Climate Change at Crater Lake

Despite its protected status, Crater Lake National Park is not immune to climate change. Scientists have observed an increase in the lake's temperature, a decrease in the park's snowfall, and impacts on species such as the American pika and whitebark pine.

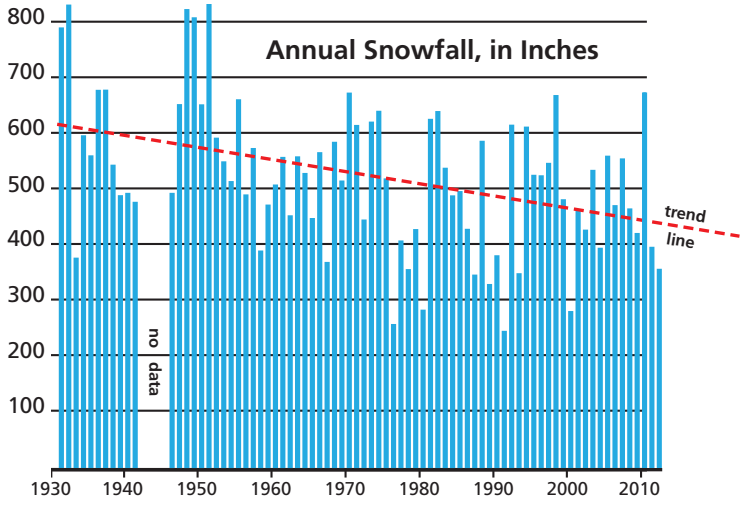
Climate change is happening.

Most scientists agree that the Earth's climate is warming due to the burning of fossil fuels. The release of "greenhouse gases" into the atmosphere traps the Earth's heat. Since 1750 (the start of the Industrial Revolution), carbon dioxide in the upper atmosphere has increased by 30 percent. As a result, the planet's temperature has risen by more than 1.5 degrees Fahrenheit (0.8º Celsius) since 1880, impacting ecosystems worldwide.

Less snow is falling in the park.

Snowfall at Crater Lake varies from year to year. Since 1931, however, when rangers first began keeping track, totals have been trending downward, and climate researchers expect the trend to continue. They predict the Pacific Northwest will experience even less snow and warmer temperatures in the decades to come.

Most snow that falls in the park eventually leaves the park to nourish the rivers of southern Oregon and northern California. Less snow falling in the park means less water is leaving the park to support cities, ranches, farms, and wildlife downstream.



Average Annual Snowfall at Park Headquarters, by Decade:

1930s – 614" (1,560 cm)
1940s – 623" (1,582 cm)
1950s – 572" (1,453 cm)
1960s – 507" (1,288 cm)
1970s – 495" (1,257 cm)
1980s – 475" (1,207 cm)
1990s – 493" (1,252 cm)
2000s – 455" (1,156 cm)
'10-13 – 474" (1,204 cm)

The waters of Crater Lake are getting warmer.

Since 1965, when scientists began monitoring Crater Lake's water temperature, surface temperatures in the summer have risen at an average rate of 1.1ºF (0.6ºC) per decade. Similar increases have occurred in other North American lakes, including Lake Superior, Lake Ontario, and Lake Tahoe.

It remains to be seen what impacts (if any) this increase will have on the ecology of Crater Lake. Some researchers speculate that warmer water will spur the growth of algae, reducing the lake's purity and clarity. Right now, however, Crater Lake is still one of the cleanest and purest bodies of water in the world. In fact, its water is cleaner than the tap water in your home. This is because roughly 83% of it comes from rain and snow falling directly on the lake's surface, while the rest is runoff from precipitation on the caldera's inner slopes. No rivers or creeks carry silt, sediment, or pollution into the lake.

Climate change puts pikas in peril.

The American pika *(Ochotona princeps)* is a small mammal that inhabits rocky slopes from Canada to New Mexico. At Crater Lake, pikas are often seen harvesting wildflowers along the Garfield Peak Trail.

Rising temperatures appear to be driving some pika populations extinct. Pikas are not able to tolerate warm weather; their dense fur is not efficient at releasing heat. A few hours in the sun at temperatures as low as 78ºF (26ºC) can be fatal. Climate change also may be altering vegetation patterns and shrinking the food supply of some populations.

Many pika populations live high up on isolated peaks. While other mammals might be able to migrate in response to climate change, most pikas cannot. At least three Oregon pika communities southeast of Crater Lake have vanished in recent decades.

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Climate change threatens whitebark pines.

Whitebark pines *(Pinus albicaulis)* grow on the rocky rim of Crater Lake and atop the park's tallest peaks. They are considered a "keystone" species, since so many other species depend on them for food, shelter, and survival. Unfortunately, half the park's whitebark pines are currently dead or dying.

The tiny mountain pine beetle *(Dendroctonus ponderosae)*, rarely seen, is responsible for much of the damage. Scientists think, however, that the real culprit may be climate change. 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 trees, such as lodgepole pines and ponderosa pines, were the beetles' main targets.

Recently, however, the beetles have turned their attention to whitebark pines. Our warming climate is helping these insects survive the winter at higher latitudes and elevations.

More information is available online.

NPS Climate Response Program:
nps.gov/subjects/climatechange/index.htm

NASA climate change website:
climate.nasa.gov

NOAA climate change website:
climate.gov

EPA climate change website:
epa.gov/climatechange