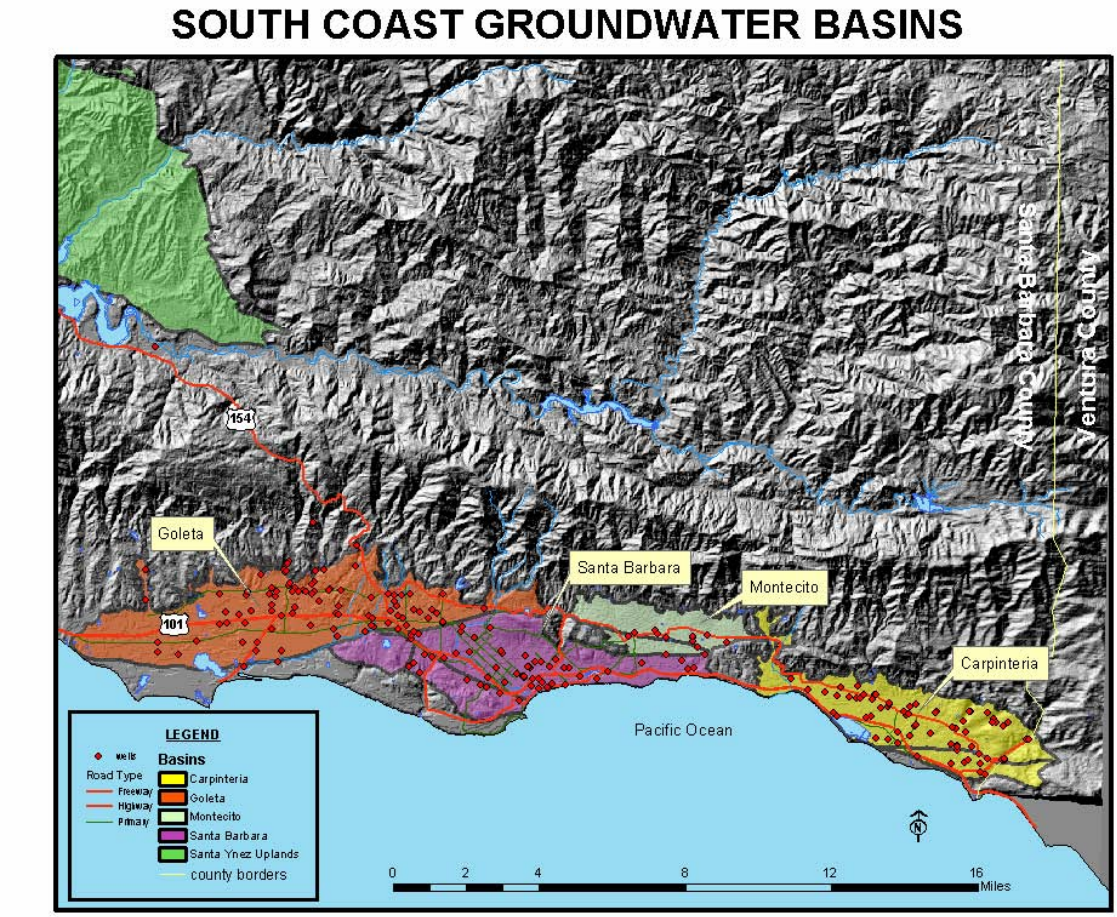
