Honey Lake Valley Groundwater Basin

- Groundwater Basin Number: 6-4
- County: Lassen, CA and Washoe, NV
- Surface Area: 311,750 acres (487 square miles)

Basin Boundaries and Hydrology

Honey Lake Valley is part of the Basin Range Geomorphic Province that extends into California. The valley is bounded to the north and northeast by Plio-Pleistocene basalt of Antelope Mountain, Shaffer Mountain, and Amedee and Skedaddle Mountains, and the Modoc plateau. The valley is bounded on the southwest by Mesozoic granitic rocks of the Diamond Mountains of the Sierra Nevada Geomorphic Province. Bald Mountain protrudes through the valley floor northwest of Honey Lake.

More than 40 streams flow from the Diamond, Fort Sage, and the Virginia Mountains and the northern volcanic uplands. Most streams are intermittent. The largest streams are the Susan River, Willow Creek, Long Valley Creek, and Gold Run Creek, which originate in the western mountains. Tributaries to the Susan River are Gold Run, Piute, and Willow creeks. Honey Lake is the most prominent surface feature in the basin with an average surface area of 47,000 acres. The lake fluctuates greatly in area and volume (USGS 1990).

The basin extends into Washoe County, Nevada. The California portion of the basin is about 45 miles long and varies in width from 10- to 15-miles. The basin is underlain by granitic bedrock at depths of 5,000 to 7,000 feet (USGS 1990).

Annual precipitation ranges from 7 to 15 inches.

Hydrogeologic Information

Water-Bearing Formations

Holocene sedimentary deposits, Pleistocene lake and near-shore deposits, and Pleistocene and Plio-Pleistocene volcanic rocks comprise the Honey Lake Valley Groundwater Basin aquifer system. The following summary is from USGS (1990) and DWR (1963).

Holocene Sedimentary Deposits. These deposits consist of intermediate alluvium, alluvial fans, and basin deposits that partly fill the structural depression underlying Honey Lake Valley.

The alluvial deposits contain poorly sorted silt, sand, and gravel that accumulate near the rim of the basin and along perennial streams where they enter the valley. The permeability of these deposits is moderate and, due to their limited thickness (up to 100 feet), yield small amounts of water.

The alluvial fans consist of poorly sorted deposits ranging in size from clay to boulders that interfinger with fine-grained lake deposits toward the center of the basin. These deposits have moderate to high permeability and may reach a thickness of 300 feet. The fans have limited areal extents along the southern perimeter of the basin. The fans yield large amounts of confined and unconfined groundwater.

The finer-grained basin deposits consist of poorly consolidated, bedded sand, silt, and clay deposited near the center of the basin. The basin deposits interfinger with the alluvial deposits. The deposits are generally thin, have low permeability, and are considered a poor source of water.

Underlying the Holocene sedimentary deposits are Pliocene semiconsolidated sedimentary and pyroclastic deposits of tuffaceous silt, clay, diatomite, sand, and pyroclastic air-fall and water-laid volcanic tuffs. The thickness is over 4,500 feet between Litchfield and Herlong and thins toward the edge of the basin. The deposits generally have low permeability.

Pleistocene Lake and Near-Shore Deposits. Lake and near-shore deposits reach a thickness up to 700 feet. The lake deposits contain a number of highly permeable sand beds in the area northwest of Honey Lake where they are important sources of groundwater. Lake deposits found east of Honey Lake and north of Herlong consist mainly of silt and clay with low permeability and are a poor source of groundwater.

The near-shore deposits are coarse-grained and form a continuous belt around the edge of the valley. The deposits are highly permeable and yield large amounts of water where saturated.

Plio-Pleistocene and Pleistocene Volcanic rocks. These volcanic rocks consist of jointed volcanic flows of the Modoc Plateau, which generally have scoriaceous tops and bottoms and dense interiors. They are found in the north and east side of the basin. This unit has moderate to high permeability and is an important confined aquifer in the northwestern and northeastern portions of the valley. The lava flows also serve as important recharge areas.

