Copper Mountain Valley Groundwater Basin

- Groundwater Basin Number: 7-11
- County: San Bernardino
- Surface Area: 30,341 acres (47.4 square miles)

Basin Boundaries and Hydrology

The Copper Mountain Valley Groundwater Basin underlies an alluvial valley in the northwestern Colorado Desert Region. This basin, which is about one mile north of the town of Joshua Tree, includes the water-bearing sediments below and adjacent to Coyote Lake (dry). The northern boundary of the basin is coincident with the surface drainage divide between this basin and the Ames Valley Groundwater Basin. The southern boundary of the basin is the Pinto Mountain fault. The contact of alluvium with consolidated rocks forming Copper Mountain and the San Bernardino Mountains mark the east and west boundaries, respectively. Average annual precipitation is about 4 inches for lower elevation, eastern part of the basin to 10 inches in the higher elevation, western part of the basin.

Hydrogeologic Information

Water Bearing Formations

The productive water-bearing materials in this basin consist of unconsolidated to partly consolidated Miocene to Quaternary continental deposits (Mendez and Christensen 1997). These deposits regionally reach 10,000 feet in thickness (Moyle 1984); however, wells in Copper Mountain Valley Groundwater Basin are known to reach a as much as 1,000 feet depth without encountering bedrock. Interpretation of resistivity surveys suggest a depth of at least 1,500 feet in this basin (Whitt and Jonker 1998).
The main productive water-bearing deposits are the interbedded gravels, conglomerates, and silts deposited in alluvial fan systems (Schaefer 1978). Other less productive deposits include alluvial channel sands and gravels; active silt, clay, and sandy-clay deposits in Coyote Lake playa; and dune sands (Schaefer 1978; BEE 1994). These deposits have an average specific yield of about 14 percent (Lewis 1972) and well yields range from 10 to 2,450 gpm. Groundwater in this basin is unconfined.

Restrictive Structures

The Pinto Mountain fault zone acts as a barrier to groundwater flow, with the water table lower by 125 feet in the Copper Mountain Valley Groundwater Basin than in the Joshua Tree Groundwater Basin to the south. (Whitt and Jonker 1998; Mendez and Christensen 1997).

Recharge Areas

Natural recharge in the basin is derived mainly from direct percolation of precipitation and the rare percolation of ephemeral streamflow (Mendez and Christensen 1997; BEE 1994). Some underflow may occur across the Pinto Mountain fault from the Joshua Tree Groundwater Basin (Lewis 1972; Whitt and Jonker 1998). Percolation of septic tank effluent also contributes to recharge of groundwater.

Groundwater Level Trends

Water level measurements taken in a well at the eastern edge of this basin, near Coyote Lake, show a total range of only about five feet during 1979 through 1999. The water level rose about five feet in late 1992 and was only about one foot below that mark when measured in 1999 (MWA 2000). Whitt and Jonker (1998) report water levels in the basin have generally remained unchanged for more than 50 years. The general regional groundwater flow pattern is from west to east, although local faults and basement highs modify this basic pattern. Groundwater in this basin appears to flow eastward from the San Bernardino Mountains to Coyote Lake (dry) (Mendez and Christensen 1997).

Groundwater Storage

Groundwater Storage Capacity. Currently a value for total storage capacity is not known to exist. The 1975 DWR value of 830,000 af is no longer valid as subsequent studies show that the basin is deeper than previously estimated. The basin boundaries have been redefined in this report based on hydrogeologic reports such as Lewis (1972), Schaefer (1978) Mendez and Christensen (1997), and Whitt and Jonker (1998). This change in configuration will affect the estimate of total storage capacity.

Groundwater in Storage. Groundwater in storage is estimated to be a minimum of 940,000 af (Whitt and Jonker 1998). This value is much larger than 67,000 af in storage estimated in 1996 because Whitt and Jonker (1998) use resistivity data to interpret a much deeper basin than previously inferred. The basin boundaries used by Whitt and Jonker (1998) are different than used in this report.

Groundwater Budget (Type A)

Recharge from precipitation was estimated to range from 728 to 1,300 af/yr (Whitt and Jonker 1998). Extractions are predominantly from urban use and estimated at 1,010 af for the year 2000 (BEE 1994).

