Owens Valley Groundwater Basin

- Groundwater Basin Number: 6-12
- County: Inyo & Mono
- Surface Area: 661,000 acres (1,030 square miles)

Basin Boundaries and Hydrology

This groundwater basin underlies Benton, Hammil, and Chalfant Valleys in Mono County and Round and Owens Valleys in Inyo County. This basin is bounded by nonwater-bearing rocks of the Benton Range on the north, of the Coso Range on the south, of the Sierra Nevada on the west, and of the White and Inyo Mountians on the east (Jennings 1958; DWR 1964; Matthews and Burnett 1965; Strand 1967; Danskin 1998) This system of valleys is drained by several creeks to the Owens River, which flows southward into the Owens (dry) Lake, a closed drainage depression in the southern part of the Owens Valley.

Average annual precipitation is 30 inches in the Sierra Nevada, 7 to 10 inches in the White and Inyo Mountains, and 4 to 6 inches on the Owens Valley floor (Groeneveld and others 1986a; 1986b; Duell 1990; Hollett and others 1991).

Hydrogeologic Information

Water Bearing Formations

The water-bearing materials of this basin are sediments that fill the valley and reach at least 1,200 feet thick (DWR 1964). The primary productive unit is Quaternary in age and is separated into upper, lower and middle members (Danskin 1998).

Upper Member. The upper member is composed of unconsolidated coarse alluvial fan material deposited along the margin of the basin, grading into layers of sand and silty clay of fluvial and lacustrine origin toward the axis of the basin. In some areas, these strata are mantled and interbedded with basalt flows. This member has an average thickness of 100 ft and is generally unconfined, except where it is confined locally by layers of basalt or fine-grained lacustrine material. Specific yield for the member ranges from 10 to 15 percent (Danskin 1998).

Middle Member. The middle member is composed of fine-grained fluvial and lacustrine material and some low permeability volcanic layers. This member is present in most areas of the basin, except along the margins where alluvial fan materials exhibit little horizontal layering. This member is usually a semi-confining layer that restricts vertical groundwater movement between the upper and lower members. An exception to this rule occurs near Bishop, where the member is composed of moderately- to highly-permeable, unconsolidated pumice. The thickness of the middle unit reaches more than 80 feet near the axis of the basin, but is generally 15 feet or less.

Lower Member. The lower member is composed of Bishop Tuff, fluvial and lacustrine material, and older alluvial fan deposits. In many areas, this

member is confined by low permeability deposits of the middle member. The thickness of this member ranges from a few tens of feet along the margins of the basin to about 500 feet along the axis of the basin (Danskin 1998).

Restrictive Structures

East-trending normal faults near the Poverty Hills form barriers to groundwater movement (Danskin 1998).

Recharge Areas

The principal source of replenishment for this basin is percolation of stream flow from the surrounding mountains. Lesser sources of recharge include infiltration of excess irrigation waters and of precipitation to the valley floor, and underflow from Long Valley (Danskin 1998).

Groundwater Level Trends

Groundwater levels in parts of this basin were depressed near Bishop and Independence during the late 1920s to 1930s because of heavy pumping (DWR 1964). Water levels rebounded somewhat and remained fairly steady through the early 1960s (DWR 1964). A series of wet years between 1982 and 1986 and relatively low groundwater pumping resulted in generally high water tables, followed by six years of heavy groundwater pumping resulting in water level declines. During the 1990s, pumping was less and water tables rose (ICWD 2001).

Groundwater Storage

Groundwater Storage Capacity. Total storage capacity of the basin is estimated to be 30,000,000 af (DWR 1975) and 35,000,000 af (Jorat 2001).

Groundwater in Storage. Unknown.

Groundwater Budget (Type A)

Recharge to the Owens Valley aquifers is estimated to have been about 233,131 af during the 1998 water year, and total pumping about 51,575 af for the 1999 water year (ICWD 2001). A groundwater model of 1970 through 1984 conditions predicts an average total recharge of 184,000 af and average total discharge of 192,000 af (Danskin 1998). The major sources of replenishment included in the model were mountain-front recharge of about 26,000 af/yr, seepage from tributary streams of about 103,000 af/yr, seepage from canals, ditches, and ponds of about 31,000 af/yr, and recharge from excess irrigation water of about 10,000 af/yr. Important sources of discharge used in the model, besides pumping and spring flows, included evapotranspiration of about 72,000 af/yr and subsurface outflow of about 10,000 af/yr (Danskin 1998).

Groundwater Quality

Characterization. Groundwater in this basin is mostly sodium bicarbonate and calcium bicarbonate in character (DWR 1964; Danskin 1998), with TDS contents less than 300 mg/L (Danskin 1998). In addition, sodium chloride water is found at Keough Hot Springs and Owens Lake, sulfate is the

dominant anion in groundwater in Round Valley, and water beneath Owens Lake has TDS concentrations reach 450,000 mg/L (DWR 1964). Water from 89 public supply water wells in the basin has an average TDS content of 128 mg/L with a range of 60 to 587 mg/L. Overall, water quality is good (Danskin 1998; DWR 1964), and groundwater in most parts of the basin show no distinct changes in quality over time (Danskin 1998).

Impairments. North of Independence, boron concentrations reach 7.6 mg/L. Fluoride concentrations range from 0.2 to 9 mg/L with an average value of 1.2 mg/L, with the highest concentrations found near Bishop (DWR 1964).

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	25	1
Radiological	26	0
Nitrates	25	0
Pesticides	24	0
VOCs and SVOCs	22	0
Inorganics – Secondary	25	2

[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	500 to 8,100 gpm	Average: 1870 gpm (Jorat 2001)
	Total depths (ft)	
Domestic	Range: 50 to 160 ft	Average: 110 ft (Jorat 2001)
Municipal/Irrigation	Range: 90 to 740 ft	Average: 360 ft (Jorat 2001)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
LADWP, ICWD	Groundwater levels	700 wells/semi-annually or monthly (ICWD 2001; Jorat 2001)
LADWP	Miscellaneous water quality	7 wells/monthly (Jorat 2001)
Department of Health Services	Title 22	89 wells/as required

Basin Management

Groundwater management:	The basin is managed under the Los Angeles/Inyo Groundwater Management Agreement of 1991 (ICWD 2001; Jorat 2001).
Water agencies	
Public	Inyo County Water Department, Los Angeles Department of Water and Power (LADWP)
Private	

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Errata

Changes made to the basin description will be noted here.