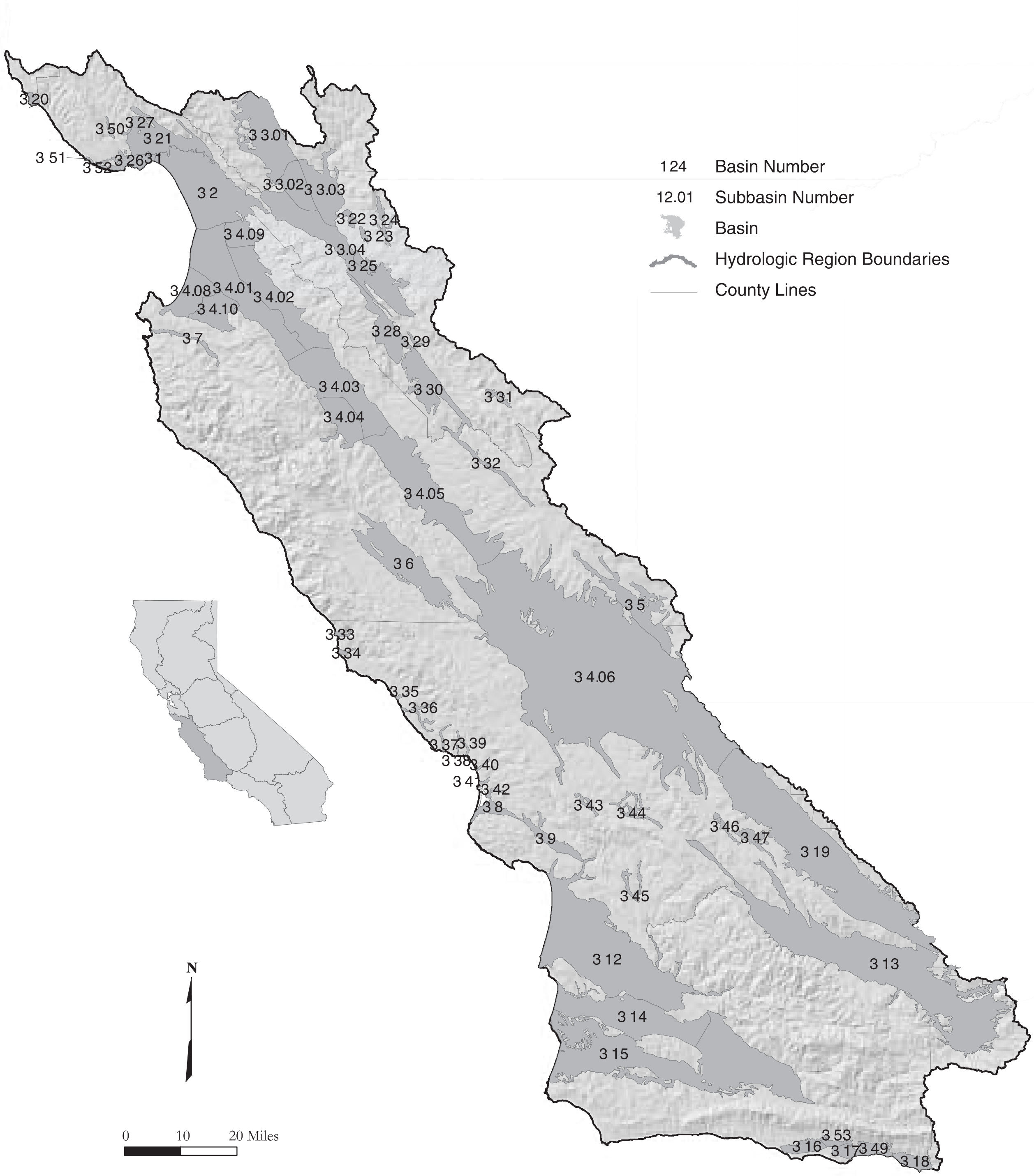

Figure 29 Central Coast Hydrologic Region

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
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.

