

their activity, although some steam may still be visible. Underground "plumbing" may have been partly sealed off by slumping of clay and rock material. As pressures continued to build up, new channels were opened and the steam escaped from other vents.

**The next station is straight ahead near the edge of the lake.**  
**Do not approach too closely!**

**25** Boiling Springs Lake is constantly heated to about 125 degrees F. by steam rising through underground vents and fissures. On cool days, water vapor may be seen rising from the lake. During the summer, the lake level drops more than a foot. The exposed mud around the edge of the lake then dries and cracks. The shoreline perimeter is about 2,000 feet. The diameter is about 630 feet.

**Return to marker 24 and turn left to the next station.**

**26** The yellowish-tan color, normal to the lake, is due to clay, opal and iron oxide particles suspended in the water. The green color seen in the shallow water and wet mud is algae, tiny plants which have adapted to the hot water environment.

**When wet, these clay banks are very slippery.**

**27** White, crusty salts, sometimes seen on the surface, are related to alum and have an astringent sweet-sour taste.

**28** This is one of the few places in the Park where you can see the huckleberry oak (*Quercus vaccinifolia*). It grows as a shrub and has huckleberry-like leaves but bears acorns. It retains green leaves all winter. The acorns are eaten by wild-life.



HUCKLEBERRY OAK

**29** The noisy steaming fumarole across the lake is the most consistently active thermal area in the vicinity. You may see sizzling "frying pan" activity in the stream delta just this side of the fumarole. Steam escaping from small vents in shallow pools sounds like eggs frying.

**30** The large oblong holes in the dead snag, 20 feet off the trail, were made by pileated woodpeckers (*Dryocopus pileatus*). These crow-sized birds are rarely seen in the Park. They make the holes while searching for the larvae of wood boring beetles. Their nests are usually built high above the ground in the hollows of trees.

**31** The gully at this end of the lake was formed by storm drainage and melting snow. It is the only inlet stream to the lake and dries up in midsummer. Do not attempt to cross the gully here. The trail crosses safely further upstream.

**32** The swollen appearance of the branchlets of these young red fir trees was caused by dwarfmistletoe (*Arceuthobium campylopodum*). The small golden-colored growth does not have broad leaves like the common mistletoe used at Christmas time. Seeds left on branches by birds sprout, grow into the tree and live as parasites. This growth prevents the flow of nutrients, causing the swelling and weakening of the branch and will, in time, affect the vitality of the tree.

**Keep left at this junction for the self-guiding trail.**

**33** The trail to the right goes to Terminal Geyser, a small thermal area with a violently steaming fumarole. Little Willow Lake, on the same trail near the Park boundary, nearly dries up in late summer and becomes a wet meadow.

**34** Here is a fine view of Lassen Peak. With binoculars you may be able to spot the trail zig-zagging up the left side of the 10,457-foot mountain. It is a plug dome volcano formed when thick, pasty lava was squeezed up through a vent, like toothpaste from a tube. Reading Peak, just to the right of Lassen Peak, is another plug dome volcano. Bumpass Mountain is the knob just visible on the skyline to the left.

**35** The attractive, tall incense cedar to the right is 18.3 feet in circumference. Shrubs near the trail and around the base of the tree are mountain white-

thorn ceanothus (*Ceanothus cordulatus*). Deer browse the leaves in spite of the sharp thorns.



**36** Turn left here to visit the boiling mudpots. **Be extremely careful! Do not step too close to the slippery or crumbly edges!**

Please help to preserve the mudpots. Anything thrown into them will destroy the natural attraction for other visitors.

**37** A mudpot is a type of hot spring consisting of a shallow pit or cavity filled with hot, generally boiling mud with very little water. The mud may have any

degree of consistency up to a thick mush or mortar. Steam and gases from underground fissures come up in large bubbles through the thick mud. As the bubbles break, mud is splattered in all directions to form a rim around the vent.

**38** The mud consists mostly of clay and opal colored by iron oxides and sulphur.

**39** Follow the trail to the left back to stake number 23.



**National Parks are areas with superlative scenic, scientific and historic values of national significance which are to be preserved unchanged for the enjoyment of present and future generations.**

**We hope you have enjoyed this self-guiding trail. Information on other such trails can be obtained at any visitor contact station.**

**If you do not wish to keep this leaflet, please return it undamaged to the box at the head of the trail. If you wish to take it with you, we hope you have remembered to leave 5c in the box for each leaflet taken.**



This leaflet was published by the Loomis Museum Association, a non-profit organization, in cooperation with the National Park Service.



Revision Date: 1967—Printing Date: 1967—Number Printed: 5000

LASSEN LITHO Susanville, Calif.

