

relatively mild eruptions like those of many of the Hawaiian volcanoes. The term "shield" comes from its resemblance to a Roman shield. A cinder cone tops Prospect Peak, indicating that its final activity was more explosive. The dense growth of trees on its slopes shows that there has been no activity there in recent years.

◆ The self-guiding trail leads along the rim to the right.

29 The elevation here is about 6900 feet. You are standing on 1 of 3 crater rims, each representing a different eruption. Trees growing just inside the crater are **Scouler willow, western white pine,** and **lodgepole pine.**



CRATER RIMS

30 Features in this fine panoramic view are identified in the drawing at the bottom of the leaflet.

31 Looking directly down the outside slope of Cinder Cone, you can see the source of the rough black lava flow of 1851. You can trace its path toward Snag Lake, then off to the left, toward Butte Lake. An earlier flow dammed the creek flowing into Butte Lake, forming Snag Lake. Lakes formed in this manner are known as coulee lakes.

◆ From here, take the trail behind you to the center rim and look into the main crater.

32 The vent, or vents, from which all these cinders were blown have been covered with cinders and other material falling and sliding back into the central crater. Future eruptions are not likely from this crater; however, they could break out from other spots nearby.

◆ Continue along this inner rim and then go back to the outer rim on the first trail to the right.

33 Here is a fine view of most of the Fantastic Lava Beds and Butte Lake to the left.

◆ The self-guiding trail continues down this side of the cone and around the base to the right. If you prefer, you may return to No. 29 on the opposite side of the crater and go back down the way you came up.

34 You are looking over the main part of the Painted Dunes. They were formed during explosive eruptions as cinders fell on top of hot lava flows. Heat and steam rising from the hot rocks oxidized the iron in the cinders, producing the various colors you see here.



SULPHUR FLOWERS

36 Take your time going down this steep slope. It is easy to turn an ankle on the larger rocks. The lava is sharp and rough.

37 Trees are slowly invading the cinder-covered Painted Dunes, but very few can be seen growing in the rough, blocky lava flows.

38 Just below is the source of the 1851 lava flow. Proceed very carefully over the rough lava to the next stake at the edge of the vent.

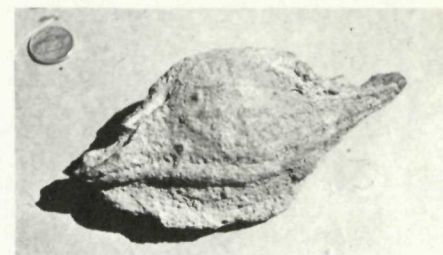
◆ You may bypass this spur loop and continue straight ahead to No. 40 by the twin trees.

39 Reaching back in the "cave," you can feel cold air. You may even see ice in early summer. Such ice caves are common in lava flows where protected pockets stay cold because there is no air circulation.

40 You are now at the edge of the Painted Dunes.

◆ Please stay on the trail to avoid marking the cinder fields with footprints.

41 Note the abundance of volcanic bombs at the base of the cone. Most of them are gradually falling apart as a result of normal weathering, unequal expansion and contraction caused by freezing and thawing of water that accumulates in cracks, and unequal heating by the sun.



VOLCANIC BOMB

42 The trail to the left goes around the west side of Fantastic Lava Beds to Snag Lake.

◆ The self-guiding trail continues to the right.

43 These are called breadcrust bombs because of their characteristic surface patterns. Homemade bread that has been lightly cut before baking to allow steam to escape will come out of the oven with a similar appearance, except that the bread should not be black.



44 You are back on the Old Emigrant Trail. Can you imagine the difficulties the wagon trains had in crossing these fields of loose cinders? Along even rougher parts of the trail, broken wagon parts and discarded utensils have been found.

◆ Follow the trail to the right back to Butte Lake.



We hope you have enjoyed your hike to Cinder Cone. Information on other self-guiding trails and scenic points of interest may be obtained at the various visitor contact stations.

If you do not wish to keep this leaflet, please return it to the box near the Ranger Station. If you do wish to keep it, leave 10¢ in the box for each leaflet taken.



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NATURE TRAIL

Lassen Volcanic National Park

Stark black chunks of lava, volcanic bombs, vast cinder and ash fields, and lava-scorched tree snags provide a setting for the climax feature of this nature trail — the 700-foot high Cinder Cone.

This self-guiding trail leads you through a devastated landscape of recent volcanic activity. History and dramatic geologic events are combined as you follow the route of early pioneers as they worked their way west to the Sacramento Valley. Along the way you pass through a pine forest to the edge of a massive lava flow and then up the slope of Cinder Cone to the rim for a panoramic view of lakes, forests, and mountains. Below you unfold the Fantastic Lava Beds, Painted Dunes, Snag and Butte Lakes, and in the distance Lassen Peak dominates the horizon.

