

## Geology Field Trip to Wendel

This is a field trip to experience some local geology and great scenery. **It is not required for the Lassen College geology class except as a class field trip using college transportation. If you do this on your own, be careful and take precautions.** To get credit (70 points extra credit) take pictures of each site that includes your image. Collect a sample of tufa and two different volcanic rocks from the slopes of Skedaddle Mountain and identify them. Bring the pictures, rocks and a written description or notes of your trip including exciting things that happened and difficulties encountered.

Starting at Litchfield where Center Road and US 395 come together. Set your odometer to zero.

Mile 3.8: Right turn to Wendel. Look east at the huge extinct, eroded volcano, Skedaddle Mountain. Look along the mountain to the north, northwest and northeast above the valley several hundred feet for evidence of old lake terraces.

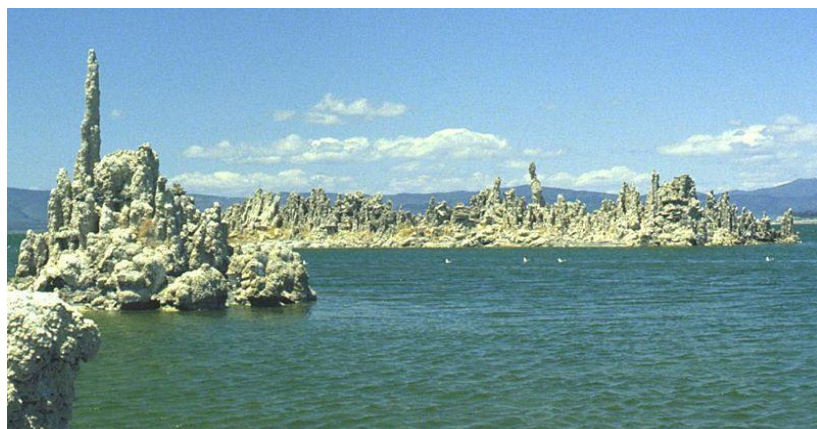
Mile 6.5: 35.5 megawatt cogeneration (wood and geothermal) power plant. This plant uses steam to generate electricity. The water is first heated using geothermal heat and then chipped wood is used to heat the hot water to steam. Notice the pipes from the geothermal wells to the plant are not straight but have many "U" bends in them to accommodate expansion and contraction of the pipe.

Mile 7.0: Geothermal wells.

Mile 7.7: New geothermal well was drilled in 2010 on the right. Tufa reef runs behind the drilling site. Tufa is a variety of limestone, formed by the precipitation of carbonate minerals in alkaline or salty lakes. Geothermally heated hot-springs sometimes produce similar (but less porous) carbonate deposits known as travertine. Calcareous tufa should not be confused with tuff, a porous volcanic rock. Modern and fossil tufa deposits abound with wetland plants; as such many tufa deposits are characterized by their large macrobiological component and are highly porous. Tufa forms either in fluvial (river) channels or in lacustrine (lake) settings. Lacustrine tufas are generally formed at the periphery of lakes and build up phytoherms (freshwater reefs) and stromatolites. Oncoids (roundish coatings) are also common in these environments. Tufa columns are an unusual form of tufa typically associated with saline lakes. Some tufa columns may actually form from hot-springs and therefore actually be a form of travertine. It is generally thought that such features form from  $\text{CaCO}_3$  precipitated when carbonate rich source waters emerge into alkaline soda lakes.

Tufa a Mono Lake

Mile 8.2: BLM road to Brubeck Spring, a good dirt road over the northern shoulder of Skedaddle Mountain. Sometimes you may wish to take the Brubeck Spring road, but for this field trip don't take the Brubeck Spring road. Continue on the paved road. Skedaddle Mountain is the largest and most complex extinct volcano in the Susanville area of northeastern California. A series of dikes seems to connect Skedaddle Mountain to smaller volcanoes running west-northwest culminating at Shaffer Mountain. This was a truly huge stratovolcano perhaps the size of Mount Shasta, the large Cascade volcano.

