Water Supplies

Groundwater
Surface Water
State Water Project
Desalination

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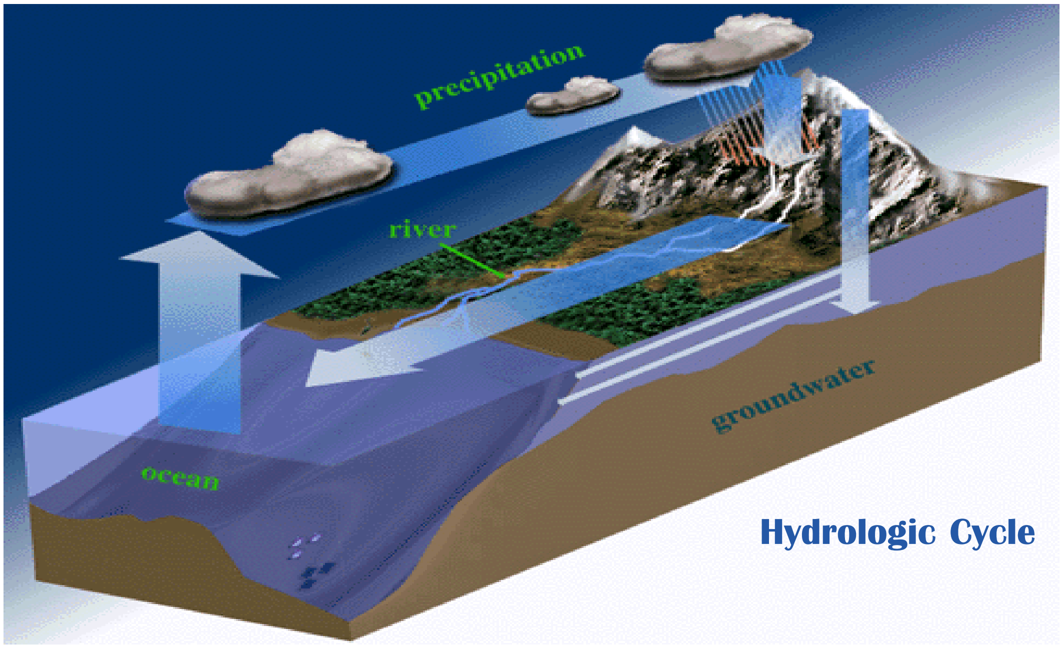
Groundwater



Introduction

Groundwater supplies about 75% of Santa Barbara County's domestic, commercial, industrial and agricultural water. It is also one of the last lines of defense against the periodic droughts that occur in the county. Historic records, combined with tree ring analysis, indicate that local drought periods of several years or more have occurred two to four times per century over the last 460 years for which tree ring records are available (Turner, 1992).

To better understand the supply and limitations of each groundwater basin and aquifer, local, state and federal agencies regularly monitor water quantity and quality. This information about our groundwater resources is critical to preventing overuse of aquifers, which can lead to depletion, seawater intrusion, diminished storage capacity, lower water quality or land subsidence within a basin. The result of overuse depends on the characteristics of the aquifer. In areas with low recharge rates, excessive pumping might render portions of an aquifer unusable indefinitely. The lowering of water tables might increase pumping "lifts", rendering groundwater economically infeasible for some uses. Thus, the consequence of long-term groundwater overuse can include permanent impairment of aquifers.

Significant changes in groundwater basins generally occur over a period of decades. In larger basins, trends in groundwater level and groundwater quality are recognizable only by examining data the length of one or more hydrologic (rainfall)

Most of the information in this section has been condensed form the following sources:

- *The Santa Barbara County Comprehensive Plan, Conservation Element*, *Groundwater Resources Section,* 1994
- *The Santa Barbara County Groundwater Report*, 1999

Another important source of information for this section is:

- *The Santa Barbara County Environmental Thresholds and Guidelines Manual*, 1995

For further detail about groundwater basins in Santa Barbara County and specific sources of information cited, please refer to these, or other documents listed in the References section of this report.

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cycles. However, some factors likely to affect the condition of the basins, such as the importation of supplemental water supplies, the implementation of basin management plans, and short-term climatic influences, may change from year to year.

