

Imperial Valley Groundwater Basin

- Groundwater Basin Number: 7-30
- County: Imperial
- Surface Area: 1,200,000 acres (1,870 sq. miles)

Basin Boundaries and Hydrology

Imperial Valley Groundwater Basin is located in the southeastern part of California at the international border with Mexico. The basin lies within the southern part of the Colorado Desert Hydrologic Region, south of the Salton Sea.

Imperial Valley Groundwater basin is bounded on the east by the Sand Hills and on the west by the impermeable rocks of the Fish Creek and Coyote Mountains. To the north the basin is bounded by the Salton Sea, which is the discharge point for groundwater in the basin. The physical groundwater basin extends across the border into Baja California where it underlies a contiguous part of the Mexicali Valley (CDPW 1954). However, in this report, the southern boundary of the Imperial Valley basin is defined politically as the international border with the Republic of Mexico. Major hydrologic features include the New and Alamo rivers, which flow north towards the Salton Sea. The rivers were formed in the mid to late 1800s when the Colorado River occasionally escaped the normal channel and flowed northward towards the present day Salton Sea (Setmire 1979). The All-American Canal (three branches) and the Coachella Canal also cross over the basin.

Hydrogeologic Information

Water Bearing Formations

The basin has two major aquifers, separated at depth by a semi-permeable aquitard that averages 60 feet thick and reaches a maximum thickness of 280 feet. The aquifers consist mostly of alluvial deposits of late Tertiary and Quaternary age. Average thickness of the upper aquifer is 200 feet with a maximum thickness of 450 feet. The lower aquifer averages 380 feet thick with a maximum thickness of 1,500 feet. As much as 80 feet of fine-grained, low permeability prehistoric lake deposits have accumulated on the nearly flat valley floor and cause locally confined aquifer conditions (Montgomery Watson 1995).

Restrictive Structures

The San Andreas, Algodones, and Imperial faults are present within the basin, but data on whether these faults control groundwater movement is lacking. The only known barriers to groundwater flow are the lake deposits of clay that obstruct downward seepage of surface waters in the central and western part of the basin (Loeltz and others 1975).

Recharge Areas

Recharge is primarily from irrigation return. Other recharge sources are deep percolation of rainfall and surface runoff, underflow into the basin, and seepage from unlined canals which traverse the valley (CDPW 1954).

Principal areas of recharge from surface runoff are in the East Mesa and West Mesa, where the surface deposits are more permeable than in the central valley (Loeltz and others 1975).

Primary underflow into the basin is from Mexicali Valley to the south and through the alluvial section between the Cargo Muchacho Mountains and Pilot Knob.

Total seepage from the All American Canal from 1942 to 1982 is estimated at 2.2 million af. Seepage from the Coachella Canal between the same years is estimated at 1.2 million acre-feet. However, in 1980, a 49 mile long southern portion of the Coachella Canal was lined, which has decreased the amount of recharge from this source (Montgomery Watson 1995).

Another source of groundwater recharge occurs along the lower reaches of the New River, near Calexico (Montgomery Watson 1995).

Groundwater Level Trends

Groundwater within the basin generally flows toward the axis of the valley and then northwestward towards the Salton Sea. (Montgomery Watson 1995). Water levels vary widely within the basin due to differing hydraulic heads and the localized confining clay beds in the area (Brown 1923). Groundwater levels remained stable within the majority of the basin from 1970 to 1990 because of relatively constant recharge and an extensive network of subsurface drains (Montgomery Watson 1995).

Groundwater Storage

Groundwater Storage Capacity. The basin may have saturated sedimentary deposits as thick as 20,000 feet. A large portion of this groundwater is undesirable because of high TDS concentrations (Montgomery Watson 1995). The total storage capacity for this basin is estimated to be 14,000,000 af (DWR 1975).

Groundwater in Storage. Groundwater storage values for the basin are not available.

Groundwater Budget (Type A)

Montgomery Watson (1995) published a groundwater model utilizing data from 1970 to 1990. Based on this model, recharge comes mostly from imported sources and canal seepage and totals approximately 250,000 af/yr. Losses to streams average 169,342 af/yr. Groundwater discharge from the basin averages 270,000 af/yr while subsurface inflow averages 173,000 af/yr. This gives an average change in groundwater storage of approximately 17,000 af/yr.

Groundwater Quality

Characterization. Water quality varies extensively throughout the basin. TDS content ranges from 498 to 7,280 mg/L in the basin (Loeltz and others 1975). Department of Health Services data from five public supply wells show an average TDS concentration of 712 mg/L and a range from 662 to 817 mg/L.

Impairments. In general, groundwater beneath the basin is unusable for domestic and irrigation purposes without treatment. TDS values typically exceeding 2,000 mg/L are reported from a limited number of test wells drilled in the western part of the basin. Groundwater in areas of the basin has higher than recommended levels of fluoride and boron (Loeltz and others 1975).

Approximately 7,000 af/yr of groundwater is estimated to recharge the basin from the New River which drains the Mexicali Valley (Montgomery Watson 1995). This groundwater is related to surface flow from the highly polluted New River and negatively affects groundwater quality in the basin (Setmire 1979).

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	1	0
Radiological	0	0
Nitrates	0	0
Pesticides	0	0
VOCs and SVOCs	0	0
Inorganics – Secondary	1	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	
Total depths (ft)	
Domestic	
Municipal/Irrigation	

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Water Level	19
Department of Health Services and cooperators	Title 22 water quality	45

Basin Management

Groundwater management:

Water agencies

Public

Private

References Cited

- Brown, John S. 1923. The Salton Sea Region, California: A Geographic, Geologic and Hydrologic Reconnaissance with a Guide to Desert Watering Places. U.S. Geological Survey Water Supply Paper 497. 292 p.
- California Department of Public Works (CDPW). 1954. Ground Water Occurrence and Quality, Colorado River Basin Region. Water Quality Investigations Report No. 4.
- Loeltz, O.J. and others. 1975. Geohydrologic Reconnaissance of the Imperial Valley, California. U.S. Geological Survey Professional paper 486-K.
- Montgomery Watson Inc. 1995. Imperial County Groundwater Study. Consultant's report prepared for County of Imperial. 218 p.
- Setmire, James, G. 1979. Water-Quality Conditions in the New River, Imperial County, California. U.S. Geological Survey Water-Resources Investigations 79-86. 63 p.

Additional References

- California Department of Water Resources (DWR). 1970. Geothermal Wastes and the Water Resources of the Salton Sea Area. Bulletin No. 143-7.
- _____. 1978. Water Wells and Springs in Palo Verde valley, Riverside and Imperial Counties, California. Bulletin 91-23.
- _____. 1980. Groundwater Basins in California. Bulletin 118-80. 135 p.

Errata

Changes made to the basin description will be noted here.