# Crater Lake

Crater Lake National Park
Oregon

National Park Service
U.S. Department of the Interior

How did a mountain become a lake? A massive volcanic eruption 7,700 years ago left a deep basin in the place where a mountain peak once stood. Centuries of rain and snow filled the basin, forming a deep blue lake whose waters are of unmatched color and clarity. It's the deepest lake in the United States. Your trip to the rim to view the lake is a climb up the flank of this transformed volcano.

CRATER LAKE PHOTO © TERRY DONNELLY

Clark's nutcrackers crack open whitebark pine cones to feed on fresh seeds *(below)* and cache the rest. They retrieve seeds for later meals and to feed their young. The birds also plant new trees, as seeds left behind may germinate.

With gnarled, twisted branches the whitebark pine lives at the highest elevations, surviving extreme temperatures and high winds. It relies almost entirely on the Clark's nutcracker for regeneration.

## JUST THE FACTS

**How big is Crater Lake?**
- 6.02 miles across (maximum)
- 4.54 miles across (minimum)
- 1,943 feet deep at deepest point
- Holds 4.9 trillion gallons of water
- Tallest point on rim 1,978 feet above lake
- Lowest point on rim 507 feet above lake

**Did a meteor form the crater?**
- No. This deep basin is the belly of an erupted volcano
- Its geologic name is a *caldera*

**Why is the lake so blue?**
- Other colors of the spectrum are absorbed. Blue wavelengths are scattered and seen by human eyes

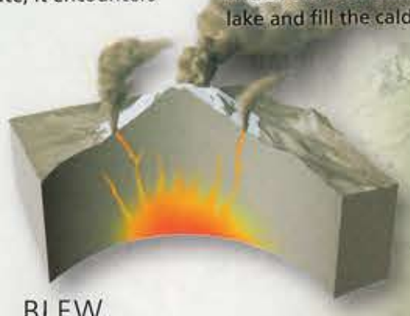
FORMATION

## A Long Line of Cascade Range Volcanoes

Mount Mazama is one of a line of volcanoes ranging from northern California into British Columbia *(diagram, far right)*. Along this zone, two of the Earth's crustal plates collide. As the denser plate of oceanic crust is forced deep into the Earth's interior beneath the continental plate, it encounters high temperatures and pressures that partially melt solid rock. About 7 million years ago the Cascades began to rise, where the molten rock surfaced as volcanic vents. This process continues. Lassen Peak and Mount St. Helens have erupted within the last century. Future eruptions may destroy the lake and fill the caldera with new rock.

### GREW

**1** For 400,000 years, repeated volcanic eruptions built 12,000-foot Mount Mazama. Thick lava oozed from vents on the mountain. Thinner lava burst to the surface in more spectacular displays of volcanic power. Glaciers formed and receded more than once.

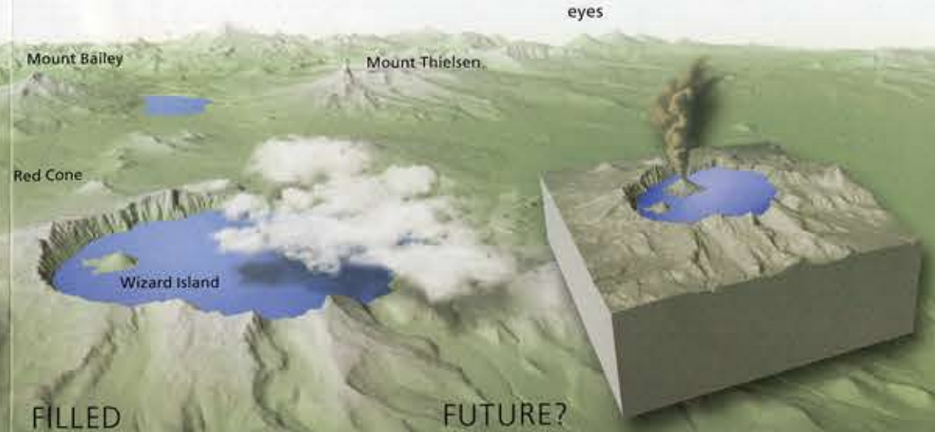


### BLEW

**2** The most violent eruption began 7,700 years ago. A huge column of pumice and ash erupted skyward from a vent northeast of the summit, powered by expanding gas released from rising magma under great pressure in a chamber beneath the mountain.