Because of these concerns and various studies indicating slight to moderate levels of overdraft in several groundwater basins within the county, and a severe level of overdraft in one basin, the County developed a set of goals and policies to protect local groundwater. These goals and policies are contained in the *Santa Barbara County Comprehensive Plan, Conservation Element, Groundwater Resources Section,* which was formally adopted on November 8, 1994. In terms of the permitting process for new developments proposed in the county, the effects of new extractions on water resources are evaluated under the California Environmental Quality Act pursuant to the adopted Groundwater Thresholds contained in the County's *Environmental Thresholds and Guidelines Manual* (Santa Barbara County Planning and Development Department, 1995) and assessed for consistency with the *Comprehensive and Coastal Plan Policies*.

Groundwater Terms

There are several terms used in this section that warrant definition. For consistency, these terms are defined as used in *Environmental Thresholds and Guidelines Manual*, although some are not in widespread use. For example, most authorities avoid the use of the term "Safe Yield" because "a never changing quantity of available water depending solely on natural water sources and a specified configuration of wells is essentially meaningless from a hydrologic standpoint" (Todd, 1980). However, in the County's *Environmental Thresholds and Guidelines Manual* (Santa Barbara County Planning and Development Department, 1995), ***Safe Yield*** is defined as the maximum amount of water that can be withdrawn from a basin (or aquifer) on an average annual basis without inducing a long-term progressive drop in water level. This value can be reported as either *Perennial Yield (or the Safe Yield for gross pumpage) or Net Yield.* ***Perennial Yield*** refers to the amount of pumpage that represents the *Safe Yield* without accounting for return flows (i.e., *Perennial Yield* includes the volume of applied water that would return to the basin through percolation called "return flows". ***Net Yield*** is the Safe Yield value with the return flows subtracted. The *Perennial Yield* value is always greater than the *Net Yield* value.

Overdraft is defined as the level by which long-term average annual pumpage exceeds the estimated Safe Yield of the basin and thus, in the long-term, may result in significant negative impacts on environmental, social or economic conditions. A basin in which Safe Yield is greater than estimated average annual pumpage is defined as being in a state of ***Surplus***. The term ***Overdraft*** does not apply to a single year or series of a few years, but to a long-term trend extending over a period of many years that are representative of long-term average rainfall conditions. Thus, the estimated overdraft accounts for both drought periods and periods of heavy rainfall.

Available Storage is the volume of water in a particular basin that can be withdrawn economically without substantial environmental effects. This storage value represents an acceptable range in storage fluctuations within the basin, not a current storage level measurement for the basin. This volume of water is also referred to as the ***Usable Storage*** or ***Working Storage*** of a basin.

The term ***Confined*** or ***Artesian*** is used to describe an aquifer, the upper surface of which is restricted by an impermeable layer (confining layer) or barrier and is under greater than atmospheric pressure so that it will rise above the aquifer in which it is contained when the aquifer is penetrated by a well. In some cases, the water might rise above ground surface.

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Overview of Santa Barbara County Groundwater Basins

The basins are discussed in groups arranged geographically:

Major South Coast Groundwater Basins:

- Carpinteria
- Montecito
- Santa Barbara
- Goleta

The Santa Ynez River Watershed:

- Santa Ynez Uplands
- Buellton Uplands
- Santa Ynez River Riparian
- Lompoc Groundwater Basins

The North Coastal Groundwater Basins:

