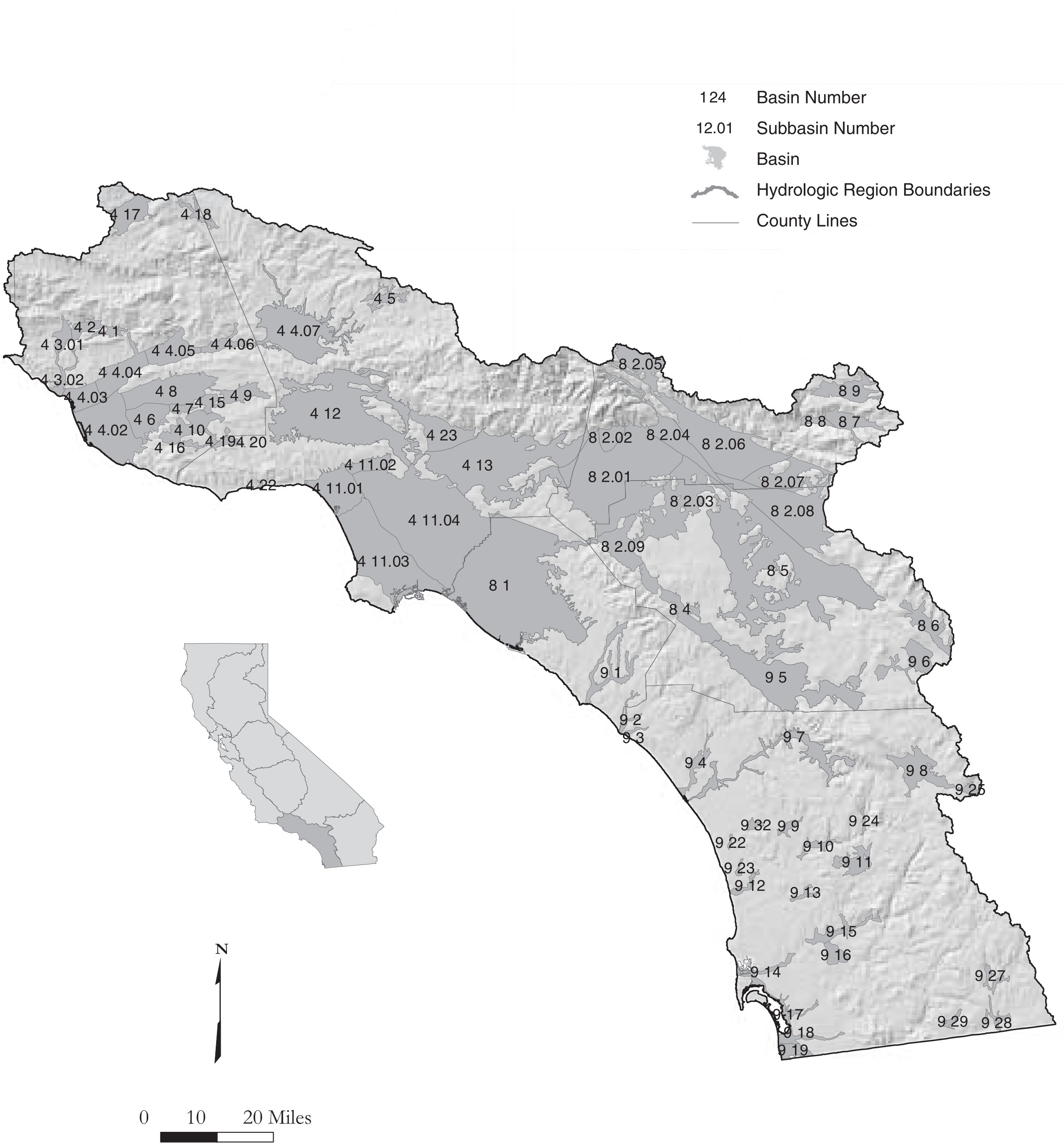

Figure 31 South Coast Hydrologic Region

Basins and Subbasins of the South Coast Hydrologic Region

Basin/subbasin	Basin name
4-1	Upper Ojai Valley
4-2	Ojai Valley
4-3	Ventura River Valley
4-3.01	Upper Ventura River
4-3.02	Lower Ventura River
4-4	Santa Clara River Valley
4-4.02	Oxnard
4-4.03	Mound
4-4.04	Santa Paula
4-4.05	Fillmore
4-4.06	Piru
4-4.07	Santa Clara River Valley East
4-5	Acton Valley
4-6	Pleasant Valley
4-7	Arroyo Santa Rosa Valley
4-8	Las Posas Valley
4-9	Simi Valley
4-10	Conejo Valley
4-11	Coastal Plain of Los Angeles
4-11.01	Santa Monica
4-11.02	Hollywood
4-11.03	West Coast
4-11.04	Central
4-12	San Fernando Valley
4-13	San Gabriel Valley
4-15	Tierre Rejada
4-16	Hidden Valley
4-17	Lockwood Valley
4-18	Hungry Valley
4-19	Thousand Oaks Area
4-20	Russell Valley
4-22	Malibu Valley
4-23	Raymond
8-1	Coastal Plain of Orange County
8-2	Upper Santa Ana Valley
8-2.01	Chino
8-2.02	Cucamonga
8-2.03	Riverside-Arlington
8-2.04	Rialto-Colton
8-2.05	Cajon
8-2.06	Bunker Hill
8-2.07	Yucaipa
8-2.08	San Timoteo
8-2.09	Temescal
8-4	Elsinore
8-5	San Jacinto
8-6	Hemet Lake Valley
8-7	Big Meadows Valley
8-8	Seven Oaks Valley
8-9	Bear Valley
9-1	San Juan Valley
9-2	San Mateo Valley
9-3	San Onofre Valley
9-4	Santa Margarita Valley
9-5	Temecula Valley
9-6	Coahuila Valley
9-7	San Luis Rey Valley
9-8	Warner Valley
9-9	Escondido Valley
9-10	San Pasqual Valley
9-11	Santa Maria Valley
9-12	San Dieguito Creek
9-13	Poway Valley
9-14	Mission Valley
9-15	San Diego River Valley
9-16	El Cajon Valley
9-17	Sweetwater Valley
9-18	Otay Valley
9-19	Tijuana Basin
9-22	Batiquitos Lagoon Valley
9-23	San Elijo Valley
9-24	Pamo Valley
9-25	Ranchita Town Area
9-27	Cottonwood Valley
9-28	Campo Valley
9-29	Potrero Valley
9-32	San Marcos Area

