Salinas Valley Groundwater Basin, Eastside Aquifer Subbasin

- Groundwater Basin Number: 3-4.02
- County: Monterey
- Surface Area: 57,500 acres (90 square miles)

Basin Boundaries and Hydrology

The Eastside Aquifer subbasin extends from approximately five miles north of the city of Salinas to twenty-five miles south to the town of Gonzales along the eastern side of the lower Salinas Valley. The subbasin is bounded to the north by the Pleistocene Aromas Red Sands of the Salinas Valley – Langley Area Subbasin. To the south, the subbasin shares a boundary with Quaternary Alluvium and Terrace deposits of the Salinas Valley – Lower Forebay Aquifer Subbasin. The western subbasin boundary generally coincides with the northeastern limit of confining conditions in the adjacent 180/400-Foot Aquifer subbasin (DWR 1946a) and with the location of State Highway 101. The eastern boundary is the contact of Quaternary Terrace deposits with granitic rocks of the Gabilan Range. The subbasin boundaries are generally correlative with those of the East Side subarea of the Monterey County Water Resources Agency (MCWRA). Intermittent streams such as Natividad, Alisal, Quail, Parsons, Muddy and Johnson Creeks drain the western slopes of the Gabilan Range and flow across the Subbasin toward the Salinas River on the west side of the Valley. Average annual precipitation is 13 inches.

Hydrogeologic Information

The Salinas Valley is surrounded by the Gabilan Range on the east, by the Sierra de Salinas and Santa Lucia Range on the west, and is drained by the Salinas River, which empties into Monterey Bay on the north. The King City (Rinconda-Reliz) Fault (Durbin 1978) generally follows the western margin of the Valley from King City in the south to Monterey Bay in the north. Valley-side down, normal movement along the fault allowed the deposition of an asymmetric, westward thickening alluvial wedge. The Salinas Valley has been filled with 10,000 to 15,000 feet of Tertiary and Quaternary marine and terrestrial sediments that include up to 2,000 feet of saturated alluvium (Showalter 1984). Above the generally non-water bearing and consolidated granitic basement, Miocene age Monterey and Pliocene age Purisima Formations are water bearing strata within the Plio-Pleistocene age Paso Robles Formation and within Pleistocene to Holocene alluvium.

Water Bearing Formations

The primary water-bearing units of this subbasin are the same units that produce water in the adjacent 180/400-Foot Aquifer subbasin – namely, the 180-Foot Aquifer and the 400-Foot Aquifer. However, the near-surface confining unit (Salinas Aquitard) does not extend into the Eastside or other subbasins. Groundwater in the Eastside Aquifer subbasin is semi-confined to unconfined and occurs in lenses of sand and gravel that are interbedded with massive units of finer grained material (Durbin 1970).

The thickness of the 180-foot aquifer varies from 50 to 150 feet in the Salinas Valley, with an average 100 feet (MW 1994; DWR 1970). Because of the westward thickening of alluvial units in the Salinas Valley (Showalter 1984), the average thickness in the Eastside subbasin is probably less than that stated above. The 180-Foot Aquifer may be in part correlative to older portions of Quaternary terrace deposits or the upper Aromas Red Sands. The 180-Foot Aquifer is separated from the 400-Foot Aquifer by a zone of discontinuous sands and blue clays called the 180/400-foot Aquiclude (MW 1998) which ranges in thickness from 10 to 70 feet.

More recent studies suggest the 400-Foot Aquifer exist not only in the 180/400-Foot Aquifer subbasin, but also in the Eastside Aquifer and Lower Forebay Aquifer subbasins (MW 1994). The 400-foot aquifer has an average thickness of 200 feet and consists of sands, gravels, and clay lenses (LHI 1985). The upper portion of the aquifer may be correlative with the Aromas Red Sands and the lower portion with the upper part of the Paso Robles Formation (MW 1994).

Later reports term the 180-Foot Aquifer and the 400-Foot Aquifer the "shallow zone" and "deep zone", respectively, in the Eastside and in the Upper and Lower Forebay subbasins (MW 1998).

An additional a deeper aquifer (also referred to as the 900-Foot Aquifer or the Deep Aquifer) is present in the lower Salinas Valley. A blue marine clay aquitard also separates this aquifer from the overlying 400-Foot Aquifer. This deeper aquifer consists of alternating layers of sand-gravel mixtures and clays (up to 900 feet thick), rather than a distinct aquifer and aquitard (MW 1994). The Deep Aquifer has experienced little development except near the coast where it is used to replace groundwater from the 180- and 400-Foot Aquifers rendered unusable by seawater intrusion; water quality and yield data are scarce.

