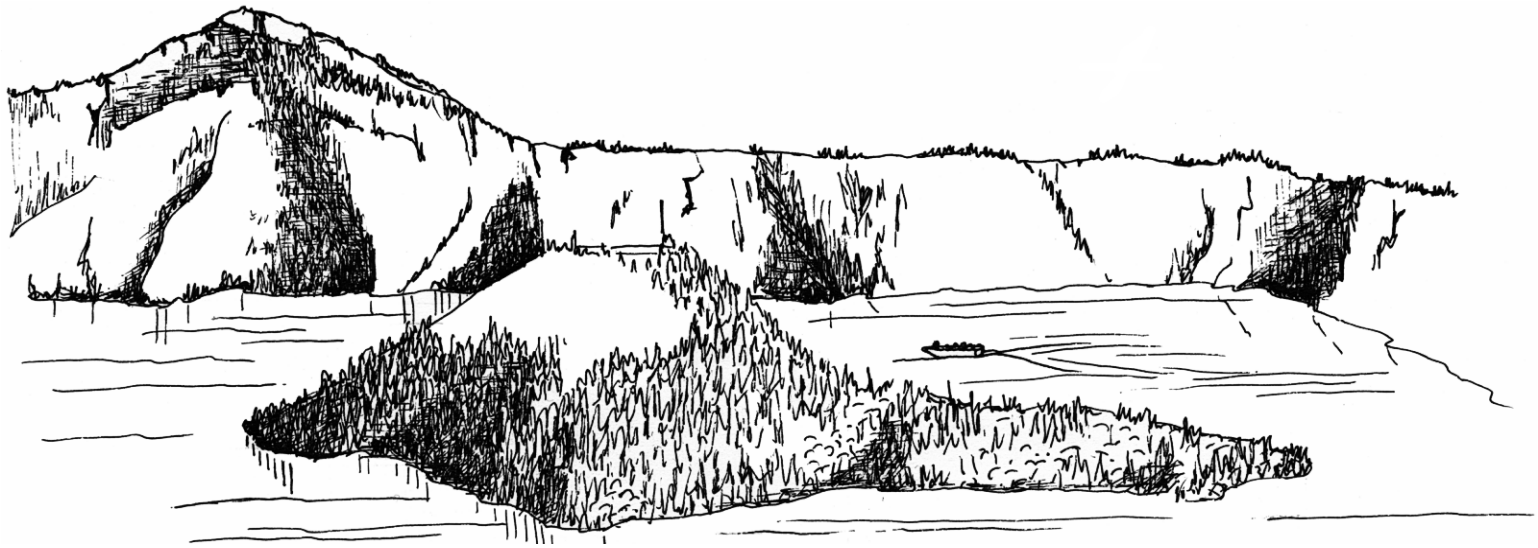
Crater Lake

National Park Service
U.S. Department of the Interior

Crater Lake National Park

Introduction to Crater Lake



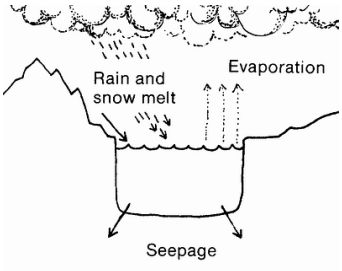
Crater Lake Is Like No Place Else On Earth

Crater Lake has inspired its visitors for hundreds of years. No place else on earth combines such a deep, pure lake with sheer surrounding cliffs and a violent volcanic past. Few places on earth are so beautiful, so pristine, or—for these very reasons—so interesting to scientists.

An Introduction to Crater Lake

Crater Lake is located in Southern Oregon on the crest of the Cascade Mountain range, 100 miles (160 km) east of the Pacific Ocean. It lies inside a caldera, or volcanic basin, created when the 12,000 foot (3,660 meter) high Mount Mazama collapsed 7,700 years ago following a large eruption.

Generous amounts of winter snow, averaging 528 inches (1,341 cm) per year, supply the lake with water. There are no inlets or outlets to the lake. Crater Lake, at 1,943 feet (592 meters) deep, is the seventh deepest lake in the world and the deepest in the United States. Evaporation and seepage prevent the lake from becoming any deeper.



The lake averages more than five miles (8 km) in diameter, and is surrounded by steep rock walls that rise up to 2000 feet (600 meters) above the lake's surface.

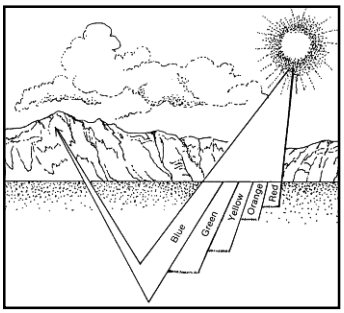
Following the collapse of Mount Mazama, lava poured into the caldera even as the lake began to rise. Today, a small volcanic island, Wizard Island, appears on the west side of the lake. This cinder cone rises 767 feet (234 meters) above the lake and is surrounded by black volcanic lava blocks. A small crater, 300 feet (90 meters) across and 90 feet (27 meters) deep, rests on the summit. The crater is filled by snow during the winter months, but remains dry during the summer.