Description of the Region

The South Coast HR covers approximately 6.78 million acres (10,600 square miles) of the southern California watershed that drains to the Pacific Ocean (Figure 31). The HR is bounded on the west by the Pacific Ocean and the watershed divide near the Ventura-Santa Barbara County line. The northern boundary corresponds to the crest of the Transverse Ranges through the San Gabriel and San Bernardino mountains. The eastern boundary lies along the crest of the San Jacinto Mountains and low-lying hills of the Peninsular Range that form a drainage boundary with the Colorado River HR. The southern boundary is the international boundary with the Republic of Mexico. Significant geographic features include the coastal plain, the central Transverse Ranges, the Peninsular Ranges, and the San Fernando, San Gabriel, Santa Ana River, and Santa Clara River valleys.

The South Coast HR includes all of Orange County, most of San Diego and Los Angeles Counties, parts of Riverside, San Bernardino, and Ventura counties, and a small amount of Kern and Santa Barbara Counties. This HR is divided into Los Angeles, Santa Ana and San Diego subregions, RWQCBs 4, 8, and 9 respectively. Groundwater basins are numbered according to these subregions. Basin numbers in the Los Angeles subregion are preceded by a 4, in Santa Ana by an 8, and in San Diego by a 9. The Los Angeles subregion contains the Ventura, Santa Clara, Los Angeles, and San Gabriel River drainages, Santa Ana encompasses the Santa Ana River drainage, and San Diego includes the Santa Maria River, San Luis Rey River and the San Diego River and other drainage systems.

According to 2000 census data, about 17 million people live within the boundaries of the South Coast HR, approximately 50 percent of the population of California. Because this HR amounts to only about 7 percent of the surface area of the State, this has the highest population density of any HR in California (DWR 1998). Major population centers include the metropolitan areas surrounding Ventura, Los Angeles, San Diego, San Bernardino, and Riverside.

The South Coast HR has 56 delineated groundwater basins. Twenty-one basins are in subregion 4 (Los Angeles), eight basins in subregion 8 (Santa Ana), and 27 basins in subregion 9 (San Diego).

The Los Angeles subregion overlies 21 groundwater basins and encompasses most of Ventura and Los Angeles counties. Within this subregion, the Ventura River Valley, Santa Clara River Valley, and Coastal Plain of Los Angeles basins are divided into subbasins. The basins in the Los Angeles subregion underlie 1.01 million acres (1,580 square miles) or about 40 percent of the total surface area of the subregion.

The Santa Ana subregion overlies eight groundwater basins and encompasses most of Orange County and parts of Los Angeles, San Bernardino, and Riverside counties. The Upper Santa Ana Valley Groundwater Basin is divided into nine subbasins. Groundwater basins underlie 979,000 acres (1,520 square miles) or about 54 percent of the Santa Ana subregion.

The San Diego subregion overlies 27 groundwater basins, encompasses most of San Diego County, and includes parts of Orange and Riverside counties. Groundwater basins underlie about 277,000 acres (433 square miles) or about 11 percent of the surface of the San Diego subregion.

Overall, groundwater basins underlie about 2.27 million acres (3,530 square miles) or about 33 percent of the South Coast HR.

Groundwater Development

Groundwater has been used in the South Coast HR for well over 100 years. High demand and use of groundwater in Southern California has given rise to many disputes over management and pumping rights, with the resolution of these cases playing a large role in the establishment and clarification of water rights law in California. Raymond Groundwater Basin, located in this HR, was the first adjudicated basin in the State. Of the 16 adjudicated basins in California, 11 are in the South Coast HR. Groundwater provides about 23 percent of water demand in normal years and about 29 percent in drought years (DWR 1998).

Groundwater is found in unconfined alluvial aquifers in most of the basins of the San Diego subregion and the inland basins of the Santa Ana and Los Angeles subregions. In some larger basins, typified by those underlying the coastal plain, groundwater occurs in multiple aquifers separated by aquitards that create confined groundwater conditions. Basins range in depth from tens or hundreds of feet in smaller basins, to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this HR depending on aquifer characteristics and well location, size, and use. Some aquifers are capable of yielding thousands of gallons per minute to municipal wells.

Conjunctive Use

Conjunctive use of surface water and groundwater is a long-standing practice in the region. At present, much of the potable water used in Southern California is imported from the Colorado River and from sources in the eastern Sierra and Northern California. Several reservoirs are operated primarily for the purpose of storing surface water for domestic and irrigation use, but groundwater basins are also recharged from the outflow of some reservoirs. The concept is to maintain streamflow over a longer period of time than would occur without regulated flow and thus provide for increased recharge of groundwater basins. Most of the larger basins in this HR are highly managed, with many conjunctive use projects being developed to optimize water supply.