The complete 5-mile round trip takes about 3 hours. It is 1½ miles to the base of Cinder Cone and another ½ mile to the top. If you don't want to take the entire trip, we suggest that you walk a little over a mile for a view of the Cinder Cone and then return, making an easy round trip of just over 2 miles. We suggest that you carry drinking water.

Follow the numbered trail markers. They refer to the numbered paragraphs in this leaflet.

Please return this leaflet to the box at the head of the trail or put 10¢ in the box if you wish to buy the pamphlet.

1 You have probably already noticed that the ground in the campground and picnic area is covered with coarse black cinders. This part of the Park is largely covered by cinders erupted from Cinder Cone, Prospect Peak, Fairfield Peak, Red Cinder Cone, and other nearby volcanoes.



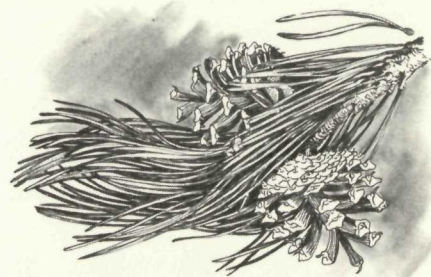
VOLCANIC CINDERS

2 From this point you can see Butte Lake and part of the Fantastic Lava Beds. You will get closer to and learn more about this lava flow farther along the trail. Another trail leads clockwise around the lake and on to Snag Lake.

3 From here to the base of Cinder Cone you will be following part of the Old Emigrant Trail which was used during the 1850's as one of the routes to the Sacramento Valley from the east. William H. Nobles established the trail in 1852 as a shorter route than Peter Lassen's trail, which went east and south of the present Park boundary.

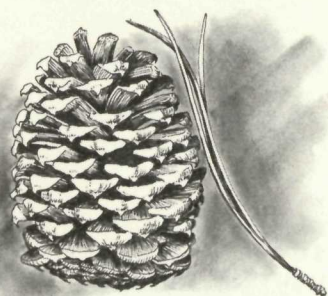
4 Beyond this chain the old trail is used only by hikers as far as Badger Flat. You may drive in to Badger Flat on a section of the trail starting near Hat Lake from the Lassen Park Road. Parts of the old trail are still clearly visible between here and the Park entrance at Manzanita Lake.

5 One of the common trees around Butte Lake is the **lodgepole pine**. Needles are short and grow in groups of 2. The cones may remain on the branches for several years. The bark is thin and scaly. Because the trunks grow tall and straight, they make good poles and cabin logs, hence the name lodgepole.



LOGEPOLE PINE

6 Needles of this **Jeffrey pine** are much longer than those of the lodgepole and grow in groups of 3. The cones take 2 years to develop and are 5 to 10 inches long when mature. Chickarees, or Douglas squirrels, chew many of the cones apart to get the seeds. Piles of chewed cone scales may be seen at the bases of trees or on a favorite log.



JEFFREY PINE

7 Despite injuries caused by lightning, insects, disease, wind and snow, trees are often able to recover and continue growing. When a tree is bent over by snow or some other factor, chemicals in the tree called **auxins** stimulate the growth on the underside of the trunk. This causes the underside to grow faster than the upper side and the tree will tend to right itself.

8 The Fantastic Lava Beds consist of blocky lava known as basalt (pronounced baa-salt'). It was a thick, pasty, slow-flowing mass, red hot inside. As the flow slowly advanced, the crust, cooling and hardening all the while, was twisted and broken into the blocky mass you see here.

9 Look at the lava closely; you may see white, glassy bits of quartz. The grayish-green scaly material on the surface of some of the rocks is a plant growth called lichen (like-en). Organic acids secreted by these plants help decompose the rocks and slowly add to the formation of soil.

10 Lightning or heat from the lava flow may have started fires that scorched these trees. If a tree is not killed by the fire, the growing part just under the bark starts to cover the wound. Small scars are sometimes completely covered. Large wounds are left open to attack by insects and fungi. Notice holes drilled by wood boring beetles.

11 A short spur trail to the left leads to a pocket of cold water at the edge of the lava flow.

◆ **Return to stake number 11 to continue the self-guiding trail.**

12 The surface of this pool marks the ground-water level. As the water table lowers in late summer, the pool may become dry. Look and listen for the **pika**. These small, dark brown members of the rabbit family live in this rocky habitat. They gather grasses for winter food.



