National Park Service
U.S. Department of the Interior

El Malpais National Monument
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Notes:

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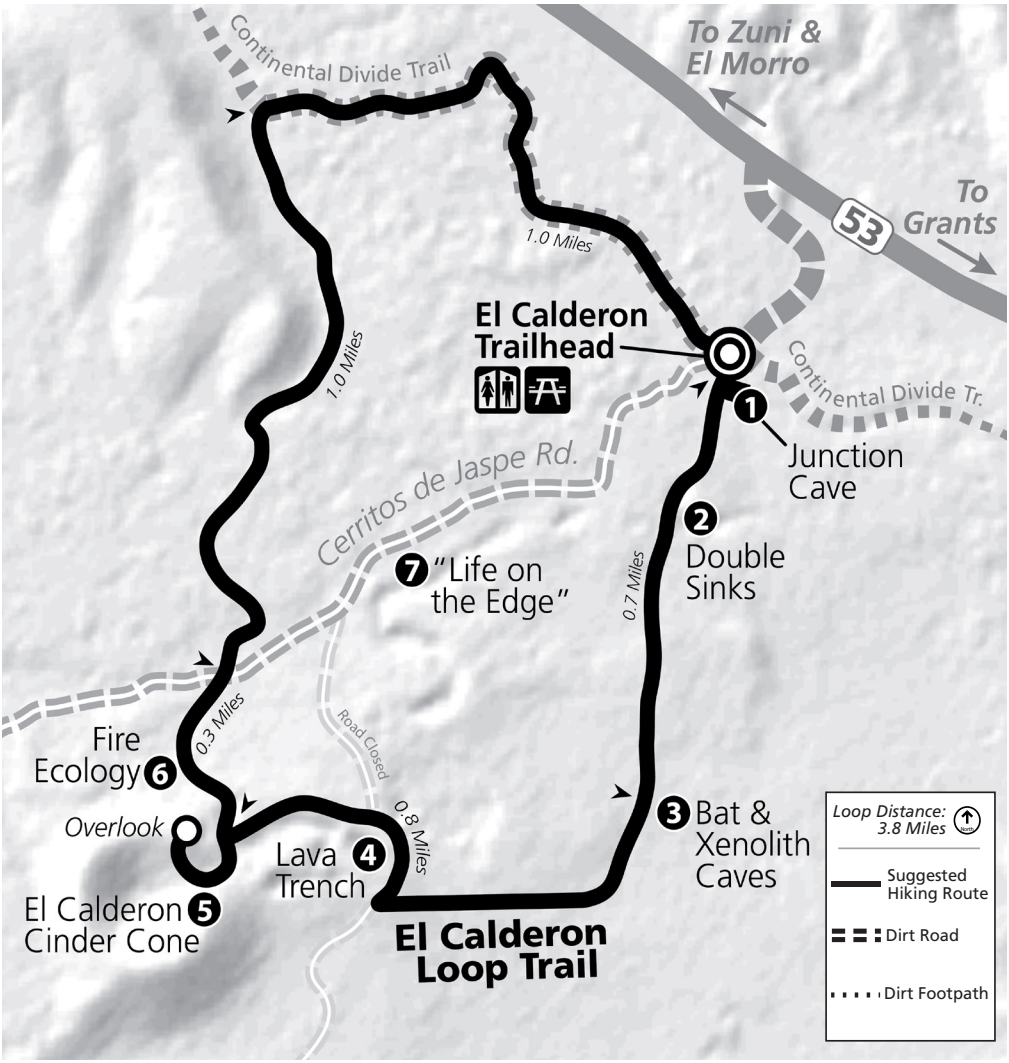
El Malpais National Monument
www.nps.gov/elma

El Calderon Area
Trail Guide

El Calderon Area

Hiking and backcountry exploring can be found in the El Calderon Area. The El Calderon Area is located 20 miles south of Grants on NM 53 and is generally accessible year round. To protect the fragile resources of the El Malpais National Monument please stay on the trail.

For more information, call the NW New Mexico Visitor Center at 505-876-2783. The Visitor Center is open from 8:00 A.M. to 5:00 P.M. daily with the exception of Thanksgiving, Christmas and New Year's Day.