Coastal basins in this HR are prone to intrusion of seawater. Seawater intrusion barriers are maintained along the Los Angeles and Orange County sections of the coastal plain. In Orange County, recycled water is injected into the ground to form a mound of groundwater between the coast and the main groundwater basin. In Los Angeles County, imported and recycled water is injected to maintain a seawater intrusion barrier.

Groundwater Quality

Groundwater in basins of the Los Angeles subregion is mainly calcium sulfate and calcium bicarbonate in character. Nitrate content is elevated in some parts of the subregion. Volatile organic compounds (VOCs) have created groundwater impairments in some of the industrialized portions of the region. The San Gabriel Valley and San Fernando Valley groundwater basins both have multiple sites of contamination from VOCs. The main constituents in the contamination plumes are trichloroethylene (TCE) and tetrachloroethylene (PCE). Some of the locations have been declared federal Superfund sites. Contamination plumes containing high concentrations of TCE and PCE also occur in the Bunker Hill Subbasin of the Upper Santa Ana Valley Groundwater Basin. Some of these plumes are also designated as Superfund sites. Perchlorate is emerging as an important contaminant in several areas in the South Coast HR.

Groundwater in basins of the Santa Ana subregion is primarily calcium and sodium bicarbonate in character. Local impairments from excess nitrate or VOCs have been recognized. Groundwater and surface water in the Chino Subbasin of the Santa Ana River Valley Groundwater Basin have elevated nitrate concentrations, partly derived from a large dairy industry in that area. In Orange County, water from the Santa Ana River provides a large part of the groundwater replenishment. Wetlands maintained along the Santa Ana River near the boundary of the Upper Santa Ana River and Orange County Groundwater Basins provide effective removal of nitrate from surface water, while maintaining critical habitat for endangered species.

Groundwater in basins of the San Diego subregion has mainly calcium and sodium cations and bicarbonate and sulfate anions. Local impairments by nitrate, sulfate, and TDS are found. Camp Pendleton Marine Base, in the northwestern part of this subregion, is on the EPA National Priorities List for soil and groundwater contamination by many constituents.

Water Quality in Public Supply Wells

From 1994 through 2000, 2,342 public supply water wells were sampled in 47 of the 73 basins and subbasins in the South Coast HR. Analyzed samples indicate that 1,360 wells, or 58 percent, met the state primary MCLs for drinking water. Nine-hundred-eighty-two wells, or 42 percent, have constituents that exceed one or more MCL. Figure 32 shows the percentages of each contaminant group that exceeded MCLs in the 982 wells.

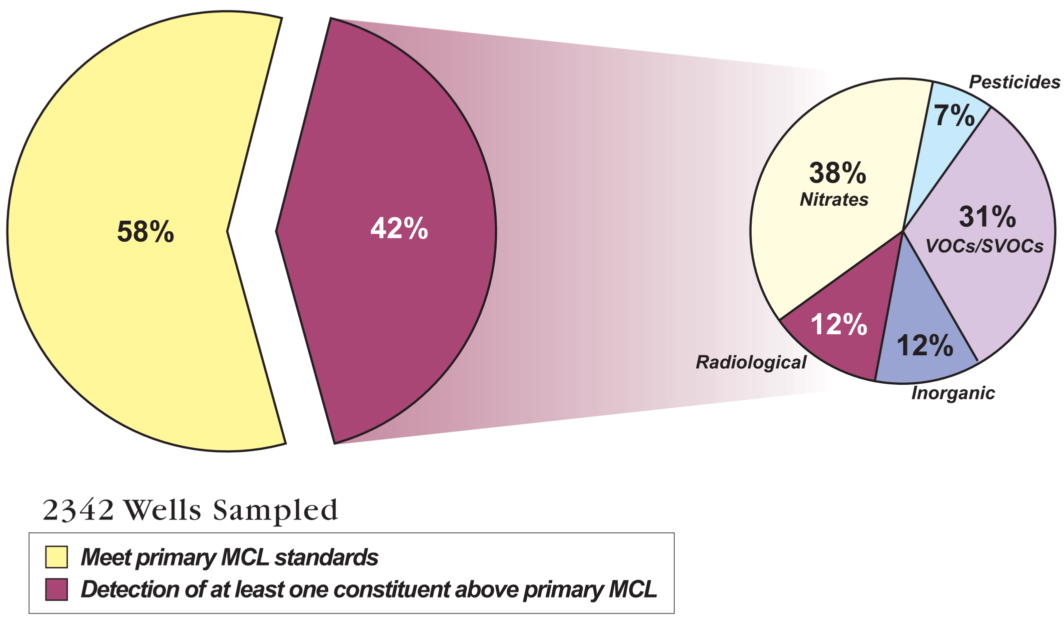

Figure 32 MCL exceedances in public supply wells in the South Coast Hydrologic Region

Table 22 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.

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 23). The Cajalco Valley (8-3), Jamul Valley (9-20), Las Pulgas Valley (9-21), Pine Valley (9-26), and Tecate Valley (9-30) Groundwater Basins have been deleted in this report because they have thin deposits of alluvium and well completion reports indicate that groundwater production is from underlying fractured bedrock. The Conejo Tierra Rejada Volcanic (4-21) is a volcanic aquifer and was not assigned a basin number in this bulletin. This is considered to be groundwater source area as discussed in Chapter 6.

