

## **Carmel Valley Groundwater Basin**

- Groundwater Basin Number: 3-7
- County: Monterey
- Surface Area: 5,160 acres ( 8 square miles)

### **Basin Boundaries and Hydrology**

The Carmel Valley Groundwater Basin lies along the downstream portion of the Carmel River located southeast of the Monterey Peninsula. The Carmel River drains approximately 250 square miles (Kapple and others 1984) into the Pacific Ocean at Carmel Bay. The groundwater basin is primarily the valley floor. The floor is about 16 miles long and varies in width from 300 to 4,500 feet (Kapple and others 1984).

The average annual runoff of the Carmel River at Carmel for water years 1962 through 1998 is 80,700 af (Friebel and others 1999). The precipitation along the groundwater basin varies from 17 to 19 inches per year and is higher in portions of the upper watershed.

### **Hydrogeologic Information**

#### ***Water Bearing Formations***

The groundwater basin consists of younger alluvium and river deposits, and older alluvium and terrace deposits. These deposits are underlain by Monterey Shale and Tertiary sandstone units.

The primary water bearing formation is the younger alluvium with a typical thickness of 50 to 100 feet (EIP Associates 1993). The younger alluvium consists of boulders, gravel, sand, silt, and clay. The thickness varies from approximately 30 feet in the upper basin to about 180 feet near the mouth of the basin (Kapple and others 1984).

#### ***Restrictive Structures***

The aquifer thickness is reduced near the mouth due to an uplifted fault block. This uplift is not an effective barrier because alluvium remains in contact with saline waters (Kapple and others 1984).

#### ***Recharge Areas***

The Carmel River is the primary source of recharge. River recharge constitutes 85 percent of the net recharge (Kapple and others 1984).

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

With the presence of surface water, groundwater levels recover rapidly. After water level recovery, levels range from 5 to 30 feet below the land surface. During normal years, water level fluctuations range from 5 to 15 feet while experiencing declines of up to 50 feet during droughts (Kapple and others 1984).

#### ***Groundwater Storage***

**Groundwater Storage Capacity.** EIP Associates (1993) reported that Monterey Peninsula Water Management District estimated the storage

capacity at 48,200 af and also reported that various investigators have made estimates varying from 36,000 to 52,000 af. Bulletin 118-75 reported a storage capacity of 60,000 af.

**Groundwater in Storage.** DWR (1974) estimated the groundwater in storage in spring 1972 as 45,500 af, 39,300 af in fall 1972, and 52,500 af in spring 1973.

### **Groundwater Budget (Type C)**

Kapple and others (1984) estimated annual pumpage from 1974 through 1978 ranging from 5,900 to 9,100 af per year with 55 percent allocated for municipal use (mostly export), 44 percent for agricultural use, and 1 percent for domestic use. Groundwater pumping has been altered since the State Water Resources Control Board Order 95-10 to reduce pumping in Carmel Valley. A budget was not estimated due to the need for recent verified data.

### **Groundwater Quality**

**Characterization.** EIP Associates (1993) reported a range of groundwater TDS from 220–1,200 milligrams/liter. The basin was characterized with four successive subunits and mean TDS was reported from up gradient to down gradient as follows: 260 mg/l, 400 mg/l, 430-670 mg/l, and 640 mg/l. Sulfates ranged from 20-600 mg/l and chlorides varied from 20-300 mg/l (EIP Associates 1993). Potential occurrence of nitrates from septic tanks has been a long-standing concern. However, MPWMD reported that data collected in 1995-96 showed nitrates to be significantly lower than State drinking water standards (MPWMD 1997).

**Impairments.** Groundwater obtained from portions of the down gradient aquifer require treatment for iron and manganese prior to municipal use (EIP Associates 1993).

### **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	18	0
Radiological	17	0
Nitrates	18	0
Pesticides	18	0
VOCs and SOCs	18	0
Inorganics – Secondary	18	14

<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 Production Characteristics

Well yields (gal/min)		
Municipal/Irrigation	Range: – 200-1,000 (Thorup 1976)	Average: 600 (DWR 1975)
Total depths (ft)		
Domestic	Range:	Average:
Municipal/Irrigation	Range: To thickness of alluvium	Average: 85 feet (Bean 1973)

## Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Monterey Peninsula WMD	Groundwater levels	50 as necessary (MPWMD 1997)
Monterey Peninsula WMD	Miscellaneous water quality	23 semi-annually or as necessary (MPWMD 1997)
Department of Health Services and cooperators	Title 22 water quality	12 Varies

## Basin Management

Groundwater management:	Monterey Peninsula Water Management District
Water agencies	
Public	
Private	California-American Water Company

## References Cited

- Bean, Robert T. 1973. *Groundwater Availability-Carmel Valley*. Standard International Corporation. 14p.
- California Department of Water Resources (DWR). 1969. *Carmel River Basin Water Quality Investigation*. Central Coastal Regional Water Quality Control Board. 46p.
- \_\_\_\_\_. 1974. *Zone 11 Investigation Carmel Valley and Seaside Ground Water Basins Monterey County*. Zone 11 of the Monterey County Flood Control and Water Conservation District. 25p.
- \_\_\_\_\_. 1975. Bulletin 118-75, "California's Ground Water."
- EIP Associates. 1993. *Monterey Peninsula Water Supply Project, Supplemental Draft, Environmental Impact Report/Statement II*. Monterey Peninsula Water Management District. Volume I. \_\_\_\_
- Friebel, M. F., L. A. Freeman, and M. D. Webster. 1999. *Water Resources Data California Water Year 1998, Volume 2. Pacific Slope Basins from Arroyo Grande to Oregon State Line except Central Valley*. Sacramento: USGS. Water-Data Report CA-98-2. pp 51 and 52.
- Kapple, Glenn W., Hugh T. Mitten, Timothy J. Durbin, and Michael J. Johnson. 1984. *Analysis of the Carmel Valley Alluvial Ground-Water Basin, Monterey County, California*. Sacramento: Monterey Peninsula Water Management District. Report 83-4280. 45p.

Monterey Peninsula Water Management District (MPWMD). 1997. *1995-96 Annual Report (July 1995-June 1996) for the Five-Year Mitigation Program MPWMD Water Allocation Program EIR*. p. II-14.

Thorup, Richard R. 1976. *Groundwater Study of the Carmel Valley Ranch and Carmel River Watershed Monterey Peninsula, Monterey County, California*. Carmel: Unique Golf Concepts, Inc. 24p.

#### Additional References

Hood, Andrew G. California State Department of Health. 1973. *Sanitary Engineering Investigation of Water Quality Carmel River and Carmel Valley Groundwater Monterey County*. Monterey County Health Department. 3p.

Logan, John. 1983. *DRAFT-The Carmel Valley Alluvial Aquifer: Bedrock geometry, hydraulic parameters and storage*. Carmel: Monterey Peninsula Water Management District. 21p.

## Errata

Changes made to the basin description will be noted here.