Exploring El Calderon

From the winding trenches that were once glowing rivers of lava, to the sloping hills of a long quiet volcano, you can imagine the forces that created this area. Where else, but at a volcano, can you see what created the rocks beneath your feet? This is where geology comes to life.

The El Calderon Area offers diverse exploring opportunities. A gravel and dirt surface route winds past volcanic features on an easy to moderate 3.8 mile hiking loop. The primitive road leading west from the parking lot is accessible to high-clearance, four-wheel drive vehicles. Backcountry camping is also allowed off this primitive road.

Be adequately prepared for whatever adventure you choose so that your memories of El Calderon are good ones.

- Tell someone where you are going
- Carry plenty of water
- Wear sturdy hiking shoes
- Be aware of changing weather conditions
- Comply with cave closures

Geology in Motion

The processes of geology are usually so slow that they cannot be measured in a human lifetime. Occasionally, we can see the effects of erosion or other processes after a good rain, or high spring winds, but this is usually the exception. However, there are some events that happen so quickly, their effects can be seen immediately. Volcanic eruptions are one of these events.

In 1943 near Paricutin, Mexico, a farmer noticed a crack in one of his fields sending out gas and ash. Less than ten years later a cinder cone 1,200 feet high towered over the field.

El Calderon Cinder Cone would have had a similar beginning when it was formed about 115,000 years ago. A vent shot cinders hundreds of feet into the air creating the cone you see today. Rivers of molten rock created lava trenches and lava tubes. Since then, the changes have been less dramatic. A combination of vegetation and erosion slowly break down lava into smaller particles. Eventually, the area is transformed from a blackened landscape to the forested land you see today.

As you explore the El Calderon Area, try to imagine not only what the area may have looked like 115,000 years ago, but also what it may look like 115,000 years in the future.

Signs of Life

The seasons bring an ever changing array of life to the El Calderon Area. In the spring, look for piñon jays and the occasional snake or lizard basking in the sun. Summer brings warmer temperatures along with several species of bats that can be seen flying from Bat Cave. As summer progresses, wildflowers blanket the ground. Fall is a good time to spot deer, elk and other animals foraging for food. During winter, prints from coyotes, bobcats, rabbits and other animals are easy to spot on freshly fallen snow.

Remember to never feed or pet wild animals. It is not only dangerous for you, but also for the animals. Let wildlife be wild.

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Researcher taking soil samples in a lava tube © 2011 Kenneth Ingham

① Junction Cave

Junction Cave is a lava tube created by the lava flows from nearby El Calderon Cinder Cone. At 115,000 years old, this is one of the oldest lava tubes in the monument.

A Living Laboratory. In a 1995 study of caves in El Malpais, Junction Cave had more cave-adapted species than any other cave surveyed at that time. Most of the life in this cave is small to microscopic and lives in dark corners, under rocks and in deep cracks.

Scientists divide the life found in caves into four categories: accidentals, trogloxenes, troglophiles and troglobites. Accidentals can be anything from moths to animals that find their way into a cave. The other types of cave life generally show some type of adaptation that allows them to use or live in the cave.

Trogloxenes typically live above ground and do not depend on the cave for survival. Bats and mice are good examples of trogloxenes. Troglophiles may live their entire lives in the cave, but are not fully adapted to the cave environment. Some spiders and beetles are examples of troglophiles. Troglobites live their entire life in the cave and are completely dependent on the cave for survival. Special kinds of tiny, all-white mites and insects are two types of troglobiotic species found in Junction Cave.

Bats in Peril. A disease called White-nose-syndrome (WNS) is spreading across the United States. Although this disease does not bother humans, it has killed of more than 6 million hibernating bats so far, and threatens to wipe out entire bat species.

The impact on North American agriculture may be profound - these millions of bats ate crop pests. Farmers may now have to use more pesticides to kill insects and grow their crops.

WNS is named for a white fungus, *Geomyces destructans*, found on bat muzzles and wings. The fungus prefers cold, humid temperatures found in caves and mines. It strikes bats when they are most vulnerable—during hibernation. It appears that the fungus creates an irritation that invades the bat's skin, causing bats to wake up and use energy reserves needed to hibernate. They then starve or freeze to death.

