

# Florissant Fossil Beds Geologic Trail

National Park Service  
U.S. Department of the Interior

Florissant Fossil Beds  
National Monument



Florissant Valley is an ever changing landscape, shaped by the power of erosion, uplift and eruptions over millions of years. Since the Proterozoic eon, Florissant had several episodes magmatic activity with the emplacement of Pikes Peak pluton nearly one billion years ago, to the eruption around the Thirtymile Volcanic field that ended Lake Florissant. Even today, water from Grape Creek continues to cut through the rock strata beneath. Rain and snow are constantly eroding the landscape. The Geologic Trail helps you see the tectonic history and erosive forces that have shaped Florissant valley.

## 1 Stop One – Eocene Lake Florissant

The trailhead of the Geologic Trail begins at the junction with the Petrified Forest Loop Trail going 1,000ft (300m) northeast of the visitor center. Follow the map on the back to see each stop. As

you walk to the junction, you will cross the 34 million year old Florissant Formation along the bottom of what was once Lake Florissant. Scale is 2in (5cm).



Snowmass, Colorado, 100 miles west of here. The Snowmastodon site provided over 5,000 fossils from mammoths and mastodons including a variety of smaller animals. The Snowmass site remains the highest altitude in the world, 8900ft (2700m), at which Pleistocene megafauna lived.



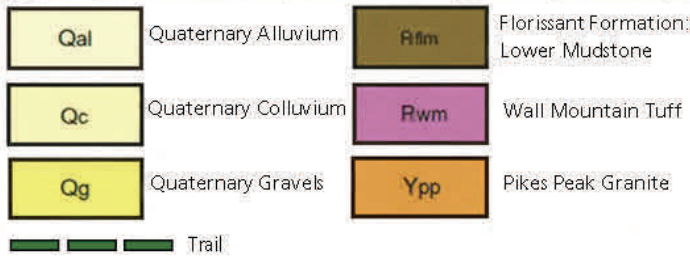
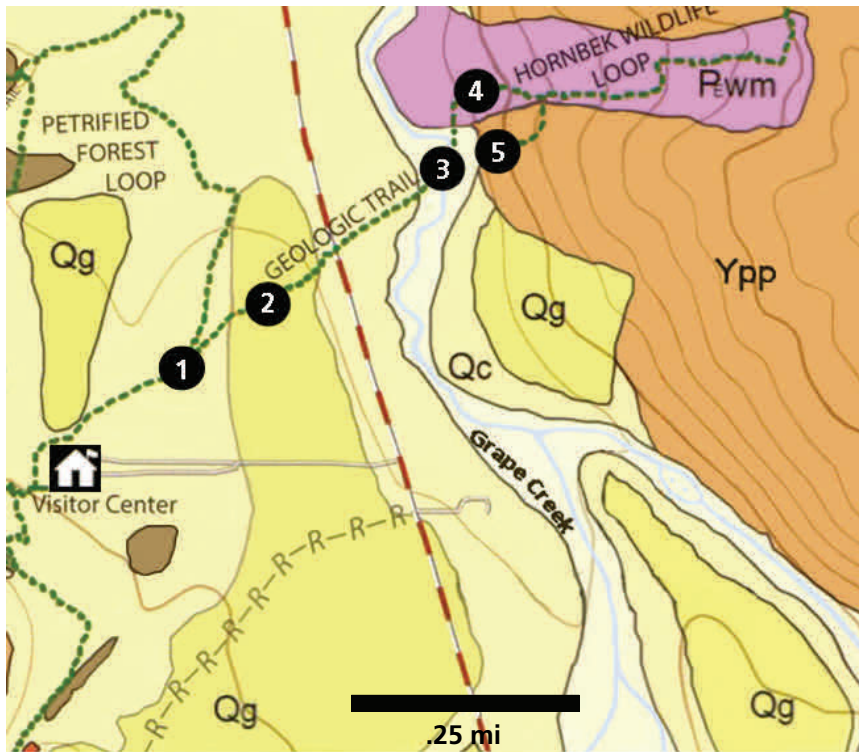
## 2 Stop Two – Ice Age Gravels

As the Geologic Trail ascends onto the low ridge, you will notice that the ground is made up of gravel. The gravel originates from decomposed granite that has been eroded by water from the slopes of surrounding hills into the Florissant valley. This overburden covers much of the Florissant Formation in the monument, but is only a few feet deep. A mammoth tooth (pictured right) and bones were discovered nearby in this layer and have been radiocarbon dated to more than 43,000 years ago (Late Pleistocene). At the time of the discovery in 1994, it was one of the highest elevations (8400ft or 2550m) at which an ice age mammoth had been found. A much larger fossil site was discovered in 2010 at

## 3 Stop Three – Grape Creek and Pikes Peak Granite

As you cross the bridge, you will see that Grape Creek is the force that actively erodes and redeposits sediment, or alluvium, along the stream channel. While most of the sediment is relatively young, it underscores that geologic processes never cease and rock is constantly being reworked.

From the bridge, you will see large boulders made of Pikes Peak Granite. This rock unit formed over 1.08 billion years ago deep beneath the surface, cooling over millions of years before being uplifted. In geology, igneous rocks that form underground with long cooling periods are plutonic. The Pike's Peak Granite forms a structure called a batholith, which is a large intrusive igneous body that forms underground over time as the magma cools. It is about 25 miles (40km) wide and 80 miles (130km) long, extending from Castle Rock to just south past Colorado Springs.



#### 4 Stop Four – Tuff Outcrop

After crossing the bridge, you will begin to ascend the trail through a section of Wall Mountain Tuff. The Wall Mountain Tuff formed 37 million years ago as an ash flow that erupted from a caldera located near modern Mount Princeton, about 50 miles (80km) west of Florissant. This superheated ash cloud settled to the ground, welded together and cooled to form a rock called rhyolitic welded tuff. This is an example of a volcanic rock, which is any finely grained or glassy igneous rock that forms from the rapid cooling of surface eruptions or extruded lava.

Wall Mountain Tuff has a few small crystals visible to the naked eye, but it is mostly fine-grained beige material (groundmass). The visible crystals, or phenocrysts, formed in the magma long before the eruption. Meanwhile the microscopic crystals in the groundmass can only be seen under a microscope. The ash flow’s rapid cooling and explosiveness prevented large crystals from forming; geologists call this a pyroclastic texture.



#### Rhyolitic Tuff vs Granite: Is there a difference?

Rhyolitic welded tuff and granite may seem like two different rocks, but they are actually more similar than they appear. Rhyolitic tuff and granite share a similar chemistry, containing about the same parts of the minerals quartz, feldspar and amphibole. However, their crystal size and texture is what determines each type of rock. Granite (right) took thousands to millions of years to form phenocrysts whereas most of rhyolitic welded tuff (left) cooled instantaneously, thereby forming microscopic crystals. The photos to the left show the different sizes of crystals seen on each rock. Notice the size difference in the quartz (Qz) crystals on each rock. Scale is 1cm (.4 in).

#### 5 Stop Five – Geologic Trail Overlook

Being the oldest rock in the monument, the Pikes Peak Granite is the foundation, or basement rock, of all overlying strata in the Florissant region. As you reach the overlook at the end of the trail, you will notice that you cross a contact between the Wall Mountain Tuff and Pikes Peak Granite. When the Wall Mountain Tuff was formed, it solidified over the Pikes Peak Granite.

In the distance you will see the modern Florissant valley and many surrounding ridges and peaks. In the late Eocene, lake Florissant would have dominated the foreground with the Guffey volcanic center on the horizon. Today, those features have been eroded or buried and replaced by new features, like Mt. Pisgah.