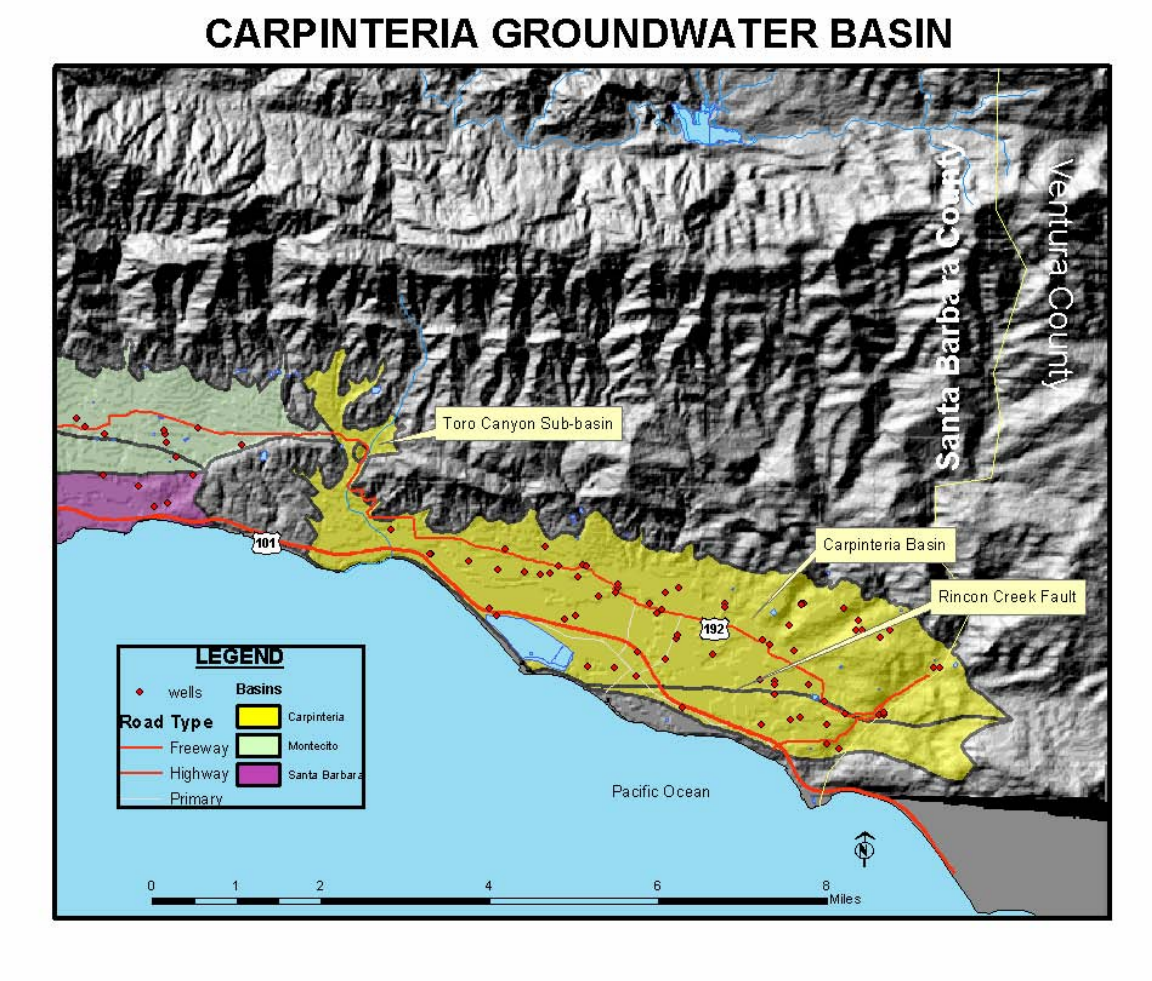
South Coast Groundwater Basins



