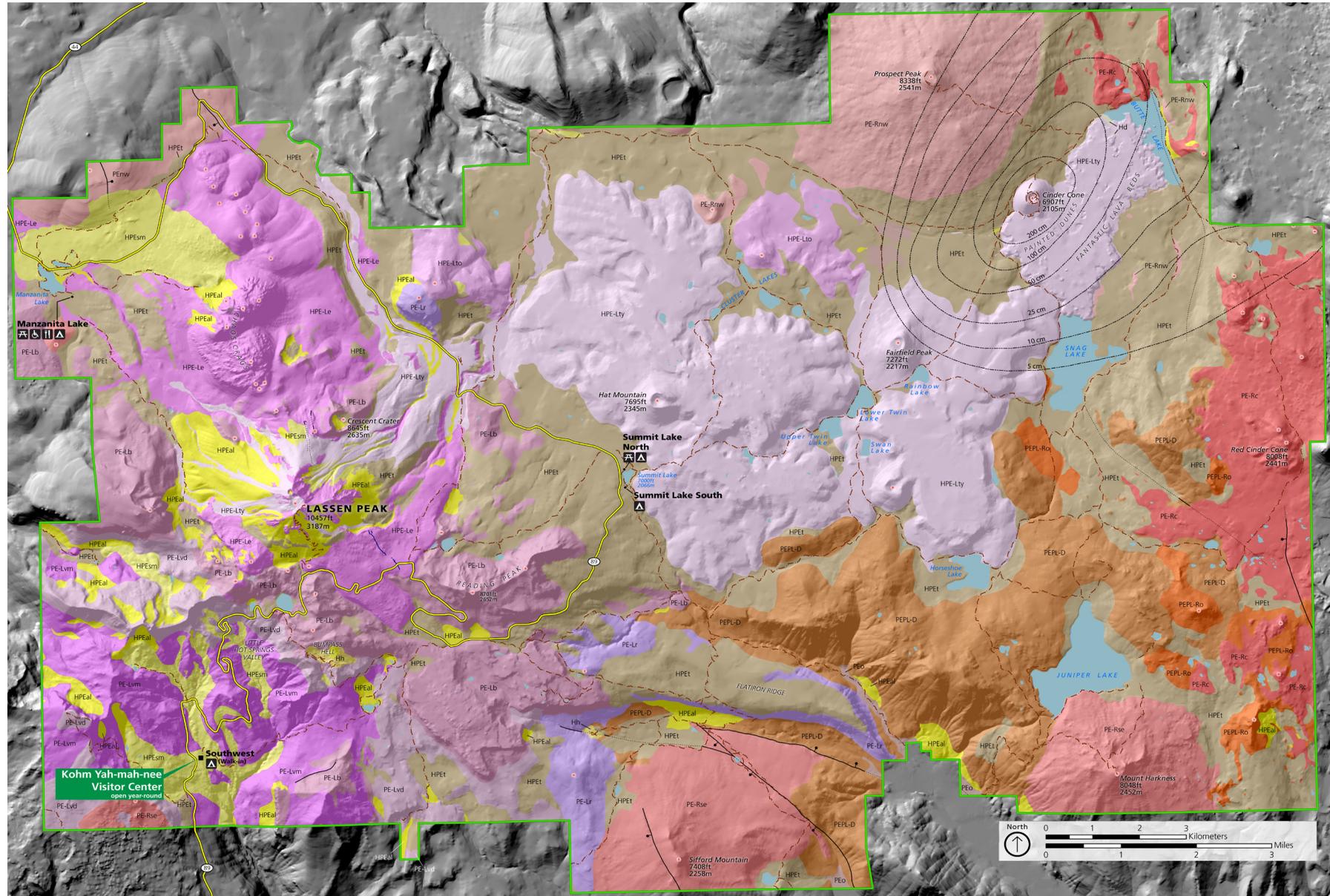




Condensed Geologic Map



Infrastructure

- Park Boundary
- Trails
- Park Highway
- Campground
- Buildings

Geologic Features

- Vent
- Non-eruptive Fissure
- Normal Fault, known
- Normal Fault, concealed
- Ash from Cinder Cone - Isopacks

Lassen Volcanic Center

- HPE-Lty Twin Lakes sequence, younger
- HPE-Le Eagle Peak sequence
- HPE-Lto Twin Lakes sequence, older
- PE-Lb Bumpass sequence
- PE-Lvd Brokeoff Volcano, Diller sequence
- PE-Lvm Brokeoff Volcano, Mill Canyon
- PE-Lr Rockland Caldera Complex

Surficial Units

- Water
- HPEal Alluvium, Talus, and Colluvium
- HPEsm Slope-movement Deposits
- Hh Hydrothermal Deposits
- HPEt Glacial Deposits, till
- PEO Glacial Deposits, outwash
- Hd Diatomite

Regional Volcanic Rocks

- PE-Rnw North and West of Lassen Volcanic Center
- PE-Rse South and East of Lassen Volcanic Center
- PE-Rc Caribou Volcanic Field
- PEPL-Ro Older Regional Volcanic Rocks of the Caribou Area
- PEPL-D Ditmar Volcanic Complex

Unit Descriptions

Lassen Volcanic Center

HPE-Lty **Twin Lakes sequence, younger** - Lava flows and domes, tephra, pyroclastic flows, debris flows, and cinders. Rock types range from basaltic-andesite to dacite. Includes historic Lassen Peak eruptions and Cinder Cone. Emplaced 93,000 - 100 years ago.