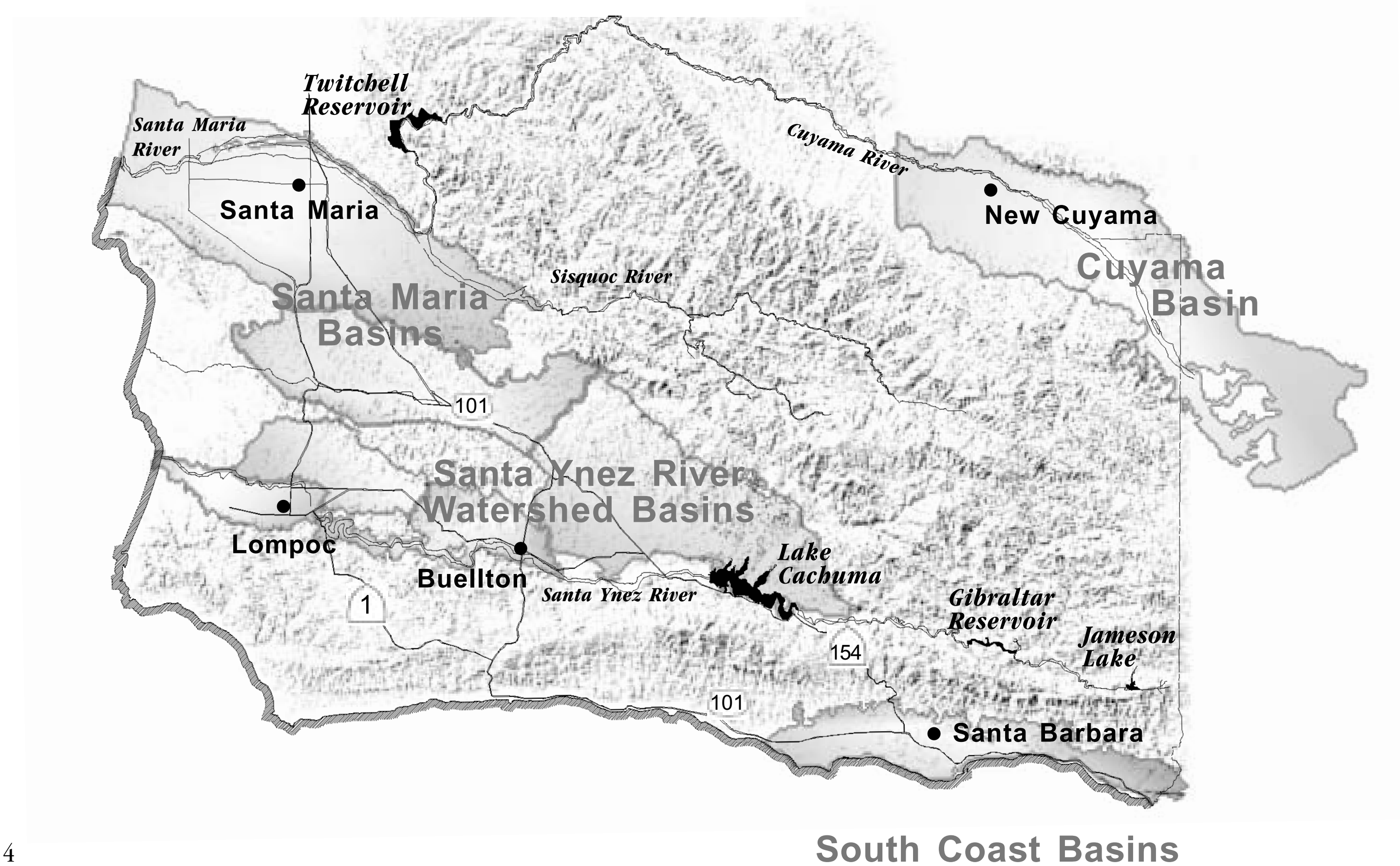
- San Antonio
- Santa Maria

The Cuyama Groundwater Basin:

The only major basin located in the northeast section of the county.

Others:

Areas of limited groundwater extraction and areas that have not been analyzed in detail.



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Well Monitoring and Data Collection

The Santa Barbara County Water Agency (SBCWA) currently monitors approximately 250 wells throughout the county. Many more wells are monitored by individual water districts. Several of these entities cooperate with the United States Geological Survey (USGS) to collect and publish groundwater data. Groundwater depth is measured by the SBCWA one or two times per year, using a graduated steel tape or an electric sounder.

To track and record groundwater data, the SBCWA has developed an electronic, geographically organized database for analyzing and displaying historical groundwater data. Groundwater data may also be obtained from the USGS and SBCWA publications and files.

The groundwater quality data used in this report comes from the USGS, the Regional Water Quality Control Board, or local water agencies, since the SBCWA does not collect this type of data. This report discusses total dissolved solids (TDS) as an indication of general water quality, nitrates as an indication of possible return flow contamination and chlorides as an indication of possible seawater intrusion.