The South Coast basins are located between the Santa Ynez Mountains and the Pacific Ocean. In general, these basins are composed of the unconsolidated material that accumulated as a result of the uplift and erosion of the ancestral Santa Ynez Mountains. Several of the basins are generally differentiated from each other where faulting or impermeable geologic formations limit the hydrologic connection between the aquifers. Faults, impermeable bedrock, inferred lithologic barriers, or arbitrary (administrative) boundaries separate the major groundwater basins (Carpinteria, Montecito, Santa Barbara, and Goleta) from each other. Inferred barriers exist where pronounced changes in water depth and/or water quality exist but where there is no other direct physical evidence of faulting or other physical barriers. It is important to note that basin and sub-basin boundaries might change as more is learned about the geologic and hydrologic relationships between the aquifer units.

Carpinteria Groundwater Basin

The Carpinteria Groundwater Basin underlies approximately 12 square miles in the Carpinteria Valley, extends east of the Santa Barbara County line into Ventura County and includes the Toro Canyon sub-basin to the west. (The Toro Canyon sub-basin is included in the Montecito Water District service area but is hydrologically a part of the Carpinteria Groundwater Basin). The aquifer consists of two storage units; storage unit one is located north of the Rincon Creek Fault and storage unit two is located south of the Rincon Creek Fault. Storage unit one and possibly unit two extend beneath the Pacific Ocean an unknown distance. The Toro Canyon area occupies a small extension of storage unit one. The Rincon Creek fault acts as a barrier to groundwater flow between the two storage units. Large portions of the southern Carpinteria Basin aquifers are confined. The confined zones include portions of both storage units.



Precipitation in the basin varies with elevation but it averages about 16.6 inches per year near the coast and increases to about 24 inches per year on the south flank of the Santa Ynez Mountains. The primary drainages through which surface water empties into the Pacific Ocean are Rincon Creek, Carpinteria Creek, Franklin Creek, Santa Monica

Creek, and Toro Canyon Creek. Water quality has been monitored sporadically over most of the 20th century. Since the initial USGS study on the basin (Upson and Worts 1951), TDS concentrations within the basin have increased, with recent concentrations ranging from 436 to 980 mg/l. Groundwater analyses conducted in 1985 revealed nitrate levels below the State maximum contaminant level of 45 mg/l for public water systems. There is no evidence of seawater intrusion into the basin. It is believed that the Rincon Creek and Carpinteria Faults act as barriers to seawater, as do clay layers overlying the aquifer near Carpinteria Slough.

The total volume of water in the basin is estimated to be 700,000 acre-feet (AF). The Available Storage is estimated to be about 50,000 AF. Safe Yield of the basin (for gross pumpage) is estimated to be 5,000 AFY. Of this amount, 4,294 AFY is considered available for the Carpinteria Valley area when the portions of the basin located in Toro Canyon and in Ventura County are excluded. Two other sources of water are available: the Cachuma Project and the State Water Project. The Carpinteria Valley Water District (CVWD) receives approximately 2,800 AFY from Lake Cachuma and holds an entitlement of 2,000 AFY in the State Water Project. In 2002 CVWD received 270 AF. of state water (see page 7). Agricultural demand is met primarily by groundwater. Agriculture consists mostly of avocados, citrus and floriculture. Urban demand is met primarily by State Water and the Cachuma project. Total water supply available to the Carpinteria Basin area (inside Santa Barbara County excluding Toro Canyon) is approximately 8,800 AFY.

The average annual demand in the entire basin is about 7,400 AFY based on a County study (Baca, 1991) which accounted for all current and estimated future water demands in the basin. Thus, there is currently an average annual surplus of about 1,400 AFY (gross), 1,260 AFY (net). A state of overdraft is not reasonably foreseeable in the Carpinteria Groundwater Basin.