Table 22 Most frequently occurring contaminants by contaminant group in the South Coast Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 56	Thallium – 13	Aluminum – 12
Inorganics – Secondary	Iron – 337	Manganese – 335	TDS – 36
Radiological	Gross Alpha – 104	Uranium – 40	Radium 226 – 9 Radium 228 – 9
Nitrates	Nitrate (as NO_3) – 364	Nitrate + Nitrite – 179	Nitrate Nitrogen (NO_3-N) – 14
Pesticides	DBCP – 61	Di(2-Ethylhexyl)phthalate –5	Heptachlor – 2 EDB – 2
VOCs/SVOCs	TCE – 196	PCE – 152	1,2 Dichloroethane – 89

DBCP = Dibromochloropropane
EDB = Ethylene Dibromide
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds

The Ventura River Valley (4-3), Santa Clara River Valley (4-4), Coastal Plain of Los Angeles (4-11), and Upper Santa Ana Valley (8-2) Groundwater Basins have been divided into subbasins in this report. The extent of the San Jacinto Groundwater Basin (8-5) has been decreased because completion of Diamond Valley Reservoir has inundated the valley. Paloma Valley has been removed because well logs indicate groundwater production is solely from fractured bedrock. The Raymond Groundwater Basin (4-23) is presented as an individual basin instead of being incorporated into the San Gabriel Valley Groundwater Basin (4-13) because it is bounded by physical barriers and has been managed as a separate and individual groundwater basin for many decades. In Bulletin 118-75, groundwater basins in two different subregions were designated the Upper Santa Ana Valley Groundwater Basin (4-14 and 8-2). To alleviate this confusion, basin 4-14 has been divided, with parts of the basin incorporated into the neighboring San Gabriel Valley Groundwater Basin (4-13) and the Chino subbasin of the Upper Santa Ana Valley Groundwater Basin (8-2.01). The San Marcos Area Groundwater Basin (9-32) in central San Diego County is presented as a new basin in this report.

Table 23 Modifications since Bulletin 118-80 of groundwater basins and subbasins in South Coast Hydrologic Region

Basin/subbasin name	Number	Old number
Upper Ventura River	4-3.01	4-3
Lower Ventura River	4-3.02	4-3
Oxnard	4-4.02	4-4
Mound	4-4.03	4-4
Santa Paula	4-4.04	4-4
Fillmore	4-4.05	4-4
Piru	4-4.06	4-4
Santa Clara River Valley East	4-4.07	4-4
Santa Monica	4-11.01	4-11
Hollywood	4-11.02	4-11
West Coast	4-11.03	4-11
Central	4-11.04	4-11
Upper Santa Ana Valley	Incorporated into 8-2.01 and 4-13	4-14
Conejo-Tierra Rejada Volcanic	deleted	4-21
Raymond	4-23	4-13
Chino	8-2.01	8-2
Cucamonga	8-2.02	8-2
Riverside-Arlington	8-2.03	8-2
Rialto-Colton	8-2.04	8-2
Cajon	8-2.05	8-2
Bunker Hill	8-2.06	8-2
Yucaipa	8-2.07	8-2
San Timoteo	8-2.08	8-2
Temescal	8-2.09	8-2
Cajalco Valley	deleted	8-3
Tijuana Basin	9-19	
Jamul Valley	deleted	9-20
Las Pulgas Valley	deleted	9-21
Batiquitos Lagoon Valley	9-22	
San Elijo Valley	9-23	
Pamo Valley	9-24	
Ranchita Town Area	9-25	
Pine Valley	deleted	9-26
Cottonwood Valley	9-27	
Campo Valley	9-28	
Potrero Valley	9-29	
Tecate Valley	deleted	9-30
San Marcos Area	9-32	Not previously identified

Table 24 South Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
4-1	UPPER OJAI VALLEY	3,800	A	200	50	4	-	1	707	438-1,249
4-2	OJAI VALLEY	6,830	A	600	383	24	-	22	640	450-1,140
4-3	VENTURA RIVER VALLEY									
4-3.01	UPPER VENTURA RIVER	7,410	C	-	600	17	-	18	706	500-1,240
4-3.02	LOWER VENTURA RIVER	5,300	A	-	20	-	-	2	-	760-3,000
4-4	SANTA CLARA RIVER VALLEY									
4-4.02	OXNARD	58,000	A	1,600	-	127	127	69	1,102	160-1,800
4-4.03	MOUND	14,800	A	-	700	11	11	4	1,644	1,498-1,908
4-4.04	SANTA PAULA	22,800	A	-	700	60	50	10	1,198	470-3,010
4-4.05	FILLMORE	20,800	A	2,100	700	23	-	10	1,100	800-2,400
4-4.06	PIRU	8,900	A	-	800	19	-	3	1,300	608-2,400
4-4.07	SANTA CLARA RIVER VALLEY EAST	66,200	C	-	-	-	-	62	-	-
4-5	ACTON VALLEY	8,270	A	1,000	140	-	-	7	-	-
4-6	PLEASANT VALLEY	21,600	A	-	1,000	9	-	12	1,110	597-3,490
4-7	ARROYO SANTA ROSA VALLEY	3,740	A	1,200	950	6	-	7	1,006	670-1,200
4-8	LAS POSAS VALLEY	42,200	A	750	-	-	-	24	742	338-1,700
4-9	SIMI VALLEY	12,100	A	-	394	13	-	1	-	1,580
4-10	CONEJO VALLEY	28,900	A	1,000	100	-	-	3	631	335-2,064
4-11	COASTAL PLAIN OF LOS ANGELES									
4-11.01	SANTA MONICA	32,100	C	4,700	-	-	-	12	916	729-1,156
4-11.02	HOLLYWOOD	10,500	A	-	-	5	5	1	-	526
4-11.03	WEST COAST	91,300	A	1,300	-	67	58	33	456	-
4-11.04	CENTRAL	177,000	A	11,000	1,730	302	64	294	453	200-2,500
4-12	SAN FERNANDO VALLEY	145,000	A	3,240	1,220	1398	2385	126	499	176-1,16
4-13	SAN GABRIEL VALLEY	154,000	A	4,850	1,000	67	296	259	367	90-4,288
4-15	TIERRA REJADA	4,390	A	1,200	172	4	1	-	-	619-930
4-16	HIDDEN VALLEY	2,210	C	-	-	-	-	1	453	289-743
4-17	LOCKWOOD VALLEY	21,800	A	350	25	-	-	1	-	-
4-18	HUNGRY VALLEY	5,310	C	-	28	-	-	-	<350	-
4-19	THOUSAND OAKS AREA	3,110	C	-	39	2	-	-	1,410	1,200-2,300
4-20	RUSSELL VALLEY	3,100	A	-	25	-	-	-	-	-
4-22	MALIBU VALLEY	613	C	1,060	1,030	-	-	-	-	-
4-23	RAYMOND	26,200	A	3,620	1,880	88	-	70	346	138-780
8-1	COASTAL PLAIN OF ORANGE COUNTY	224,000	A	4,500	2,500	521	411	240	475	232-661
8-2	UPPER SANTA ANA VALLEY									
8-2.01	CHINO	154,000	A	1,500	1,000	12	8	187	484	200-600
8-2.02	CUCAMONGA	9,530	C	4,400	2,115	1	1	21	-	-
8-2.03	RIVERSIDE-ARLINGTON	58,600	A	-	-	11	3	43	-	370-756
8-2.04	RIALTO-COLTON	30,100	A	5,000	545	50	5	41	337	
8-2.05	CAJON	23,200	C	200	60	-	-	5	-	-
8-2.06	BUNKER HILL	89,600	A	5,000	1,245	398	169	204	-	150-550
8-2.07	YUCAIPA	25,300	A	2,800	206	19	3	45	334	-

