# A Guide to the Lava Bluffs Trail

## Calaveras Big Trees State Park

**Welcome to the Lava Bluff Trail in Calaveras Big Trees State Park.**

## The Trail

This moderately difficult trail will take you through diverse forest environments, across a volcanic formation, and along a historic water ditch, The park's most colorful display of spring wildflowers occurs along this trail, as well as excellent opportunities for birdwatching.

There are many steep sections along the 2.5 mile (4 km) loop, including some with difficult footing. Starting at 4,000 feet (1,219 m), the trail ranges from 3,700 (1,127 m) to 4,200 (1,280 m) feet in elevation. Allow at least two hours.

Following the south-facing slope of the North Fork Stanislaus River Canyon, this trail has some areas with no shade and can be quite hot during the summer. Bring plenty of water, sunscreen, and insect repellant, wear supportive hiking boots and hike during the cooler part of the day or season.

**The Trail Guide.**

This trail guide has numbered stops. The numbers on the trail are NOT marked. Use the topographical map included with this guide to find the locations where the narration is based.

**PLEASE:**

- STAY ON THE ESTABLISHED TRAIL. This will help prevent soil erosion, damage to native plants and animals, and injuries to you.
- RESPECT ALL WILDLIFE. You may encounter wild animals on your hike. To protect them and yourself, please do not feed or approach any wildlife.
- LEAVE ALL NATURAL OBJECTS WHERE THEY ARE FOUND. Every object in the park is protected and plays an important role in its ecosystem.
- TAKE ALL LITTER WITH YOU. Litter is not only ugly, it is also harmful to wildlife.

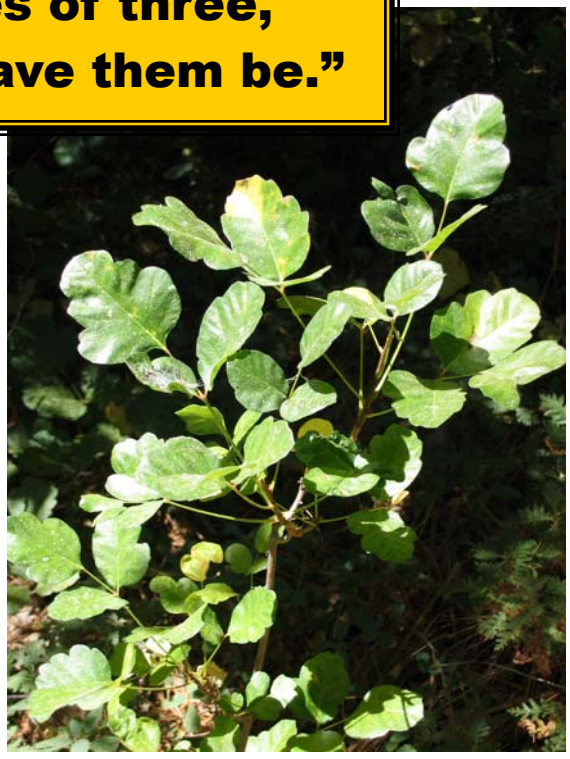
Thank you for your help.

# Poison Oak, What Does it Look Like?

Poison  Oak is one of the most widespread and variable plants in California.  Growing as shrub, tree or vine, it appears along several sections of the Lava Bluffs Trail.  It is easy to avoid if you become familiar with the attractive “leaves of three.”  If you think that you have com into contact with the rash producing oil from the plant, wash thoroughly with soap and water as soon as possible.