Montecito Groundwater Basin

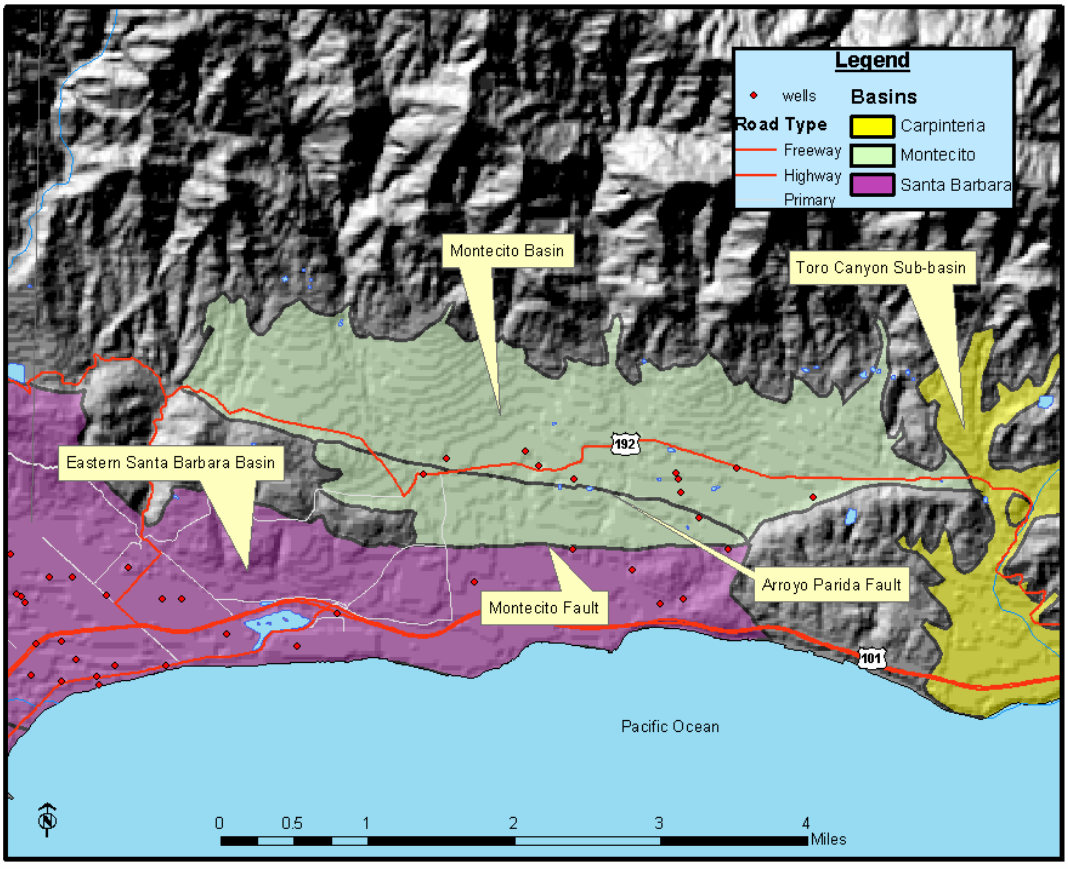
The Montecito Groundwater Basin encompasses about 6.7 square miles between the Santa Ynez Mountains and the Pacific Ocean. The Montecito Groundwater Basin is separated from the Carpinteria Groundwater Basin to the east by faults and bedrock and from the Santa Barbara Groundwater Basin to the west by an administrative boundary. The basin has been divided into three storage units on the basis of east-west trending faults that act as barriers to groundwater movement. The northern unit is bounded on the south by the Arroyo Parida Fault, the central unit by the Montecito Fault and the southern unit by the Rincon Creek Fault. These storage units are numbered one, two, and three, respectively Brown and Caldwell, 1978). The Toro Canyon sub-basin is included in the section on the Carpinteria Groundwater Basin because it is contiguous with that aquifer. However, the Toro Canyon sub-basin is within the Montecito Water District service area.

Average precipitation within the basin ranges from about 18 inches per year near the coast to about 21 inches per year in the foothills of the Santa Ynez Mountains. Surface drainage occurs via several small creeks that flow from the Santa Ynez Mountains south to the Pacific Ocean.

Water quality in the basin generally is suitable for agricultural and domestic use. Some wells near fault zones or coastal areas yield groundwater with elevated levels of TDS and other constituents. Studies indicate that seawater intrusion is not a significant problem in the basin. It is thought that deeper aquifers of the basin are protected from seawater intrusion by an impermeable offshore fault. However, some encroachment of seawater might occur in shallower aquifers during periods of heavy pumping such as during the early 1960's.

Available Storage within the Montecito Groundwater Basin is estimated to be 14,400 acre-feet (excluding the Toro Canyon sub-basin). Groundwater from this basin supplies private residences and a small amount of agriculture within Montecito. Many residences are served by private wells or by water pumped by the Montecito Water District (MWD). Historically, water from the Cachuma and Jameson reservoirs on the Santa Ynez River has met roughly 95 percent of the water demand within the MWD. The remaining 5 percent of the demand has been filled by groundwater. The recent importation of State Water Project supplies has substantially increased the water supply available in the Montecito area. In 2002 MWD imported 1244 AF of state water. The water supply available in the Montecito area is approximately 9,210 AFY, including groundwater and the available surface water sources.