Table 24 South Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
8-2.08	SAN TIMOTEO	73,100	A	-	-	67	12	36	-	-
8-2.09	TEMESCAL	23,500	C	-	-	2	2	20	753	373-950
8-4	ELSINORE	25,700	C	5,400	-	1	1	18	-	
8-5	SAN JACINTO	188,000	C	-	-	150	115	56	463	160-12,000
8-6	HEMET LAKE VALLEY	16,700	C	820	196	-	-	9	-	-
8-7	BIG MEADOWS VALLEY	14,200	C	120	34	-	-	8	-	-
8-8	SEVEN OAKS VALLEY	4,080	C	-	-	-	-	1	-	-
8-9	BEAR VALLEY	19,600	A	1,000	500	57	57	52	-	-
9-1	SAN JUAN VALLEY	16,700	C	1,000	-	-	-	8	760	430-12,880
9-2	SAN MATEO VALLEY	2,990	A	-	-	-	-	5	586	490-770
9-3	SAN ONOFRE VALLEY	1,250	A	-	-	-	-	2	-	600-1,500
9-4	SANTA MARGARITA VALLEY	626	A	1,980	-	4	-	-	-	337-9,030
9-5	TEMECULA VALLEY	87,800	C	1,750	-	140	4	67	476	220-1,500
9-6	COAHUILA VALLEY	18,200	C	500	-	2	-	1	-	304-969
9-7	SAN LUIS REY VALLEY	37,000	C	2,000	500	-	-	28	1,258	530-7,060
9-8	WARNER VALLEY	24,000	C	1,800	800	-	-	4	-	263
9-9	ESCONDIDO VALLEY	2,890	C	190	50	-	-	1	-	250-5,000
9-10	SAN PASQUAL VALLEY	4,540	C	1,700	1,000	-	-	2	-	500-1,550
9-11	SANTA MARIA VALLEY	12,300	A	500	36	3	-	2	1,000	324-1,680
9-12	SAN DIEGUITO CREEK	3,560	A	1,800	700	-	-	-	-	2,000
9-13	POWAY VALLEY	2,470	C	200	100	-	-	1	-	610-1,500
9-14	MISSION VALLEY	7,350	C	-	1,000	-	-	-	-	-
9-15	SAN DIEGO RIVER VALLEY	9,890	C	2,000	-	-	-	5	-	260-2,870
9-16	EL CAJON VALLEY	7,160	C	300	50	1	-	2,340		
9-17	SWEETWATER VALLEY	5,920	C	1,500	300	7	7	9	2,114	300-50,000
9-18	OTAY VALLEY	6,830	C	1,000	185	-	-	-	-	500->2,000
9-19	TIJUANA BASIN	7,410	A	2,000	350	-	-	-	-	380-3,620
9-22	BATIQUITOS LAGOON VALLEY	741	C	-	-	-	-	-	1,280	788-2,362
9-23	SAN ELIJO VALLEY	883	C	1,800	-	-	-	-	-	1,170-5,090
9-24	PAMO VALLEY	1,500	C	-	-	-	-	-	369	279-455
9-25	RANCHITA TOWN AREA	3,130	C	125	22	-	-	-	-	283-305
9-27	COTTONWOOD VALLEY	3,850	C	-	-	-	-	1	-	-
9-28	CAMPO VALLEY	3,550	C	-	<40	-	-	4	-	800
9-29	POTRERO VALLEY	2,020	C	-	-	-	-	4	-	-
9-32	SAN MARCOS VALLEY	2,130	C	60	-	-	-	-	-	500-700

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

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Coastal Plain of Los Angeles Groundwater Basin, Central Subbasin

- Groundwater Basin Number: 4-11.04
- County: Los Angeles
- Surface Area: 177,000 acres (277 square miles)

Basin Boundaries and Hydrology

The Central Subbasin occupies a large portion of the southeastern part of the Coastal Plain of Los Angeles Groundwater Basin. This subbasin is commonly referred to as the "Central Basin" and is bounded on the north by a surface divide called the La Brea high, and on the northeast and east by emergent less permeable Tertiary rocks of the Elysian, Repetto, Merced and Puente Hills. The southeast boundary between Central Basin and Orange County Groundwater Basin roughly follows Coyote Creek, which is a regional drainage province boundary. The southwest boundary is formed by the Newport Inglewood fault system and the associated folded rocks of the Newport Inglewood uplift. The Los Angeles and San Gabriel Rivers drain inland basins and pass across the surface of the Central Basin on their way to the Pacific Ocean. Average precipitation throughout the subbasin ranges from 11 to 13 inches with an average of around 12 inches.

