Tahoe Valley Groundwater Basin, Tahoe South Subbasin

- Groundwater Basin Number: 6-5.01
- County: El Dorado
- Surface Area: 14,800 acres (23 square miles)

Basin Boundaries and Hydrology

The Tahoe Valley South Subbasin of the Tahoe Valley Groundwater Basin is about 150 miles east of the San Francisco Bay Area and about 90 miles east of the Sacramento Valley. The Tahoe Valley Groundwater Basin is within the larger structural feature commonly referred to as the Lake Tahoe Basin. The groundwater basin consists of three alluvial areas surrounding the California side of the lake on the south, west, and north. The subbasin occupies a roughly triangular area and is bounded on the southwest and southeast by the Sierra Nevada, on the north by the southern shore of Lake Tahoe, and to the northeast by the California-Nevada state line. The southern boundary extends about 3 miles south of the town of Meyers and forms the triangular apex. Elevations within the subbasin range from 6,225 feet at lake level to above 6,500 feet in the south.

The Upper Truckee River flows north along the entire length of the basin and drains into Lake Tahoe. The river is joined by Grass Lake and Big Meadow creeks near the southern end of the basin, Angora Creek centrally, and Trout Creek near the northern extent of the basin. Average annual precipitation in the subbasin ranges from 23 inches to 49 inches, increasing from north to south.

Hydrogeologic Information

Water Bearing Formations

The principal source of groundwater in the Tahoe Valley South subbasin is from Tertiary and Quaternary age glacial, fluvial, and lacustrine sediments, collectively referred to as basin-fill deposits (Burnett 1971). Each of the three depositional processes gives rise to distinct sediment types with variable hydraulic properties (Scott et al 1978). Specific-yield estimates in the basin range from 6 to 20 percent and average about 10 percent (Thodal 1997). Most water wells drilled in the basin are completed in basin-fill deposits (Thodal 1997), where groundwater occurs under confined, semi-confined, and unconfined conditions. Pre-Cretaceous granitic rocks form the base of the aquifer.

Basin-fill deposits. Glacial outwash sediments, deposited on prograding deltas, are the predominant sediments within the basin, and are typically composed of rock ranging from fine silt to large boulders that have been sorted and stratified by the action of water flowing from the glacier (Freeze and Cherry 1979). Thickness may range from 1,600 to 1,900 feet in the South Lake Tahoe area (Blum 1979), but typically ranges from 50 to 150 feet (HydroSearch, Inc. 1974). Permeability of these deposits can be moderate to high. Glacial sediments consisting of moraine deposits also occur within the basin and mark the extent of glacial advance. These deposits are generally unsorted, have high clay content, and are produced by the grinding glacial action. They typically have moderate permeability.

Lacustrine deposits. These deposits are widespread and discontinuous, and are a result of fluctuating lake levels. They occur as high as 600 feet above the current lake level (about 6,225 feet). Deposits containing well-sorted beach sand have relatively high permeability, but those with high silt and clay content have lower permeability (Thodal 1997).

Holocene Fluvial Deposits. Holocene fluvial deposits are located along stream channels; however, their limited thickness and extent makes them relatively insignificant in the basin (Woodling 1987).

Groundwater Level Trends

Groundwater elevation changes are directly related to changes in groundwater storage. As reported by Thodal (1997), changes in groundwater storage have been minimal. Decreases in groundwater storage have resulted locally in areas of pumping. A cone of depression in the groundwater table had developed in the South Lake Tahoe urban area in the 1960s and 1970s but has since begun to recover. In addition, elevation data from six wells regularly monitored by DWR (generally on a semi-annual basis, beginning in the 1960s and continuing until the present) indicate no long-term change in water levels (DWR unpublished monitoring data).

Groundwater Storage

Total Storage. Published calculations indicate about 936,760 acre-feet of total storage capacity within the subbasin (SWRCB 1979). That study used assumed a surface area 25,310 acres, which is considerably larger than the area currently delineated and the approximate area published in Bulletin 118 –75 (~13,440 acres). Specific yield and thickness for the SWRCB study was calculated for individual sections (approximately one square mile) based on extensive review of well completion reports.

Groundwater in Storage. Based on groundwater levels obtained in 1978, the SWRCB (1979) calculated the amount of groundwater in storage at 827,625 af, with about 341,000 af of groundwater in storage above the lake surface elevation of 6,225 feet.

Groundwater Budget (Type C)

No published groundwater budget information was found.