MONTECITO GROUNDWATER BASIN

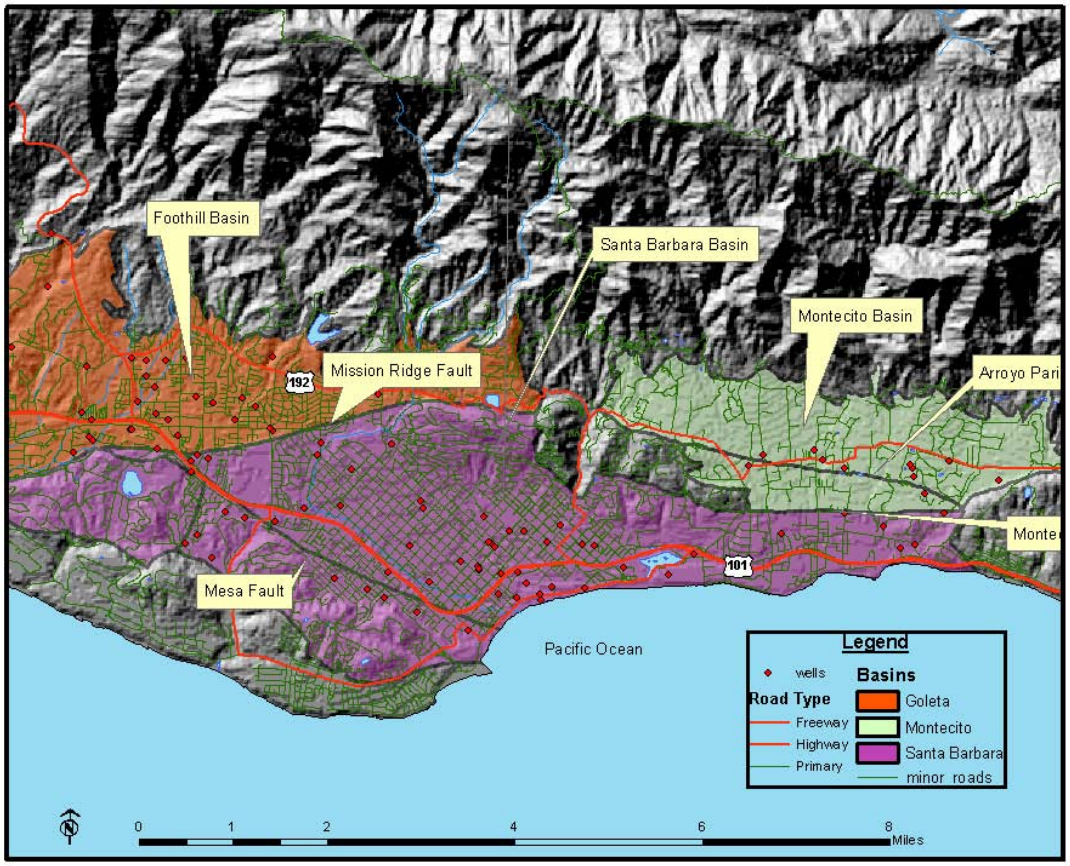


This figure includes 2,560 AFY from the Cachuma Project, 2,000 AFY from Jameson Lake and other surface water sources, 65 AFY from MWD bedrock wells, 3,000 AFY of State Water and the Safe Yield of the groundwater basin of 1,350 AFY (for gross pumpage). Water demand in the Montecito area is approximately 5,500 AFY according to a County study (Baca, 1992) which incorporated demand associated with approved projects and vacant lots. Thus, a substantial surplus of water supply is available in this area and overdraft of the groundwater basin is not reasonably foreseeable.

Santa Barbara Groundwater Basin

The Santa Barbara Groundwater Basin is composed of alluvial sediments that underlie a coastal plain. The basin includes two hydrologic units: Storage Unit #I and Storage Unit #III. These hydrologic units encompass about 7 square miles in and adjacent to the City of Santa Barbara. The basin is bounded on the north and west by faults, and by the ocean on the south. The boundary to the east is an arbitrary line separating the Santa Barbara Groundwater basin from the Montecito Groundwater Basin that does not reflect any known hydrologic or geologic barrier. [The separate Foothill Groundwater Basin discussed in the following section encompasses the hydrologic unit which includes the formerly designated Storage Unit #II of the Santa Barbara Basin and the former "East sub-basin" of the Goleta Groundwater Basin (Freckleton, 1989).]