**The look of Poison Oak varies throughout the year. It can be a straight, thin stick in winter, a leafy bush with berries in mid-summer, or the red leafed plant that many are familiar with in late summer and fall.  Be careful in underbrush and when venturing off the trail. Remember the old adage . . .**

**“Leaves of three,**
**Leave them be.”**



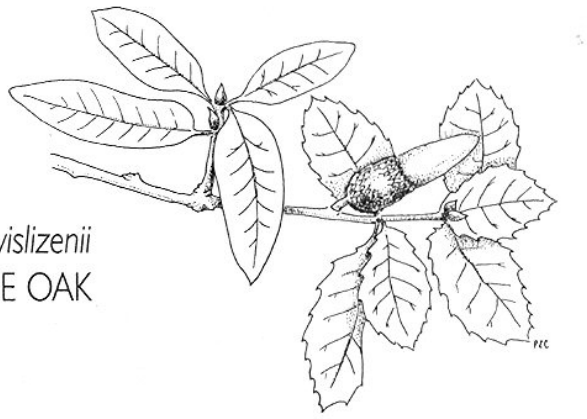
1 To fully appreciate the features of this trail, take time to look, listen and smell. Be aware of changes in temperature and shade as you traverse the varied topography. See if you can discover how those changes affect plant and animal life along the trail.

*Quercus kelloggii*
CALIFORNIA BLACK OAK

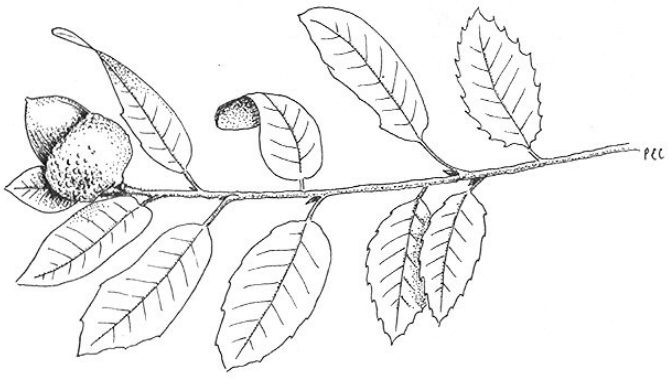
The trail passes through some of the most diverse forest communities in the park. A combination of granitic and volcanic soils, warm, south-facing slopes, and a variety of microclimates create a zone of transition between two communities. Trees of the Sierra Nevada Mixed Conifer Forest—sugar and ponderosa pines, white fir, black oak and incense cedar—typically occur between 2,500 (762 m) and 6,000 feet (1,829 m) in elevation. Here they are found growing intermixed with the evergreen interior live and canyon live oaks that typify the lower-elevation Sierra Foothill Woodland Community, usually growing between 1,000 (305 m) and 3,000 feet (914.5 m).

Other plants associated with these two forest types overlap here as well. Sun-loving mountain misery and manzanita prefer the open, rocky areas, while ferns and lilies grace cooler shadier drainages. Spring wildflowers carpet the sunny, well-drained volcanic mudflow formation, while towering conifers prefer the granitic soils.

Food and shelter provided by this smorgasbord of plant life supports a large number of wildlife species. As the seasons change so do the species that utilize the many riches created by this variety. Watch for signs of coyote, bear, squirrel, mountain lion, and deer. In open rocky areas look for rubber boas, gopher snakes, and alligator lizards. Bird watchers may enjoy sighting doves, woodpeckers, hawks, owls, humming birds, quail and songbirds. A wide array of butterflies visit in the warmer months, along with many other insect species.

