Central Coast Hydrologic Region

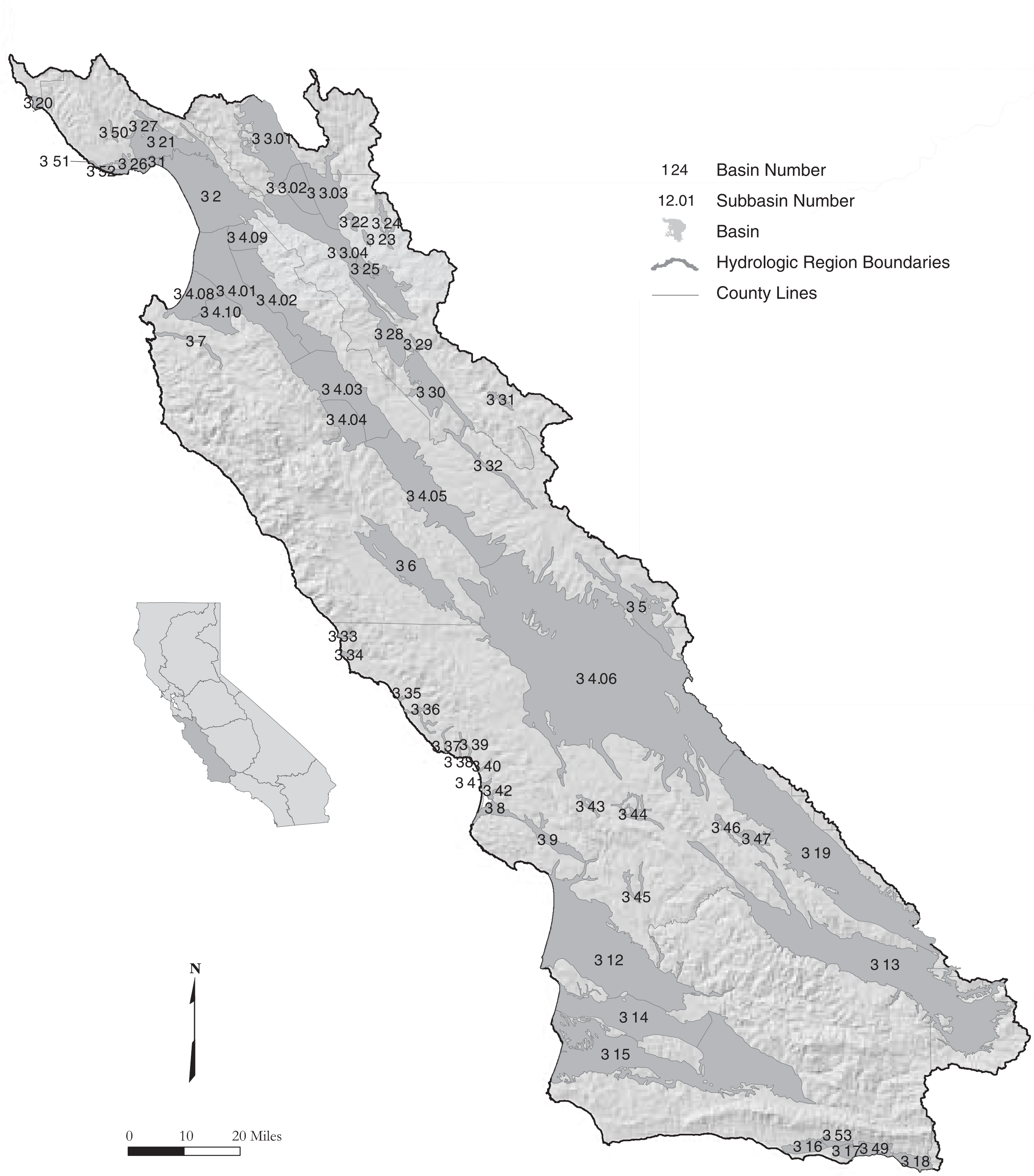

Figure 29 Central Coast Hydrologic Region

Basins and Subbasins of Central Coast Hydrologic Region

RegionBasin/ subbasin	Basin name
3-1	Soquel Valley
3-2	Pajaro Valley
3-3	Gilroy-Hollister Valley
3-3.01	Llagas Area
3-3.02	Bolsa Area
3-3.03	Hollister Area
3-3.04	San Juan Bautista Area
3-4	Salinas Valley
3-4.01	180/400 Foot Aquifer
3-4.02	East Side Aquifer
3-4.04	Forebay Aquifer
3-4.05	Upper Valley Aquifer
3-4.06	Paso Robles Area
3-4.08	Seaside Area
3-4.09	Langley Area
3-4.10	Corral de Tierra Area
3-5	Cholame Valley
3-6	Lockwood Valley
3-7	Carmel Valley
3-8	Los Osos Valley
3-9	San Luis Obispo Valley
3-12	Santa Maria River Valley
3-13	Cuyama Valley
3-14	San Antonio Creek Valley
3-15	Santa Ynez River Valley
3-16	Goleta
3-17	Santa Barbara
3-18	Carpinteria
3-19	Carrizo Plain
3-20	Ano Nuevo Area
3-21	Santa Cruz Purisima Formation
3-22	Santa Ana Valley
3-23	Upper Santa Ana Valley
3-24	Quien Sabe Valley
3-25	Tres Pinos Valley
3-26	West Santa Cruz Terrace
3-27	Scotts Valley
3-28	San Benito River Valley
3-29	Dry Lake Valley
3-30	Bitter Water Valley
3-31	Hernandez Valley
3-32	Peach Tree Valley
3-33	San Carpoforo Valley
3-34	Arroyo de la Cruz Valley

RegionBasin/ subbasin	Basin name
3-35	San Simeon Valley
3-36	Santa Rosa Valley
3-37	Villa Valley
3-38	Cayucos Valley
3-39	Old Valley
3-40	Toro Valley
3-41	Morro Valley
3-42	Chorro Valley
3-43	Rinconada Valley
3-44	Pozo Valley
3-45	Huasna Valley
3-46	Rafael Valley
3-47	Big Spring Area
3-49	Montecito
3-50	Felton Area
3-51	Majors Creek
3-52	Needle Rock Point
3-53	Foothill

Description of the Region