SANTA BARBARA GROUNDWATER BASIN



Annual rainfall within the Santa Barbara Basin varies with altitude but averages about 18 inches near the coast and up to about 21 inches in the higher elevations of the foothills (i.e., in the Foothill Basin area). Major drainage channels include Sycamore Creek, Mission Creek, San Roque Creek, and Arroyo Burro Creek.

TDS concentrations within the two basins range from about 400 mg/l to about 1,000 mg/l. Isolated wells have exhibited much higher TDS concentrations. Seawater intrusion occurred in some areas of the south basin where heavy pumping from municipal wells caused groundwater levels to drop as much as 100 feet in the late 1970's. More recently, samples taken from coastal wells have confirmed the presence of seawater intrusion with chloride concentrations greater than 1,000 mg/l. Groundwater pumping within the Santa Barbara Groundwater Basin has been drastically reduced since 1991. Effective pumping practices, together with groundwater injection programs have restored the previously existing gradient thereby reversing the trend of seawater intrusion.

Available Storage within the Santa Barbara Basin is estimated to be 10,000 AF. Groundwater constitutes about 10 percent of the water supply for the City of Santa Barbara. Groundwater is produced by the City and by a few private businesses and homeowners. Surface water supplies available to the City of Santa Barbara include the State Water Project, Cachuma and Gibraltar reservoirs (and desalinated seawater).

Other supplies include allocations from the Montecito and Goleta water districts and reclaimed wastewater.

The status of the City of Santa Barbara Basin (i.e. Storage Units #I and #III) has been analyzed by the County on the basis of the overall supply/demand balance of the City of Santa Barbara. Overall water supplies available to the City total approximately 18,300 AFY, including the groundwater basin Safe Yield of 847 AFY, yield of 3,000 AFY from the State Water Project , and 14,453 AFY from the other sources listed above. Water demand has been estimated to be 15,121 AFY (Baca et al., 1992). Thus, a substantial surplus in water supply is available to the City and overdraft of the basin would not be reasonably foreseeable. Furthermore, the City of Santa Barbara is actively managing the use of this basin as an underground storage reservoir. This is part of an overall plan for the conjunctive use of the various City water resources. The dominant pumper in the basin is the City, thus it can control the physical conditions in the basin. Based on this circumstance, the City of Santa Barbara Groundwater Basin is not considered to be subject to overdraft (City of Santa Barbara, 1994).

Foothill Groundwater Basin

The Foothill Groundwater Basin is described and analyzed in U.S. Geological Survey Water Resources Investigations Report 89-4017 (Freckleton, 1989). The definition and description of this basin is presented below is based on this report. The Foothill Groundwater Basin is comprised of unconsolidated alluvial sediments which have accumulated along the base of the Santa Ynez Mountains in the Santa Barbara and Goleta areas. This basin encompasses about 4.5 square miles and extends from the outcrops of the underlying tertiary bedrock formations on the north to the Modoc and Mission Ridge faults on the south. This hydrologic unit includes the former Storage Unit #II of the Santa Barbara Basin and the former "East sub-basin" of the Goleta Groundwater Basin.