MW (1994) estimated specific yields for the three main aquifers in the Salinas Valley for their Integrated Ground and Surface Water Model (IGSM). The estimated values for the 180-Foot, 400-Foot, and Deep Aquifers were 8-16 percent, 6 percent, and 6 percent, respectively. An average weighted specific yield of 8.8 percent was derived for three depth zones within the interval 20 to 200 feet below grade by the SWRB (1955). Yates (1988) estimated a storage coefficient of 0.0285 in the northern subbasin and 0.030 in the southern subbasin.

Groundwater quality issues primarily stem from long-term agricultural production in the Salinas Valley that has contributed to an extensive non-point source nitrate problem. Nitrate concentrations in many wells in the Valley exceed drinking water standards (DWR 1970), including in wells throughout the Eastside Aquifer subbasin (MCWRA 1997).

Restrictive Structures

Groundwater flow is generally in a down-valley direction but extensive pumping has created a long-lasting groundwater table depression near the Valley margin in the northern subbasin northeast of Salinas. Flow is now from the north, west and south into the depression. Average groundwater depths at the depression were up to 50 feet below sea level from 1970 to 1981 (Yates 1988). During Fall 1995, the deepest portion of the depression was over 80 feet below sea level (MCWRA 1997). The linear depression may result from the restriction of groundwater flow caused by the presence of a northwest trending buried fault. Groundwater elevations decrease from the east to the west by over 130 feet within a distance of one mile as this buried structure is crossed (Showalter 1984).

Recharge Areas

Historically, subbasin recharge was from percolation from stream channels that head on the west slopes of the Gabilan Range (DWR 1946a) and from subsurface inflow from rainfall percolated through the Aromas Red Sands deposits in the adjacent Langley Area subbasin to the north (Yates 1988). With the advent of large-scale groundwater pumping over the past 50 years, recharge now is primarily from subsurface flow from the subbasins to the south and west.

Groundwater Level Trends

Between 1964 and 1974, the amount of groundwater in storage increased 86,500 af. This increase slowed to 15,100 af between 1974 and 1984. From 1984 to 1994, the increasing trend reversed, and the amount of water in storage dropped by 155,000 af (MW 1998).

Groundwater Storage

Calculations made by DWR (2000) give an estimated total storage capacity of 3,690,000 af for the subbasin. As of 1994, there is approximately 2,560,000 af of groundwater in storage in this subbasin (MW 1998).

Groundwater Budget (Type A)

A detailed groundwater budget was available for this subbasin for 1994 (MW 1998). Natural recharge (including applied water recharge) is estimated to be 41,000 af. There is no artificial recharge. Subsurface inflow is approximately 17,000 af. Annual urban and agricultural extractions total 86,000 af. There are no other extractions or subsurface outflow.

Groundwater Quality

Characterization. The water in this subbasin is of a sodium-calcium chloride type, with the salts derived from marine formations in the subbasin watershed (JSA 1990). Based on 129 analyses, TDS values range from 168 to 977 mg/L, with an average value of 450 (DHS 2000). The Department of Health Services monitors Title 22 water quality standards, and in 25 public supply wells they report TDS values ranging from 240 to 788 mg/L, with an average value of 413 mg/L (DHS 2000). DHS also report 128 analyses that give EC values ranging from 52 to 1,600 µmhos/cm, with an average value of 693 µmhos/cm (DHS 2000).

Impairments. Of 68 wells sampled for nitrates in 1995, 32 exceeded the drinking water standard of 45 mg/L. The average concentration was 69 mg/L (MCWRA 1997).

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	28	0
Radiological	30	0
Nitrates	28	2
Pesticides	30	0
VOCs and SOCs	30	0
Inorganics – Secondary	28	4

[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 Production characteristics

	Well yields (gal/min)	
Municipal/Irrigation		
	Total depths (ft)	
Domestic		
Municipal/Irrigation	Range: 299 - 1,100	Average: 610 (12 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
MCWRA	Groundwater levels	74 Varies (Geomatrix 2001)
MCWRA	Mineral, nutrient, & minor element.	67 Annually (Geomatrix 2001)
Department of Health Services (incl Cooperators)	Title 22 water quality	53 Varies

Basin Management

Groundwater management:	MCWRA requires annual extraction reports form all agricultural and municipal well operators; and has researched, developed and/or constructed projects to reduce seawater intrusion, manage nitrate contamination in the ground water, provide adequate water supplies to meet current and future needs, and to hydrologically balance the ground water basin in the Salinas Valley.
Water agencies	
Public	Monterey County Water Resources Agency
Private	California Water Service Co. (CWS)–Salinas; Alco Water Service; Gabilan Water Co.

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Errata

Changes made to the basin description will be noted here.