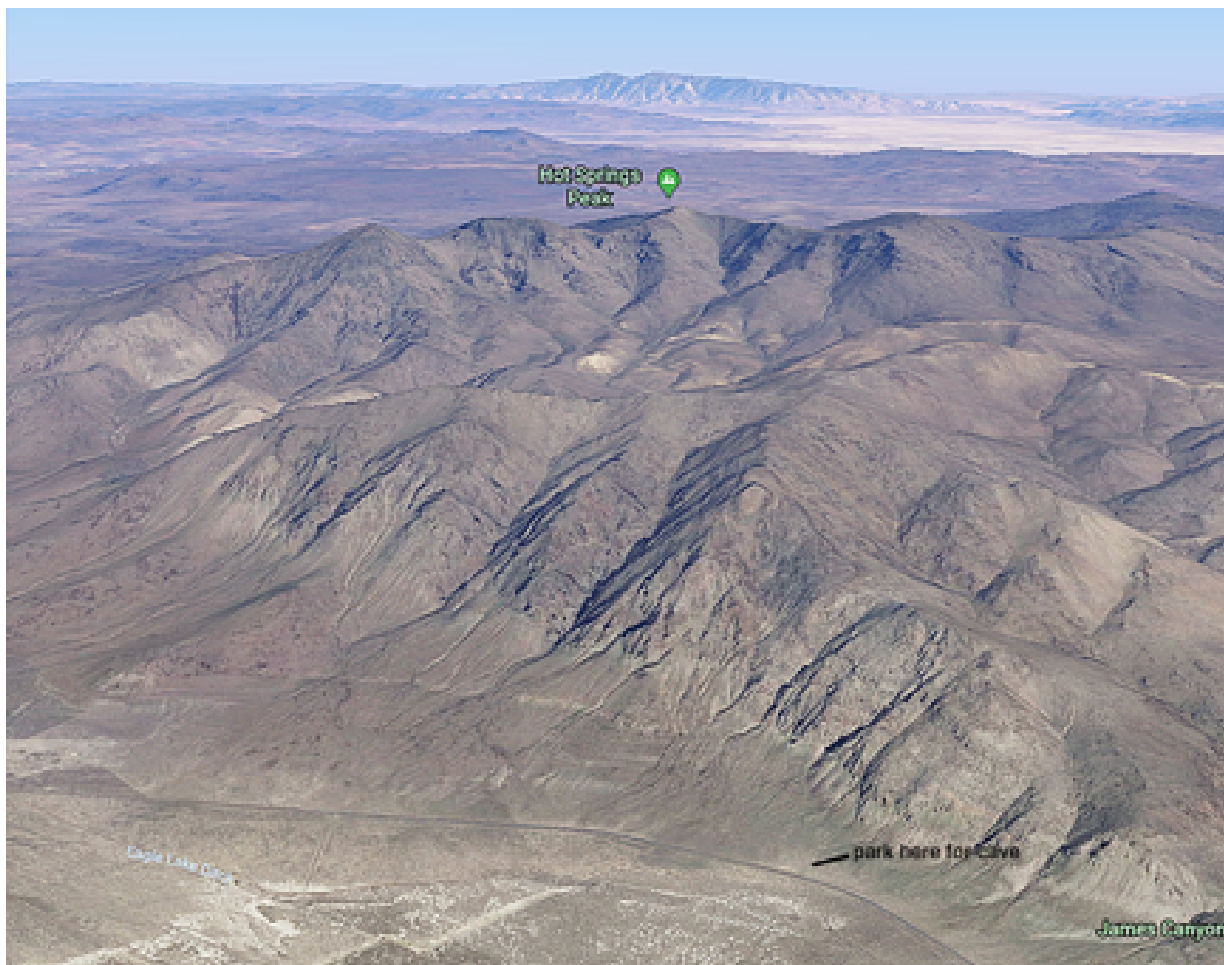
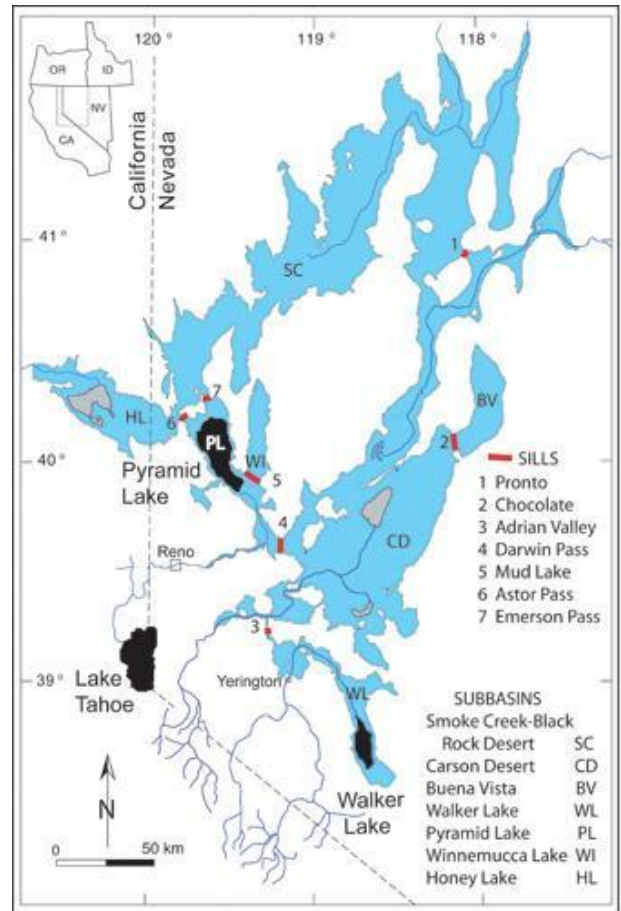


