



GEOLOGY TOUR: The Volcanic Legacy Scenic Byway

A 500 mile volcano to volcano driving guide highlighting the geology that shaped the land from Lassen Volcanic National Park in Northern California and ending at Crater Lake National Park in Southern Oregon. See www.volcaniclegacybyway.org/volcan.html for a map of the geology guide and corresponding points of interest by number.

1	Lassen Volcanic National Park & Kohm Yah-mah-nee Visitor Center Mineral, CA Latitude 40.378982 Longitude -121.531448 Exhibits and displays will enhance your understanding of the volcanic wonders and historic events that occurred here. All four types of volcanoes that exist in the world can be found in the park. Composite or strato-volcanoes, shield volcanoes, plug domes, and cinder cones. Thumping mud pots, boiling pools, steaming ground, and roaring fumaroles illustrate the geologic dance of fire and ice. These hydro-thermal features can be found at Bumpass Hell, Sulphur Works, Devil's Kitchen, Little Pilot Pinnacle, and Terminal Geyser. While the park and visitor center are open all year, heavy snow closes the main road through the park. Lassen Volcanic National Park (530) 595-4480 www.nps.gov/lavo/
2	Crater Lake and Campground Susanville, CA Latitude 40.626834 Longitude -121.042741 The lake at Crater Mountain lies at the top of a shield volcano. Because the summit area has been glaciated, some believe the lake is also glacial in nature. Although there have been speculations of their similarities, the much larger Crater Lake (in Oregon) is a caldera that was formed by the collapse of a composite volcano. No evidence of collapse has yet been found at this site's summit. This scenic campground has a single loop near the deep blue lake. Larger travel trailers and RVs are not recommended. Eagle Lake Ranger District (530) 257-4188 www.fs.usda.gov/lassen
3	Hat Creek Rim Overlook Old Station, CA Latitude 40.7019583 Longitude -121.4003 The Hat Creek Rim is a fault where the earth's crust has been shifted vertically along fissures, crevices, and fractures caused by powerful subterranean forces. Still "alive and cracking" today, the rim is over 900 feet above the Hat Creek Valley floor. However, one million years ago the rim and the valley were at the same elevation. Outfitted with viewing scopes, this overlook affords views of geologic pillars such as West Prospect Peak, Lassen Peak, Crater Peak, Magee Peak, Burney Mountain, and Mt. Shasta as well as offers an access point to the Pacific Crest National Scenic Trail. Hat Creek Ranger District (530) 336-5521 www.fs.usda.gov/lassen

<p>4</p>	<p>Spattercone Trail Old Station, CA Latitude 40.66903 Longitude -121.44300 This trail travels to the vent area of the Hat Creek Flow and highlights many spatter cones and other geologic features on its 1.5 mile loop tour. Spatter cones were formed along linear fractures during eruptions with hot magma. Hot gases, escaping through the lava, create peculiar and anomalous shapes that land around the vent of the volcano as it solidifies. At the trail's entrance, you will find picnic tables, toilets, drinking water, and plenty of parking. The trail is mainly exposed so bring drinking water. This trail can be accessed approximately 1.5 miles south of the Highway 89/44 junction in Old Station. Hat Creek Ranger District (530) 336-5521 www.fs.usda.gov/lassen</p>
<p>5</p>	<p>Panoramic Point Vista Old Station, CA Latitude 40.62537 Longitude -121.47914 A short, paved photo trail offers dramatic views of Lassen Peak and Chaos Crags. A relatively small volcanic eruption occurred at Lassen Peak between 1914 and 1917. About 1,100 years ago, the most recent large eruption created Chaos Crags. Such large eruptions in the Lassen area have an average recurrence interval of about 10,000 years. The nearby Deer Hollow Trail takes you through a tree plantation, and describes how people and the forces of nature brought back timber, where a fire once ravaged the land. Hat Creek Ranger District (530) 336-5521 www.fs.usda.gov/lassen</p>
<p>6</p>	<p>Manzanita Lake at Lassen Volcanic National Park Shingletown, CA Latitude 40.5441666 Longitude -121.5775 Just before the north entrance of the park, you will find the non-staffed Lassen Crossroads Information Center with geologic, historic, and cultural information about Lassen National Forest and the park. About 0.5 mile past the park entrance, stop by the Loomis Museum and see how B.F. Loomis documented Lassen Peak's most recent eruptions as well as pick up general park information. Lassen Peak itself is a large plug dome that stands at 10,457 ft. and is 27,000 years old. It is named after one of the early Euro-American settlers in the region, Danish immigrant Peter Lassen, who obtained a land grant from the Mexican government in 1844. A large campsite is also located inside the entrance of the park, next to Manzanita Lake. While the park is open all year, heavy snow closes the main road through the park. Lassen Volcanic National Park (530) 595-4480 www.nps.gov/lavo/</p>
<p>7</p>	<p>Subway Cave Old Station, CA Latitude 40.7091414 Longitude -121.417980200 Hike one-third mile into the largest accessible tube of the Hat Creek Lava Flow, a flow that was discharged in a series of north-south fissures about 24,000 years ago. This river of lava, located near the town of Old Station, crawled northward 16 miles, covering the floor of Hat Creek Valley. While the top crust cooled and hardened, rivers of red-hot lava insulated by newly formed rock above, continued to flow underneath. Eventually, the lava drained away, leaving hundreds of tube-like caves. The entrance to this cave was formed by a partial collapse of the cave's roof many years ago. Don't forget to bring your flashlight. Restrooms, water, and picnic tables are available. Hat Creek Ranger District (530) 336-5521 www.fs.usda.gov/lassen</p>

