a few individuals seem to possess an inborn, genetic resistance to the blister-rust fungus. Some trees are able to shed their infected needles (on which the fungal spores germinate) before the fungus can spread from the needles to the branches. Other trees are able to quarantine the disease in a section of bark and prevent it from spreading further. Fewer than 5% of whitebark pines express these traits, but researchers such as Beck are hoping to identify and utilize them. By locating resistant trees, collecting their seeds, and planting their offspring throughout the park, we might be able to accelerate the natural selection process in order to regenerate our whitebark pine forests before the current groves die off.

Jen Beck, park botanist

Scientists first harvested seeds at Crater Lake in 2003, from 10 trees at Rim Village. The seeds were germinated in a nursery at the Dorena Genetic Resource Center (DGRC), a U.S. Forest Service facility 20 miles (32 km) south of Eugene that studies how trees defend themselves from disease. At the age of two, the seedlings were exposed to the blister-rust fungus and were checked, over the next 5 years, for signs of resistance. "The parent trees are given letter grades, just like grades in school," describes Beck. "Unfortunately, we got one C, five Ds, and four Fs." Seeds collected in 2005 and 2006, from 28 trees on the west and east sides of the lake, are showing better resistance. "Results are preliminary, but they include some As and Bs," Beck reports.

Some of the seedlings from the '05 and '06 collections were surplus to the DGRC's experimental needs, so the park decided to go ahead and plant them. In 2009, 331 seedlings from 16 parent trees were transplanted to Rim Village. You can examine these trees yourself by walking along the paved paths behind the Rim Village Cafe (between the Cafe and the rim of the caldera). Infant whitebark pines grow slowly, so "They're still shorter than your knee," says Beck. "To protect them, we planted them next to boulders; that's where to look." So far, pocket gophers have eaten a few of the seedlings, but over 90% are still alive.

This fall, Beck and her two seasonal assistants plan to establish an additional 522 seedlings in two locations: near North Junction and along the East Rim Drive at Dutton Ridge. They will also harvest more seeds from new parent trees that, in the field, appear to be staving off or coping with blister-rust infection. So far, seeds from 76 trees have been sent to the DGRC from collection efforts in '03, '05, '06, '09, and 2011. Eventually, if a pool of rust-resistant parent trees can be identified, large-scale planting of their progeny will follow.

Beck's work is funded, in part, by park entrance fees. The U.S. Forest Service has also contributed funds. "We couldn't do this without help from park visitors, the Deschutes National Forest, the DGRC, and researchers at Oregon State University," she says. "A whole community of people is working hard to save this tree. We are not alone in our efforts." Other national parks, including Yellowstone, Mount Rainier, and Glacier, have also begun "outplanting" nursery-grown seedlings.

There's a sense of urgency to the task. Whitebark pines typically don't produce cones until age 60, and it's not until age 100 that they enter into their prime reproductive years. Raising a forest of genetically resistant trees will take time. If we wait too long, until most of the current trees have died, the few survivors will be at such low numbers that virtually all of their seeds will be consumed by Clark's nutcrackers (the birds responsible for propagating the seeds in the wild) rather than dispersed into the soil. That's why, although the idea of planting trees in a national park may at first seem counter to the agency's practice of avoiding manipulation of the natural landscape, intervention is critical. Whitebark pines are not likely to save themselves.

The decline of the whitebark pine, and of the high-elevation forest community it supports, illustrate the importance of preventing the introduction of non-native species in the first place. Prevention, early detection, containment, and quick eradication of non-natives are key to avoiding costly and difficult mitigation efforts. It's also a reminder, says Beck, that "Even the most remote places are vulnerable to our impacts. The whitebark pine is basically a wilderness species, but it's in decline because of humans."

Even so, Beck remains optimistic. "We need to maintain hope," she says. "Collective hope and action are very powerful. They are representative of the good part of the human spirit. The effort to save the whitebark pine is range-wide. Many people and organizations are involved. I'm still hopeful that, in the future, my kids and grandkids will be able to see whitebark pines enduring on the rim of Crater Lake."