Groundwater Quality

Characterization. Groundwater within the basin is of relatively high quality and meets all Federal and State standards for drinking water (Krieger and Stewart 1996). Data for two public supply wells in the basin have TDS content of 180 and 214 mg/L.

Impairments. DWR (1975) reports failing septic tanks may be threatening water quality in parts of the basin. Some wells exceeded TDS concentrations of 500 mg/L (BEE 1994).

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	2	0
Radiological	2	0
Nitrates	2	0

Pesticides	2	0
VOCs and SVOCs	2	0
Inorganics – Secondary	2	0

[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: 10 – 2,450 gal/min	Average:
	Total depths (ft)	
Domestic	Range:	Average:
Municipal/Irrigation	Range:	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Water Levels	2
Department of Health Services	Title 22 Water Quality	2

Basin Management

Groundwater management:	A groundwater management plan for this basin is currently in place.
Water agencies	
Public	Mojave Water Agency, Joshua Basin Water District.
Private	

References

Bookman-Edmonston Engineering Inc. (BEE). 1994. *Regional water management plan.* Mojave Water Agency, Apple Valley California. 135 p.

California Department of Water Resources (DWR). 1975. *California's Groundwater. Bulletin No. 118*. 135 p.

Krieger and Stewart, Inc. 1996. *Joshua Basin Water District Groundwater Management Plan.* Prepared for Joshua Basin Water District.

Lewis, R.E. 1972. *Ground-water resources of the Yucca Valley-Joshua Tree area, San Bernardino County, California.* U.S. Geological Survey Open-File Report. 51 p.

Mendez, G.O. and A.H. Christensen. 1997. *Regional water table (1996) and water-level changes in the Mojave River, the Morongo, and the Fort Irwin ground-water basins, San Bernardino County, California.* U.S. Geological Survey Water-Resources Investigations Report 97-4160. 34 p.

Mojave Water Agency (MWA). 2000. *Annual Ground Water Level Monitoring Program for 1999. Apple Valley California*. 129 p.

Moyle, W.R., Jr. 1984. *Bouguer gravity anomaly map of the Twentynine Palms Marine Corps Base and vicinity, California.* U.S. Geological Survey Water-Resources Investigations Report 84-4005.

Schaefer, D.H. 1978. *Ground-water resources of the Marine Corps Base, Twentynine Palms, San Bernardino County, California.* U.S. Geological Survey Water-Resources Investigations Report 77-37. 29 p.

Whitt, A . and K. Jonker. 1998. *Groundwater survey of the Joshua Tree and Copper Mountain Subbasins, Joshua Tree California.* Consultant's report prepared by Western Water Surveys, for Joshua Basin Water District.

Additional References

Akers, J.P. 1986. Geohydrology and potential for artificial recharge in the western part of the U.S. Marine Corps Base, Twentynine Palms, California, 1982-83. U.S. Geological Survey Water-Resources Investigations Report 84-4119. 18 p.

Bader, J.S. 1963. Effect of faulting in alluvium on the occurrence, movement, and quality of ground water in the Twentynine Palms area, California (abstract). Geological Society of America Special Paper 73. 22 p.

_____. 1966. Records of water level and pumpage in Joshua Tree National Monument, California. U.S. Geological Survey Open-File Report. 3 p.

California Department of Water Resources (DWR). 1960. Data on water wells and springs in the Yucca Valley-Twentynine Palms area, San Bernardino and Riverside counties, California. Bulletin 91-2. 163 p.

_____. 1984. Twentynine Palms ground water study. Southern District Report. 109 p.

Downing, D.J. 1974. Records of water level and pumpage for 1973 in Joshua Tree National Monument, California. U.S. Geological Survey Open-File Report. 15 p.

_____. 1977. Ground-water data for 1974-75 in Joshua Tree National Monument, California. U.S. Geological Survey Open-File Report 77-80. 34 p.

_____. 1978. Ground-water data for 1976-77 in Joshua Tree National Monument, California. U.S. Geological Survey Open-File Report 78-854. 34 p.

Freckleton, J.R. 1982. Ground water in the Twenty-nine Palms Indian Reservation and vicinity, San Bernardino County, California. U.S. Geological Survey Water-Resources Investigations Report 82-4060. 46 p.

Moyle, W.R., Jr. 1974. Geohydrologic map of southern California. U.S. Geological Survey Water-Resources Investigations Repot 48-73.

Errata

Changes made to the basin description will be noted here.