Hydrogeologic Information

Water Bearing Formations

Throughout the Central Basin, groundwater occurs in Holocene and Pleistocene age sediments at relatively shallow depths. The Central Basin is historically divided into forebay and pressure areas. The Los Angeles forebay is located in the northern part of the Central Basin where the Los Angeles River enters the Central Basin through the Los Angeles Narrows from the San Fernando Groundwater Basin. The Montebello forebay extends southward from the Whittier Narrows where the San Gabriel River encounters the Central Basin and is the most important area of recharge in the subbasin. Both forebays have unconfined groundwater conditions and relatively interconnected aquifers that extend up to 1,600 feet deep to provide recharge to the aquifer system of this subbasin (DWR 1961). The Whittier area extends from the Puente Hills south and southwest to the axis of the Santa Fe Springs-Coyote Hills uplift and contains up to 1,000 feet of freshwater-bearing sediments. The Central Basin pressure area is the largest of the four divisions, and contains many aquifers of permeable sands and gravels separated by semi-permeable to impermeable sandy clay to clay, that extend to about 2,200 feet below the surface (DWR 1961). The estimated average specific yield of these sediments is around 18 percent. Throughout much of the subbasin, the aquifers are confined, but areas with semi-permeable aquicludes allow some interaction between the aquifers (DWR 1961).

The main productive freshwater-bearing sediments are contained within Holocene alluvium and the Pleistocene Lakewood and San Pedro Formations (DWR 1961). Throughout most of the subbasin, the near surface Bellflower aquiclude restricts vertical percolation into the Holocene age Gaspur aquifer and other underlying aquifers, and creates local semi-perched groundwater conditions. The main additional productive aquifers in the subbasin are the Gardena and Gage aquifers within the Lakewood Formation and the Silverado, Lynwood and Sunnyside aquifers within the San Pedro Formation (DWR 1961). Specific yield of deposits in this subbasin range up to 23 percent in the Montebello forebay, 29 percent in the Los Angeles forebay, and 37 percent in the Central Basin pressure area (DWR 1961). Historically, groundwater flow in the Central Basin has been from recharge areas in the northeast part of the subbasin, toward the Pacific Ocean on the southwest. However, pumping has lowered the water level in the Central Basin and water levels in some aquifers are about equal on both sides of the Newport-Inglewood uplift, decreasing subsurface outflow to the West Coast Subbasin (DWR 1961).

There are several principal aquifers/aquicludes present in this subbasin.

Aquifers/ Aquiclude	Age	Formation	Lithology	Maximum Thickness (feet)
Gaspur	Holocene		Coarse sand, gravel	120
Semiperched	Holocene		Sand, gravel	60
Bellflower	Pleistocene	Lakewood Formation	Clay, sandy clay	140
Gardena	Pleistocene	Lakewood Formation	Sand, gravel	160
Gage			Sand	120
Silverado	Lower Pleistocene	San Pedro Formation	Sandy gravel	300
Lynwood			Coarse sand and gravel	150
Sunnyside				350

Restrictive Structures

Many faults, folds and uplifted basement areas affect the water-bearing rocks in the Central Basin. Most of these structures form minor restrictions to groundwater flow in the subbasin. The strongest effect on groundwater occurs along the southwest boundary to the Central Subbasin. The faults and folds of the Newport – Inglewood uplift are partial barriers to movement of groundwater from the Central Basin to the West Coast Basin (DWR 1961). The La Brea high is a system of folded, uplifted and eroded Tertiary basement rocks. Because the San Pedro Formation is eroded from this area, subsurface flow southward from the Hollywood Basin is restricted to the Lakewood formation (DWR 1961). The Whittier Narrows is an eroded gap through the Merced and Puente Hills that provides both surface and subsurface inflow to the Central Basin (DWR 1961). The Rio Hondo, Pico, and Cemetery faults are northeast-trending faults that project into the gap and displace aquifers. The trend of these faults parallels the local groundwater flow and do not act as significant barriers to groundwater flow (DWR 1961).

Recharge Areas

Groundwater enters the Central Basin through surface and subsurface flow and by direct percolation of precipitation, stream flow, and applied water; and replenishes the aquifers dominantly in the forebay areas where permeable sediments are exposed at ground surface (DWR 1961). Natural replenishment of the subbasin's groundwater supply is largely from surface inflow through Whittier Narrows (and some underflow) from the San Gabriel Valley. Percolation into the Los Angeles Forebay Area is restricted due to paving and development of the surface of the forebay. Imported water purchased from Metropolitan Water District and recycled water from Whittier and San Jose Treatment Plants are used for artificial recharge in the Montebello Forebay at the Rio Hondo and San Gabriel River spreading grounds (DWR 1999). Saltwater intrusion is a problem in areas where recent or active river systems have eroded through the Newport Inglewood uplift. A mound of water to form a barrier is formed by injection of water in wells along the Alamitos Gap (DWR 1999).

Groundwater Level Trends

Water levels varied over a range of about 25 feet between 1961 and 1977 and have varied through a range of about 5 to 10 feet since 1996. Most water wells show levels in 1999 that are in the upper portion of their recent historical range.

Groundwater Storage

Groundwater Storage Capacity. Total storage capacity of the Central Basin is 13,800,000 (DWR 1961).

Groundwater in Storage.