### FELL

**3** New vents encircling the subsiding peak brought hot flows of pumice, ash, and gas down its flanks. As the magma chamber emptied, the mountain could not support its own weight and collapsed, forming a deep caldera where the snow-capped volcano once stood.




### FILLED

**4** The deep basin filled with centuries of rain and snowfall. No streams run into the lake, so very little sediment clouds its pure waters. Precipitation, balanced with evaporation and seepage, keeps the lake level consistent. Wizard Island erupted after the lake began to fill.

### FUTURE?

**5** It may now be asleep, but Mazama is not an extinct volcano. It may awaken with a new eruptive phase some day as the geologic processes that built the Cascade Range continue. Perhaps the violence of its past will return to once again transform this peaceful landscape.


EXPLORATION

## Surprising Secrets of the Nation's Deepest Lake

Research on the lake floor in *Deep Rover*, the submersible *(left)*, found thick mats of bacteria thriving in the absence of light. Hydrothermal pools, unknown before, indicate the volcanic heat source beneath the lake. Thick bands of moss ring the walls at depths over 400 feet. Much remains to be learned; only two percent of the lake bottom has been explored.

**A PRISTINE BENCHMARK FOR CHANGE**
Crater Lake's purity makes it an indicator of human-induced change. Studies here show possible impacts of air pollution, climate change, and invasive species.

After his first visit here in 1885 **William Gladstone Steel** *(above)* campaigned to protect Crater Lake, which he first heard about as a schoolboy. Steel's work met success with the park's creation in 1902.

**FIRST SCIENCE EXPEDITION, 1886**

The first attempt to determine lake depth, in 1886, was surprisingly accurate. Headed by Clarence Dutton of the U.S. Geological Survey, the **Cleetwood Expedition** was named for its boat *(above)*.

A finding of 1,996 feet was taken that used a simple wooden sounding device to lower a section of pipe attached to piano wire.

Sonar equipment now records the lake's depth as 1,943 feet.

Park aquatic biologists *(with moss, above)* explored the lake floor in *Deep Rover*, in the research tradition that the Cleetwood Expedition launched. Moss beds discovered to encircle the lake and Wizard Island may weigh 50 times more than the rest of the lake's living matter.

**NEW MYSTERIES STILL SURFACE**

**FUTURE SCIENTISTS . . .**

A **Science and Learning Center** supports research and education efforts, connecting students, artists, scientists, and the public to share the results of recent investigations. The scientists share their findings and contribute to the education work. An **Artists-in-Residence** program enables participants to offer the artistic expression of their encounter with Crater Lake.

**A midge fly** *(above)* **lays its eggs on the lake surface. The eggs sink nearly 2,000 feet to the lake bottom to hatch, feed as larvae, and mature as pupae. The pupa slowly wiggles and floats to the surface to emerge as an adult, and the cycle begins again.**



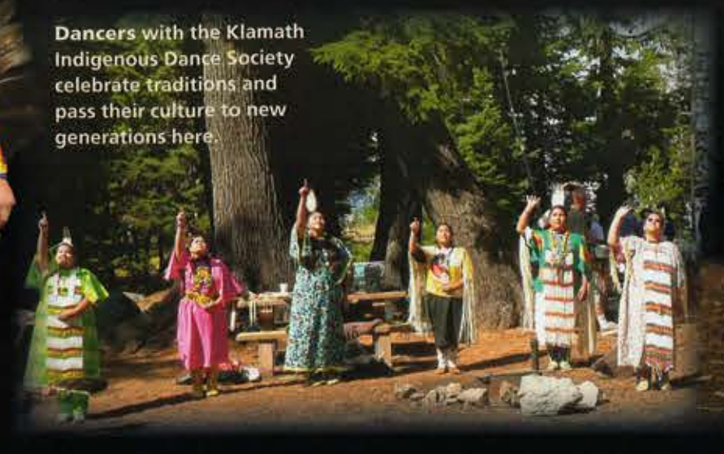
INSPIRATION

## *A Place of Power*

Local tribes' oral traditions of the cataclysmic eruption closely parallel known geologic details, indicating tribal ancestors witnessed the event. After the eruption, the area became a prominent ritual site to the tribes in this region. The tribes perceive that spirits and particular powers inhabit the volcanic terrain. Private ceremonial activities, including vision quests, take place here today as they have for countless generations.

Instructional stories center on the lake as one of the most striking features on the tribal landscape. Government treaties placed tribal boundaries outside the park, but Crater Lake remains an integral part of tribal practices.