The following water quality standards from the *Compilation of Federal and State Drinking Water Standards & Criteria* (State of California, 1995) are provided for comparison purposes. The DHS secondary standard, which applies to taste, odor and appearance, is 1,000 mg/L maximum contaminant level for TDS in drinking water. The DHS primary standards, which apply to chemical and radioactive contaminants in water, are 45 mg/L for nitrates and 250 mg/L for chloride.

General Trends

Many of the monitoring wells discussed in this report exhibit pronounced water level declines and increases as a result of varying weather patterns of the area's semiarid climate. The severe drought that occurred between 1986 and 1991 led to significant declines in water levels. Then several years of above average rainfall from March 1991 to April 1998 caused groundwater levels to rise substantially in most areas of the county. Depending on future climatic conditions, the rise in water levels observed in some of the basins may be a short-term variation in a long-term trend of overdraft-induced water level decline.

Well response to precipitation depends on many factors including the percolation time required for recharge to reach water tables. Deep aquifers respond slowly, often having a lag time of two or more years. Shallow aquifers such as those near creeks and rivers and those located in relatively shallow basins with surface material of high permeability tend to respond more quickly to variations in precipitation and stream flow. Therefore, in such areas there has been a strong correlation between well measurements for a particular year and that season's precipitation.

It is important to note that localized influences such as variations in pumping can also modify general trends. As a result of these factors, single year or short-term groundwater trends are of limited value in assessing overall basin conditions.

Historic trends and hydrologic balance studies using available data indicate slight to moderate overdrafts in groundwater basins in the Santa Maria Valley, San Antonio Valley, Santa Ynez Uplands and Lompoc Uplands. Significant overdraft is evident only in the Cuyama Valley Groundwater Basin (Santa Barbara County Water Agency, 1996). Effects of importation of State Water Project (SWP) water in the Santa Maria area and Santa Ynez Uplands are as yet unclear, but may eliminate overdraft in these areas in the future.

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A Brief Comparison of Groundwater Basins in Santa Barbara County

Basin	Size	Perennial Yield for: Gross Pump-age	Net Pump-age	Estimated Net Demand on Groundwater	Net Surplus/ (Overdraft)	Available Storage	Land Use Summary
	Acres	AFY	AFY	AFY	AFY	AF	
South County Groundwater Basins							
Carpinteria	6,700	4,294	3,865	2,605 Pumpage level assumes that all available surface supplies are utilized	1,260	50,000	One city, orchards, irrigated crops and greenhouses
Montecito	4,300	1,350	1,215	Pumpage not required due to surplus surface supplies	N/A	14,400	Primarily low-density residential use; unincorporated
Santa Barbara	4,500	847	805	Pumpage not required due to surplus surface supplies. Basin managed by City of S.B.	N/A	10,000	Primarily residential, industrial and commercial
Foothill	3,000	953	905	898 (Maximum long-term pumpage. Basin managed by City of S.B.)	Not subject to overdraft per SB/LCMWC agreement.	5,000	Primarily residential
Goleta North/ Central	5,700	3,600	3,420	3,420	Not subject to Overdraft per Court decision.	18,000	Primarily residential, industrial and commercial. Basin has been adjudicated and is not subject to overdraft.
Goleta West	3,500	500	475	220	255	10,000	Primarily residential, industrial and commercial.
Santa Ynez River Groundwater Basins							
Santa Ynez Uplands	83,200	11,500	8,970	10,998	(2,600)	900,000	Three towns, one city, and other low density residential; varied, high-value agriculture
Buellton Uplands	16,400	3,740	2,768	1,932	800	154,000	Agriculture; one city
Lompoc	48,600	28,537	21,468	22,459	(991)	170,000	One city, unincorporated urban development, Vandenberg AFB; varied agriculture; petroleum