Groundwater Budget (Type A)

A complete water budget could not be constructed due to the lack of data available. Recharge to the subbasin is accomplished through both natural and artificial recharge. The Watermaster reported natural recharge for the subbasin to be 31,950 af and artificial recharge to be 63,688 af for 1998 (DWR 1999). Additionally, the subbasin receives 27,000 af/yr of water through the Whittier Narrows from the San Gabriel Valley Basin in the form of subsurface flow (SWRB 1952). Urban extractions for the subbasin were 204,335 af in 1998 (DWR 1999).

Groundwater Quality

Characterization. TDS content in the subbasin ranges from 200 to 2,500 mg/l according to data from 293 public supply wells. The average for these 293 wells is 453 mg/l.

I

Impairments.

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	316	15
Radiological	315	1
Nitrates	315	2
Pesticides	322	0
VOCs and SVOCs	344	43
Inorganics – Secondary	316	113

[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	

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Groundwater levels	90
DWR	Groundwater levels	87
Los Angeles County Public Works	Groundwater levels	212 / Bi-monthly
USGS	Miscellaneous water quality	64
Department of Health Services and cooperators	Title 22 water quality	294

Basin Management

Groundwater management:	Central Basin was adjudicated in 1965, and the Department of Water Resources was appointed Watermaster. Every month extractions are reported to the Watermaster by each individual pumper. This allows the Watermaster to regulate the water rights of the subbasin. (DWR 1999)
Water agencies	
Public	City of Bellflower, Bellflower-Somerset MWC, City of Compton, City of Huntington Park, City of Long Beach, City of Los Angeles DWP, City of Montebello, City of Paramount, City of Pico Rivera, City of Santa Fe Springs, Sativa LA County WD, City of Signal Hill, South Montebello ID, City of South Gate, City of Vernon, City of Whittier. (DWR 1999)
Private	California-American Water Company, Montebello Land and Water Company, Bellflower Home Garden Water Co., California Water Service, Lynwood Park MWC, Maywood MWC, Park Water Company, Pearless Water Company, San Gabriel Valley Water Company, Southern California Water Company, Tract No. 180 Water Company, Tract 349 MWC, Western Water Company.(DWR 1999)

References Cited

California Department of Water Resources (DWR). 1961. Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County. Bulletin No. 104.

____, Southern District. 1999. Watermaster Service in the Central Basin, Los Angeles County, July 1, 1998 – June 30, 1999.

California State Water Resources Board (SWRB). 1952. Central Basin Investigation. Bulletin No. 8.

Additional References

United States Geological Survey (USGS). 2000. *Analysis of the Geohydrology and Water-management Issues of the Central and West Basins, Los Angeles County, California.* Internet Web Site: http://water.wr.usgs.gov/projects00/ca512.html.

Water Replenishment District of Southern California. 2000. *Annual Report on Results of Water Quality Monitoring Water Year 1998-1999.*

____. 2000. *Engineering Survey and Report.*

Errata

Changes made to the basin description will be noted here.

Coastal Plain of Los Angeles County Groundwater Basin, West Coast Subbasin

- Groundwater Basin Number: 4-11.03
- County: Los Angeles
- Surface Area: 91,300 acres (142 square miles)

Basin Boundaries and Hydrology

The West Coast Subbasin of the Coastal Plain of Los Angeles Basin is adjudicated and commonly referred to as the "West Coast Basin." It is bounded on the north by the Ballona Escarpment, an abandoned erosional channel from the Los Angeles River. On the east it is bounded by the Newport-Inglewood fault zone, and on the south and west by the Pacific Ocean and consolidated rocks of the Palos Verdes Hills (DWR 1999). The surface of the subbasin is crossed in the south by the Los Angeles River through the Dominguez Gap, and the San Gabriel River through the Alamitos Gap, both of which then flow into San Pedro Bay. Average precipitation throughout the subbasin is 12 to 14 inches.

Hydrogeologic Information

Water Bearing Formations

The water-bearing deposits include the unconsolidated and semi-consolidated marine and alluvial sediments of Holocene, Pleistocene, and Pliocene ages. Discharge of groundwater from the subbasin occurs primarily by pumping extractions (DWR 1961).

The principal aquifers present in the subbasin are below.

Aquifers/ Aquiclude	EPOCH	Formation	Lithology	Maximum Thickness (feet)	Yield (gpm)
Semiperched	Holocene	Alluvium	Sand, silt, clay	60	
Bellflower			Silty clay, clay	80	
Gaspur			Coarse sand, gravel	120	
Bellflower			Silty clay, clay	200	
Gardena			Sand, gravel	160	100-1300
Gage	Pleistocene	Lakewood Formation	Fine to coarse-grained sand and gravel	160	
Lynwood	Lower Pleistocene	San Pedro Formation	Sand, gravel with small amount of clay	200	500-600
Silverado			Coarse sand and gravel	500	
unnamed			Coarse sand and gravel/silt and clay	500 to 700	

The Semiperched aquifer of both Holocene and Pleistocene age is unconfined. The water in underlying aquifers is confined throughout most of the Basin, though the Gage and Gardena aquifers are unconfined where water levels have dropped below the Bellflower aquiclude (DWR 1961). These aquifers merge in places with adjacent aquifers, particularly near Redondo Beach (DWR 1961).

The Silverado aquifer, underlying most of the West Coast Basin, is the most productive aquifer in the Basin. It yields 80-90 percent of the groundwater extracted annually (DWR 1999). Specific yield values range from 1 percent to 26 percent (DWR 1961), with a subbasin average of 13 percent (DWR 1961).

