

## Upper Santa Ana Valley Groundwater Basin, Yucaipa Subbasin

- Groundwater Basin Number: 8-2.07
- County: San Bernardino
- Surface Area: 25,300 acres (39 square miles)

### Basin Boundaries and Hydrology

The Yucaipa Subbasin underlies the southeast part of San Bernardino Valley. It is bounded on the north by the San Andreas fault, on the west by the Redlands fault and the Crafton Hills, on the south by the Banning fault, and on the east by the Yucaipa Hills. The average annual precipitation ranges from 12 to 28 inches. This part of the San Bernardino Valley is drained by Oak Glen, Wilson, and Yucaipa Creeks south and west into San Timoteo Wash, a tributary to the Santa Ana River.

### Hydrogeologic Information

#### *Water Bearing Formations*

Groundwater is found chiefly in alluvium, with lesser quantities in the San Timoteo Formation and fractured bedrock beneath the alluvium (Moreland 1970). Specific yield is estimated to vary from less than 4 percent northeast of Yucaipa, to a maximum of about 10 percent in the southeastern part of the subbasin (DPW 1934). Alternatively, specific yield is estimated to range from about 6 to 22 percent (DWR 1967a), with the average for the subbasin of about 10 percent (DWR 1979).

**Alluvium.** Alluvial deposits in the subbasin are divided into older and younger units. The Holocene age younger alluvium consists of unconsolidated boulders, gravel, sand, silt, and clay (Moreland 1970). This unit forms a thin veneer and is mostly above the water table (Moreland 1970). The middle to late Pleistocene age older alluvium consists of boulders, gravel, sand, silt, and clay (Moreland 1970), and holds the primary source of groundwater in the subbasin. Clays present in this section are due to weathering and soil formation during accumulation of the deposits (DPW 1934).

**San Timoteo Formation.** The Pliocene-Pleistocene age San Timoteo Formation consists of alluvial deposits that have been folded and eroded. These deposits are widely distributed and principally composed of gravel, silt, and clay, with comparatively small amounts of calcite-cemented conglomerate. The clasts are chiefly granitic, with lesser amounts of volcanic and metamorphic pebbles and cobbles (DPW 1934). The total thickness of the San Timoteo Formation is estimated to be between 1,500 and 2,000 feet, but logs of deep wells near the central part of the subbasin indicate water-bearing gravels to depths of only 700 to 1,000 feet (DPW 1934).

#### *Restrictive Structures*

Several structures disrupt groundwater flow in the subbasin (DWR 1967a; Todd 1988; Wildermuth 2000). The Chicken Hill fault, Yucaipa barrier,

Casa Blanca barrier, and Gateway barrier all restrict groundwater movement, trend northeasterly, and were formed in response to differential movements along the San Andreas and Banning faults (Todd 1988). These structures displace water levels as much as 160 feet across them (Moreland 1970). The Oak Glen fault and the South Mesa barrier trend northwesterly and are the result of sympathetic movement related to the San Andreas and Banning faults (Todd 1988). These structures displace water levels as much as 120 feet across them (Moreland 1970). The Redlands (Wildermuth 2000) and Crafton faults have displacements of groundwater levels (DWR 1967a), which indicate that they are partial barriers to groundwater flow. In the western part of the subbasin, northeast-dipping beds of the San Timoteo Formation form barriers that cause groundwater to rise to the surface (DWR 1967a).

### ***Recharge Areas***

Dominant recharge to the subbasin is from percolation of precipitation and infiltration within the channels of overlying streams, particularly Yucaipa and Oak Glen Creeks, underflow from the fractures within the surrounding bedrock beneath the subbasin, and artificial recharge at spreading grounds. Four artificial recharge facilities were noted in 1967 (DWR 1967b) with a total capacity of about 56,500 af/yr. By increasing the spreading acreage along Oak Glen Creek by 25-50 acres, the capability exists to spread 7,000 to 14,000 af of surface water annually to recharge the Yucaipa Subbasin (YVWD 2000a).