The Central Coast HR covers approximately 7.22 million acres (11,300 square miles) in central California (Figure 29). This HR includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara counties, most of San Benito County, and parts of San Mateo, Santa Clara, and Ventura counties. Significant geographic features include the Pajaro, Salinas, Carmel, Santa Maria, Santa Ynez, and Cuyama valleys; the coastal plain of Santa Barbara; and the Coast Range. Major drainages in the region include the Salinas, Cuyama, Santa Ynez, Santa Maria, San Antonio, San Lorenzo, San Benito, Pajaro, Nacimiento, Carmel, and Big Sur Rivers.

Population data from the 2000 Census suggest that about 1.4 million people or about 4 percent of the population of the State live in this HR. Major population centers include Santa Barbara, Santa Maria, San Luis Obispo, Gilroy, Hollister, Morgan Hill, Salinas, and Monterey.

The Central Coast HR has 50 delineated groundwater basins. Within this region, the Gilroy-Hollister Valley and Salinas Valley groundwater basins are divided into four and eight subbasins, respectively. Groundwater basins in this HR underlie about 2.390 million acres (3,740 square miles) or about one-third of the HR.

Groundwater Development

Locally, groundwater is an extremely important source of water supply. Within the region, groundwater accounted for 83 percent of the annual supply used for agricultural and urban purposes in 1995. For an average year, groundwater in the region accounts for about 8.4 percent of the statewide groundwater supply and about 1.3 percent of the total state water supply for agricultural and urban needs. In drought years, groundwater in this region is expected to account for about 7.2 percent of the statewide groundwater supply and about 1.9 percent of the total State water supply for agricultural and urban needs (DWR 1998).