② Double Sinks

Just a few minutes up the gravel trail are two deep pits called Double Sinks. These steep sided collapses are about 80 feet deep and are formed where the roofs of lava tubes collapsed. They are home to owls, squirrels, and ferns. In fact, delicate ferns can be found in hidden, shady places throughout the lava flows where pockets of moisture are sheltered from drying summer heat and winds.

③ Bat Cave & Xenolith Cave

Like Junction Cave, these are lava tube caves. Bat Cave's entrance is easily seen from the trail, but Xenolith runs the opposite way, underneath the trail and into the hillside to the west.

Xenolith means "foreign rock," and refers to small chunks of white non-volcanic rocks found in the walls of the cave's lower passages. These rocks got mixed into the lava as it flowed over, or errupted through, limestone or sandstone somehwere else in the monument.

During the summer months, thousands of bats fly from the entrance of Bat Cave at dusk to forage for insects. These Mexican free-tailed bats use this cave as a summer home and migrate south for the winter. Other bats, like little brown bats and Townsend's big eared bats, live here year round and hibernate in this cave. **Bat Cave is closed year-round.**

Smoke Signals. A cloud of smoke circling toward the sky is what the nightly flight of Mexican free-tailed bats looks like. The flight can last for an hour or more without showing signs of slowing. However, in recent years, the circling cloud of smoke has been replaced by a winding tendril that lasts fifteen minutes or less. Research is underway to understand more about the monument's bat species. Please do your part in helping to protect the bats of El Malpais National Monument. Do not go into Bat Cave or disturb bats in any way.

Human use. Lava tubes have been used for temporary shelters, natural refrigerators, shrines, and even as a source for fertilizer. Bat guano is an excellent fertilizer because it is high in nitrates. Remnants of a simple mining operation are still in Bat Cave. Guano mining, even on this small scale, could not have been pleasant. Guano has a very distinct and unpleasant smell that you can occasionally get a whiff of from the trail near the cave entrance.

Beyond Bat Cave

As you continue along the trail, enjoy the view to the southeast. In the distance are the sandstone cliffs that border the east side of the monument. The hills in the foreground are the Cerritos de Jaspe.

Signs of life are everywhere if you look and listen closely. The staccato thumping of a woodpecker; the pine cone seeded and thrown out by a squirrel; the paw print left behind in mud by a bobcat. This is all evidence that life abounds in the "badland."

Wildlife

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What types of animals should you look for as you explore El Calderon? There are many. Although most wildlife is active in the early morning or evening, you may encounter several species of wildlife. Deer, elk, mountain lions, bobcats, coyote, bears, turkeys, snakes, and lizards all call this area home.

Tracks & Scat. Though you may not see much wildlife on an afternoon hike besides the occasional squirrel or lizard, you will probably see evidence that animals do live here. Many leave behind tracks, and other things as well - scat found along the trail leaves a clear sign of not only who was here, but also what they last ate!

Birds of a feather. If you tire of looking at the ground for wildlife, look to the trees and sky. Say's phoebes and western kingbirds dart overhead while flickers and nuthatches search for food. In the spring, listen for large flocks of piñon jays noisily going about their business. In the winter, look for the flittering of juncos and sparrows.

Hawks and eagles, though not seen as frequently, soar high in the sky, circling on unseen air currents.

flicker, *Colaptes auratus*

④ Lava Trench

Along the dirt road and the footpath to the cinder cone, look for the deep winding trench that begins at the mouth of the volcano. This trench was created by a river of lava that swept cinder and lava several miles to the southeast. A trench is formed in the same way as a lava tube, but the roof collapses shortly after the tube cools. Because more water collects in the bottom of the trench, trees are able to grow larger than their counterparts on the top.

⑤ El Calderon Cinder Cone

The loose, pea-sized rocks are called cinders. They are bits of lava that hardened as they were shot hundreds of feet into the air from a vent in the ground. As the cinders fell to the ground, they formed a cone shaped structure around the lava vent. There were at least two main eruptions from this volcano. One created the black cinders; the other created the red cinders. The red cinders contain higher amounts of iron and oxidized as they were exposed to the air.