Restrictive Structures

Folding and associated faulting have formed the dominant northwest-trending structural features in West Coast Basin. The major structural feature in the area is the Newport-Inglewood fault zone, which forms the eastern boundary of the subbasin and is a partial barrier to groundwater movement in the area. This zone is marked by thinning, folding and offsetting of the aquifers. Southeast of Signal Hill, the Cherry Hill and Reservoir Hill faults of this zone act as barriers to groundwater movement in all aquifers (DWR 1961). The Avalon-Compton fault acts as a barrier below the Lynwood aquifer. The Rosecrans and Dominguez anticlines appear to act as partial barriers to groundwater movement (DWR 1961).

Recharge Areas

Natural replenishment of the Basin's groundwater supply is largely limited to underflow from the Central Basin through and over the Newport-Inglewood fault zone. Water spread in the Central Basin percolates into aquifers there, and eventually some crosses the Newport-Inglewood fault to supplement the groundwater supply in the West Coast Basin. Seawater intrusion occurs in some aquifers that are exposed to the ocean offshore. Injection wells in the West Coast Basin Barrier create a north-south trending mound of fresh water from the LA International Airport south to the Palos Verdes Hills. Injection wells also form a protective mound at the Dominguez Gap Barrier near Wilmington (DWR 1999). Minor replenishment to the West Coast Basin occurs from infiltration of surface inflow from both the Los Angles and San Gabriel Rivers into the uppermost aquifers. Other minor sources of recharge by infiltration from the surface include return irrigation water from fields and lawns, industrial waters, and other applied surface waters.

Groundwater Level Trends

Water levels have risen about thirty feet from levels measured before adjudication of the subbasin in 1961(DWR 1999). In 1999, water levels were higher in the El Segundo and Dominguez gap areas from water levels of 1998 (DWR 1999). The general regional groundwater flow pattern is southward and westward from the Central Coastal Plain toward the ocean.

Groundwater Storage

Groundwater Storage Capacity. The storage capacity of the primary water producing aquifer, the Silverado aquifer, is estimated to be 6,500,000 af (DWR 1961).

Groundwater Budget (Type A)

A complete budget could not be constructed due to the lack of available data. However, some inflows and outflows for the subbasin were determined for water year 1998, and should give an idea of the subbasin activity. Recharge to the subbasin by means of artificial recharge was determined to be 95,638 af (DWR 1999). The subbasin received about 19,665 af of recharge from injection into wells forming the Dominguez Gap Barrier (DWR 1999). Subsurface inflow, arriving primarily from the Central Basin, accounts for 68,473 af (DPW 1952) of recharge to the subbasin. Extractions from the subbasin are predominately for urban use, with a small amount dedicated to agriculture. Urban use accounted for 51,673 af (DWR 1999), while agriculture was 89 af (DWR 1999).

Groundwater Quality

Characterization. The character of water in the Gaspur zone of the subbasin is variable. Seawater intrusion has produced deterioration of water quality over time. Early tests indicated that the water was sodium bicarbonate in character. It is questionable whether this is representative of the entire zone, because the higher quality water residing outside the subbasin is calcium bicarbonate in nature (DPW 1952).

The Gardena water-bearing zone exhibits a calcium-sodium bicarbonate character and is of good quality. In the Silverado zone, the character of water varies considerably. In the coastal region of this zone, the water is calcium chloride in character, and then transitions into sodium bicarbonate moving inland. The Pico formation is sodium bicarbonate in nature and is of good quality (DPW 1952). Data from 45 public supply wells shows an average TDS content of 720 mg/L and a range of 170 to 5,510 mg/L.

Impairments. Seawater intrusion occurs in the Silverado zone along the Santa Monica Bay and in the Gaspur zone in the San Pedro Bay. Two seawater barrier projects are currently in operation. The West Coast Basin Barrier Project, which runs from the Los Angeles Airport to the Palos Verde Hills, and the Dominguez Gap Barrier Project which covers the area of the West Coast Basin bordering the San Pedro Bay. Injection wells along these barriers create a groundwater ridge, which inhibits the inland flow of salt water into the subbasin to protect and maintain groundwater elevations (DWR 1999).

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	45	0
Radiological	45	1
Nitrates	46	0
Pesticides	46	0
VOCs and SVOCs	44	0
Inorganics – Secondary	45	30

[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	To 1,300 gal/min
	Total depths (ft)
Domestic	
Municipal/Irrigation	

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Groundwater levels	67
USGS	Miscellaneous water quality	58
DWR	Groundwater levels	71
Department of Health Services and cooperators	Title 22 water quality	45

Basin Management

Groundwater management:	In 1961 the West Coast Basin was adjudicated, and the Department of Water Resources was retained as Watermaster. Each month individual pumpers report their extractions to the Watermaster, which allows the Watermaster to regulate water rights in the subbasin. (DWR 1999)
Water agencies	
Public	City of El Segundo, City of Inglewood, City of Lomita, City of Long Beach, City of Los Angeles, City of Signal Hill, City of Torrance
Private	California-American Water Co., California Water Service Co., Dominguez Water Corp., Los Angeles Waterworks Dist. 29, Southern California Water Company. (DWR 1999)

References Cited

California Department of Public Works (DPW). 1952. *West Coast Basin Reference-Report of Referee.* 130 p.

California Department of Water Resources (DWR). 1961. *Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County.* Bulletin No. 104.

____, Southern District. 1999. *Watermaster Service in the West Coast Basin, Los Angeles County, July 1, 1998 – June 30, 1999.* 84 p.

Water Replenishment District of Southern California, 2000, *Engineering Survey and Report*

Additional References

California Department of Water Resources (DWR). 1958. *Sea-Water Intrusion in California.* Bulletin No. 63. 91 p.

____. 1975. *Sea-Water Intrusion in California.* Bulletin No. 63-5. 394 p.

Errata

Changes made to the basin description will be noted here.