BEAVER and BEAR drawings by D. HOVIE  
All other drawings by B. TELFER

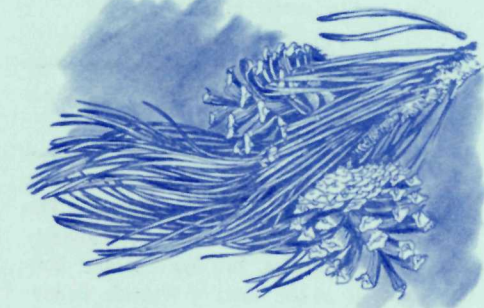


**The Boiling Springs Lake Nature Trail is about 2½ miles round trip and requires about 2 hours hiking time.**

**Help keep the trail clean by bringing back any refuse you take in, and deposit it in the trash barrel at the beginning of the trail.**

Your contributions make these leaflets possible. If you plan to keep this one, please leave 5¢ in the box.

**1** Most of the trees in this picnic area are lodgepole pine (*Pinus contorta*). Its bark is thin and scaly. The needles occur in bundles of two and are twisted, thus the scientific name "contorta." The cones may remain on the branches for several years.



LODGEPOLE PINE

Cone 1-2½ inches

**2** At the base of this dead tree is a colony of large red ants with a well developed social system. Notice how they have worked together to build a shelter of twigs and pine needles. Please do not poke the ant hill or otherwise disturb the occupants. They are part of the natural scene protected in all National Parks.

**3** Hot Springs Creek is fed partly by natural thermal water from Boiling Springs Lake, Devils Kitchen and a few hot springs along the trail. However, most of the water comes from a stream above Devils Kitchen and from cold water springs along the sides of Warner Valley. Further down the valley this stream joins with Kings Creek to form Warner Creek. Watch for the dipper, a small gray bird that feeds in the fast flowing water.

**4** Beavers (*Castor canadensis*) have been active in Warner Valley as can be seen by gnawed trees along stream



banks. Look for evidences along the trail. Their home is usually a pile of sticks and mud in a pool behind a dam which they build across a stream. Sometimes they tunnel into a stream bank from an underwater entrance.

5 White fir (*Abies concolor*) is one of the most common trees to be seen along the trail. Needles grow singly rather than in groups like the pines. The large white fir behind these two young ones is 14.3 feet in circumference, one of the largest you will see in Warner Valley. True fir cones grow straight up like candles and fall apart at maturity while still attached to the branchlets. Thus, you seldom see whole fir cones on the ground.



WHITE FIR  
Cone 2-5 inches

6 This exposed slope may look dry and barren in late summer but it is rich with flowers during the early summer. The grayish bare exposure facing you on the opposite slope is composed of mineral deposits from hot springs, some of which are still active. You will see a small hot spring at stake number 8.

7 Warner Valley was originally formed when stresses within the earth caused a huge block of the crust to sink, creating a steep trough known as a graben. During the Ice Age glaciers moving slowly down from the mountains widened and gouged the trough to form a broad U-shaped valley. You are standing on a rock and gravel slope that was probably deposited by a glacier as a lateral or side moraine. Flatiron Ridge on the other side of the valley is composed of old lava flows, known as flatiron andesite, that were exposed by the glaciers. Stream erosion has played an important part in shaping Warner Valley since the glaciers' retreat.

8 Several natural hot springs feed this little stream to supply water for the thermal pool at Drakesbad Guest Ranch. The pool is for guests only. The water is heated through contact with hot rocks deep underground. In the 1860's a settler named Edward R. Drake promoted the thermal waters for a health spa or "bad." It remained a private resort until 1958, when the property was purchased by the government and added to the Park. Drakesbad is now operated by the Lassen National Park Company, which also operates Manzanita Lake Lodge, under National Park Service regulations.

9 This large incense cedar (*Libocedrus decurrens*) is 22.5 feet in circumference. The reddish bark looks somewhat like that of the giant sequoia, but none of the latter are found in this area. Large sections of the bark were used by Indians to form conical shelters. The wood has an incense-like fragrance.



INCENSE CEDAR  
Cone ¾-1 inch

Follow the trail to the left to Boiling Springs Lake.

The trail to the right leads to Drakesbad and Devils Kitchen. The latter is a fascinating area of violently steaming fumaroles, hot springs and boiling mudpots at the head of Warner Valley.

10 The broad-leaf shrub here is a Scouler willow (*Salix Scouleriana*). Most

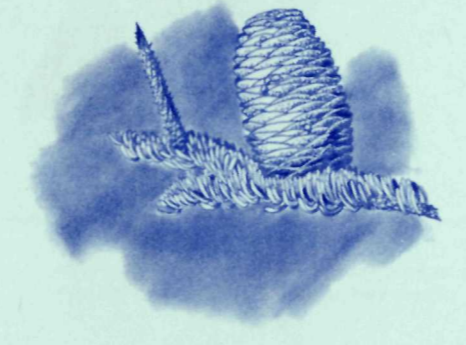


SCOULER WILLOW

species of willows grow best in wet meadows or along streams and lakeshores. This one, however, prefers dry places along meadow edges or in open woods. The leaves are wider and rounded on the ends; other species of willows have narrow pointed leaves.

11 The stream next to the trail is overflow from Boiling Springs Lake and may become dry in midsummer. Notice the whitish mineral deposits from the thermal water on the rocks in the streambed.