PIKA

13 An old trail to Prospect Peak leads off to the right. It climbs about 2200 feet in 2½ miles.

14 Trees felled by wind, lightning or other causes slowly decay and return to the soil. Carpenter ants, termites, beetles and fungi all do their part. The insects chew the wood into tiny particles while building their tunnels. Fungi live in the dead wood and slowly decompose the tree.

15 **Engraver beetles** chew their tunnels just under the bark of weak or freshly killed trees and leave intricate patterns in the wood. In contrast, the boring beetles make their tunnels deep within the trunk of the tree. Woodpeckers drill holes in search of the insects for food.

16 The whitish soil at the edge of the lava flow is composed of the remains of countless numbers of tiny microscopic plants called diatoms. They grow in oceans, lakes, and even wet soil. The limey skeletons of the plants accumulate on the floor of a body of water to form diatomaceous earth.



FANTASTIC LAVA BEDS

17 Fantastic Lava Beds are composed of lavas from several eruptions. The most recent flow of 1851 does not appear along this edge but courses down the middle, as you will see when you reach the top of Cinder Cone. Some trees growing in this area at the time of the flows were probably killed by the heat of the lava. Dead snags along the edge may be remnants of these trees. They have become "sand-blasted" through the years by windblown cinders.

18 Notice that there are great quantities of pine cones under the trees but very few seedlings. The porous cinders and dry summer conditions make it difficult for young trees to get started.

19 The beautifully symmetrical Cinder Cone, straight ahead, rises 700 feet above its base. It was formed by explosive eruptions which threw volcanic

ash and cinder from a central vent. Much of the material fell around the vent, building the cone. Its shape is relatively undisturbed by water erosion because the porous cinders absorb even the heaviest rainfall.

20 Small fragments of lava shattered by the explosive force of steam and other gases escaping from the vent are called "ash" and "cinder." Even though the lava may be red hot during eruptions it is not burning as is sometimes thought.

21 The exposed tree root crossing the trail here is protected by layers of bark just as on the trunk. While roots are growing underground they do not normally develop such thick bark layers. Why are these roots exposed?

22 A severe storm in October, 1962 blew down a number of trees in this area. Notice the shallow root system on this fallen Jeffrey pine. During the storm rain loosened the soil and cinders, causing the tree to topple. The depression left where the tree was standing may last for several years before being filled in again.

23 Even though the shape of Cinder Cone is relatively undisturbed by heavy rainfall, footprints will remain in the cinders indefinitely.

◆ **Help preserve the beauty and character of the cone and cinder fields by staying strictly on the trails.**

24 Tiny particles of white pumice found here were blown by the wind from Lassen Peak during the 1914-1921 eruptions. Some blew as far as Reno, Nevada, 110 miles from the Peak. Pumice is light, frothy lava that was filled with gas bubbles before it cooled. The dark brown pumice here blew out of Cinder Cone.



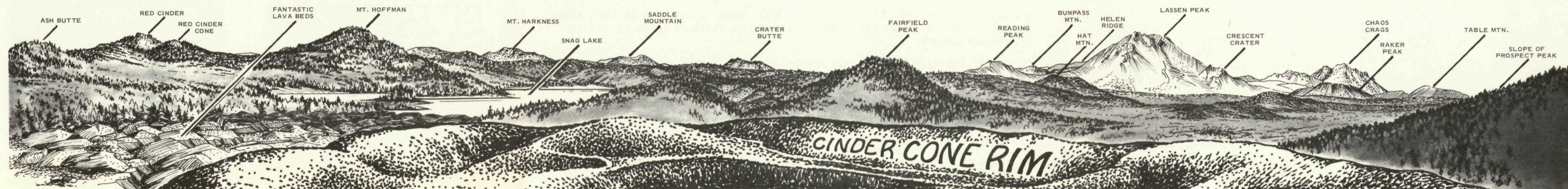
CINDER CONE SLOPE

25 The slope of Cinder Cone is about 35 degrees, the so-called "angle of repose." Loose cinders cannot stay in place on slopes steeper than this. The climb is relatively easy if you take your time. Rest briefly but often.

26 Large rounded boulders at the base of the cone are called volcanic bombs. They were blown out of the vent on top of the cone and rolled down the slope while still hot but already hardened. They are composed of glassy basalt which cooled rapidly.

27 Lassen Peak is visible in the distance over the shoulder of Cinder Cone. You are looking at the northeast slope of the Peak that was devastated by a huge mud flow and a "Great Hot Blast" during eruptions in May, 1915. Patches of snow remain on the upper slopes of the Peak all summer.

28 Prospect Peak is the rounded shield or Hawaiian-type volcano directly to the right, or northwest. It was built, layer upon layer, by lava flows from



PANORAMIC VIEW