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Basin	Size	Perennial Yield for: Gross Pump-age	Net Pump-age	Estimated Net Demand on Groundwater	Net Surplus/ (Overdraft)	Available Storage	Land Use Summary
	Acres	AFY	AFY	AFY	AFY	AF	
North County Groundwater Basins							
San Antonio	70,400	8,667	6,500	15,931	(9,431)	800,000	One town; extensive agriculture; some petroleum; VAFB
Santa Maria	110,000 (80,000 within Santa Barbara County)	120,000	80,000	100,000 (90,500 with City of Santa Maria reduction in pumpage due to SWP supply.)	(20,000) (8,000 with City of Santa Maria reduction in pumpage due to SWP supply.)	1,100,000	Two cities; extensive unincorporated urban area (Santa Barbara County); extensive irrigated agriculture; petroleum
Cuyama Groundwater Basins							
Cuyama	441,600 (81,280 w/in Sta. Barbara County	10,667	8,000	36,525	(28,525)	1,500,000	Extensive agriculture; some petroleum; very low population density
Other County Groundwater Basins							
More Ranch	502	84	76	24	60		Primarily open space; limited residential/agriculture
Ellwood to Gaviota Coastal Basins	67,200	—	6,000	N/A	N/A	2,000,000	Agriculture, primarily orchards and grazing; limited municipal/industrial
Gaviota to Pt. Conception Coastal Basins	23,040	—	N/A	N/A	N/A	N/A	Agriculture, primarily grazing
Santa Ynez River Riparian Basins	12,000 (3 sub-units)	—	N/A	N/A	N/A	Storage generally maintained by capture of local runoff & by releases of prior rights water banked in Cachuma Lake	Two cities; 7,300 acres of irrigated cropland

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The beach at Rincon Point

South Coast Basins

The South Coast basins are located between the Santa Ynez Mountains and the Pacific Ocean (see Santa Barbara County Groundwater Map). In general, these basins are composed of the unconsolidated material that accumulated as a result of the uplift and erosion of the mountains. Several of the basins are generally differentiated from each other where faulting or impermeable geologic formations limit the hydrologic connection between the aquifers.

The major groundwater basins (Carpinteria, Montecito, Santa Barbara, and Goleta) are separated from each other by faults, impermeable bedrock, inferred lithologic barriers, or arbitrary (administrative) boundaries. 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 subbasin boundaries might change as more is learned about the geologic and hydrologic relationships between the aquifer units.

South Coast Basins

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Carpinteria Groundwater Basin

Physical Characteristics:

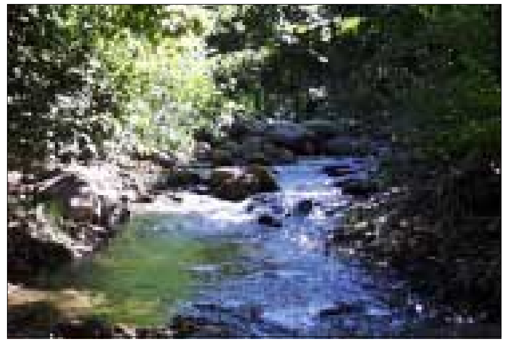
The Carpinteria Groundwater Basin underlies approximately 12 square miles in the Carpinteria Valley. It extends east of the Santa Barbara County line into Ventura County and includes the Toro Canyon subbasin to the west. (The Toro Canyon Subbasin is included in the Montecito Water District service area 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 aquifer are confined including portions of both storage units.

Precipitation in the basin varies with elevation but 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 Creek.

Water Quality:

Water quality has been monitored sporadically over most of the 20th century. Since the initial USGS study (Upson, 1951; 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.



Carpinteria Creek

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.

Basin Supply and Demand:

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 receives approximately 2,800 AFY from Lake Cachuma and holds an entitlement of 2,000 AFY in the State Water Project. Agricultural demand is met by groundwater and Cachuma Project water. Agriculture consists mostly of avocados, citrus and floriculture. Urban demand is met by SWP water and the Cachuma Projects. 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) and 1,260 AFY (net). A state of overdraft is not reasonably foreseeable in the Carpinteria Groundwater Basin.

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Montecito Groundwater Basin

Physical Characteristics:

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 tending faults that act as barriers to groundwater movement. The northernmost unit is bounded on the south by the Arroyo Parida Fault, the central unit by the Montecito Fault and the southernmost unit by the Rincon Creek Fault. These storage units are numbered One, Two, and Three, respectively (Lovejoy and Sheahan, 1978). The Toro Canyon Subbasin is included in the section on the Carpinteria Groundwater Basin because it is contiguous with that aquifer. However, the Toro Canyon subbasin 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:

Water quality in the basin is generally 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 1960s.