How can anything grow in the loose, airy cinders around El Calderon? The cinders, as loose as they are, provide a good place for seeds to take root. The cinders may also retain water deep below the surface, providing ample moisture for trees, plants and wild flowers. There are, in fact, several plants in the monument that grow only on cinders. Bracken ferns, cinders phacelia and limber pine do not grow elswhere in El Malpais except on cinders. On El Calderon Cinder Cone, look for ponderosa pines, Rocky Mountain juniper and chamisa. In the late summer, primrose, Indian paintbrush and sunflowers are common.

Bombs away. Cinders were not the only thing El Calderon sent flying into the air. Lava bombs, some up to three feet in diameter were also hurled into the air. These rounded pieces of lava were formed when a piece of lava was ejected from the volcano, and solidified before it hit the ground. If one of these bombs hit a tree, it could wrap around the trunk and create a horseshoe shape. If the bomb spiraled through the air, it would be elongated, like a football. Look for these lava bombs around the base of El Calderon.

A point in time. The eruption of El Calderon is just one dot on a time line of events that continue to shape the earth. By the time El Calderon was formed, the area around El Malpais had already seen millions of years of volcanic activity. After El Calderon's eruption, there continued to be volcanic activity about every eight to ten thousand years up until around three thousand years ago. Because cinder cones do not erupt again once the vent is plugged with hardened lava, El Calderon itself is no longer an active volcano. However, it is possible that there will again be volcanic activity in the El Malpais area. Will it happen in our lifetime? Only time will tell, but history reveals that it will be several thousand years before this area sees volcanic activity.

Reminders of the past. Cinders, like guano from Bat Cave, were also mined from the El Calderon Area. Notice a hole in the side of the cinder cone. This hole, along with items such as glass bottles, tin cans and tools that occasionally turn up in the loose cinders are evidence of a cinder mining operation. It is not known how long the mine was active, but the cinders were probably used to build roads.

6 Fire Ecology

Wildfire is a naturally occuring and necessary process. Through tree-ring research, scientists know that low intensity fires occur in this area every eight to ten years. These low intensity fires clear dry brush and prevent large, hot fires from burning everything.

When European settlers came to this area, they began to put out all fires to protect grazing land and homes. Fires continued to be suppressed throughout the 20th century by land management agencies in keeping with standard land management practices.

Because fires have not been allowed to burn on a natural cycle, forest lands have accumulated a high concentration of dry vegetation and other fuels. This means that fires today are generally hotter and larger, burning healthy trees that withstand smaller fires.

Restoring balance. Park managers are trying to restore the natural fire cycle to El Malpais National Monument. The blackened areas you see along the trail are from prescribed fires. These fires are ignited under specific conditions to clear excess fuel and allow healthy trees to thrive.

Soon after a prescribed fire, grasses and wildflowers abound. The burned trees return nutrients to the soil and a healthy forest emerges from the ashes. One tree that thrives from the effects of fire is the quaking aspen. Known as a pioneer tree, it is the first tree to start life anew in a burned area.

What is tall, fire resistant and smells like vanilla? The ponderosa pine can grow to heights of 150 feet or more. Their thick bark protects them from fires, and if you put your nose up to one and breathe deeply, you may detect the heady scent of vanilla.

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ponderosa pine, *Pinus ponderosa*

7 Life on the Edge

Lava, though it may seem harsh and inhospitable, can create some unusual habitats. One of these habitats is actually found just along the edges of lava flows. Known as the "edge effect," it is an area of dense vegetation. Scientists surmise that runoff from the lava and from the surrounding land collects along the edge and allows more vegetation to grow.

As you follow the dirt road, look for the edge effect. Aspens, not normally found at this elevation, grow along the lava edge and can be seen as you return to the parking area.

A Continuing Process. *The volcanic forces that shaped this area 115,000 years ago are the same forces that continue to shape the earth to this day. From Kilauea in Hawaii to Eyjafjallajökull in Iceland, the Earth is alive with activity. The El Calderon Area provides an opportunity to see the evidence of these forces and experience one point in time of a continual process of change.*