Sacramento Valley Groundwater Basin, Los Molinos Subbasin

- Groundwater Basin Number: 5-21.56
- County: Tehama, Butte
- Surface Area: 33,170 acres (52 square miles)

Basin Boundaries and Hydrology

The Los Molinos Subbasin comprises the portion of the Sacramento Valley groundwater basin bounded on the west by the Sacramento River, on the north by Mill Creek, on the east by the Chico Monocline, and on the south by Deer Creek. Mill Creek and Deer Creek serve as hydrologic boundaries in the near surface. The subbasin is hydrologically contiguous with Dye Creek and Vina subbasins at depth. The Chico Monocline serves as a geographical boundary with some areas of recharge located east of the boundary. Annual precipitation is approximately 18-inches.

Water-Bearing Formations

The aquifer system of the subbasin is comprised of continental deposits of late Quaternary to Tertiary age. The Quaternary deposits include Holocene stream channel deposits, Pleistocene Modesto Formation terrace deposits located along most stream and river channels, and Pleistocene fanglomerate deposits from the Cascade Range. The Tertiary deposits include the Tuscan Formation.

Holocene Stream Channel Deposits. The western edge of the subbasin is bounded by Holocene stream channel deposits of the Sacramento River. These deposits consist of moderately to highly permeable unconsolidated gravel, sand, silt and clay derived from the erosion, reworking, and deposition of the adjacent Tuscan and Tehama formations (DWR 2000). The thickness varies from 1- to 80-feet (Helley and Harwood 1985). The unit represents the upper part of the unconfined zone of the aquifer and is moderately-to-highly permeable; however, the thickness and areal extent of the deposits limit the water-bearing capability.

Pleistocene Modesto Formation. Pleistocene Modesto Formation deposits (deposited between 14,000 and 42,000 years ago) extend from Mill Creek to Deer Creek on the west side of the subbasin and along the courses of Mill Creek, Deer Creek, and Thomes Creek. The formation consists of undifferentiated terrace deposits of unconsolidated weathered and unweathered gravel, sand, silt and clay. Thickness of the unit can range from 0- to 150-feet (DWR 2000).

Pleistocene Fanglomerate. Along with the Modesto Formation, the fanglomerate is a primary surficial deposit in the subbasin. The formation is an alluvial fan deposit derived from erosion and deposition of volcanic material from mudflows of the Tuscan Formation and consists of polylithic volcanic clasts set in a weathered tuffaceous matix. The fan deposits are poorly sorted and somewhat indurated to well cemented. The fanglomerate is being dissected by Mill Creek and Deer Creek. Thickness of the deposit is

up to 150 feet (Ely 1994). The fanglomerate is not sufficiently thick to produce large quantities of groundwater (Olmsted and Davis 1961).
Pliocene Tuscan Formation. The Tuscan Formation is the primary source of groundwater in the subbasin. The formation is composed of a series of volcanic mudflows, tuff breccia, tuffaceous sandstone and volcanic ash layers. The formation is described as four separate but lithologically similar units, A through D (with Unit A being the oldest), which in some areas are separated by layers of thin tuff or ash units (Helley and Harwood 1985). Units A, B, and C are found within the subbasin and extend in the subsurface west of the Sacramento River (DWR 2000).

Unit A is the oldest water bearing unit of the formation and is characterized by the presence of metamorphic clasts within interbedded lahars, volcanic conglomerate, volcanic sandstone and siltstone. Unit B is composed of fairly equal distribution of lahars, tuffaceous sandstone, and conglomerate. Unit C consists of massive mudflow or lahar deposits with some interbedded volcanic conglomerate and sandstone. In the subsurface, these low permeability lahars form thick confining layers for groundwater contained in the more permeable sediments of Unit B.

The Tuscan Formation reaches a thickness of 1,500 feet over older sedimentary deposits (DWR 2000). The dip of the formation averages approximately 2.5 degrees, east of the valley, and steepens sharply to 10- to 20-degrees southwestward towards the valley at the Chico Monocline (Olmsted and Davis 1961). The formation flattens beneath valley sediments.

Groundwater Level Trends

Review of the hydrographs for long-term comparison of spring-spring groundwater levels indicates a slight decline associated with the 1976-77 and 1987-94 droughts, followed by a recovery to pre-drought conditions of the early 1970's and 1980's. Generally, groundwater level data show an average seasonal fluctuation of approximate 2 feet for normal and dry years. Overall, there does not appear to be any increasing or decreasing trends in groundwater levels.

Groundwater Storage

The storage capacity of the subbasin was estimated based on estimates of specific yield for the Sacramento Valley as developed in DWR (1978). Estimates of specific yield, determined on a regional basis, were used to obtain a weighted specific yield conforming to the subbasin boundary. The estimated specific yield for the subbasin is 6.0 percent. The estimated storage capacity to a depth of 200 feet is approximately 397,740 acre-feet.

Groundwater Budget (Type B)

Estimates of groundwater extraction for the Los Molinos Subbasin are based on a field survey conducted by the California Department of Water Resources in 1994. Surveys included landuse and sources of water. Estimate of groundwater extraction for agricultural use is estimated to be 5,900 acre-feet. Municipal and industrial use is approximately 1,000 acre-feet. Deep percolation of applied water is estimated to be 3,000 acre-feet.

Groundwater Quality

Groundwater in Antelope, Dye Creek, Los Molinos, and Vina subbasins is characterized as calcium-magnesium bicarbonate and magnesium-calcium bicarbonate. Total dissolved solids (TDS) range from 119- to 558-mg/L, averaging 280 mg/L (DWR unpublished data).

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	6	0
Radiological	6	0
Nitrates	6	0
Pesticides	4	0
VOCs and SVOCs	3	0
Inorganics – Secondary	6	0

[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		
	Total depths (ft)	
Domestic	Range: 31 – 340	Average: 92 (311 Well Completion Reports)
Irrigation	Range: 27 – 740	Average: 327 (42 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	3 wells semi-annually
Department of Health Services	Miscellaneous water quality	9

Basin Management

Groundwater management:	Tehama County Flood Control and Water Conservation District
Water agencies	
Public	Tehama County Flood Control and Water Conservation District, Stanford Vina Ranch ID, Los Molinos Mutual Water Co., Los Molinos Water Works
Private	

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Errata

Changes made to the basin description will be noted here.