The lake level fluctuates slightly from year to year. The highest level was reached in 1975 when the water level rose to 6,179.34 feet (1,883.47 meters) above sea level. The lowest level was recorded in 1942 when it dropped to 6,163.20 feet (1,878.55 meters). For such a deep lake, the maximum observed variation of 16 feet (5 meters) is minor (less than 1 percent).

Physical Characteristics

Color:
The color of Crater Lake is the product of its great depth, the purity and clarity of its water, and the way solar radiation interacts with water. Water molecules absorb the longer wavelengths of light better (reds, oranges, yellows, and greens). This energy slowly heats the lake throughout the summer. Shorter wavelengths (blues) are more easily scattered than absorbed. In the deep lake, some of the scattered blue light is redirected back up to the surface where we can see it. Around the edges where the water is less deep, some of the unabsorbed green sunlight is reflected back up. The color of the lake can vary from day to day depending on wind, cloud cover, and the angle of the sun.

Physical Characteristics (continued)



Light Penetration:
Sunlight is able to penetrate the waters of Crater Lake to great depths. Researchers often use a reflector called a Secchi disk to determine lake clarity. Readings deeper than 100 feet (30 meters) in most lakes are rare, but they can typically reach 120 feet (37 meters) at Crater Lake. A reading of 142 feet (43.3 meters) was recorded in 1997.

Temperature:
Surface temperatures of the lake water vary between 32°F (0°C) and 66°F (19°C). Summer temperatures typically range between 50°F (10°C) and 60°F (16°C). Water more than 260 feet (80 meters) beneath the surface remains near 38°F (3°C) all year long. During the hottest time of the summer, the top water layers warm and become less dense than colder water below. This condition of thermal stratification usually continues into September.

The lake rarely freezes in winter because of the large amount of heat stored in the lake during the summer, windy surface conditions, and relatively mild air temperatures. The most significant complete freezing event in recent history occurred between January and April in 1949. The lake was mostly covered with ice twice in 1985, in January and again in December.

Why Is the Lake So Blue?

1) Most of the annual input comes directly from precipitation.
2) No stream or creek flows into the lake carrying dissolved minerals or dust.
3) Seepage removes minerals already dissolved in the lake.
4) Volcanic rocks below the water line are relatively insoluble in cold lake water.

Water Circulation

The upper 600 feet (180 meters) of lake water appears to be well mixed based upon the degree of oxygen saturation. Studies indicate that some surface water mixes annually to the lake bottom but a total turnover of lake water is incomplete. As many as six years may be necessary to totally exchange lake water at the bottom with oxygen-rich surface water.

Hydrothermal Springs

Lake researchers have discovered two areas on the lake bottom affected by hydrothermal spring water. Mineral-rich water, at a slightly elevated temperature, pools in some locations and leaves iron deposits in others. Communities of bacteria mark the venting sites.

Aquatic Life

Between 1888 and 1942, more than 1.8 million fish were introduced into Crater Lake. Today, rainbow trout and kokanee salmon can be seen swimming in the lake.

Scientist have identified 157 different species of phytoplankton and 12 species of zooplankton in the lake. The density and diversity of these minute life forms is greatly restricted by the low concentrations of nitrogen in the lake.

Large colonies of moss circle the lake at a depth between 100 feet (30 meters) and 400 feet (120 meters). The unusual clarity of the lake water permits the moss to thrive at depths found nowhere else.

Statistics

Average lake surface elevation	6,173 feet (1,881 meters) above sea level
Greatest depth	1,943 feet (592 meters)
Average depth	1,148 feet (350 meters)
Shallowest depth	15-25 feet (6 meters) at Phantom Ship
	30-60 feet (14 meters) at Skell Channel
Surface area	21 square miles (5400 ha)
Widest point	6.02 miles (9.69 km) from Discovery Point to Grotto Cove
Narrowest point	4.54 miles (7.31 km) from Dutton Cliff to Llao Rock
Wizard Island	767 feet (234 meters) above the lake surface
Phantom Ship	170 feet (52 meters) above the lake surface
Hillman Peak	1,978 feet (603 meters) above the water, highest point on the rim
Palisade Point	507 feet (155 meters) above the water, lowest point on the rim
Sinnott Memorial	900 feet (270 meters) above the lake
Average height of rim	1,000 feet (300 meters) above the lake
Rim Village to Wizard Island	2 miles (3 km)