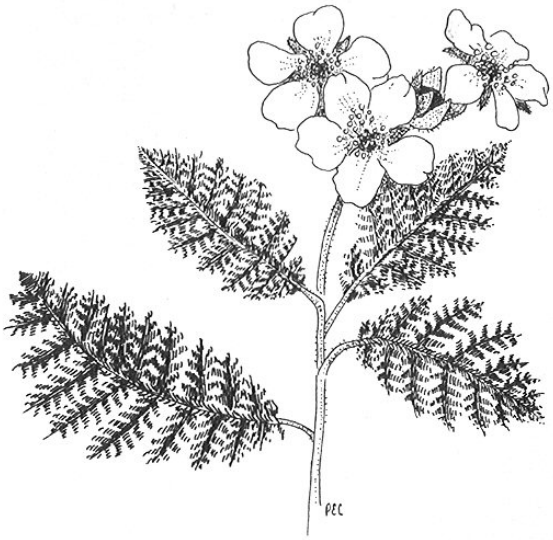


*Quercus wislizenii*
INTERIOR LIVE OAK



*Quercus chrysolepsis*
CANYON LIVE OAK

**2** Fire is one of the most important influences shaping Sierra Nevada forest ecosystems. Because of the continuing presence of lightening-sparked fire over millions of years, plants have developed specific adaptations that help them survive these fires. Ponderosa pine has thick bark that protects the growing cambium layer from fire's heat. Live oaks and shrubs such as manzanita and mountain misery have dormant growth buds that sprout after fire damage. Oak trees produce healthier acorns when fire kills pests that live around the base of the tree. Some plants are now so completely adapted to fire that they have difficulty propagating without its effects. Dogwood and manzanita berries must be burned or pass through an animals digestive system in order to germinate. Fire clears competing vegetation and layers of dead plant material, called litter, from the ground that prevent the seedling s from surviving.



*Chamaebatia foliolosa*
MOUNTAIN MISERY [WHITE]

Native American inhabitants learned about fire's useful effects and used fire as a tool to improve their food supply, create better basketry materials, and open pathways for travel. Lightening and Native American practices resulted in fires occurring as often as once every three years. When European immigrants began to settle in the Sierra Nevada during the 1850's, fire's role began to change. Over that last 150 plus years continuous efforts have been made to eliminate fire from the landscape. Fire came to be seen as a destructive, rather than creative, part of the ecosystem.

In an attempt to re-establish a healthier, fire safe forest at Calaveras Big Trees, resource managers have been conducting prescribed fires here since the mid 1970's. A prescribed fire (or burn) is set under very specific conditions and is designed to achieve specific goals. Many parts of the park have been burned, including several sections of forest along this trail. Positive results in the park include reduced fuel and fire danger, healthier stands of conifers and oaks, improved food supply for wildlife and a tremendous increase in giant sequoia seedling germination. See if you can find evidence of prescribed burns as you continue.

*Arctostaphylos patula* • GREENLEAF MANZANITA

**3** The microclimate of this seasonal drainage provides the shade and water needed by plants and animals that require a cooler habitat. In early summer you will find tall leopard lilies, displaying orange bells with black "leopard" spots. Other delights to discover include the pale yellow Hartweg's iris, the hanging blossoms of crimson columbine, creamy flowers of mountain dogwood, dainty pink Pacific star flower, and hidden blooms of false Soloman's-seal.

*Smilacina racemosa*
FALSE SOLOMON'S SEAL [WHITE]

*Lilium pardalinum*
LEOPARD LILY [ORANGE]

*Iris hartwegii*
HARTWEG'S IRIS [YELLOW]

*Aquilegia formosa*
CRIMSON COLUMBINE [RED]

*Trientalis latifolia*
STARFLOWER [WHITE-PINK]

4 From this stop you have the best view of the volcanic formations. In early spring, you will be treated to the most prolific and colorful display of wildflowers in the Park. Exposure to the sun and water draining from the porous volcanic mudflow create ideal conditions for this ever-changing show. You may be able to spot McKay's Reservoir downstream on the Stanislaus River, located just outside the park boundary. Please take a few moments at this viewpoint to read about the formation you are about to cross.

Lava Bluff Landscape

Four hundred fifty million years ago (mya), the future Sierra Nevada was still buried beneath a warm inland sea. Enormous masses of molten rock beneath the sea floor began to cool into granite 210 mya, and then were slowly uplifted to a height of about 3,000 feet by immense pressure generated as the Pacific Plate was pushed under the North American Plate. From 80 to 50 mya, this first mountain range was greatly eroded into low hills by prehistoric rivers. These rivers deposited nine vertical miles of sediment into a shallow lagoon that is not the Great Central Valley of California.

About 30 mya, ancient—now vanished—volcanoes to the east of the Sierran crest began erupting. The first explosions covered the northern Sierra Nevada with hot ash, creating a layer of rock called tuff. Examine the rock near your feet to see this swirling ash formation.