Clark's Nutcracker: Tree Farmer

No story on the whitebark pine would be complete without mention of its avian partner: the Clark's nutcracker *(Nucifraga columbiana)*. Nutcrackers are large, raucous birds related to ravens, jays, and magpies. Without their cooperation, whitebark pines could not reproduce.

Unlike most other evergreen cones, those of the whitebark pine remain tightly closed, on the tree, after the seeds ripen. The seeds reach the soil only with the assistance of the Clark's nutcracker, which uses its sharp, black bill to pry out the large, nutritious nuts. Some seeds get eaten immediately, but most are hidden a few inches deep in the dirt, in small caches of 3 to 5. One nutcracker can stash up to 100,000 seeds in a single summer! Over the next 9 months, it will use its precise spatial memory to retrieve more than half of its caches. Unclaimed seeds eventually germinate.

Whitebark pine cones sit horizontally at the tops of trees, providing perfect perches for the Clark's nutcracker.

Just think: every whitebark pine you see at Crater Lake (except for those established in 2009 at Rim Village) was carefully planted by a Clark's nutcracker. That explains why the pines tend to grow in clusters, with several trunks emerging from the same spot. Each spot indicates where a thrifty nutcracker, years ago, buried a small cache of seeds.

To learn more about the intertwined fate of these two amazing species, pick up a copy of *Made for Each Other: A Symbiosis of Birds and Plants* (160 pages, $24.95), available at either visitor center. To examine a grove of whitebark pines up close, visit the Whitebark Pine Picnic area. It's on the East Rim Drive, just north of the Mount Scott trailhead. Cloudcap Overlook and Watchman Overlook are also good places to stop.

RICHARD SZNEZKO USFS

Removing a cone's scales reveals a feast of nutritious nuts.

Beetle Epidemic Complicates Whitebark Pine Restoration

The non-native fungus described above is not the only foe facing the whitebark pine. A native insect, the mountain pine beetle *(Dendroctonus ponderosae)*, is hastening the decline of the species. In fact, over the past decade at Crater Lake, more whitebark pines have succumbed to beetles than to blister rust. The bigger worry is that beetles are killing some of the few trees that have the genetic tools to combat the fungus. Scientists are now in a race to identify and protect these important individuals before the beetles get to them first.

What's behind the beetle epidemic? For millennia, mountain pine beetles have thrived in the forests of western North America. In the past, however, their intolerance of cold weather generally safeguarded high-elevation trees. Lower-elevation pines, such as lodgepole and ponderosa, were the beetles' main targets. That has now changed as of the 21st century. Across the western U.S. and Canada, beetles have turned their attention toward whitebark pines. Our warming climate, it seems, is allowing them to survive winter at higher latitudes and higher elevations.

Beetle attacks are swift and deadly. Females swarm individual trees, laying eggs beneath the bark. When the eggs hatch, the larvae dine on the tree's innermost layer of bark, tunneling horizontally around the trunk. Within a few weeks, the tree dies, having starved to death—its flow of water and nutrients cut off.

The size of a grain of rice, pine beetles go unnoticed by even the most observant of us. (The one below is shown at 5 times its actual size.) Except for a few days in summer, when adults fly from their home tree to a new host, they spend their entire life cycle beneath the bark.

KLAUS BOLTE, CANADIAN FOREST SERVICE

Fortunately, we can protect individual trees from beetle invasion. Shortly after adults overwhelm a tree, they emit a pheromone (a chemical signal) that alerts other beetles in the area to stay away. Much like a "no vacancy" sign, this pheromone, called "verbenone," tells other beetles that the tree can't support a larger population. By attaching pouches containing a synthetic form of verbenone to the trunks of trees we'd like to protect, we can trick the beetles into thinking those trees have already been attacked. The method isn't foolproof, and the pouches must be replaced annually to be effective, but it's our best hope of prolonging the lives of the disease-resistant trees whose seeds hold the key to the long-term survival of our whitebark pine communities.

This summer, Jen Beck's crew will be stapling pouches of verbenone to 60 whitebark pines in an effort to ward off beetles. These trees are potentially valuable "parents" whose seedlings are currently being tested for resistance to the blister-rust fungus.