Aquifers are varied and range from large extensive alluvial valleys with thick multilayered aquifers and aquitards to small inland valleys and coastal terraces. Several of the larger basins provide a dependable and drought-resistant water supply to coastal cities and farms.

Conjunctive use of surface water and groundwater is a long-standing practice in the region. Several reservoirs including Hernandez, Twitchell, Lake San Antonio, and Lake Nacimiento are operated primarily for the purpose of groundwater recharge. The concept is to maintain streamflow over a longer period than would occur without surface water storage and thus provide for increased recharge of groundwater. Seawater intrusion is a major problem throughout much of the region. In the Salinas Valley Groundwater Basin, seawater intrusion was first documented in the 1930s and has been observed more than 5 miles inland.

Groundwater Quality

Much of the groundwater in the region is characterized by calcium sulfate to calcium sodium bicarbonate sulfate water types because of marine sedimentary rock in the watersheds. Aquifers intruded by seawater are typically characterized by sodium chloride to calcium chloride, and have chloride concentrations greater than 500 mg/L. In several areas, groundwater exceeds the MCL for nitrate.

Water Quality in Public Supply Wells

From 1994 through 2000, 711 public supply water wells were sampled in 38 of the 60 basins and subbasins in the Central Coast HR. Analyzed samples indicate that 587 wells, or 83 percent, met the state primary MCLs for drinking water. One-hundred-twenty-four wells, or 17 percent, have constituents that exceed one or more MCL. Figure 30 shows the percentages of each contaminant group that exceeded MCLs in the 124 wells.

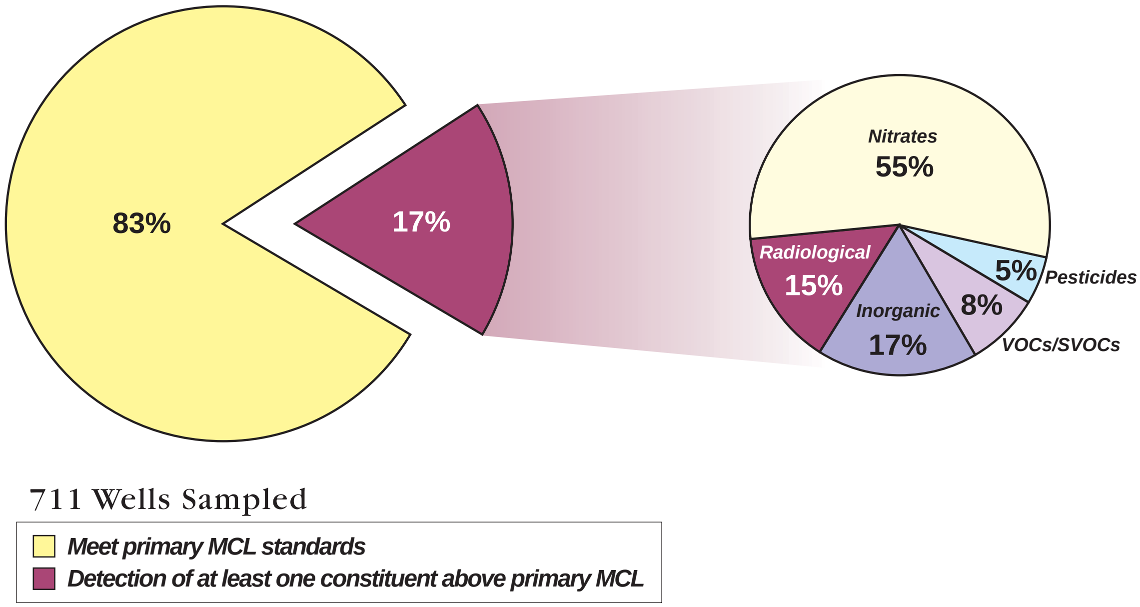

Figure 30 MCL exceedances in public supply wells in the Central Coast Hydrologic Region

Table 19 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 19 Most frequently occurring contaminants by contaminant group in the Central Coast Hydrologic Region