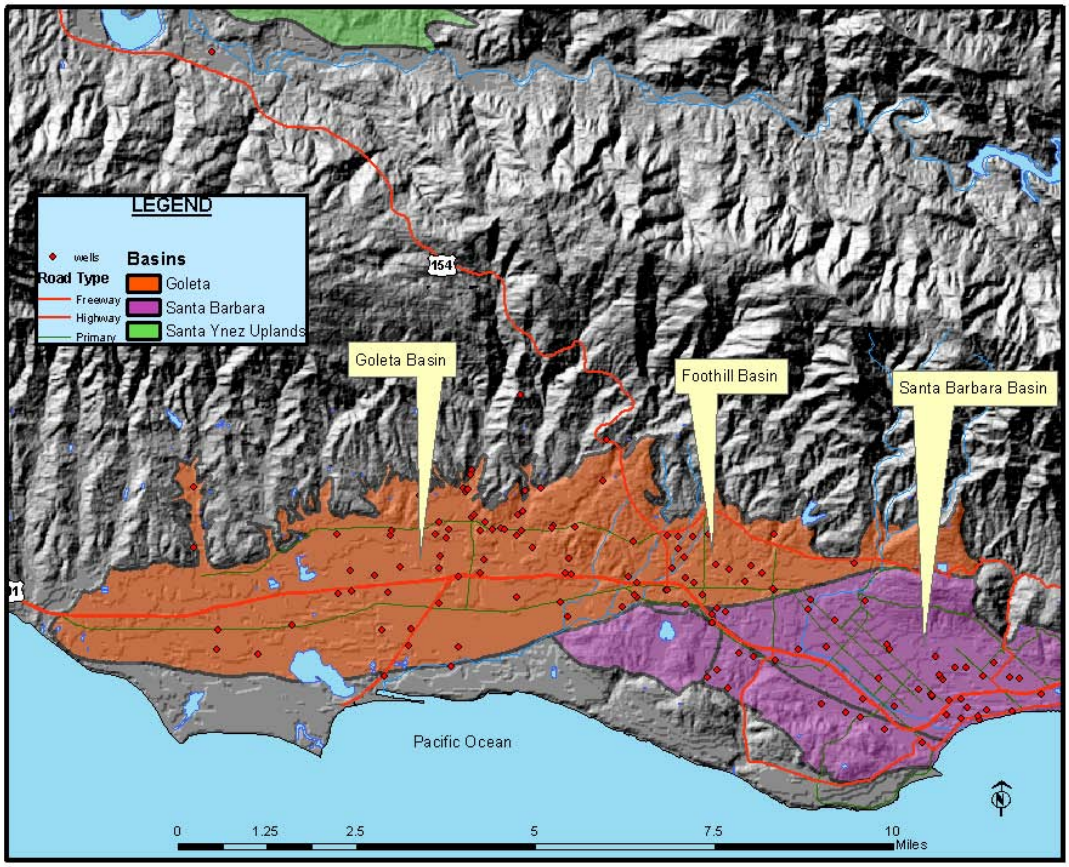
TDS concentrations range from 610 to 1,000 ppm in 7 wells sampled in the basin. Chloride concentrations in this basin are relatively low (44 to 130 ppm) in the seven wells (Freckleton, 1989). Note that an eighth well was sampled in the USGS study from which poor quality water (TDS 1,900 ppm, chloride 360 ppm) was recovered. This well, however, is known to produce water from bedrock aquifers below the sediments that comprise the Foothill Basin.

Available Storage of the Foothill Basin is estimated to be 5,000 AFY. Safe Yield is estimated to be 953 AFY (for gross pumpage) based on the 1989 USGS study. Demand on the basin falls into three categories: pumpage by the City of Santa Barbara, pumpage by the La Cumbre Mutual Water Company (LCMWC) and extractions by private landowners. The supply/demand status of this basin has been analyzed by the County (Baca, 1993). Pumpage of the basin, including commitments to approved projects was estimated to be 945 AFY when the effects of a City of Santa Barbara /LCMWC agreement involving the State Water Project are considered. This agreement limited LCMWC pumpage to a fixed annual volume and included cooperation in the management of the basin. The City of Santa Barbara is conducting conjunctive use water supply management activities by injecting and storing surface water in the basin. Based on the agreement between the two major pumpers (together the City and LCMWC account for about 80% of basin pumpage), and the active management of the

basin by the City of Santa Barbara, the Foothill Basin is not considered to be subject to overdraft.

The Goleta Groundwater Basin lies immediately west of the Santa Barbara Groundwater Basin on the County's south coast. Goleta is an alluvial plain, bordered by the Santa Ynez Mountains to the north and the More Ranch Fault to the south. It is about eight miles long and three miles wide including the hydraulically connected alluvial materials extending into the drainages along the northern border. Foothills and terraces to the southeast of the alluvial plain rise to an elevation of over 500 feet above sea level. Average rainfall within the basin ranges from about 16 inches per year at the coast to about 20 inches per year at the basin's highest elevation in the foothills of the Santa Ynez Mountains. Surface drainage is to the south toward the Goleta slough through which several creeks empty into the ocean including Atascadero, Maria Ygnacio, San Jose, Tecolotito, and San Pedro.

