Santa Clara River Valley Basin, Fillmore Subbasin

- Groundwater Basin Number: 4-4.05
- County: Ventura
- Surface Area: 20,800 acres (32.5 square miles)

Basin Boundaries and Hydrology

Fillmore Subbasin is bounded on the north by impervious rocks of the Topatopa Mountains and the San Cayetano fault and on the south by impervious rocks of Oak Ridge and the Oak Ridge fault. The eastern and western boundaries are marked by bedrock constrictions that cause rising groundwater (CDPW 1933; CSWRB 1956). Ground surface elevations range from 280 feet above sea level in the west to about 1,000 feet above sea level along the north and south edges (CSWRB 1956). The Santa Clara River and Sespe Creek drain the surface waters of the subbasin. Average annual precipitation ranges from 14 to 18 inches.

Hydrogeologic Information

The primary water-bearing materials are sands and gravels of the upper Pleistocene to Holocene age alluvium and the lower Pleistocene San Pedro Formation (CSWRB 1956). Groundwater in these sediments is generally unconfined. The average well yield is about 700 gpm, and the average water-bearing thickness of the sediments is about 425 feet (Panaro 2000). Average specific yield is 12 percent (CSWRB 1956).

Water Bearing Formations

Alluvium. The Pleistocene to Holocene age alluvium consists of silts and clays with lenses of more permeable sand and gravel. The alluvium reaches a maximum thickness of about 200 feet.

San Pedro Formation. The Pleistocene age San Pedro Formation consists dominantly of finer sands and gravels than the overlying alluvium. The San Pedro Formation extends as deep as 4,000 feet (CSWRB 1956; Panaro 2000).

Restrictive Structures

The San Cayetano and Oak Ridge faults restrict groundwater movement in and out of the subbasin. Both faults are covered by a thin amount of Holocene age alluvial gravel, but place water-bearing alluvium against semi-permeable Modelo Formation in the sub-surface (CSWRB 1956). The Santa Clara River syncline helps direct flow of groundwater and, where warped and constricted, causes groundwater to rise toward the surface (CSWRB 1956).

Recharge Areas

Recharge to the subbasin is provided by percolation of surface flow in the Santa Clara River, Sespe Creek, and minor tributary streams. Some of the surface flow in the Santa Clara River originates as release from Lake Piru and contains natural runoff of precipitation and imported State Water Project water (UWCD 2000). Subsurface flow from Piru Subbasin, direct

percolation of precipitation, and percolation of irrigation waters provide recharge as well.

Groundwater Level Trends

Groundwater in Fillmore Subbasin generally flows to the west, and the gradient decreases westward (CSWRB 1956). Water levels in the Fillmore Subbasin vary cyclically according to seasonal changes in pumping and precipitation. During the last 50 years, the groundwater levels have varied over a range of about 45 feet and during the last 30 years, a range of about 30 feet (UWCD 1996, 1999b). Like the Piru Subbasin to the east, the Fillmore Subbasin recharges rapidly and fills to capacity in years of abundant precipitation. The most recent low water levels were observed at the end of 1992 and then water levels recovered about 30 feet to the historical high by 1994 (UWCD 1996, 1999b). Subsequently, water levels have remained within about five feet of historical high levels (UWCD 1996, 1999b). In October 1999, the subbasin was an estimated 95 percent full (Panaro 2000).

Groundwater Storage

Groundwater Storage Capacity. Calculations of storage capacity vary from 7,330,000 af (Panaro 2000) to about 1,000,000 af (CSWRB 1956). The CSWRB estimate uses a surface area of 12,000 acres, an average water-bearing thickness of 1,000 feet and an average specific yield of about 8 percent (CSWRB 1956). The Fox Canyon Groundwater Management Agency (Panaro 2000) uses surface area of 24,224 acres, an average water-bearing thickness of 2,480 feet, and an average specific yield of 12.2 percent. The surface area of the Fillmore Subbasin described in this report differs from that used by either of the two previous studies. Because the difference in area mostly involves shallow alluvium along the edges of the subbasin and likely does not appreciably change the effective water bearing thickness of the subbasin, the calculations of the FCGMA (Panaro 2000) are considered representative of this subbasin.