Contaminant group wells	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of
Inorganics – Primary	Antimony – 6	Aluminum – 4	Chromium (Total) – 4
Inorganics – Secondary	Iron – 145	Manganese – 135	TDS – 11
Radiological	Gross Alpha – 15	Radium 226 – 3	Uranium – 3
Nitrates	Nitrate (as NO_3) – 69	Nitrate + Nitrite – 24	
Pesticides	Heptachlor – 4	Di (2-Ethylhexyl) phthalate – 2	
VOCs/SVOCs	TCE – 3	3 are tied at 2 exceedances	

TCE = Trichloroethylene
VOC = Volatile Organic Compound
SVOC= Semivolatile Organic Compound

Changes from Bulletin 118-80

Four new basins have been defined since Bulletin 118-80. They are Felton Area, Majors Creek, Needle Rock Point, and Foothill groundwater basins. Additionally, new subbasins have been broken out in both the Gilroy-Hollister Valley Groundwater Basin (3-3) and the Salinas Valley Groundwater Basin (3-4) (Table 20).

Table 20 Modifications since Bulletin 118-80 of groundwater basins and subbasins in Central Coast Hydrologic Region

Subbasin name	New number	Old number
Llagas Area	3-3.01	3-3
Bolsa Area	3-3.02	3-3
Hollister Area	3-3.03	3-3
San Juan Bautista Area	3-3.04	3-3
180/400 Foot Aquifer	3-4.01	3-4
East Side Aquifer	3-4.02	3-4
Upper Forebay Aquifer	3-4.04	3-4
Upper Valley Aquifer	3-4.05	3-4
Pismo Creek Valley Basin	3-12	3-10
Arroyo Grande Creek Basin	3-12	3-11
Careaga Sand Highlands Basin	3-12 and 3-14	3-48
Felton Area	3-50	
Majors Creek	3-51	
Needle Rock Point	3-52	
Foothill	3-53	

Pismo Creek Valley Basin (3-10) and Arroyo Grande Creek Basin (3-11) have been merged into the Santa Maria River Valley Basin (3-12). Careaga Sand Highlands Basin (3-48) has been merged into the Santa Maria River Valley Basin (3-12) and San Antonio Creek Valley Basin (3-14).