FOOTHILL AND GOLETA GROUNDWATER BASINS



The Goleta Groundwater Basin, as defined by the USGS, is divided into two sub-basins separated by an inferred low permeability barrier that separates areas of differing water quality. The Goleta North-Central Sub-basin extends from the Modoc Fault on the east to a north-west trending line marking an inferred low permeability zone on the west.

Extending west from this line to outcrops of Tertiary bedrock is the West Sub-basin. Both basins are separated from the ocean on the south by the More Ranch Fault. Although originally defined as portions of a larger basin, these two hydrologic units are distinct and have been analyzed and described in planning and legal documents as separate basins. Two court decisions in 1989 and 1991 declared these basins to be distinct and separate for purposes of water rights. Thus, the discussion presented below refers to the "North-Central Basin" and the "West Basin". [Note: The term "Goleta Groundwater Basin" is sometimes used as a synonym for the Goleta North-Central Basin.]

The USGS compiled water quality data in the early 1940's. Groundwater analyses completed at that time indicated that chloride concentrations throughout most of the North-Central and West basins were less than the DHS secondary standard of 250 mg/l. TDS ranged from about 170 mg/l to 1,400 mg/l in the North-Central Basin, and was approximately 800 mg/l in the West Sub-basin. More recent studies (Freckleton, 1989) yielded similar TDS ranges as the USGS study with the exception of high concentrations in some wells of the West Basin. The recent study yielded no evidence of seawater intrusion. In addition, seawater intrusion is not likely to have occurred at any time due to the rock formations and the More Ranch Fault along the coast which act as barriers to groundwater migration. Near-surface low permeability sediments cause the southern portion of the North-Central and West basins to be under confined conditions and provide a barrier to contamination from potential surface sources of water quality degradation such as agricultural return flow or infiltration of brackish water in the overlying Goleta Slough. High TDS perched water is present in shallow aquifers above the confining layers. This water is not in general use. Water quality in the North-Central Basin is sufficient for many agricultural uses but might require treatment for domestic uses. Water in the West Basin requires treatment for domestic use and can be used for irrigation of a limited variety of crops.

The Goleta Water District has extracted water from bedrock wells on a test basis. The pumped water from the fractures in consolidated bedrock in the foothills north of the basin and was of very poor quality. The District has no plans to utilize water from this source.

Goleta North/Central Basin

Available or useable storage of the North/Central Basin is estimated to be around 29,000 AF (Goleta Water District, 2005). Total available storage within the basin (including the West Basin) has been estimated to be about 245,000 AF. Useable storage is defined as the storage available between historical high and low water levels, whereas total storage available is the storage to the bottom of the production well screens-openings to the aquifer. Safe Yield of this basin is estimated to be 3,600 AFY (92-EIR-3). Historically, this basin was in a state of severe overdraft. This state of overdraft resulted in lengthy legal proceedings and a long-term moratorium on new water connections to the Goleta Water District (GWD). The Wright Judgment in 1989 served to adjudicate the water resources of this basin and assigned quantities of the basin Safe Yield to various parties, including the GWD and the LCMWC. The judgment also ordered the GWD to bring the North/Central Basin into a state of hydrologic balance by 1998. The GWD has achieved compliance with this order through the importation of State Water and the development

of other supplemental supplies. These supplemental supplies have offset the court mandated reduction in pumpage from the basin. Given that the basin has been adjudicated and the Court controls pumpage, overdraft is not foreseeable in the North-Central Basin.

Goleta West Basin

Available Storage of the Goleta West Basin is estimated to be around 7,000 AF. Safe Yield is estimated to be 500 AFY (92-EIR-3). Based on a 4-8-92 meeting between the County and the GWD (as reported in 92-EIR-3), pumpage in the Goleta West Basin is approximately 232 AFY and is entirely attributable to private landowners. Thus, based on the most recent analysis the West Basin has a surplus of 268 AFY. This state of surplus is anticipated to extend for many years into the future given the availability of high quality supplies from the GWD and the generally poor quality of the water in this hydrologic unit. The Goleta area receives surface water from two sources, the Cachuma Project and the State Water Project. In 2002 GWD imported 3,724 AF of state water. These projects are the major sources of water for the area and provide about 16,300 AFY.