HPE-Lto **Twin Lakes sequence, older** - Includes andesitic cinders and lava flows of Raker Peak and Cluster Lakes. Heavy glaciation. Estimated to be 300,000 - 250,000 years old. Much younger than underlying rhyolite of Raker Peak.

HPE-Le **Eagle Peak sequence** - Rhyodacitic and dacitic lava flows and domes of Eagle Peak, Chaos Crags and Kings Creek, includes eruptive event that formed Lassen Peak ~27,000 years ago. Glaciated and may be overlain by moraines. Emplaced 66,000 - 1,050 years ago.

PE-Lb **Bumpass sequence** - Dacite and rhyodacite lava domes of Bumpass Mountain, Mount Helen, Ski Heil, Vulcan's Castle, Reading Peak, and Crescent Crater. Emplaced 300,000 - 193,000 years ago.

PE-Lvd **Brokeoff Volcano, Diller sequence** - Andesite (60-63% SiO₂) lava flows erupted from unpreserved vents high on Brokeoff Volcano. 300-400 meters thick. Emplaced 485,000 - 387,000 years ago.

PE-Lvm **Brokeoff Volcano, Mill Canyon sequence** - Mix of basaltic andesite and andesite lava flows with sparse dacite lava flows. Includes tephra fallout and hydrothermal alteration. Emplaced 591,000 - 470,000 years ago.

PE-Lr **Rockland Caldera Complex** - Rhyolite and dacite lava domes flows that underlies Brokeoff Volcano. Part of a caldera-forming explosion in the Lassen Volcanic Center. Emplaced 827,000 - 588,000 years ago.

Regional Volcanic Rocks

PEPL-D **Ditmar Volcanic Complex** - Eroded remnants of composite volcano. Rhyolite and andesite lava flows and domes with sparse dacite. Age of exposed rocks range from 2.3 - 1.3 million years old. Similar rocks are undoubtedly found buried beneath the younger Lassen Volcanic Center.

PE-Rnw **North and West of Lassen Volcanic Center** - Andesite and basalt lava flows that form shield volcanoes, cinder cones, and spatter cones. Vent areas generally poorly preserved. Age of rock varies from an estimated 1 million - 143,000 years ago.

PE-Rse **South and East of Lassen Volcanic Center** - A variety of basalt and andesite flows that form shield and cinder cone volcanoes. Includes Mt. Harkness. Age range between 300,000 - 172,000 years ago.

PE-Rc **Caribou Volcanic Field** - Principally basalt lava with some andesitic basalt. Formed lava flows and cinder cones. Area is glaciated and some flows may have been confined by glaciers. Rocks are dated between 331,000 - 20,000 years ago.

PEPL-Ro **Older Regional Volcanic Rocks of the Caribou Area** - Basalt and basaltic andesite lava flows and cones. Unit is heavily glaciated; typically only flow cores remain and crop out. Age of rocks was determined to be 725,000 - 650,000 years old.

Additional Resources

Geologic Map of Lassen Volcanic National Park and Vicinity, California (scale 1:50,000) Clynne, M.A. and L.J.P. Muffler. 2010. Scientific investigations map 2899. US Geologic Survey. Menlo Park, CA
pubs.er.usgs.gov/publication/sim2899

Surficial Units

HPEal **Alluvium, Talus, and Colluvium** - Sand and gravel in modern stream channels; and rubble consisting mainly of talus at the base of cliffs or steep slopes. Deposited primarily within the last 11,000 years.

HPEsm **Slope-movement Deposits** - Nonsorted, unconsolidated, nonbedded deposits of course to fine rubble. Primarily deposited over the last 11,000 years.

Hh **Hydrothermal Deposits** - Light grey or orange-brown, altered andesite and dacite. May be so intensively altered that original lithology is indeterminable. Includes areas of kaolinite and silica. Alteration is ongoing.

HPEt **Glacial Deposits, till** - Poorly sorted, unconsolidated, nonbedded rock and rock fragments. Occurs as sheet like deposits, and large and small well preserved moraines. Deposited 70,000 - 8,000 years ago.

PEo **Glacial Deposits, outwash** - Moderately sorted, unconsolidated gravel and sand commonly containing boulders as much as 2 m across. Occurs as partial valley fills, thick sheets and alluvial fans. Deposited 130,000 - 8,000 years ago.

Hd **Diatomite** - Deposits of diatomite in ancient Butte Lake. Pattern of deposits indicate that a much larger lake existed prior to the eruption of Cinder Cone.

Lassen Volcanic National Park Geologic Resources Inventory Report, NPS Geologic Resources Division
Lakewood, Colorado
nature.nps.gov/geology/inventory/gre_publications.cfm