**Archaeologists uncovered 75 sagebrush sandals** *(below)* **from a cave near Fort Rock, Oregon, buried beneath a layer of Mount Mazama's ash. This find suggests that ancestral peoples witnessed the great eruption.**

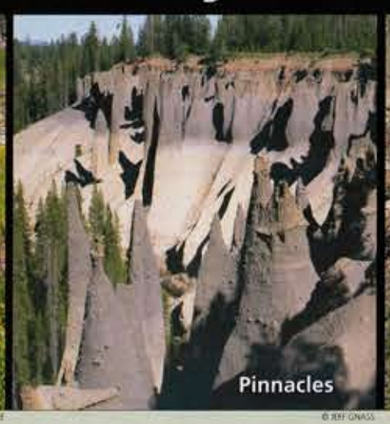


**Dancers** with the Klamath Indigenous Dance Society celebrate traditions and pass their culture to new generations here.

# Taking in the Beauty of Crater Lake


Vidae Falls

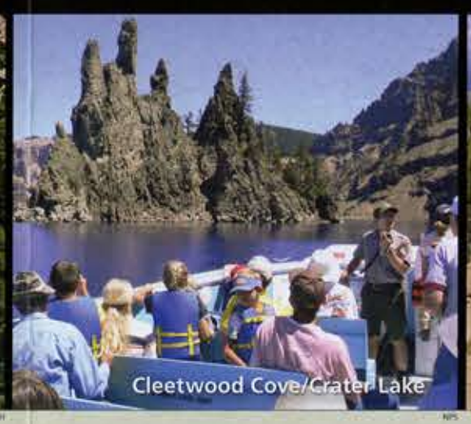
© CHARLES A. BLAKESLEE


Pinnacles

© JEFF GNASS


Pumice Castle

NPS / BETSY EMRICH


Cleetwood Cove/Crater Lake

NPS


View from Garfield Peak Trail

NPS


533 inches of snow yearly

NPS

**Rim Village** provides information, ranger programs, lodging, and meals from early June through September. A small café and gift store is open there year-round. **Mazama Village** is the summer season center for food, gifts, gasoline, lodging, camping, groceries, and supplies. **Park Headquarters** offers visitor services like information, first aid, backcountry permits, and map and book sales. Service animals are welcome. See your free *Crater Lake Reflections Visitor Guide* for details on these services.

Pullouts, viewpoints, and trails along 33-mile Rim Drive offer changing views of the sweeping curve of the caldera wall, massive cliffs overhanging the lake, and the extravagant beauty of the lake itself. Annual snowfall averaging 44 feet closes Rim Drive from mid-October to late June. In summer allow two to three hours to travel around the lake and enjoy its features. Stop at beautiful **Vidae Falls** *(above)* along East Rim Drive. View the mysterious island named **Phantom Ship**. A side trip down Pinnacles Road leads to the wheelchair-accessible **Plaikni Falls Trail** and the **Pinnacles**, eerie spires of volcanic ash sculpted by erosion. Other viewpoints offer expansive landscape vistas. Look for **Pumice Castle**, a narrow tower of reddish rock on the eastern caldera wall. It survives after centuries of erosion. Enjoy a strenuous hike to the lake on the **Cleetwood Cove Trail**, access point for **Crater Lake Boat Tours** (advance ticket purchase required). Back at Rim Village, climb the **Garfield Peak Trail** near historic Crater Lake Lodge.

**Safety and Regulations** Park roads are often steep and winding. Drive safely, using common sense. Read other safety tips and regulations found in your free visitor guide. Please do not feed or disturb wildlife. For firearms regulations see the park website or ask a ranger. With your help we can preserve this national park unimpaired for future generations to enjoy. **In an emergency call 911.**

**More Information**
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Crater Lake, OR 97604
541-594-3000
www.nps.gov/crla