12 Young red fir (*Abies magnifica*) needles are blue-green in color as compared to the yellow-green needles of white fir. This blue-green color suggests the name "silvertip," a name heard at Christmas time. However, trees are never taken from the National Parks for this purpose. Notice the lacy appearance of the branchlets on the taller red fir trees.

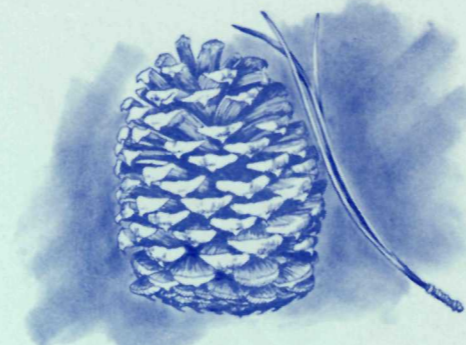


RED FIR CONE AND NEEDLES  
Cone 4-8 inches

13 Evidences of old fires may be seen in many places in the forest. Long periods without rain cause the forest litter to become extremely flammable. An observer is employed during the summer at a fire lookout station on top of Mt. Harkness, which overlooks Warner Valley and much of the rest of the Park. Fires started by lightning or by careless hikers and campers are reported and extinguished as soon as possible by firefighting crews.

14 The large Jeffrey pine (*Pinus Jeffreyi*) overhead has probably withstood several forest fires in its lifetime. Its thick bark is fairly resistant to light ground fires. When the trunk of the tree is warmed by the sun, you can detect a fragrant vanilla or pineapple odor in the crevices of the bark. The cones are 5 to

10 inches long, usually much larger than those of ponderosa pine.



JEFFREY PINE CONE AND NEEDLES  
Cone 5-10 inches

15 The yellowish-green growth on the tree trunks is staghorn lichen (*Letharia vulpina*). Actually a specialized combination of species of fungus and alga living together, it does no harm to the trees and grows on dead snags just as well. The green alga utilizes sunlight and moisture to provide food for the plant while the fungus provides support and holds the mass together.

16 Bears are not common in the Park but have been seen in this vicinity and near Summit and Juniper Lakes. Their tracks are seen occasionally along the trails. Clawed or chewed wooden trail signs also denote their presence.



This self-guiding trail continues to the right.

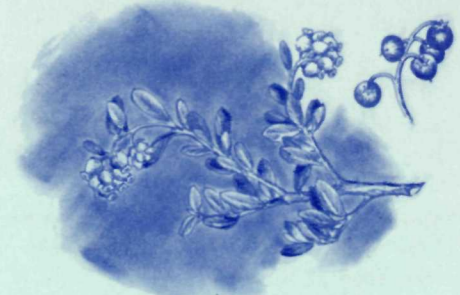
17 Fallen and dead standing trees are usually left in place in the National Parks. They provide home sites, food, and shelter for small mammals, insects, and birds. Notice the bark beetle "engravings" on some of the fallen tree trunks. The adult beetles lay their eggs in galleries carved for this purpose. When the larvae develop they carve extensive tunnels in their search for food.

18 In this dense stand of young white fir (*Abies concolor*), only the most vigorous trees will survive. The weaker ones will eventually be crowded out in their struggle to obtain enough sunlight to survive. Some will die as they become shaded by the faster growing ones.

19 When a tree such as this white fir is bent over by winter snow, some of the side branches will replace the dead top. When a top is completely broken off or killed, one and sometimes two side branches will turn upward, as on the small tree on the other side of the trail.

20 Look closely at the cross section of this fallen Jeffrey pine trunk. The concentric growth rings tell the age of the tree. The fastest and softest growth is in the spring and summer. The slowest and hardest growth is in the autumn and winter. The harder wood stays in tiny ridges while the softer portion wears away. The living and growing part of the tree is a thin layer just under the bark. The inside of a living tree as well as the outer layers of bark are dead. As the tree expands through growth, the bark splits and cracks, forming patterns typical of each kind of tree.

21 The low shrubs here are pinemat manzanita (*Arctostaphylos nevadensis*). They seldom grow over 10 inches tall. White urn-shaped blossoms appear in midsummer. Late in the summer the red bark peels off in thin papery curls, due to growth and expansion. The berries of manzanita (Spanish for "little apple") are an important food item for wildlife.



PINEMAT MANZANITA

22 You are walking up the slope of Red Mountain. The rock outcrop along the trail is Red Mountain basaltic lava, very poor in silica and relatively rich in iron, magnesium and other minerals. In contrast, the pink dacite lava of Lassen Peak and Chaos Crags is rich in silica and poor in the other minerals.

23 You are about to enter the thermal area of Boiling Springs Lake. The rotten egg odor is hydrogen sulfide from the steam vents. Listen for the thumping of the bubbling mudpots. The stream just ahead, dry in midsummer, is the outlet of the lake. The trail continues across the creek, around the lake and back to this junction.



Please be careful! The mudpots, steaming fumaroles and boiling pools are superheated. Crust near the edges of these may be thin and slippery. Stay on the trail!

24 The pits you see here are dried-up mudpots that have ceased much of