Success in Sun Creek

How Scientists are Saving the Park's Only Native Fish

A sobering fact of modern civilization is that, across the globe, human activity is sending other species toward extinction. When it comes to biodiversity, bad news is the norm. Here at Crater Lake, however, we have some good news to report: biologists have recently succeeded in saving the park's only population of native fish. It took 20 years of planning, labor, and expense—and the work is far from finished—but the success of the park's Bull Trout Restoration Program serves as a hopeful reminder that human beings are equally capable of protecting the Earth's biodiversity as we are of diminishing it.

Bull trout *(Salvelinus confluentus)* are cold-water fish native to many rivers and lakes of western North America. They get their name from their relatively large, broad, flat heads. Once abundant, they are now listed as threatened under the U.S. Endangered Species Act, a victim of habitat fragmentation, poor water quality, and the introduction of non-native competitors. While bull trout never colonized Crater Lake itself, they once thrived south of the lake in tributaries of the Klamath River such as Sun Creek and Annie Creek.

In 1989, the park discovered that its sole remaining bull trout population had dwindled to roughly 150 individuals confined to a 1.2-mile (1.9-km) stretch of Sun Creek. The apparent cause of the decline was competition from non-native brook trout *(Salvelinus fontinalis)*, a species from the eastern U.S. introduced to park streams from the 1920s to the 1970s for recreational fishing. Records show that the National Park Service and Oregon Department of Fish and Wildlife stocked more than 275,000 brook trout into Sun Creek alone! Brook trout lay more eggs than bull trout, breed at a younger age, and compete with bull trout for food and space. They also hybridize with bull trout, producing offspring that are sterile. By 1992, outnumbered by brook trout by a ratio of 13 to 1, Sun Creek's bull trout seemed destined for extinction.

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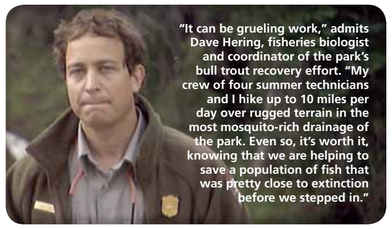
In Oregon, bull trout live in the watersheds of the Columbia and Klamath Rivers. In the park, they feed on insects and are quite small, mostly 5 to 10 inches (13-25 cm) long. Historically, before the introduction of non-native competitors and the blockage of migratory corridors, Sun Creek's bull trout likely spent part of their lives in the Wood River or Upper Klamath Lake, growing much larger and feeding on other fish.

To save the population, biologists realized they would need to rid the creek of its introduced fish. It was a complicated process—taking from 1992 to 2005—but it consisted of four main steps. First, biologists constructed two artificial waterfalls along Sun Creek near the park's southern boundary, tall enough to prevent non-native fish from re-entering the park from downstream. Second, they carefully captured the creek's remaining bull trout and temporarily housed them in several remote locations, including an outdoor tank near Park Headquarters. Next, they eradicated brook trout from the stream by introducing a fish toxin (called antimycin) to the water and using a technique called electrofishing (catching fish by stunning them with an underwater electric current). Finally, with the non-natives vanquished, the bull trout were returned to their home.

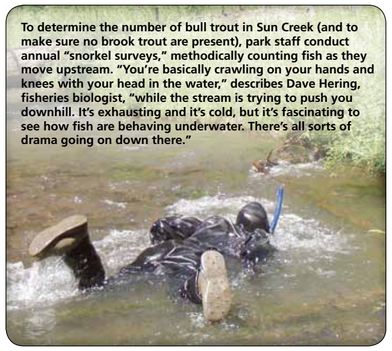
Today, with the creek all to themselves, the native trout are thriving. Their numbers have grown to approximately 2,000, they are increasing in size, and they have expanded their range to encompass a 7-mile (11.2-km) stretch of the stream. Even so, the long-term survival of the population will depend on its ability to re-establish gene flow with other bull trout populations in the Klamath Basin. To that end, the park is partnering with the Oregon Department of Fish and Wildlife, the Oregon Department of Forestry, and the U.S. Fish and Wildlife Service to extend the species' safe haven beyond the park boundary. In 2010, two additional waterfalls were built across Sun Creek 4 miles (6 km) south of the park on state land. This summer, crews will work to remove the estimated 6,000 non-native fish (brook trout and brown trout) that currently reside there.