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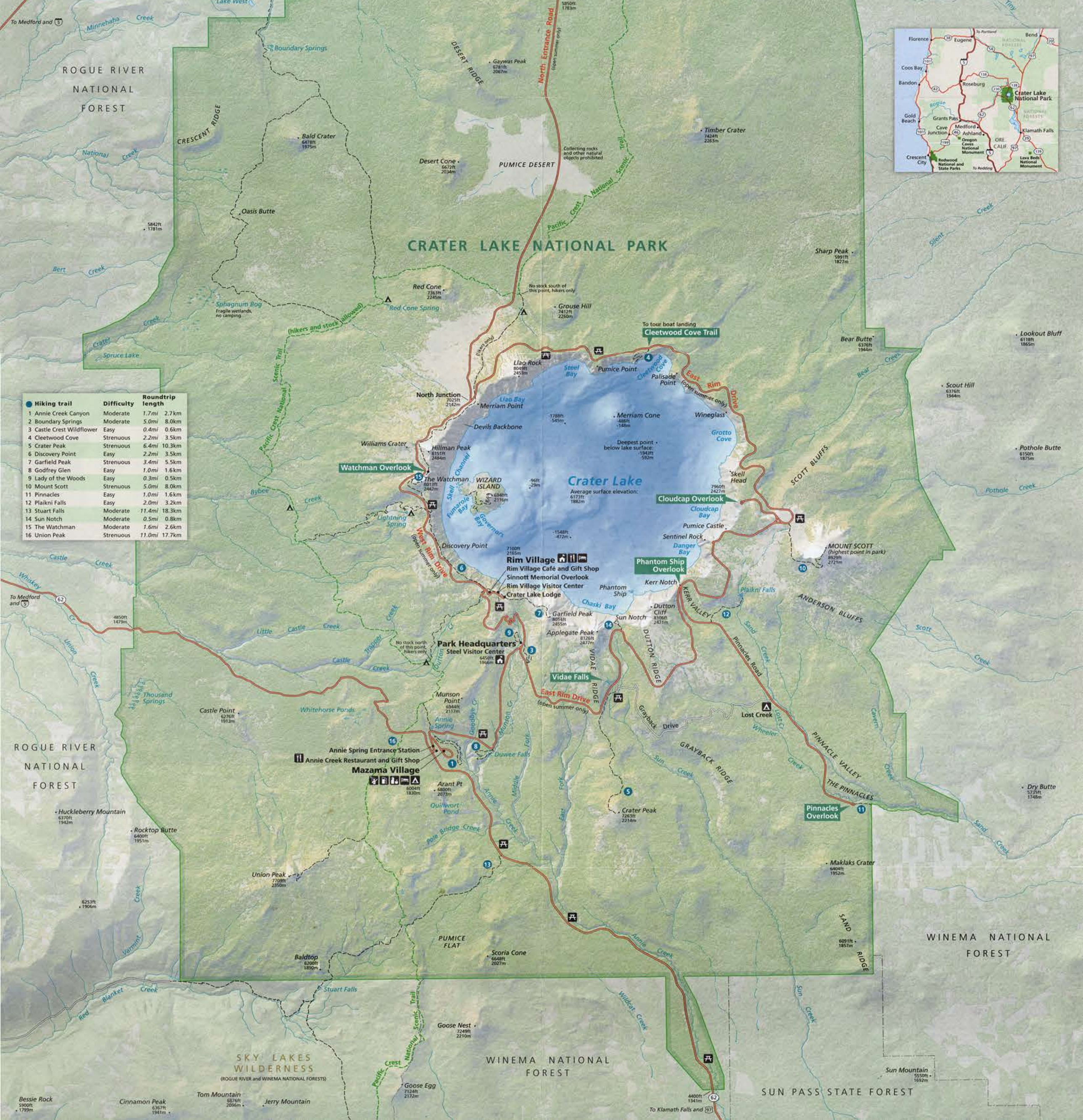


| Hiking trail | Difficulty | Roundtrip length | |
|---|---|---|---|
| 1 Annie Creek Canyon | Moderate | 1.7mi | 2.7km |
| 2 Boundary Springs | Moderate | 5.0mi | 8.0km |
| 3 Castle Crest Wildflower | Easy | 0.4mi | 0.6km |
| 4 Cleetwood Cove | Strenuous | 2.2mi | 3.5km |
| 5 Crater Peak | Strenuous | 6.4mi | 10.3km |
| 6 Discovery Point | Easy | 2.2mi | 3.5km |
| 7 Garfield Peak | Strenuous | 3.4mi | 5.5km |
| 8 Godfrey Glen | Easy | 1.0mi | 1.6km |
| 9 Lady of the Woods | Easy | 0.3mi | 0.5km |
| 10 Mount Scott | Strenuous | 5.0mi | 8.0km |
| 11 Pinnacles | Easy | 1.0mi | 1.6km |
| 12 Plaikni Falls | Easy | 2.0mi | 3.2km |
| 13 Stuart Falls | Moderate | 11.4mi | 18.3km |
| 14 Sun Notch | Moderate | 0.5mi | 0.8km |
| 15 The Watchman | Moderate | 1.6mi | 2.6km |
| 16 Union Peak | Strenuous | 11.0mi | 17.7km |