The next events produced a "layer cake" of lava and mudflow called the Merhten Formation. Lava flowed down ancient stream channels in the low-lying mountains. On top of the lava oozed hot steaming mud created by the erupting ash with melted glaciers and snowfields. Acting like wet cement, these mudflows—or lahars—carried along sand, gravel, stream cobbles and anything else in their path. After the eruptions ended, rain continued to transport the easily eroded ash. Alternately occurring flows of lava and mud continued over a period of 15 million years, obliterating the young Sierra Nevada by covering 12,000 square miles (19,312 sq km) of the range to a depth of 1,500 ((457 m) to 4,000 feet (1,219 m). The next section of trail passes through the Merhten Formation, which is found throughout the park.

*Asclepias cordifolia*
PURPLE MILKWEED
[RED-PURPLE]

*Pellaea mucronata*
CLIFF-BRAKE
BIRD'S-FOOT FERN

New stream channels began to cut down through the cooled lahars. About nine mya more eruptions to the east produced molten lava which flowed down riverbeds, filling the channel of the pre-historic Stanislaus River, then located 200 feet (61 m) above this point. The lava cooled into a dark rock called latite, which is more resistant to erosion than the surrounding rock. The river found a new path, gradually cutting down through the softer layers of rock to its present location 800 feet (244 m) below, creating the lava bluffs and exposing the underlying Merhten Formation.

Of course, this is not the end of the Sierra Nevada geologic story. The Sierran crest began rising towards its present height around five mya. Three mya marked the beginning of periods of glaciation that created places of incredible beauty throughout the range. Glaciers occurred at higher elevations and did not impact today's Calaveras Big Trees State Park. The last great ice age ended 11,000 years ago, and geologists believe that we are now in an interglacial period. Today the Sierra Nevada continues to be active geologically. The range continues to slowly rise, while the rivers continue to cut downward. Small glaciers hang in the highest summits, while earthquakes and geothermal activity hint at future volcanic events. As you traverse this formation, look carefully at the layers and try to imagine the events that brought them to this place.

**5** You may take this trail for a closer view of the lava bluffs. You are now near the western edge of the park and may hear noise from vehicles and logging activity occurring outside the park boundary.

*Dudlyea cymosa ssp. cymosa*
HENS AND CHICKS [PINK/YELLOW]

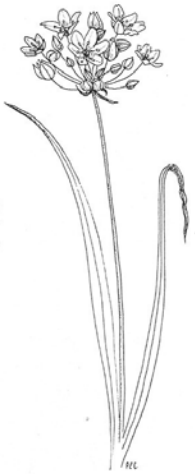
## Springtime Treasures

*Selaginella hansenii* • SPIKE-MOSS

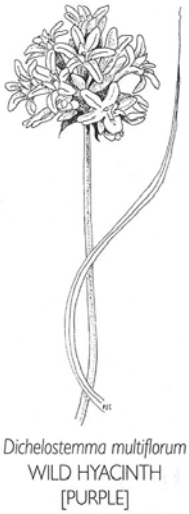
*Mimulus bicolor*
BICOLORED MONKEYFLOWER
[WHITE AND YELLOW]

*Mimulus guttatus*
COMMON MONKEYFLOWER
[YELLOW]

*Brodiaea elegans*
HARVEST BRODIAEA
[PURPLE]



*Triteleia hyacinthina*
WHITE BRODIAEA
[WHITE]



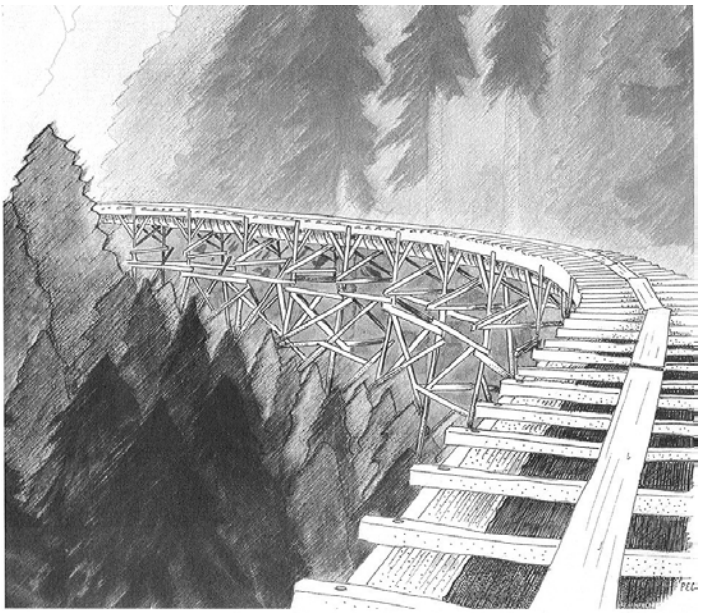
*Dichelostemma multiflorum*
WILD HYACINTH
[PURPLE]