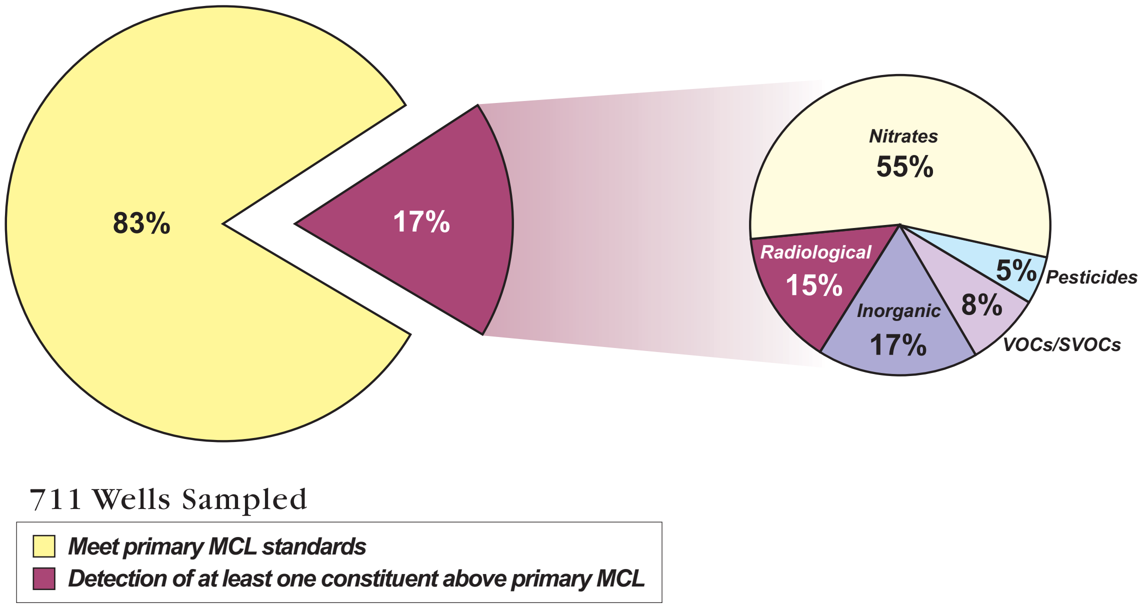

Figure 30 MCL exceedances in public supply wells in the Central Coast Hydrologic Region

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, Upper Valley Aquifer Subbasin

- Groundwater Subbasin Number: 3-4.05
- County: Monterey
- Surface Area: 98,200 acres (153 square miles)

Basin Boundaries and Hydrology

The Salinas Valley Groundwater Basin, Upper Valley Aquifer Subbasin occupies the upper portion of the Salinas Valley and extends from approximately three miles south of Greenfield to about six miles south of the town of San Ardo. The subbasin is bounded to the west by the contact of the Quaternary Paso Robles Formation or Quaternary terrace deposits with middle Miocene marine sedimentary rocks (Monterey Shale) of the Sierra de Salinas. To the east, the boundary is the contact of the Paso Robles Formation or of the Quaternary terrace deposits or alluvium with the Early to Middle Pliocene Pancho Rico Formation of the Gabilan Range. The northern boundary is shared with the Salinas Valley – Forebay Aquifer subbasin and generally represents the southern limit of confining conditions above the 400-Foot Aquifer (MW 1994). This boundary also represents a constriction of the Valley floor caused by encroachment from the west by the composite alluvial fan of Arroyo Seco and Monroe Creek. The southern boundary is the Sargent Creek drainage and its projection across the valley and is shared with the Salinas Valley – Paso Robles Area subbasin. The narrow constriction of the Salinas Valley at this location generally separates the upper and lower Salinas River drainage basins.

Intermittent streams such as Pine and Pancho Rico Creeks and perennial San Lorenzo Creek drain the western slopes of the Gabilan Range and flow westward across the subbasin toward the Salinas River. The subbasin boundaries are generally correlative with those of the Upper Valley Subarea of the Monterey County Water Resources Agency (MCWRA). Average annual precipitation is approximately 11 inches at the valley floor to 15 inches at the eastern and western margin of the subbasin.

Hydrogeologic Information

Water Bearing Formations

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. Along the eastern margin of the Upper Valley Aquifer subbasin, the Pancho Rico

Formation is the equivalent of the Purisima Formation. The depth to the base of fresh water ranges from about 1,000 feet at the northern subbasin valley margin to 200 feet at the southern margin (Durbin 1978) with a sharp rise from about 800 to 300 feet at the center of the subbasin.

The primary aquifer of the subbasin is unconfined and is represented by unconsolidated to semi-consolidated and interbedded gravel, sand, and silt of the Paso Robles Formation, alluvial fan and river deposits. Deposits west of the Salinas River tend to be coarser grained than those to the east. Well yields up to 4,000 gallons per minute are present in both the Paso Robles Formation and river deposits (Yates 1988). These deposits represent the lateral equivalents of the 180-Foot and 400-Foot Aquifer units of the lower Salinas Valley. However, no aquitards comparable to those separating aquifers in the lower Salinas Valley exist in the sedimentary sequence of the subbasin. The Deep Aquifer of the lower Valley has no equivalent in the subbasin due to the southward shallowing of the basement complex.

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 and 400-Foot Aquifers were 8-16 percent and 6 percent, respectively. Yates (1988) estimated a storage coefficient of 7.8 percent for the northern Subbasin and 15.0 percent for the southern subbasin. MCWRA (2000) lists the specific yield as 10 percent.