Someday—and it could take decades to accomplish—the hope is that Sun Creek's bull trout will be able to reconnect with their relatives in other parts of the watershed and re-colonize their historic range. Another hope is that some will return to a migratory way of life. Historically, many of the creek's trout likely traveled to the food-rich waters of Upper Klamath Lake before returning to the gravel beds of Sun Creek to spawn. Over the past few summers, park biologists have inserted microchips (Passive Integrated Transponders, or "PIT tags") in nearly 300 of the bull trout to study their movements and to check for the persistence of migratory behavior in the population. Biologists can detect or "scan" the microchips of nearby fish using radio waves emitted from handheld antennas, as well as from stationary antennas located at several points along the stream. So far, most fish have remained within 100 meters (109 yards) of where they were tagged, but a few of the larger fish have journeyed downstream, over the waterfalls and out of the park, possibly expressing the migratory patterns of their ancestors. You can help us protect this threatened species by following park regulations, which prohibit fishing in Sun Creek.



"It can be grueling work," admits Dave Hering, fisheries biologist and coordinator of the park's bull trout recovery effort. "My crew of four summer technicians and I hike up to 10 miles per day over rugged terrain in the most mosquito-rich drainage of the park. Even so, it's worth it, knowing that we are helping to save a population of fish that was pretty close to extinction before we stepped in."

In a world of widespread and large-scale environmental degradation, saving a small population of fish in a remote section of Crater Lake National Park might seem insignificant. But the continued progress of the Bull Trout Restoration Program is a reminder that ultimately, maintaining the integrity of our natural environment is something that will be achieved incrementally—through hard work, dedication, and small, attainable successes.



To determine the number of bull trout in Sun Creek (and to make sure no brook trout are present), park staff conduct annual "snorkel surveys," methodically counting fish as they move upstream. "You're basically crawling on your hands and knees with your head in the water," describes Dave Hering, fisheries biologist, "while the stream is trying to push you downhill. It's exhausting and it's cold, but it's fascinating to see how fish are behaving underwater. There's all sorts of drama going on down there."

Crater Lake: Clearly Remarkable

First-time visitors to Crater Lake are often surprised to find such a clean lake in the belly of what once was a dirty, smelly, violent volcano. Early park naturalist Arthur Hasler may have been only slightly exaggerating when he observed, 75 years ago, that "The unusual transparency of the water, in addition to its apparent blue color, sends the sightseer into ecstasies." Ecstatic or not, most sightseers today react by instinctively reaching for a camera, as though compelled to capture proof that such a remarkable lake exists. What accounts for the lake's stunning clarity? How do we quantify it? And how does the transparency of the water affect the lake's ecology and broader scientific significance?

Believe it or not, the water in Crater Lake is cleaner than the water that pours from your faucet at home. That's because roughly 83% of it comes from rain and snow falling directly on the lake's surface. (The rest is runoff from precipitation landing on the slopes inside the caldera.) No rivers or creeks carry silt, sediment, or pollution into Crater Lake. The other reason the lake is so pure is that its volcanic basin is currently dormant. The last eruption here occurred some 4,900 years ago, when an underwater lava dome east of Wizard Island grew to within 95 feet (29 meters) of the surface. Since then, activity has ceased. Dissolved gases and minerals do enter the lake through hydrothermal vents on the lake's floor, but in very, very small amounts.

