Cirque and tarn at Vulcan Peak.

Glacial Features

Vulcan Lake and Little Vulcan Lake are glacial features that formed during past ice ages. **Valley glaciers** are masses of ice that flow from higher elevation to lower elevation. As they move, glaciers erode the slopes of mountains and form semicircular hollows called **cirques**. The Vulcan lakes are **cirque lakes** or **tarns**, meaning they formed in a hollow carved by the movement of a valley glacier. A series of tarns can look like a giant's footprints, each print filled with lakes and connected by streams. These are also known as "paternoster" lakes because they look like rosary beads. Vulcan Lake and Little Vulcan Lake may be paternoster lakes. Because of the weathering pattern of peridotite, glacial features are not very well preserved in the Vulcan Peak area, but maybe you can still imagine a giant block of ice carving its way through the landscape.

The Carnivorous Darlingtonia Plant

You can see the Darlingtonia plant (also known as cobra lily) along the 1909 road to Vulcan Lake and maybe even on the trails. The Darlingtonia plant grows in serpentine because it flourishes in wet, nutrient-poor soils. It entices insects into the top of the plant and digests them in the stalk.

Darlingtonia plant

Geologic Features of the Vulcan Peak (1120) Vulcan Lake (1110A) and Gardner Mine (1122A) Trails

Siskiyou National Forest

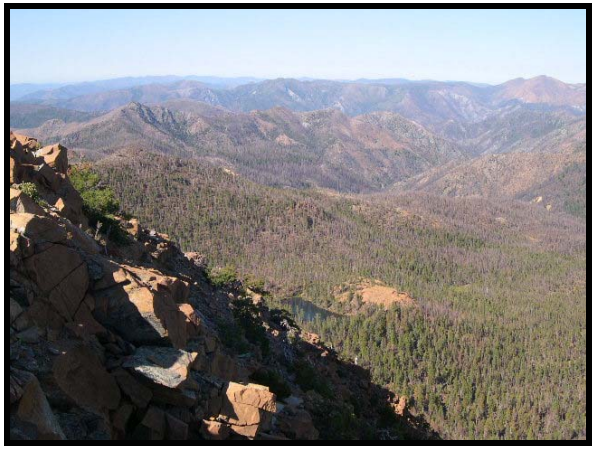
More information about these trails can be found at:

Chetco Ranger District
539 Chetco Ave
PO Box 4580
Brookings, OR 97415
(541) 412-6000
www.fs.fed.us/r6/siskiyou

Information about the 2002 Biscuit Fire:
www.biscuitfire.com

Created by Kathryn Flynn, August 2003.

Geologic Features of the Vulcan Peak, Vulcan Lake, and Gardner Mine Trails Siskiyou National Forest



View of Vulcan Lake from Vulcan Peak Trail.

Welcome to the Vulcan Peak Area! These trails have spectacular views of the Kalmiopsis Wilderness and offer opportunities to explore the interesting geology of the Siskiyou National Forest. The rocks of the area demonstrate evidence of plate tectonic processes and you can also check out the history of chromite mining in southwestern Oregon. These trails are also a good place to see the effects of the 2002 Biscuit Fire on soils and vegetation in the National Forest.

This publication was sponsored by the Geological Society of America and the USDA Forest Service.

Rock Types of the Vulcan Peak Area

As you hike along these trails you can see several rock types, including peridotite, chromite, serpentine, rodingite, and sandstone.

Peridotite: This is the dominant rock type in the area (Figure 1). Its weathered surface is brown to red and very rough (due to differential weathering of minerals). The fresh surface has coarse green crystals. Periodite can form very red soils due to the high iron content.

Serpentine: Some areas of the peridotite have been highly *serpentinized* or altered to soft green minerals. This rock is greenish gray and forms gentle slopes and gray soils. The word *serpentine* means snake in Latin because the fresh rock is green and shiny like a snake (Figure 3).

Chromite: Chromite here looks like the peridotite except it also has shiny dark metallic crystals. Look carefully to find some.

Rodingite: This is a white to greenish gray or pink rock that forms in veins intersecting the serpentine. Here it is well exposed at the Gardner mine (Figure 2).

Dothan Formation: These light gray sandstones are exposed at the beginning of the Vulcan Peak Trail. They weather to tan or yellow soils. You will cross the contact between the Dothan and peridotite as you walk up the trail—see if you can find it!

Figure 1. Peridotite boulders on Vulcan Peak Trail.

Mining Near Vulcan Lake

Figure 2. Rodingite and mine shaft at the Gardner Mine.

Chrome is used in steel alloys, stainless steel, chrome plating, and some paints. Chromite was mined in southwest Oregon during World War I, World War II, and the 1950s . Domestic chrome was stockpiled during this time for strategic purposes, but since then cheaper imported chrome has been used. Most of the chromite deposits in this area were discovered by tracing pieces of displaced rock to their sources. When there is no active mining, the mine shafts can collapse because serpentine is a weak rock.

The Gardner Mine Trail (1122A) leads to the site of the **Gardner chromite mine.** Here chromite occurs as stringers and lenses, in sheared serpentine. The ore is of a uniformly high grade but challenging to mine because of the deformed rock. By 1958, the Gardner claims produced about 200 tons of massive chromite plus some low-grade ore. At the mining site you can see the old mining shaft, rodingite dikes, and maybe some chromite ore floating on the slope.

Figure 3. Serpentinized rock on the Vulcan Lake Trail.

The Origin of Peridotite

The Vulcan Peak area is located in the *Snow Camp Terrane*. A **terrane** is a suite of rocks formed when tectonic forces push the crust together. Here in southwest Oregon there are 8 terranes that make up the Klamath Mountains. The Snow Camp Terrane is an **ophiolite**, a sequence of rocks that resembles a slice of the ocean floor.

The peridotite layer of the ophiolite is the deepest layer of oceanic rocks. It consists of rock from the earth's mantle, which is usually 5-8 kilometers below the ocean floor (Figure 4). The peridotite exposed in the Vulcan Peak area gives us an exciting chance to see what mantle rocks are like.

These rocks are ultramafic, meaning they have high iron and magnesium content. This gives them their dark color. When these dark minerals are altered by pressure and temperature, they can become *serpentine minerals,* which are shiny and green (Figure 3). There is lots of serpentine in this area because the rocks have been folded and fractured, as you can see by hiking in the area.

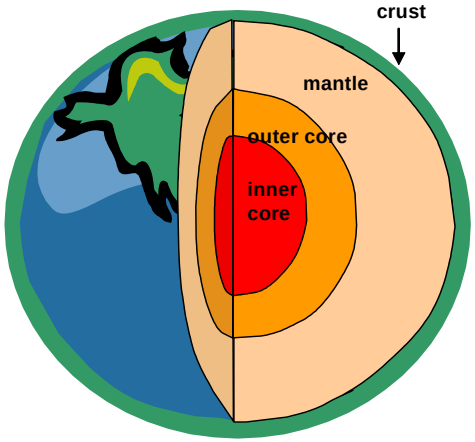


Figure 4. Cross section of the earth with crust, mantle, outer core, and inner core.