Table 21 Central Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
3-1	SOQUEL VALLEY	2,500	C	1,421	665	6	6	16	482	270-990
3-2	PAJARO VALLEY	76,800	A	2,000	500	185	185	149	580-910	300-30,000
3-3	GILROY-HOLLISTER VALLEY									
3-3.01	LLAGAS AREA	55,600	C	-	-	-	-	95	-	-
3-3.02	BOLSA AREA	21,000	A	-	400	11	<11	3	-	400-1800
3-3.03	HOLLISTER AREA	32,700	A	-	400	42	<42	35	-	400-1600
3-3.04	SAN JUAN BAUTISTA AREA	74,300	A	-	400	37	<37	40	-	460-1700
3-4	SALINAS VALLEY									
3-4.01	180/400 FOOT AQUIFER	84,400	A	-	-	166	218	82	478	223-1,013
3-4.02	EAST SIDE AQUIFER	57,500	A	-	-	74	67	53	450	168-977
3-4.04	FOREBAY AQUIFER	94,100	A	-	-	89	91	35	624	300-1,100
3-4.05	UPPER VALLEY AQUIFER	98,200	A	4,000	-	36	37	17	443	140-3,700
3-4.06	PASO ROBLES AREA	597,000	A	3,300	-	183	-	58	614	165-3,868
3-4.08	SEASIDE AREA	25,900	B	3,500	1,000		7	24	400	200-900
3-4.09	LANGLEY AREA	15,400	B	1,570	450	-	-	52	-	52-348
3-4.10	CORRAL DE TIERRA AREA	22,300	C	948	450	-	3	26	-	355-679
3-5	CHOLAME VALLEY	39,800	C	3,000	1,000	1	-	1	-	-
3-6	LOCKWOOD VALLEY	59,900	C	1,500	100	-	-	9	-	-
3-7	CARMEL VALLEY	5,160	C	1,000	600	50	23	12	260-670	220-1,200
3-8	LOS OSOS VALLEY	6,990	A	700	230	-	-	10	354	78-33,700
3-9	SAN LUIS OBISPO VALLEY	12,700	A	600	300	-	-	11	583	278-1,949
3-12	SANTA MARIA RIVER VALLEY	184,000	A	2,500	1,000	286	10	108	598	139-1,200
3-13	CUYAMA VALLEY	147,000	A	4,400	1,100	17	2	8	-	206-3,905
3-14	SAN ANTONIO CREEK VALLEY	81,800	A	-	400	30	-	9	415	129-8,040
3-15	SANTA YNEZ RIVER VALLEY	204,000	A	1,300	750	163	21	76	507	400-700
3-16	GOLETA	9,210	A	800	500	49	11	17	755	617-929
3-17	SANTA BARBARA	6,160	A	625	560	75	36	5	-	217-385
3-18	CARPINTERIA	8,120	A	500	300	41	41	4	557	317-1,780
3-19	CARRIZO PLAIN	173,000	C	1,000	500	-	-	1	-	-
3-20	ANO NUEVO AREA	2,032	C	-	-	-	-	2	-	-
3-21	SANTA CRUZ PURISIMA FORMATION	40,200	C	200	20	-	-	39	440	380-560
3-22	SANTA ANA VALLEY	2,720	C	130	-	-	-	-	-	-
3-23	UPPER SANTA ANA VALLEY	1,430	C	-	-	-	-	-	-	-
3-24	QUIEN SABE VALLEY	4,710	C	122	122	-	-	-	-	-
3-25	TRES PINOS VALLEY	3,390	C	1,225	-	-	-	3	-	-
3-26	WEST SANTA CRUZ TERRACE	7,870	C	550	200	-	-	7	480	378-684
3-27	SCOTTS VALLEY	774	C	410	100-900	26	7	7	360	100-980
3-28	SAN BENITO RIVER VALLEY	24,200	C	2,000	-	-	-	3	-	-
3-29	DRY LAKE VALLEY	1,420	C	-	-	-	-	-	-	-
3-30	BITTER WATER VALLEY	32,200	C	-	-	-	-	-	-	-
3-31	HERNANDEZ VALLEY	2,860	C	160	58	-	-	-	-	-

Table 21 Central Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
3-32	PEACH TREE VALLEY	9,790	C	117	84	-	-	-	-	-
3-33	SAN CARPOFORO VALLEY	200	C	-	-	-	-	-	-	217-385
3-34	ARROYO DE LA CRUZ VALLEY	750	C	-	-	-	-	-	-	211-381
3-35	SAN SIMEON VALLEY	620	A	170	100	-	-	4	413	46-2,210
3-36	SANTA ROSA VALLEY	4,480	A	708	400	-	-	2	-	298-2,637
3-37	VILLA VALLEY	980	C	-	-	-	-	-	-	260-1,635
3-38	CAYUCOS VALLEY	530	C	166	100	-	-	-	-	815-916
3-39	OLD VALLEY	750	C	335	200	-	-	-	-	346-2,462
3-40	TORO VALLEY	721	C	500	0	-	-	-	-	458-732
3-41	MORRO VALLEY	1,200	C	442	300	-	-	6	1150	469-5,100
3-42	CHORRO VALLEY	3,200	C	700	200	-	-	6	656	60-3,606
3-43	RINCONADA VALLEY	2,580	C	0	0	-	-	-	-	-
3-44	POZO VALLEY	6,840	C	230	100	-	-	5	-	287-676
3-45	HUASNA VALLEY	4,700	C	0	0	-	-	-	-	-
3-46	RAFAEL VALLEY	2,990	C	0	0	-	-	-	-	-
3-47	BIG SPRING AREA	7,320	C	0	0	-	-	-	-	-
3-49	MONTECITO	6,270	A	1,000	750	88	2	4	700	600-1,100
3-50	FELTON AREA	1,160	C	825	244	6	-	2	-	69-400
3-51	MAJORS CREEK	364	C	50	38	-	-	-	-	-
3-52	NEEDLE ROCK POINT	480	C	450	320	-	-	-	-	-
3-53	FOOTHILL	3,120	A	-	-	-	8	7	828	554-1,118