Basin Supply and Demand:

Available Storage within the Montecito Groundwater Basin is estimated to be 14,400 AF (excluding the Toro Canyon subbasin). 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 Lake Cachuma and Jameson Reservoir on the Santa Ynez River has met roughly 90% of the water demand within the MWD. The remaining 10% 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.

The water supply available in the Montecito area is approximately 8,700 AFY, including groundwater and the available surface water sources. This figure includes 2,300 AFY from the Cachuma Project, 1,926 AFY from Jameson Lake and other surface water sources, 65 AFY from MWD bedrock wells, 3,000 AFY of SWP 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. Since the available surface supplies provide more than enough water to meet local demand, overdraft of the groundwater basin is not reasonably foreseeable.

Santa Barbara Groundwater Basin

Physical Characteristics:

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,

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that does not reflect any known hydrologic or geologic barrier, separating the Santa Barbara Groundwater Basin from the Montecito Groundwater Basin. *(The separate Foothill Groundwater Basin discussed in the following section encompasses the hydrologic unit that includes the formerly designated Storage Unit #II of the Santa Barbara Basin and the former "East Subbasin" of the Goleta 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.

Water Quality:

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 (Storage Unit #1) where heavy pumping from municipal wells caused groundwater levels to drop as much as 100 feet in the late 1970s.

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.

Basin Supply and Demand:

Available Storage within the Santa Barbara Basin is estimated to be 10,000 AF. Groundwater constitutes about 10% 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, Lake Cachuma, Gibraltar Reservoir 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 (Baca and Ahlroth, 1992a). Overall water supplies available to the City total approximately 18,300 AFY, including the groundwater basin Safe Yield (for gross pumpage) of 847 AFY, a 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 and Ahlroth, 1992a). 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. Since the City is the dominant pumper in the basin, 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 Water Department, 1994).

Foothill Groundwater Basin

The Foothill Groundwater Basin is described and analyzed in USGS Water Resources Investigations Report 89-4017 (Freckleton, 1989). The definition and description of this basin presented below are based on this report.

Physical Characteristics:

The Foothill Groundwater Basin is comprised of unconsolidated alluvial sediments that 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

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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 Subbasin" of the Goleta Groundwater Basin.

Water Quality:

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

Basin Supply and Demand:

Available Storage of the Foothill Basin is estimated to be 5,000 AF. 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 and Ahlroth, 1992a). Pumpage of the basin, including commitments to approved projects was estimated to be 898 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.

Goleta Groundwater Basin

Physical Characteristics:

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 (Hope Ranch Area) 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 Ygnacia, San Jose, Tecolotito, and San Pedro.

The Goleta Groundwater Basin, as defined by the USGS, is divided into two subbasins separated by an inferred low permeability barrier that separates areas of differing water quality. The Goleta North-Central Subbasin 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 Subbasin. 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.]*

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Water Quality:

The USGS compiled water quality data for these basins in the early 1940s. 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 Subbasin.

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 that 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 a bedrock well on a test basis. The well 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.

Basin Supply and Demand:

Goleta North/Central Basin:

Available Storage of the North/Central Basin is estimated to be 18,000 AF. Total storage within the basin (including the West Basin) has been estimated to be about 245,000 AF. Safe Yield (for gross pumpage) of this basin is estimated to be 3,600 AFY. 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 Judgement 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 judgement 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 SWP 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 pumpage is controlled by the Court, overdraft is not foreseeable in the North-Central Basin.

Goleta West Basin:

Available Storage of the Goleta West Basin is estimated to be 10,000 AF. Safe Yield (for gross pumpage) is estimated to be 500 AFY. Based on the results of a meeting in April, 1992 between the County and the GWD, gross pumpage in the Goleta West Basin is estimated to be 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 for gross pumpage. 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.

Other Supplies:

The Goleta area receives surface water from two sources, the Cachuma Project and the State Water Project. These projects are the major sources of water for the area and provide about 16,300 AFY.