Groundwater flow is generally in a down-valley direction. Recharge from San Lorenzo Creek east of King City appeared to create a slight flattening of the water table gradient and locally influenced the flow direction at this location during Fall 1995 (MCWRA 1997).

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 1971), including in wells throughout the Upper Valley Aquifer subbasin (MCWRA 1997).

Restrictive Structures

The King City Fault, whose large vertical offset allowed a deep wedge of sediments to accumulate in the northern Salinas Valley, does not extend southeastward in the subbasin. Instead, between Greenfield and San Ardo, the groundwater basin occupies the axis of a northwest-plunging synclinal flexure in the basement complex (Durbin 1978). Younger marine deposits (Pancho Rico Formation) and overlying non-marine deposits (Paso Robles Formation) outcrop along both sides of the valley. Overlying these deposits are widespread Quaternary terrace deposits and minor Holocene sand dune deposits present south of King City. Holocene alluvium of the Salinas River drainage and its tributaries complete the sedimentary sequence (Jennings 1959).

Recharge Areas

Subbasin recharge is primarily from percolation through channel deposits of the Salinas River and tributary drainages (DWR 1946a). A lesser volume of recharge results from the percolation of precipitation along valley margins and from applied irrigation water (LHI 1985). Subsurface flow from precipitation recharged through the Pancho Rico Formation east of the Subbasin and minimal subsurface flows from drainage along the Salinas River account for the remainder of recharge.

Groundwater Level Trends

Between 1964 and 1974, the amount of groundwater in storage in this subbasin rose 600 af. This trend continued through 1974 to 1984 and through 1984 to 1994, with increases in the amount of groundwater stored of 9,600 af and 4,500 af, respectively (MW 1998).

Groundwater Storage

As of 1994, the amount of groundwater in storage is approximately 2,460,000 af (MW 1998). The total calculated storage capacity of the subbasin is estimated to be 3,100,000 af (DWR 2000).

Groundwater Budget (Type A)

A detailed water budget was determined for 1994 (MW 1998). Natural recharge accounts for approximately 165,000 af of the total basin inflow. Applied water recharge is included in this estimate. Subsurface inflow was estimated to be 7,000 af. Annual urban and agricultural extractions are approximately 153,000 af combined, and there are no other extractions. Subsurface outflow is estimated to be 17,000 af.

Groundwater Quality

Characterization. The groundwater in this subbasin is of a sodium and calcium sulfate type, and sodium chloride groundwaters east of the Salinas river, and west of the river, better quality calcium-magnesium bicarbonate waters dominate (DWR 1969b). TDS values range from 1,200 to 3,700 mg/L (DWR 1969b). The Department of Health Services (2000) reports TDS values of 140 to 990 mg/L, with an average value of 443 mg/L in 168 analyses, and a range of 311 mg/L to 775 mg/L, with an average value of 536 mg/L, in 7 public supply wells. EC values range from 730 to 3,980 µmhos/cm, with an average value of 2,150 µmhos/cm (based on 11 wells, DWR 1969b). DHS (2000) reports EC values ranging from 465 to 1,518 µmhos/cm from 69 analyses.

Impairments. Recharge of poor quality surface water (>2000 µmhos/cm) from drainages along the western slope of the Gabilan Range have created poor quality groundwater along the eastern side of the subbasin. This results in sulfate, boron, TDS, and conductivity exceeding drinking water standards in many areas (DWR 1969b). Of 35 wells sampled during 1995 for nitrate, 23 exceeded the drinking water standard. The average nitrate value was 98 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	12	4
Radiological	11	0

Nitrates	12	6
Pesticides	13	0
VOCs and SOCs	13	0
Inorganics – Secondary	12	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 Production characteristics

	Well yields (gal/min)	
Municipal/Irrigation		
	Total depths (ft)	
Domestic		
Municipal/Irrigation	Range: 93 - 600	Average: 235 (16 Well Completion Reports)

Active Monitoring Data

Agency	**Parameter**	**Number of wells /measurement frequency**
MCWRA	Groundwater levels	36 Varies (Geomatrix 2001)
MCWRA	Mineral, nutrient, & minor element.	37 Annually (Geomatrix 2001)
Department of Health Services (incl. Cooperators)	Title 22 water quality	17 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 groundwater, provide adequate water supplies to meet current and future needs, and to hydrologically balance the groundwater basin in the Salinas Valley.
Water agencies	
Public	Monterey County Water Resources Agency; San Ardo WD; San Lucas WD
Private	California Water Service Co. (CWS)–King City; Little Bear WC

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Errata

Changes made to the basin description will be noted here.