Groundwater in Storage. Panaro (2000) reports that this subbasin was 95 percent full in 1999. This suggests that about 6,960,000 af of groundwater was in storage.

Groundwater Budget (Type A)

For 1997-98, Panaro estimated the applied water recharge to be 19,125 af. Panaro estimated the subsurface inflow to be 5,900 af. The estimated range for subsurface outflow is 2,400 to 11,500 af/year. This is partially based on a hydrologic analysis presented in CSWRB Bulletin 12 which estimated subsurface outflow to average 11,500 af/year for the study period 1936-37 through 1950-51 (CSWRB 1956). The low estimate of 2,400 af/year assumes that all subsurface inflows to the adjacent Santa Paula Subbasin reported by Panaro (2000) result from subsurface outflows in the Fillmore Subbasin. Average annual extraction is estimated to be 42,972 af. An additional 139 af of pumpage is estimated by UWCD (1999b).

Groundwater Quality

Characterization. Water in this subbasin is calcium sulfate in character, although some groundwater in the Sespe Uplands area is calcium bicarbonate

in character. TDS concentration ranges from 800 to 2,400 mg/L with an average of 1,100 mg/L (UWCD 1996). Data from 9 public supply wells show a TDS content range of 660 to 1,590 mg/L, with an average of 967 mg/L.

Impairments. Agricultural return flows may lead to high nitrate concentrations particularly during dry periods (UWCD 1996; Panaro 2000). Urban stormwater runoff within the Santa Clara River Watershed tends to concentrate salts and other contaminants. Other potential sources of water quality problems are leaking underground storage tanks, wastewater effluents, and the leeching of contaminants from a nearby landfill. Other contaminants in the subbasin are boron, sulfate, and nitrates (UWCD 1996).

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	13	0
Radiological	10	1
Nitrates	14	1
Pesticides	10	0
VOCs and SVOCs	10	1
Inorganics – Secondary	13	3

[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 Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: up to 2,100 (CSWRB 1956)	Average: 700 (Panaro 2000)
	Total depths (ft)	
Domestic	Range:	Average:
Municipal/Irrigation	Range:	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Ventura County Water Resources.	Groundwater levels	18 wells/bimonthly (UWCD 1999b).
United Water Conservation District	Groundwater levels	5 wells/bimonthly 1 well/monthly (UWCD 1999b).
United Water Conservation District.	Miscellaneous water quality	Several wells sampled at irregular intervals (UWCD 1996).
Department of Health Services and cooperators	Title 22 water quality	10

Basin Management

Groundwater management:	The United Water Conservation District adopted an AB3030 plan in 1996 (UWCD 1996, 1999b).
Water agencies	
Public	United Water Conservation District (UWCD), Ventura County Department of Public Works, Fox Canyon Groundwater Management Agency.
Private	Approximately 14 independent purveyors (Panaro 2000).

References Cited

California Department of Public Works (CDPW). 1933. *Ventura County Investigation*. Division of Water Resources. Bulletin 46. 244 p.

California State Water Resources Board (CSWRB). 1956. *Ventura County Investigation*. Bulletin 12. Two Volumes.

California Department of Water Resources (DWR). 1959. *Water Quality and Water Quality Problems, Ventura County*. Bulletin 75. 195 p.

Panaro, D. 2000. Fox Canyon Groundwater Management Agency: Written Communication to R.R. Davis (DWR), March 21, 2000.

United Water Conservation District (UWCD). 1996. *AB3030 Groundwater Management Plan for Piru/Fillmore Basins.* 30 p.

_____. 1999a. *Surface and Groundwater Conditions Report: Water Year 1998.* 64 p.

_____. 1999b. *Piru and Fillmore Basins Groundwater Conditions Report Water Year 1998.* 68 p.

_____. 2001. Web Page: Diversions and Deliveries. www.unitedwater.org. October 2, 2001.

Additional References

Jennings, C.W., and Strand, R.G., 1969, *Geologic Map of California: Los Angeles Sheet*, Olaf P. Jenkins Edition: California Division of Mines and Geology, scale 1:250,000, 1 sheet.

Errata

Updated groundwater management information and added hotlinks to applicable websites. (1/20/06)