Santa Clara River Valley Basin, Piru Subbasin

- Groundwater Basin Number: 4-4.06
- County: Ventura
- Surface Area: 8,900 acres (13.9 square miles)

Basin Boundaries and Hydrology

Piru Subbasin is bounded on the north by impervious rocks of the Topatopa Mountains and on the south by impervious rocks of Oak Ridge and the Santa Susanna Mountains. Thinning of the alluvium and exposures of shale mark the eastern boundary and the boundary to the west is marked by a bedrock constriction causing rising groundwater (CDPW 1933; CSWRB 1956). Ground surface elevations range from 470 feet above sea level in the west to about 1,000 feet above sea level in the east. The Santa Clara River and Piru Creek drain the surface waters of the subbasin. Average annual precipitation ranges from 14 to 18 inches.

Hydrogeologic Information

Water Bearing Formations

The primary water-bearing materials are sands and gravels of upper Pleistocene to Holocene alluvium and lower Pleistocene San Pedro Formation (CSWRB 1956). Average well yield for the subbasin is 800 gpm and average depth to water-producing zones is 30 to 90 feet (Panaro 2000). Groundwater in Piru Subbasin, which is generally unconfined, flows to the west. The estimated specific yield is 17 percent (CSWRB 1956).

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 the Oak Ridge faults cut through the Piru Basin and juxtapose the water-bearing San Pedro Formation with typically non-water-bearing Modelo and Matilija Formations (CSWRB 1956). The water-bearing gravels are folded by the Santa Clara syncline creating a thick aquifer system. This syncline is warped up in the west bringing non-water-bearing materials closer to the surface (CSWRB 1956). When combined with a narrowing of the subbasin to the west, this structural restriction creates rising water at the western edge of the subbasin (CSWRB 1956).

Recharge Areas

Groundwater recharge to the subbasin is by percolation of runoff from Piru Creek, Hopper Creek, and the Santa Clara River. Natural runoff and State Water Project water released from Piru Lake is diverted to percolation basins near the town of Piru (UWCD 2000). Direct percolation of precipitation, subsurface flow, and return of irrigation waters provide recharge as well (CSWRB 1956; UWCD 1999ab).

Groundwater Levels Trends

Groundwater levels have fluctuated about 140 feet during the last 70 years, about 60 feet during the last 20 years, and 30 to 40 feet since 1995 (CSWRB 1956; UWCD 1999b). Hydrographs show 1998 water levels equaled their historic maximum, indicating a full subbasin (UCWD 1999b) and 1999 levels indicate the subbasin was at 90 percent of storage capacity (Panaro 2000). Hydrographs suggest that groundwater levels, which have reached a maximum elevation several times since 1980, change in rapid response to precipitation patterns (UWCD 1999b).

Groundwater Storage

Groundwater Storage Capacity. Calculations of storage capacity vary from 1,979,000 acre feet (Panaro 2000) to 960,000 acre feet (CSWRB 1956). The CSWRB (1956) estimate uses an average area of 6,000 acres, an average thickness of 1,000 feet, and an average specific yield of 16 percent. The Fox Canyon Groundwater Management Agency (FCGMA; Panaro 2000) uses an area of 6,976 acres, an average saturated thickness of 1,700 feet, and an average specific yield of 16.7 percent. The surface area of the Piru Basin described in this report is larger than that utilized by either of the two previous studies. Because the additional area is mostly achieved by incorporation of the shallow alluvium within the Piru Creek drainage and likely does not add appreciably to the effective saturated thickness of the subbasin, the calculations of the FCGMA (Panaro 2000) are considered representative of this subbasin.

Groundwater in Storage. Panaro (2000) estimates that the subbasin was 90 percent full in 1999, implying about 1,880,000 af of storage at that time.

Groundwater Budget (Type A)

For 1997-98, Panaro (2000) estimated the applied water recharge to be 9,450 af. Panaro estimated the subsurface inflow to be 5,500 af. The estimated range for subsurface outflow is 5,900 to 21,600 af/year. This is partially based on a hydrologic analysis presented in CSWRB (1956) which estimated subsurface outflow to range from 13,800 to 21,600 af/year for the study period 1936-37 through 1950-51 (CSWRB 1956). The low estimate of 5,900 af/year assumes that all subsurface inflows to the adjacent Fillmore Subbasin reported by Panaro (2000) result from subsurface outflows in the Piru Subbasin. Average annual extraction has an estimated total pumpage of 9,092 af.

Groundwater Quality

Characterization. Groundwater in this subbasin is generally calcium sulfate in character (UWCD 1996). TDS concentrations range from 608 to 2,400 mg/L, with an average of approximately 1,300 mg/L (UWCD 1996; UWCD 1999ab). Electrical conductivity readings for groundwater in the subbasin range from 1,140 to 1,550 μmho with an average of 1353 μmho. Data for 3 public supply wells average 957 mg/L for TDS content and range from 930 to 990 mg/L.

Impairments. Agricultural return flows may lead to high nitrate concentrations particularly during dry periods (UWCD 1996; Panaro 2000).

Urban storm water 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 and wastewater effluents. The most prominent natural contaminants in the subbasin are boron and sulfate (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	3	0
Radiological	3	0
Nitrates	3	0
Pesticides	3	0
VOCs and SVOCs	3	0
Inorganics – Secondary	3	1

[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:	Average: 800 (Panaro 2000)
	Total depths (ft)	
Domestic	Range:	Average:
Municipal/Irrigation	Range:	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
United Water Conservation District	Groundwater levels	9/(3 bimonthly and 6 monthly)
Ventura County Water Resources	Groundwater levels	10/bimonthly
United Water Conservation District	Miscellaneous water quality	Several wells sampled at irregular intervals
Department of Health Services and cooperators	Title 22 water quality	3

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
Private	Approximately 6 water or sewer companies (Panaro 2000)

References Cited

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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.

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Additional References

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

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Errata

Changes made to the basin description will be noted here.