Florissant Fossil Beds

Road Guide to Florissant's Volcanic Past

National Park Service
U.S. Department of the Interior

Florissant Fossil Beds
National Monument
Colorado

Eroded remnants of the ancient Guffey volcano are visible from a scenic overlook 13-14 miles (21-22 km) from Florissant Fossil Beds National Monument (map on back). The illustration above imagines how this volcanic center looked relative to the modern landscape. This volcanic center and its eruptions of ash and lahars had an enormous impact on the Florissant valley 34-36 million years ago and helped to preserve trees, leaves, and delicate insects as fossils.

Deep History of the Rocky Mountain Region

The modern Rocky Mountains formed between 70 and 40 million years ago, beginning at the end of the Cretaceous Period and continuing into the Eocene Epoch. This mountain uplift, known as the Laramide Orogeny, is thought to have originated as the angle of plate tectonic subduction of the ancient Farallon Plate along the Pacific Coast became shallower, more horizontal in orientation, and extended eastward into the continental interior. Volcanoes formed in association with this plate tectonic subduction. Following this period of uplift, the surface was beveled by erosion into an undulating landscape dissected by streams such as the one that formed the ancient Florissant valley.

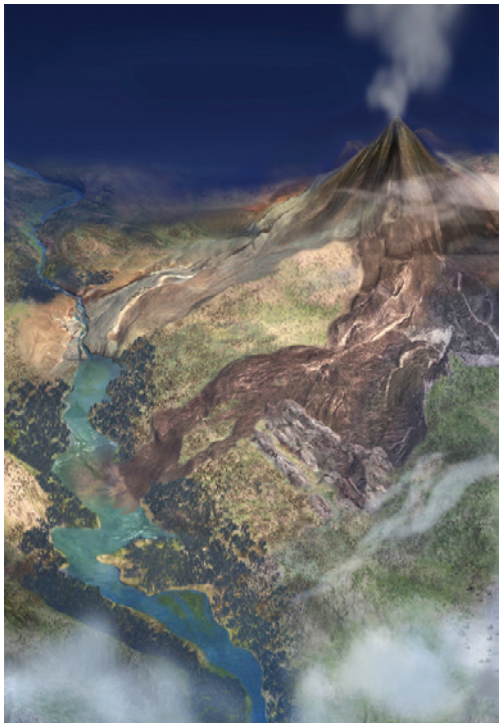
Colorado Volcanoes

Beginning 37 million years ago, eruptions from large collapsing calderas caused hot ash flows to race across the eroded landscape like volcanic hurricanes. Volcanic activity intensified as the subducting tectonic plate began to steepen again and move westward. About 34—36 million years ago, a stratovolcano similar to the Cascade Range mountains formed near Florissant. Eruptions from this stratovolcano produced ash, lahars (volcanic mudflows), and rocks including pumice, andesite, and breccias. One of these lahars, and the eroded remnant of the stratovolcano itself, can be observed along the route shown on the map (on back). Volcanic activity continued in southwestern Colorado until 23 million years ago. It was one of the most significant volcanic periods in Earth's history. In more recent geologic times, volcanic activity continued in Colorado with more subdued eruptions of basalt flows.

Eruptions from the stratovolcano form the Thirtynine Mile volcanic area of the central Colorado volcanic field. Within this area is the Guffey volcanic center, which is the core of the Guffey volcano. At its base, the volcano was about 12 miles (20 km) in diameter and may have had more than one summit. Today, most of the Guffey volcano has eroded away.

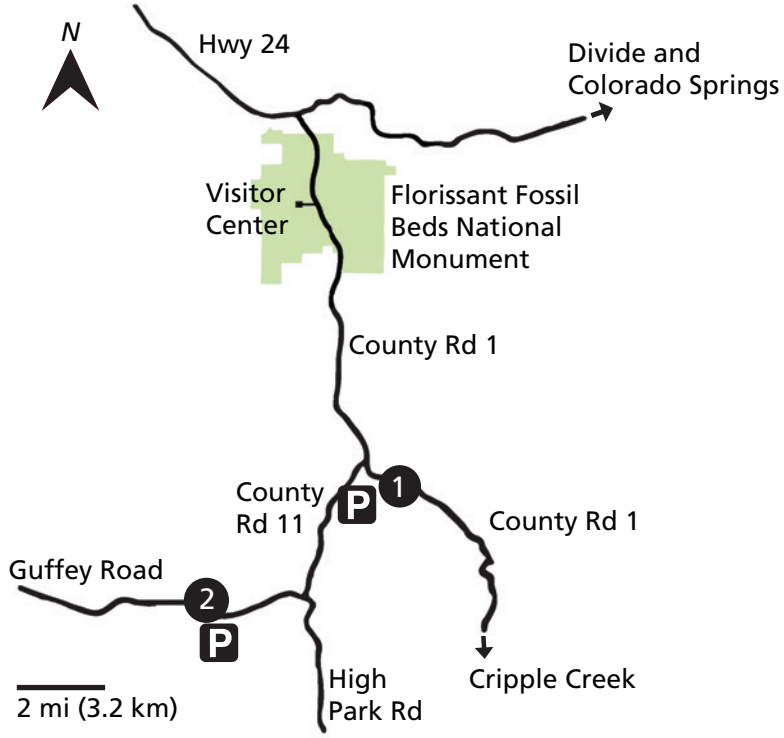
How did the Guffey volcano change Florissant?