### ***Groundwater Level Trends***

Water level records in most parts of the subbasin show relatively small seasonal fluctuations and a steady decline from 1918 through 1933, without significant recovery during the following wet years (DPW 1934). Increased pumping and reduced recharge caused by below-normal precipitation resulted in an increased rate of water level decline of 10 to 20 feet per year beginning in 1945 (Moreland 1970). This rate of decline continued into the early 1960s then was reduced to 5 to 10 feet per year in 1969 (Moreland 1970).

The water table in the Yucaipa Subbasin slopes steeply from the San Andreas fault through a narrow gap to Yucaipa, then flattens southwest of Yucaipa. At Liveoak Creek and other ravines in the north, the water table reaches the surface. Fluctuations in water levels were usually around 5 to 10 feet annually (DWR 1934). The subbasin currently is in an overdraft state; however, water levels are at or near historic highs. Groundwater within the subbasin is typically reached between 200 to 280 feet below the surface (YVWD 2000a).

Groundwater flow is generally from areas of recharge in the north and east along the edges the San Bernardino Mountains and the Crafton and Yucaipa Hills, towards the Bunker Hill Subbasin on the southwest and west (Wildermuth 2000; YVWCD 2000a).

### **Groundwater Storage**

**Groundwater Storage Capacity.** The total capacity of the subbasin has been estimated to be 807,517 af (YVWD 2000), 783,000 af (DWR 1986), and 1,230,000 af (DWR 1967a). The estimated storage capacity of the upper 100-foot zone in the Yucaipa Subbasin is 99,000 af (DPW 1934).

**Groundwater in Storage.** Groundwater in storage in 1986 was estimated to have been about 585,700 af (Mann 1986) and in 1960 to be about 626,000 af (DWR 1967a).

### **Groundwater Budget (Type A)**

Inflow into the subbasin from natural recharge for 1988 is estimated to have been 7,900 af and subsurface inflow is considered negligible (Todd 1988). Artificial recharge is through spreading of surface water, but accounts for less than 1,000 af (YVWD 2000a). Groundwater extractions for domestic and irrigation use is 13,800 af/yr (YVWD 2000a). Subsurface outflow is 890 af/yr (Todd 1988). Using these figures, the total change in storage for the subbasin in 1988 would be a loss of about 5,790 af. The amount of groundwater extracted in 1980 was estimated to be 4,485 af and the estimated deep percolation for 1980 through 2040 ranges from 14,900 to 20,300 af (DWR 1986).

### **Groundwater Quality**

**Characterization.** Groundwater in the subbasin is calcium-sodium bicarbonate in character (DWR 1966; SBVWCD 2000). Water sampled from 43 public supply wells show an average TDS content of approximately 322 mg/L with a range of 200 to 630 mg/L. The average TDS content has also been estimated to be 343 mg/L (DWR 1986) and 334 mg/L (SBVWCD 2000).

**Impairments.** Nine wells sampled north and west of Yucaipa showed high sulfate and nitrate levels (DPW 1933), although in the 1960s no wells showed significant nitrate concentrations and only one well was slightly elevated with sulfate content (DWR 1966).

### **Water Quality in Public Supply Wells**

Constituent Group <sup>1</sup>	Number of wells sampled <sup>2</sup>	Number of wells with a concentration above an MCL <sup>3</sup>
Inorganics – Primary	43	1
Radiological	44	1
Nitrates	46	12
Pesticides	43	4
VOCs and SVOCs	44	1
Inorganics – Secondary	43	4

<sup>1</sup> 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).

<sup>2</sup> Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.

<sup>3</sup> 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 Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: 2 – 2,800 gal/min	Average: 206 gal/min
	Total depths (ft)	
Domestic	Range: 18 – 1,070 ft	Average: 302 ft
Municipal/Irrigation	Range: 150 – 1,150 ft	Average: 497 ft

## Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Groundwater levels	19
USGS	Miscellaneous water quality	3
Department of Health Services and cooperators	Title 22 water quality	45

## Basin Management

Groundwater management: The YVWD is currently involved with development of a groundwater management plan (AB3030 plan) to prescribe collective management of the subbasin (YVWD 2000a).

Water agencies

Public Yucaipa Valley Water District

Private

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## Errata

Substantive changes made to the basin description will be noted here.