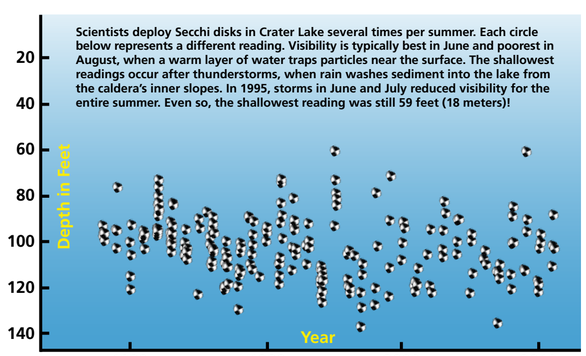
With so few particles suspended in the water, Crater Lake is exceptionally clear: certainly one of the clearest lakes in the world. When an 8-inch (20-cm) Secchi disk is lowered into the water, the average depth at which it disappears is nearly 102 feet (31 meters)! On a good day, Secchi disk readings surpass 130 feet (40 meters). Back in the early 1980s, however, worries arose that Crater Lake's clarity was diminishing. Secchi disk depths from 1978-81 were noticeably shallower than the previous measurements that had been taken, a decade earlier, in 1968-69. So concerned was the U.S. Congress that it passed a law directing the Secretary of the Interior to investigate. Happily, the resulting Limnological (lake research) Monitoring Program, which continues to this day, found that the 1978-81 readings fell squarely within the normal range of variation. Clarity fluctuates quite a bit *(see the graph below)*, but Crater Lake is as clean as ever.

Park scientists also monitor transparency with more sophisticated instruments. At least once a month each summer, they lower a waterproof light meter into the lake to study the degree to which different wavelengths of light are able to penetrate. On average, they find that 1% of the sun's visible rays persist to a depth of 330 feet (100 meters). That might not, at first blush, sound impressive. But even 1% of the sun's visible rays are more than enough to support the survival of aquatic plants. Moss, for example, hangs from underwater cliffs as deep as 460 feet (140 meters) below the surface. Nowhere else in the world has moss been found thriving at such tremendous depths.

The ultraviolet (UV) part of the spectrum also pierces deep into Crater Lake. In fact, in 2003 scientists were amazed to discover that UV rays penetrate deeper in Crater Lake than was believed to be theoretically possible in even the purest of water. A benchmark of physics had to be reset! Crater Lake's transparency to UV light has a huge impact, it turns out, on its living organisms. Just as ultraviolet rays are harmful to humans, giving us sunburns and skin cancer, they are also hazardous to aquatic life forms. Moss doesn't grow within 85 feet (26 meters) of the lake's surface. Most of the lake's 163 species of phytoplankton (tiny algae that form the basis of the food chain) hide out even deeper. You'd need to travel 260 feet (80 meters) below the surface to find them at their maximum abundance.

In a lake as clear as this one, small changes in water quality are easy to detect, especially compared with other lakes that aren't as clear. (It's easier to see when a spoonful of dirt is added to a glass of clear water than a glass that's already muddy.) At a time when virtually every large lake in the world is experiencing degradation from local human activity, Crater Lake is becoming important to scientists as a barometer with which to measure changes happening on a regional and global scale, such as changes in climate and atmospheric pollution. For now, the spectacular waters of Crater Lake remain largely untrammeled by the impacts of human civilization. Hopefully many more generations of park visitors will be able to experience the "ecstasies" of gazing down upon this remarkable body of water.

Secchi (rhymes with "Becky") disks are used worldwide to measure water clarity. The usual method is to lower the 8-inch (20-cm) disk until it disappears, raise it until it reappears, then take the average of the two readings. Ideally, measurements are taken at midday under calm conditions. The average Secchi disk depth at Crater Lake is 102 feet (31 meters)!



Scientists deploy Secchi disks in Crater Lake several times per summer. Each circle below represents a different reading. Visibility is typically best in June and poorest in August, when a warm layer of water traps particles near the surface. The shallowest readings occur after thunderstorms, when rain washes sediment into the lake from the caldera's inner slopes. In 1995, storms in June and July reduced visibility for the entire summer. Even so, the shallowest reading was still 59 feet (18 meters)!

Aquatic ecologist Mark Buktenica inspects a clump of moss retrieved from the depths of Crater Lake. Moss carpets the lake floor as deep as 460 feet (140 meters) below the surface, a testament to the lake's transparency to sunlight.

Support Your Park–

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 any Oregon DMV office or www.oregon.gov/ODOT/DMV for details.