*Mimulus torreyi*
PINK OR TORREY'S MONKEYFLOWER
[PINK]

*Lupinus nanus*
DWARF LUPINE [PURPLE]

*Limnanthes alba*
MEADOWFOAM [WHITE]

*Clarkia amoena*
FAREWELL-TO-SPRING
[PINK]



Historic Flume

6 Some remnants of changes made to the environment during the during the California Gold Rush can be seen on the next section of trail as it follows the historic Union Water Company Ditch.

Many gold miners had flocked to Murphy's Flat (now known as Murphy's) by 1850 but found that there was not enough water to develop the mines in the area. Large amounts of water were needed to wash the gold from the excavated gravel. By 1851, 25 resourceful residents had organized the Union Water Company, whose main purpose was to bring water from the Stanislaus River, 15 miles to the east of town, to Murphy's Flat. Work on the ditch began immediately, with a series of construction camps set up along the route. The energetic work crews did the job mostly with pick and shovel, and sometimes mules and plows. Wooden boxes four to five feet in width, called flumes, were built to carry the water across the ravines, along sheer cliffs, and sometimes even above the tree tops.

Completion of all this work required the construction of sawmills, dams, crew camps and a three mile long railway to transport logs. Storms that destroyed flumes and dams, as well as financial problems, provided many setbacks. The 15 miles of ditch and flume were completed lat in 1852 and first brought water to Murphy's Flat in January 1853. With plenty of water, the population of Murphy's grew from 1,200 to over 5,000 at its peak.

Built in 1854 to increase the flow of water into the system, this section of ditch, used by the trail, started 14 miles upstream at Sourgrass Meadow and ended at a dam on Union, now Love, Creek, just west of the park. It traversed some of the routes toughest terrain. In 1875 this section was abandoned as other ditches came into use.

The next section of trail is built on this historic ditch. In some places you will be walking in the ditch constructed by the hard-working crews of 1854. In other places, you might imagine the wooden flume crossing the drainages that you traverse. You may be able to hear the Stanislaus River, 500 feet below.

The ditch and flume system was eventually expanded to over 270 miles. The portions still in use today are the only source of domestic water for Murphys, Angels Camp and other downstream communities. A 3/4 mile section of wooden flume was destroyed during the Darby Fire in September 2001. Bolted to cliff faces in a very steep canyon, it was difficult to reconstruct, leaving these communities with no inflow of water for over a month.

An interesting side note is that Augustus T. Dowd, a hunter hired by the Union Water Company to supply meat to construction crews, made the first "official' discovery of the giant sequoias at the North Grove of Big Trees in 1852.

**7** This lower section of the seasonal drainage we crossed earlier at the third stop hosts a beautiful display of ferns. Sword, bracken and chain fern flourish in the damp earth. Moss, bleeding hearts and thimbleberry, with its large furry leaves, thrive in this shady glen. Crossing the creek, you will walk over the large granite boulders—examples of the rock type that forms the underlying structure of the Sierra Nevada.