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

Salinas Valley Groundwater Basin, 180/400 Foot Aquifer Subbasin

- Groundwater Subbasin Number: 3-4.01
- County: Monterey
- Surface Area: 84,400 acres (132 square miles)

Basin Boundaries and Hydrology

The Salinas Valley Groundwater Basin– 180/400-Foot Aquifer Subbasin includes the lower reaches and mouth of the Salinas River. The southwestern basin boundary is the contact of Quaternary Alluvium or Terrace Deposits with the granitic basement of the Sierra de Salinas. Further north along the western Salinas Valley margin the basin boundary is the contact with the Quaternary Paso Robles Formation or Aromas Red Sands of the Corral de Tierra Area Subbasin. The extreme northwest boundary of the subbasin is shared with the Salinas Valley - Seaside Area Subbasin along the seaward projection of the King City Fault. This fault may act a groundwater flow barrier between subbasins beneath a cover of Holocene sand dunes (Durbin and others 1978). The Subbasin is bounded by Monterey Bay to the northwest. The northern subbasin boundary is shared with the Pajaro Valley Groundwater Basin and coincides with the inland projection of a 400-foot deep, buried and clay-filled paleodrainage of the Salinas River. This acts as a barrier to groundwater flow between these subbasins (DWR 1969a; Durbin and others 1978). The northeastern boundary is shared throughout most of its length by the adjacent Salinas Valley – Eastside Subbasin, and to the north with a shorter length of common boundary with the Salinas Valley – Langley Area Subbasin. The northeastern subbasin boundary generally coincides with the northeastern limit of confining conditions in the 180/400-Foot Aquifer Subbasin (DWR 1946a) and with the location of State Highway 101. The southeastern boundary (near the City of Gonzales) is shared with the adjacent Salinas Valley – Lower Forebay Subbasin and is the approximate limit of confining conditions in an up-valley direction (DWR 1946a). The 180/400 Foot Aquifer Subbasin boundaries generally coincide with those of the Pressure Subarea of the Monterey County Water Resources Agency (MCWRA).

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 generally follows the western margin of the Valley from King City in the south to Monterey Bay in the north (Durbin and others 1978). 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 and others 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 180/400-Foot Aquifer Subbasin contains two main water-bearing units that are the basis for the subbasin's name – the 180-Foot Aquifer and the 400-Foot Aquifer – so named for the average depth at which they occur. A near-surface water-bearing zone also exists but it is a relatively minor source of water due to its poor quality. The 180-Foot Aquifer only occurs in this subbasin, as its confining blue clay layer (the Salinas Aquitard) thins and disappears east of the boundary with the adjacent Eastside Subbasin and south of the town of Chualar (MW 1994; LHI 1985). This Salinas Aquitard ranges in thickness from 25 feet near Salinas to more than 100 feet near Monterey Bay. The thickness of the 180-Foot Aquifer varies from 50 to 150 feet, with an average 100 feet (MW 1994; DWR 1970). This unit consists of a complex zone of interconnected sands, gravels and clay lenses (Durbin 1978). The 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 aquifers and aquitards ranging in thickness from 10 to 70 feet; the major aquitard in this sequence is also a marine blue clay.

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).

An additional, 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.

Because of the confined nature of the aquifers in the subbasin, an estimate of specific yield is not quite applicable. However, Yates (1988) estimated a storage coefficient of 0.018 in the northern Subbasin and 0.015 in the southern subbasin. A value of 0.075 was estimated for the central subbasin area. 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.