Groundwater Quality

Characterization. Water composition is variable, but generally is of a mixed-cation bicarbonate type (Woodling 1987, Thodal 1997). Total dissolved solids values range from 59 to 260 mg/L based on nine wells sampled from 1990-1992 (Thodal 1997). Electrical conductivity values range from 94 to 542 μmhos/cm based on eight wells sampled in 1996 (Rowe and Allander 2000).

Impairments. Woodling (1987) reports that the nitrate-nitrogen and phosphorous quantities entering Lake Tahoe from the groundwater basin, while small, are a significant percentage of the total nutrient budget for the lake. He concluded that more study was needed to evaluate whether the chemical concentrations present may be harmful to the lake (by stimulating algal growth in the lake).

South Tahoe Public Utilities District reports that MTBE has had a major impact on the groundwater supply within its service area (STPUD supplies most of the groundwater within the basin). Low concentrations of MTBE have rendered 12 of its 34 production wells useless, and have forced a reduction in pumping in one well. As a result, two contaminated wells have been destroyed and two new wells have been drilled (Berghson 2000).

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	44	2
Radiological	47	4
Nitrates	46	0
Pesticides	44	0
VOCs and VSOCs	44	8
Inorganics – Secondary	44	12

[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)	
Municipal/Irrigation	Range: 4–4,000	Average: NA (based on 34 wells; Woodling 1987)
	Total depths (ft)	
Domestic	Range: 32–412	Average: 142 (based on 55 wells)
Municipal/Irrigation	Range: 46–364	Average: 207 (based on 8 wells)

Active Monitoring Data

Agency	Parameter	Number of Wells /Measurement Frequency
DWR	Groundwater levels	6 wells/ semi-annually
STPUD		34 production wells, infrequent
DWR	Miscellaneous water quality	4 well/ biennially
Department of Health Services, including cooperators	Title 22 water quality	54 wells

Basin Management

Groundwater Management	STPUD is preparing a groundwater management plan pursuant to AB3030, with an anticipated date for submittal to its board of directors in 2001.
Water Agencies	
Public	Lakeside Mutual Water, STPUD, Tahoe Keys Water Company
Private	

References Cited

Berghson, I. 2000. South Tahoe Public Utilities District, personal telephone communication, November 20, 2000.

Blum, J.L. 1979. *Geologic and Gravimetric Investigation of the South Lake Tahoe Groundwater Basin, California*. University of California, Davis, unpublished M.S. Thesis. 96 p.

Burnett, J.L. 1971. "Geology of the Lake Tahoe Basin." *California Geology* 24(7): 119-127.

California State Water Resources Control Board (SWRCB). 1979. *Report on Water Use and Water Rights – Lake Tahoe Basin.*

Freeze, R.A. and J.A. Cherry. 1979. *Groundwater*. Englewood Cliffs, N.J.: Prentice-Hall, Inc. 604p.

Hydro-Search, Inc. 1974. *Evaluation of ground-water supply, Ward Creek Valley, California.* Project report. 55p.

Rowe, Timothy G and Kip K. Allander. 2000. *Surface- and Ground-Water Characteristics in the Upper Truckee River and Trout Creek Watersheds, South Lake Tahoe, California and Nevada, July-December 1996.* Water-Resources Investigations Report 00-4001. USGS. 39 p.

Scott, Verne H., J.C. Scalmanini and R.A. Mattews. 1978. *Groundwater Resources of the South Tahoe Public Utility District.* Department of Water Science and Engineering, University of California, Davis.

Thodal, Carl E. 1997. *Hydrogeology of Lake Tahoe Basin, California and Nevada, and Results of a Ground-Water Quality Monitoring Network, Water Years 1990-1992*. Water-Resources Investigations Report 97-4072. USGS. 53 p.

United States Geological Survey (USGS). 1997. *Stream and Ground-Water Monitoring Program, Lake Tahoe Basin, Nevada and California*. Fact Sheet FS-100-97. 6 p.

Woodling, John K. 1987. *A Hydrogelogic Investigation of Ground Water – Lake Interaction in the Southern Tahoe Basin*. M.S. Thesis, University of California, Davis. 133 p.

Additional References

Crippen, J.R., and B.R. Pavelka. 1970. *The Lake Tahoe Basin, California-Nevada.* U.S. Geological Survey Water-Supply Paper 1972. 56p.

Errata

Changes made to the basin description will be noted here.