<p>8</p>	<p>McArthur-Burney Falls Memorial State Park Burney, CA Latitude 41.013796 Longitude -121.649362 The lava flow that created the landscape surrounding this waterfall covers an extensive area in the lower Hat Creek Valley. It erupted from a vent up valley near the foot of Burney Mountain about 200,000 years ago. While the basalt of Rocky Ledge forms the lip of the falls, surface and ground water from Burney Creek and Hat Creek feed this waterfall that drains into Lake Britton. At 129 feet, Burney Falls is the centerpiece of this park and cascades at a rate of 100 million gallons of water daily. The park along with the Lake Britton Recreation Area, offer camping, hiking, swimming, boating and fishing. McArthur-Burney Falls Memorial State Park (530) 335-2777 www.parks.ca.gov/?page_id=455</p>
<p>9</p>	<p>Ahjumawi Lava Springs State Park McArthur, CA Latitude 41.13170 Longitude -121.45035 Over two thirds of this park is covered by lava flows, including vast areas of jagged black basalt, mostly from Brushy Butte. Although young, the age of this basalt is unknown. In this place of remote and pristine beauty, you can catch sight of sparkling aqua bays, vistas of Lassen Peak and Mt. Shasta, as well as birds such as bald eagles, ospreys, and great blue herons. Herds of mule deer also forage through much of the park. "Ahjumawi" means "where the waters come together...." Big Lake, Tule River, Ja-She Creek, Lava Creek, and Fall River all unite here and form one of the largest systems of fresh water springs in the country. This park can only be accessed by boat. Ahjumawi Lava Springs State Park (530) 335-2777 www.parks.ca.gov/?page_id=464</p>
<p>10</p>	<p>Bartle: Geologic Loop Tour Bartle, CA Latitude 41.252129 Longitude -121.824131 Beginning and ending in Bartle, view craters, caves, and lava flows on a 60-mile driving loop that includes a portion of the Modoc Volcanic Scenic Byway. Drive north on Forest Highway 15, east on Forest Road 43N48, south on Forest Road 44N75, back down Forest Highway 49 south, and then back toward Forest Highway 15 south to the entry point on State Highway 89. Tour includes: Harris Springs, Paint Pot Crater, Burnt Lava Flow, Pumice Stone Mountain, Little Glass Mountain, Little Mt. Hoffman Lookout, Medicine Lake Recreation Area, Callahan Flow, Double Hole Crater and Overlook, Glass Mountain, Jot Dean Ice Caves, and Rock Lava Flow. Allow for at least 3 hours of exploring, bring lots of drinking water, and be sure to fill up your gas tank. McCloud Ranger District (530) 964-2184 www.fs.usda.gov/stnf</p>
<p>11</p>	<p>McCloud River Falls Trail & Recreation Area McCloud, CA Latitude 41.241368 Longitude -122.025855 A 1.6 mile trail meanders upstream alongside 3 waterfalls, all volcanic in nature. Beginning at Lower Falls, this trail passes by Middle Falls, an overlook (with views of Mt. Shasta and Castle Crags), and Upper Falls. Water from melting glaciers and springs across the eastern slopes of Mt. Shasta flow downward, eventually accumulating in the McCloud River. The river drops about 6,000 feet from its headwaters, over these falls to its delta in Shasta Lake, a distance of only 40 miles. While the Middle Falls are the largest, the other two are wheelchair accessible. The recreation area offers picnicking, swimming, fishing, and camping. McCloud Ranger District, (530) 964-2184 www.fs.usda.gov/stnf</p>