Skedaddle Mountain was active for about a million years around 12 million years ago. This volcano produced lavas with composition ranging from rhyolite to basalt with ash and ash flow and ash fall breccias.

On the slopes of Skedaddle Mountain and those to the west-northwest including Shaffer Mountain, are terraces of Lake Lahontan, a large Pleistocene lake of modern northwestern Nevada that extended into northeastern California and southern Oregon (map on next page). The area of the former lake occupies a large portion of the Great Basin. Climate change around the end of the Pleistocene epoch led to a gradual desiccation of ancient Lake Lahontan. The lake had largely disappeared in its extended form by approximately 9,000 years ago. As the surface elevation dropped, the lake broke up into a series of smaller lakes, most of which rapidly dried up leaving only a playa. These playas include the Black Rock Desert, the Carson Sink and the Humboldt Sink. The only modern day remnants existing as

true lakes are Pyramid Lake and Walker Lake. Winnemucca Lake has been dry since the 1930s and Honey Lake periodically desiccates. The ancient shoreline is evidenced by tufa formations throughout the area. Surprisingly, the watershed feeding Lake Lahontan is not thought to have been significantly wetter during its highstand than it is currently. Rather, its desiccation is thought to be mostly due to increase in the evaporation rate as the climate warmed.

Mile 12.4 (approximately): Look for a faint trail and rough, small parking area on the mountain to your left. This may be hard to find. I recommend that you use your phone GPS to put in the coordinates: 40° 20' 02" N and 120° 11' 04" to find the turn off parking spot for the cave trail. Also study the Google Earth images of the Mountain and Cave location at the end of this paper. If you think you are there, turn off on the left to Tommy Tucker Cave. This 45 by 20 foot cave was excavated in 1940 and 1942. Parts of the cave are covered with a 4 inch layer of tufa indicating the lake level was at least this high. Actually the highest lake terraces are close to 300 feet high, 100 feet above this cave. The trail to the cave is very steep and dangerous. There is no need to go up to the cave if this seems too difficult, but take a selfie of you with the cave and trail behind. Next pages for images of where to park and where the trail is. Notice from the pictures on the next page that the cave parking and trail is just about where the road gets closest to the steep volcanic slope.





The cave was excavated many years ago and many artifacts were found. You can find out more at: <http://digitalassets.lib.berkeley.edu/anthpubs/ucb/text/ucas035-002.pdf> See last page for this document.

For fishermen and women, the Lahontan cutthroat trout evolved as a predator species within the waters of Lake Lahontan, feeding on native chub and sucker. This subspecies of cutthroat trout survives today in tributary rivers of the Great Basin, and has been re-introduced to Pyramid Lake and Walker Lake after being destroyed in those lakes during the 20th century.