The Guffey volcano erupted multiple times, sending ash and lahars down into the Florissant valley. One lahar flowed eastward from the slopes of the Guffey volcanic center and dammed the stream in the ancient Florissant valley, forming Lake Florissant. This lahar can be seen at stop 1 (see back). Another lahar later flooded the valley with volcanic debris that enveloped and preserved the redwood stumps. Later still, another lahar flowed into Lake Florissant and churned up sediment that is visible today as the caprock conglomerate.



An artistic reconstruction of the Guffey volcano 34 million years ago depicts fresh volcanic debris spilling into Lake Florissant. In the background, the valley stream erodes through a dam of older volcanic material.

Ash from the volcano fell into Lake Florissant. Ash, clay, and single-celled algae called diatoms formed paper-thin layers of lake shale, which preserve many fossil plants and insects. The youngest rock unit in the Florissant Formation contains pumice, which is evidence of a large eruption that ended the existence of the lake.



Artistic reconstruction of a lahar as it dammed the stream. Note the mixed size of debris throughout the volcanic mudflow.

The rock breccia that formed from a lahar is exposed at stop 1.

1 Stop One — Lahar that Dammed Lake Florissant

Turn right on Teller County Rd 1 out of the Florissant Fossil Beds visitor center parking lot. Drive 6.7 miles (10.8 km) and *turn right onto County Rd 11*. Turn immediately left into a parking lot past the intersection. Walk about 300 yards (about 100 m) diagonally south across a field to county Road 1 and continue to the roadcut. Be aware that there are no parking or turnaround areas if you try to drive to the roadcut. This is a dangerous area for pedestrians. *Use extreme caution!*

On both sides of the roadcut you can see the lahar that originated from the Guffey volcanic center to the west. This lahar dammed the stream that flowed through the ancient Florissant valley, thus forming Lake Florissant. The lake was about 1 mile (1—2 km) wide and extended 12 miles (19 km) northwards. The debris carried by the flow contained rock fragments of different compositions, shapes, and sizes (sand grains to boulders), which is typical for lahars. The dark fragments are pieces of Thirtynine Mile andesite (a dark, fine-grained volcanic rock). The lighter, pinkish fragments are pieces of 1.4-billion-year-old Cripple Creek Granite. Notice that some rocks are rounded, indicating that they were picked up from the streambed by the lahar. In the roadcut on the east side, you can see a light-colored clastic dike of sediment that squeezed up from the streambed as the lahar settled.

2 Stop Two — Guffey Volcanic Center Viewpoint

Turn left out of the parking lot from stop 1 (going southwest) onto County Rd 11. Proceed 4.0 miles (6.3 km) and *go right at the fork, onto Guffey Road (County Rd 112)*. Continue for 2.7 miles (4.4 km) to parking areas on the right and left sides of the road near mile marker 14. This is a BLM fee area. Proceed across the road from the parking lot on the left. Walk 200 feet (60 m) north, past the sign, and continue another 100 feet (30 m) veering slightly to the right, off the trail (do not go down!). This will lead you to a rocky overlook (photo on front).

You are standing on 1.4-billion-year-old Cripple Creek Granite. Looking west across the valley, you can view the remnants of the ancient Guffey volcanic center in the Thirtynine Mile volcanic area. From left to right (south to north), some of the peaks that remain are Witcher, McIntyre, Castle, Saddle, and Thirtynine Mile Mountains (see labeled picture at top of front page). These modern mountains formed the slopes surrounding the ancient volcanic center. The layered volcanic flows in each peak dip in different directions around the volcano's summit.

The lahars that flowed from the Guffey volcanic center once filled this valley to a level far above the point on which you are standing. The valley of modern West Four Mile Creek below you formed as erosion cut through the lahars and exhumed the surface of the ancient valley. As it did so, the creek became entrenched, or trapped, in its path and was not able to change direction when it encountered the much harder Cripple Creek Granite beneath it. This is how the canyon below (north) was formed.

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