<p>12</p>	<p>Mt. Shasta Everitt Memorial Scenic Drive Mt. Shasta, CA Latitude 41.319511 Longitude -122.306135 Take a closer look at Mt. Shasta (14,179 ft.) - one of the Cascade Ranges' most striking composite volcanoes - on a 15 mile scenic drive that passes Bunny Flat, a major trailhead for day hikers and mountain climbers. A subject for many Native American myths, the Shasta Indians believed that the Great Spirit first created the mountain by pushing down ice and snow through a hole from heaven and then used the mountain to step onto the earth. Mt. Shasta is often visited by spiritual sojourners for its perceived sacred qualities. Its sphere of influence is great from most any view. Be sure to register at the Mt. Shasta Ranger District if you intend to climb the mountain. Mt. Shasta Ranger District (530) 926-4511 www.fs.usda.gov/stnf</p>
<p>13</p>	<p>Hedge Creek Falls Trail Dunsmuir, CA Latitude 41.236361 Longitude -122.269714 Thousands of years of erosion, mostly from the freezing and thawing of water trapped in cracks on the basaltic face, has resulted in the sheared appearance at the face of the falls. The cave, behind the falls, is a normal occurrence in thick lava flows. Its water source is a massive aquifer resultant of several volcanic occurrences. This easy-5 minute walk leading to the falls, with views of Mt. Shasta, the river, forests and trains, was named long ago after a nearby berry farmer, Mr. Hedge. Dunsmuir Chamber of Commerce 1-800-DUNSMUIR www.dunsmuir.com</p>
<p>14</p>	<p>Black Butte Lookout Area and Trail (gravel road) Mt. Shasta, CA Latitude 41.36654 Longitude -122.347791 With easy access near I-5, the trail to the summit allows one to fulfill a desire to reach the top of a plug dome volcano that was formed 9,000 years ago. Where horses and mules once brought supplies to those manning the fire lookout atop Black Butte, hikers now enjoy a 2.5 mile path that was constructed by the Civilian Conservation Corps in the late 1930's. Black Butte, standing at 6,325 ft., was originally named Muir's Peak, after famed author and naturalist, John Muir. Mt. Shasta Ranger District (530) 926-4511 www.fs.usda.gov/stnf</p>
<p>15</p>	<p>Lava Park Weed, CA Latitude 41.511662 Longitude -122.302551 The ridge on the east side of Highway 97, just 6 miles north of Weed, marks the edge of an andesitic lava flow that, from an aerial view, resembles a hand or fingers. This flow poured from a flank vent on the northern side of the Shastina cone on Mt. Shasta. The Lava Park flow is 9,000 years old, slightly younger than Mount Shasta. It is a block lava flow with beautiful examples of flow levees, which have higher edges and a lower middle. Like a river, it built levees at the margins, while lava in the middle continued to flow after the margins stopped. Goosenest Ranger District (530) 398-4391 www.fs.usda.gov/klamath</p>

<p>16</p>	<p>Pluto’s Cave Weed, CA Latitude 41.568171 Longitude -122.282366 Named after a Roman god of the underworld, Pluto’s Cave is a 1,500 foot long lava tube formed by an eruption of basaltic lava, which originated from a vent between Deer Mountain and Whaleback Mountain. Two short trails lead the visitor to opposite ends of the cave. Access may also be had through a section of collapsed ceiling. Goosenest Ranger District (530) 398-4391 www.fs.usda.gov/klamath</p>
<p>17</p>	<p>Deer Mountain Weed, CA Latitude 41.606666 Longitude -122.1291666 Deer Mountain is an eroded, single andesitic shield volcano made of the same pumice as the Red Banks on Mt. Shasta. The Deer Mountain Chuck Best Memorial Snowmobile Park intertwines with a 230 mile snowmobile trail system through the Klamath, Modoc, and Shasta-Trinity National Forests and hosts the annual Siskiyou Sled Dog Races each winter. Goosenest Ranger District (530) 398-4391 www.fs.usda.gov/klamath</p>
<p>18</p>	<p>Whaleback Mountain Weed, CA Latitude 41.528333 Longitude -122.141111 This shield volcano is composed of dark basaltic andesite, and has 4 cinder cones (and 4 craters) that appear from a distance as two mounds, giving the mountain its distinct whaleback shape. It stands at 8,344 ft. There is an excellent hang and paragliding site on the mountain, which operates under a special use permit from the Forest Service. Goosenest Ranger District (530) 398-4391 www.fs.usda.gov/klamath</p>
<p>19</p>	<p>Vista Point: View of Mt. Shasta Macdoel, CA Latitude 41.776785 Longitude -122.582788 Take a photo of Mt. Shasta’s northern face and learn about the stories of the surrounding lands. The panels here describe Mount Shasta’s 500,000 years of active volcanism, along with its place within the Pacific Ocean’s Ring of Fire. Other panels tell human stories of inspiration and reverence for Mt. Shasta by Native American tribes, and impressions from westward explorers, miners and settlers. Located about 15 miles past the County Road A12 turnoff. Goosenest Ranger District (530) 398-4391 www.fs.usda.gov/klamath</p>
<p>20</p>	<p>Herd Peak Lookout Macdoel, CA Latitude 41.633 Longitude -122.205 Open to visitors, this fire lookout was built in 1933, and offers sweeping views of Butte Valley—an area dropped down between faults and encircled by volcanoes to form a closed drainage basin. The down-faulted valley has subsequently been filled to its present elevation of 4,250 feet by alluvial deposits created by sediment that gets washed into the basin from the surrounding volcanic mountains. It is suspected that Butte Valley has contained a lake intermittently in its history, especially during glacial periods. Located 7 miles north of County Road A12. Take first right on Forest Road 45N22, left on 44N39 (6 miles). Goosenest Ranger District (530) 398-4391 www.fs.usda.gov/klamath</p>