Money from plate sales goes into an endowment that funds the operation of the park's Science and Learning Center. The center opened in 2006 and consists of two renovated historic structures near Park Headquarters: the original Superintendent's Residence and Chief Naturalist's Residence. These buildings now provide living and working space for visiting scientists, teachers, and artists. The Science and Learning Center draws researchers and educators to Crater Lake from around the world, encouraging them to use the park as an outdoor laboratory and classroom. For more information about the Science and Learning Center and its programs, visit www.nps.gov/crla/slc.htm.

Science and Learning Center

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. Volunteers are provided free housing 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, and much more. For more information, visit www.friendsofcraterlake.org.

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 safety in exchange for at least 6 days of service each winter. For more information, visit www.craterlakeskipatrol.org.

Volunteer Ski Patrollers

Contribute to the Crater Lake Trust

The Crater Lake National Park Trust is a non-profit organization that raises private funds to support park projects and connect the park with surrounding communities. It helps fund, for example, the transportation of more than 5,000 grade-school students to the park each year. In a program called "Classroom at Crater Lake," kids engage in hands-on science and learn about wildlife, old-growth forests, and winter ecology. For more than half the kids, it's their first visit to the park. The Trust also organizes events for the public at Crater Lake, including free "Family Fun Days." And the Trust's lecture series brings "the park to the people" with free public talks in local communities on the park's history, geology, and ecology. To learn more, visit www.craterlaketrust.org or write to P.O. Box 62, Crater Lake, OR 97604. Consider sharing your love of the park by making a tax-deductible gift.

CRATER LAKE
NATIONAL PARK TRUST

"Classroom at Crater Lake"

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 to the right. For a complete list of merchandise and to buy items online, visit www.craterlakeoregon.org. Items can also be purchased by phone by calling 541-594-3111.

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 national park, and we value your input on how best to manage it. You can provide feedback in several ways. Ask for a comment form at a visitor center, send an e-mail to crla_information_requests@nps.gov, or write to: Superintendent, Crater Lake National Park, P.O. Box 7, Crater Lake, OR 97604.

–Thank You!

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

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

EXPERIENCE YOUR AMERICA™

Recommended Reading

Crater Lake: The Story Behind the Scenery
Large photos with detailed captions accompany the text of this popular book. 48 pages, $11.95.

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

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.

Trails of Crater Lake & Oregon Caves
A detailed guide to 24 hiking trails. 112 pages, $14.95.

Exploring Crater Lake National Park: A Family Activity Book
Fun, educational puzzles and activities for kids. 103 pages, $9.99.

Trees To Know in Oregon
Tree identification is easy and enjoyable with this photo-packed, fact-filled guide. 153 pages, $18.00.

Crater Lake National Park: A History
A thoughtful and thorough account of the park's rich human history. 280 pages, $22.95.

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, $16.99.

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

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

Volcanoes
Folding, waterproof guide to volcanoes, lava rocks, and plate tectonics. 11 pages, $7.95.

Star and Planet Guide
Rotating "planisphere" for locating stars, planets, and constellations. $11.99.

Crater Lake Water Bottle
Insulated, stainless-steel water bottle with Crater Lake logo. 25 ounces (.75 liters), $24.99.

Crater Lake Cinch Sack
Carry your water, snacks, and sunscreen. Available in blue, red, or green. $16.99.

Clark's Nutcracker T-Shirt
100% cotton. Nutcracker on front and Crater Lake on back. $16.95.

Climate Chart

Summers at Crater Lake are short but warm and sunny. Even so, there are days when the lake is shrouded in clouds. July, August, and early September are your "best bets" for warm, dry weather. In May, early June, late September, and October, sunny days alternate with periods of rain and snow. Winters are long and snowy. Storms from the Pacific Ocean dump an average of 44 feet (13.3 meters) of snow at Park Headquarters. The tremendous snowfall is a result of our position at the crest of the Cascade Mountains.

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
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. 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
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. Lake Surface Temp. (°C)	4	3	3	3	4	7	13	15	14	10	7	4