*We hope that you have enjoyed your hike on the Lava Bluffs Trail, and that you will return in other seasons to experience it's many personalities. For more information about plants and animals found along this trail, please stop by the Visitor Center or visit our website www.parks.ca.gov*

*Polystichum munitum* • SWORD FERN

*Pteridium aquilinum* • BRACKEN FERN

*Dicentra formosa*
BLEEDING HEART
[PINK]

*Woodwardia fimbriata* • GIANT CHAIN FERN

*This guide was originally written by Wendy Harrison, Interpretive Specialist for the Calaveras Big Trees Association.*

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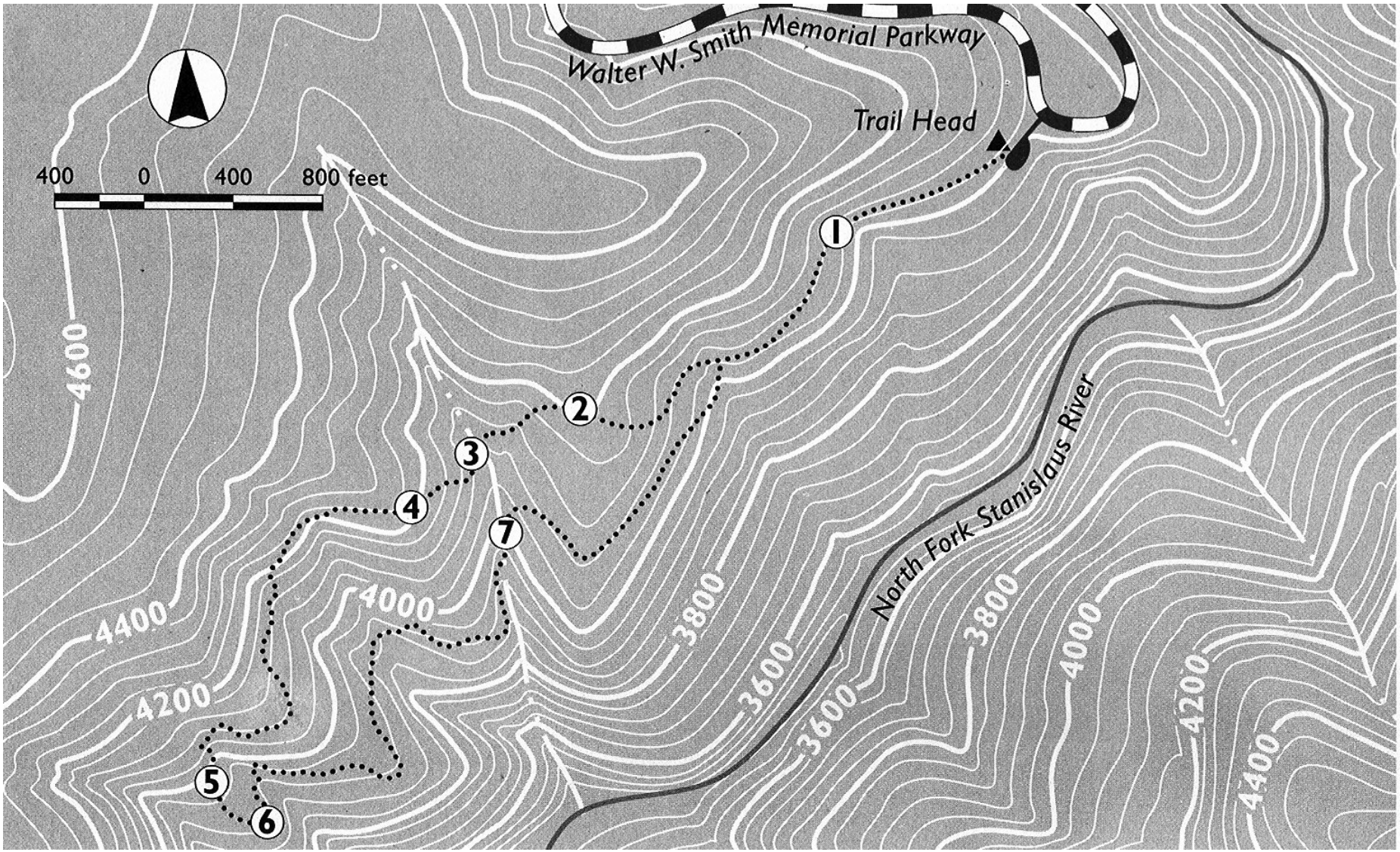
Walter W. Smith Memorial Parkway
Trail Head
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North Fork Stanislaus River