Heavy pumping of the 180- and 400-Foot Aquifers has caused significant seawater intrusion into both these aquifers, which was first documented in 1930s (DWR 1946a). Groundwater flow in the northernmost subbasin has been directed from Monterey Bay inland since at least this time. By 1995, seawater had intruded over five miles inland through the 180-Foot Aquifer, including the area beneath the towns of Castroville and Marina. Seawater has also intruded over two miles into the 400-Foot Aquifer by 1995.

Along with water quality issues associated with seawater intrusion, long-term agricultural production in the Salinas Valley has contributed to an extensive non-point source nitrate problem. Nitrate concentrations in many wells in the Valley exceed drinking water standards (DWR 1970; MCWRA 1997), including areas of the subbasin between Marina and Salinas, and to the northwest of Gonzales.

Recharge Areas

Due to the impermeable nature of the clay aquitard above the 180-Foot Aquifer, subbasin recharge (including that from precipitation, agricultural return flows, or river flow) is nil. Instead, recharge is from underflow originating in upper valley areas such as the Arroyo Seco Cone and Salinas River bed or the adjacent Eastside Subbasin, and more recently, from seawater intrusion. Historically, groundwater flowed from subbasins to the south and east through the subbasin and seaward to discharge zones in the walls of the submarine canyon in Monterey Bay (Durbin and others 1978; Greene 1970). With increased pumping in the adjacent Eastside Subbasin since the 1970s, groundwater flow is dominantly northeastward in the central and southern subbasin.

Groundwater Level Trends

Between 1964 and 1974, the amount of groundwater in storage has increased by 38,100 af. This increase continued from 1974 to 1984 with a rise of 8,200 af. This trend reversed itself between 1984 and 1994, when there was a decrease of 62,600 af in the amount of groundwater stored (MW 1998).

Groundwater Storage

Calculations done by DWR (2000) estimate the total storage capacity of this subbasin to be 7,240,000 af. As of 1998, there was 6,860,000 af of groundwater in storage (MW 1998).

Groundwater Budget (Type A)

A detailed groundwater budget for this subbasin was calculated for 1994 (MW 1998). Natural recharge into the aquifer was estimated to be 117,000 af. There is no artificial recharge. Applied water recharge is approximately 11,000 af, but because this recharge is caused by seawater intrusion, it is not included in the total basin inflow estimate. Subsurface inflow is estimated to be 21,000 af. Annual urban and agricultural extractions total approximately 130,000 af. There are no other extractions. Subsurface outflow is approximately 8,000 af.

Groundwater Quality

Characterization. The 180-Foot Aquifer is characterized by calcium sulfate to calcium sodium bicarbonate sulfate groundwaters (JSA 1990). Where this aquifer is intruded by seawater, the water is typically characterized by sodium chloride to calcium chloride. TDS values range from 223 to 1,013 mg/L, with an average value of 478 mg/L (based on 187 analyses; DHS 2000). TDS values from 30 public supply wells were reported as ranging from 233 to 996 mg/L, with an average value of 556 mg/L. EC values for this subbasin range from 320 to 1,526 µmhos/cm, with an average value of 741 µmhos/cm.

Impairments. Of 194 wells sampled during 1995 for nitrate in both the 180-Foot and 400-Foot Aquifers, 21 exceeded the drinking water standard. The average nitrate values for these aquifers were 35 and 9 mg/L, respectively (MCWRA 1997). Approximately 20,000 acres of the 180-Foot Aquifer and 10,000 acres of the 400-Foot Aquifer had been intruded by seawater (defined by chloride levels above 500 mg/L) by 1995 (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	33	0
Radiological	36	3
Nitrates	33	2
Pesticides	41	0
VOCs and SOCs	41	4
Inorganics – Secondary	33	7

[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: 150 - 886	Average: 464 (74 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
MCWRA	Groundwater levels	166 Varies (Geomatrix 2001)
MCWRA	Mineral, nutrient, & minor element.	218 Annually (Geomatrix 2001)
Department of Health Services (incl. Cooperators)	Title 22 water quality	82 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; Castroville CWD; City of Gonzales
Private	California Water Service Co. (CWS)– Salinas; CWS – Oak Hills

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Errata

Changes made to the basin description will be noted here.

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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