Recharge Areas

The major sources of groundwater recharge are direct infiltration of precipitation in upland areas and infiltration of streamflow in alluvial-fan areas accounting for approximately 80 percent of total recharge (USGS 1990). The remaining 20 percent consists of infiltration of surface water and irrigation flow on the valley floor (USGS 1990). The upland recharge areas consist of Plio-Pleistocene and Pleistocene basalt flows. Subsurface flow may also enter the valley from Secret Valley through Pliocene lake sediments, which appear to be continuous beneath the lava field separating the two valleys (DWR 1963).

Groundwater Level Trends

The water levels in most wells declined 10 feet or more during the early 1990s and have since recovered to pre-1990 levels.

Groundwater Storage

Groundwater in Storage. The total volume of water stored in the upper 100 feet of saturated basin-fill deposits and volcanic-rock aquifers is estimated to be 10 million acre-feet. Not all of this water is economically recoverable or of acceptable quality for practical use (USGS 1990).

Groundwater Budget (Type B)

Estimates of groundwater extraction are based on a survey conducted by the California Department of Water Resources during 1997. The survey included land use and sources of water. Estimates of groundwater extraction for agricultural; municipal and industrial; and environmental wetland uses are 51,000, 15,000, and 3,800 acre-feet, respectively. Deep percolation from agricultural applied water is estimated to be 14,000 acre-feet.

Groundwater Quality

Characterization. Water quality varies in the basin. Calcium bicarbonate to sodium bicarbonate type waters occur in the Janesville-Buntingville area and south of Herlong and along the southwestern side of Honey Lake. Sodium bicarbonate type waters occur east of Honey Lake and north of the railroad. Poor quality waters, sodium-calcium bicarbonate-sulfate in character, exist east of Honey Lake and north of Herlong near the ordnance depot. Dissolved solids generally increase west to east and range from 89 to 2,500 mg/L, averaging 518 mg/L (DWR unpublished data).

Impairments. Poor quality water with high boron, arsenic, ASAR, total dissolved solids, fluoride, and nitrate levels occur between Litchfield and Honey Lake, and east of Honey Lake and north of Herlong. Some wells in the vicinity of Standish have high concentrations of arsenic. Thermal waters exist in several areas derived from a fractured bedrock flow system associated with the Honey Lake and Walker Lane fault systems—most notably in the Wendel and Amedee area (Varian 1997). The Juncal and Bohm (1987) investigation indicates that the Wendel-Amedee system is part of a deep flow system with recharge from the Diamond Mountain Range of the Sierra Nevada (Varian 1997). Amedee Hot Springs is on the eastern edge of Honey Lake and is coincident with the extension of Amedee fault (DWR 1968).

Locally, wells have high hardness, boron, fluoride, iron, ammonia, phosphorus, sulfate, manganese, sodium, calcium, chloride, and nitrate levels.

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	54	4
Radiological	17	1
Nitrates	60	0
Pesticides	12	0
VOCs and VSOCs	12	0
Inorganics – Secondary	54	11

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater*

– *Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Production Characteristics

	Well yields (gal/min)	
Irrigation	Range: 20–2500	Average: 784 (19 Well Completion Reports)
	Total depths (ft)	
Domestic	Range: 20–1005	Average: 180 (1,525 Well Completion Reports)
Irrigation	Range: 35–845	Average: 368 (146 Well Completion Reports)

Active Monitoring Data

Agency	**Parameter**	**Number of wells /measurement frequency**
DWR	Groundwater levels	39 wells semi-annually
Soil Conservation Service		14 wells semi-annually
Sierra Army Depo		4 wells semi-annually
DWR	Miscellaneous water quality	24 wells every 3 years
Department of Health Services		49 wells

Basin Management

Groundwater Management:	Honey Lake Valley Groundwater Basin Act Honey Lake Valley Groundwater Management District
Water Agencies	
Public	West Patton Village CSD, City of Susanville WSA
Private	Lassen Irrigation District

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Errata

Changes made to the basin description will be noted here.