**This view trip takes lots of gas and time (3 to 4 hours). It is optional. You can get an 'A' easily by attending class, doing the assignments and getting pretty good grades on the tests. Be careful and safe. Don't drive or ride with someone who is impaired or not careful. When you get to the last stop below Tommy Tucker Cave (or close to it) look for tufa and a couple of different samples of volcanic material to bring back. Take a picture of yourself at this site and in front of biomass plants and/or tufa domes. You don't have to climb to the cave mouth as the path is very steep. You will be on paved roads except at the end where you park and turn around. Don't get stuck in the mud or sand. The trip can earn 70 extra credit points. All work must be handed in two weeks before the last day of regular classes before the final. If you go, understand what you are looking for because Mr. Fuller will ask you questions about the geology.**

# EXCAVATION OF TOMMY TUCKER CAVE, LASSEN COUNTY, CALIFORNIA

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THE following is a brief account of the partial excavation of a cave on the east side of Honey Lake Valley, near Wendel in Lassen County, California.<sup>2</sup> Although the materials recovered are not extensive, these notes seem warranted by the fact that this is the only dry cave archaeology done south of Oregon on this extreme western periphery of the Great Basin. Ninety miles to the east, work has been done in Lovelock Cave<sup>3</sup> and Humboldt Cave.<sup>4</sup> Some 150 miles north of our area the University of Oregon, under the direction of L. S. Cressman, has devoted nearly seven years (1935-42) to excavating the dry caves of south-central Oregon.<sup>5</sup>

Honey Lake is the remnant of the westernmost arm of extinct Lake Lahontan. Its surface is 3,950 feet above sea level at the present time. The lake is bounded on the northeastern corner by Hot Springs Peak, a mountain of Miocene volcanics. Tommy Tucker Cave, *circa* 200 feet above the valley floor, is a fissure on a fault line near the foot of this peak. It is two miles east of the present lake shore, the closest permanent water. Perhaps more accessible than

the lake shore is a group of active hot springs at Amadee, two and a half miles to the southwest, or a similar group near Wendel, three miles to the northwest.

The site is in territory occupied within historic times by a Northern Paiute band called the Wadadökadö.<sup>6</sup> The large peninsula which juts into Honey Lake fifteen miles to the southwest is frequently ascribed to the Washo; a similar distance to the west the Maidu held the western shores of the lake.

The general trend of the cave is north and south, i.e., parallel rather than at right angles to the face of the mountain. Because of this, the cave cannot be seen from the valley floor. A narrow shelf runs along the bluff face at the level of the cave mouth and from this shelf a talus slope drops for 150 feet so sharply that ascent and descent are very difficult.

Tommy Tucker Cave consists of two chambers connected by a narrow passage. The larger and foremost of these is 45 feet long, 20 feet wide, about 12 feet high, and is extremely irregular in outline. This complete area was excavated to a depth of 40 inches. At no point was the original floor reached.<sup>7</sup> The north wall and the roof are composed of crumbling volcanic breccia; the south wall, of a much more durable andesite. The roof and considerable portions of the cave walls are covered with a 4-inch thick layer of calcareous tufa, presumably laid down when Lake Lahontan covered the cave.

The ceiling of the cave is heavily coated with soot. No true strata were observable, but lenses of charcoal and straw were present. The human deposit in the cave covered the entire floor, extending to as great a depth as we reached anywhere in our excavations. It consisted of an extremely dusty admixture of ordinary camp refuse material with gravel (constantly crumbling from the breccia ceiling) and bat guano. The fact that these last two materials did not

<sup>1</sup> This paper is one of a collection of manuscripts assembled for the California Archaeological Survey under the title of "An Archaeological Survey of Lassen County, California."

<sup>2</sup> The first excavation was carried on during two weeks of August, 1940, by Harry and Francis Riddell. In January, 1942, Richard K. Beardsley and the authors spent an additional ten days at this site. The materials described are in the Museum of Anthropology, University of California. The cave is named for a Maidu Indian World War I hero, a native of Lassen County.

We are indebted to Mr. Adan Treganza for preparing the drawings of the sandals, the bone artifacts, and the projectile points; to Dr. L. S. Cressman, of the University of Oregon, for examining and aiding in the description of the basketry and sandals; to Drs. Alden H. Miller and Harvey Fisher, of the University of California Museum of Vertebrate Zoology, for identifying the mammalian and avian remains; to Mr. Clement Meighan for preparing the photographic plate; and to Dr. Herbert L. Mason, of the University of California Herbarium, for identification of botanical remains.

<sup>3</sup> Loud and Harrington, 1929.

<sup>6</sup> Stewart, 1938; Stewart, 1939.

<sup>7</sup> A plat of the cave floor was prepared and objects of interest were located in reference to a datum, a plane, and an excavation block. These data are not presented in