<p>21</p>	<p>Goosenest Peak Trail Macdoel, CA Latitude 41.736351 Longitude -122.217236 With views of Mt. Shasta, Little Shasta Valley and Whaleback Mountain, this moderate 2.2 mile trail travels on the Goosenest Volcano, a shield volcano with a cinder cone on top, resembling a goose’s nest. To access the trailhead, turn left from Highway 97 and drive approximately 8 miles to Forest Road 45N30 and turn left. Travel about 4 miles to Forest Road 45N72Y and turn left. Parking area for the trailhead is less than a mile on the left. Goosenest Ranger District (530) 398-4391 www.fs.usda.gov/klamath</p>
<p>22</p>	<p>Lava Beds National Monument Tulelake, CA Latitude 41.739987 Longitude -121.517824 You will find over 700 caves and many volcanic features, which resulted from a tectonic plate slowly sliding beneath the Pacific Ocean under the continental plate (hundreds of miles away). Lava Beds sits on the northern flank of the Medicine Lake Shield Volcano. Here you will also find Native American rock art sites, historic battlefields, as well as excellent bird watching opportunities to the north at the Tulelake and Lower Klamath Wildlife Refuges. Lava Beds National Monument (530) 667-8113 www.nps.gov/labe</p>
<p>23</p>	<p>Oux Kanee Scenic Overlook Chiloquin, OR Latitude 42.66833 Longitude -121.87306 Meaning “people of the lake”, you can see views of volcanic activity, falcons and red-tailed hawks, and the headwaters of Spring Creek, which contains Mare’s eggs, an endemic form of algae resembling small, brown jellyfish bodies. You will see sweeping views of Mt. McLoughlin, Tableland, Pelican Butte, and the Williamson River. To reach Oux Kanee Overlook, travel 33 miles north on Highway 97 from Klamath Falls to the top of Spring Creek Hill and then proceed west for one mile on Forest Road 9732. Chiloquin Ranger District (541) 783-4001 www.fs.usda.gov/fremont-winema</p>
<p>24</p>	<p>Mountain Lakes Loop Trail Klamath Falls, OR Latitude 42.375 Longitude -122.125 There is some controversy over the origins of this area. Many believe that the Mountain Lakes Loop Recreation Area resides inside of a caldera, formed in much the same way as Crater Lake. While it cannot be proved, it is also cannot completely be refuted at this point and geologic research is continuing in this area today. This 7.2 mile trail offers views of 8 peaks, the remnants of heavily glaciated shield volcanoes, lava cones, and lakes. Repeated glaciations shaped the land, gouging out beds for many small lakes, known as cirque lakes or tarns, each with their own unique setting. Klamath Ranger District (541) 883-6714 www.fs.usda.gov/fremont-winema</p>
<p>25</p>	<p>Mt. McLoughlin Klamath Falls, OR Latitude 42.444856 Longitude -122.315303 Extensive glaciation on the northeast side of this composite volcano has exposed the interior structure, including two solidified conduits that once supplied lava to the summit crater. The best estimate for its age is 100,000 years old. A 7 mile path to its summit also links to the Pacific Crest National Scenic Trail. The peak of Mt. McLoughlin reaches up to 9,496 ft. Klamath Ranger District (541) 883-6714 www.fs.usda.gov/fremont-winema</p>