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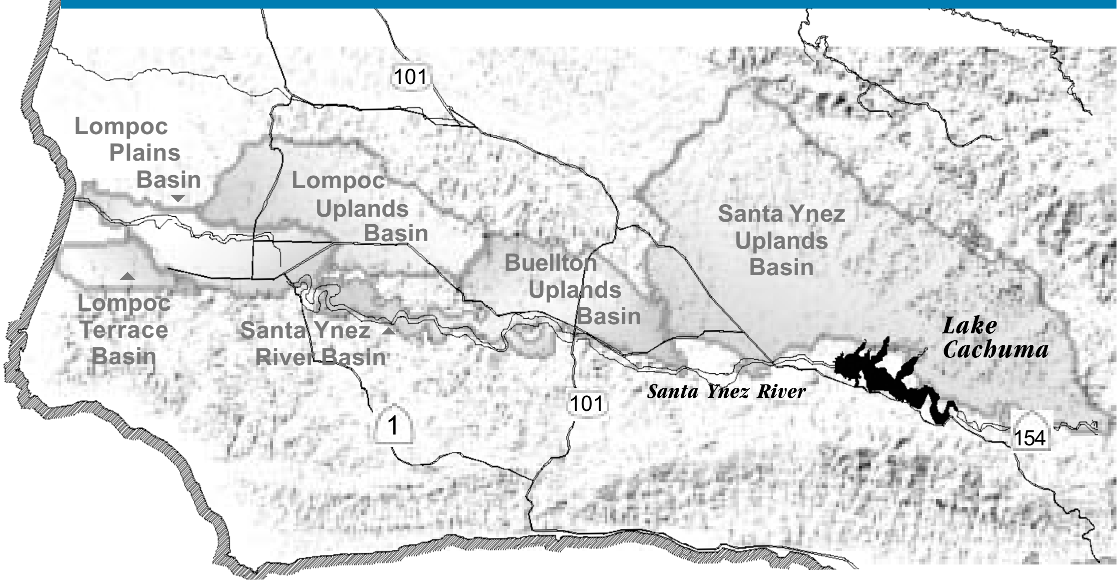
Groundwater Basins of the Santa Ynez River Watershed



The groundwater basins within the Santa Ynez River drainage lie between the San Rafael Mountains to the northeast, the Purisima Hills to the north, and the Santa Ynez Mountains to the south. The shape and location of these basins are controlled by the east-west oriented folds and faults of the region. In addition, the formations of the basins have been influenced by the former stages and flow of the Santa Ynez River, creating terraces and uplands which comprise some of the primary aquifers.

New vineyards in the Santa Ynez Uplands

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Santa Ynez Uplands Groundwater Basin

Physical Characteristics:

The Santa Ynez Uplands Groundwater Basin underlies 130 square miles located about 25 miles east of the Pacific Ocean and north of the Santa Ynez River. The basin is wedge shaped, narrowing to the east. It is bounded by a groundwater divide (from the San Antonio Basin) to the northwest, faults and the impermeable rocks of the San Rafael Mountains to the northeast, and impermeable rock formations that separate it from the Santa Ynez River (and the Santa Ynez River Riparian Basin) to the south.

Average rainfall within the basin varies from a maximum of about 24 inches per year in the higher elevations to a minimum of about 15 inches per year in the southern and central areas. Rainfall is the primary source of recharge to the basin.

Water Quality:

Water quality within the basin is generally adequate for most agricultural and domestic purposes. Studies completed in 1970 indicate TDS concentrations ranging from 400 to 700 mg/L. Although recent water quality data are limited, samples analyzed by the USGS in 1992 exhibited a TDS concentration of 507 mg/L.

Basin Supply and Demand:

Available Storage within the Santa Ynez Uplands Groundwater Basin is estimated to be about 900,000 acre-feet (AF). Safe Yield of this basin is estimated to be 11,500 AFY (for gross pumpage). Estimated gross pumpage of the basin is 14,100 AFY (Santa Barbara County Water Agency, 1977). Recent estimates by the County show that this number is currently accurate. Thus, the basin is in overdraft at a level of 2,600 AFY. This level of overdraft is small in comparison to the Available Storage.

Groundwater pumpage meets about 75% of the water demand within the basin area. In addition to groundwater, water is imported into the basin from the Cachuma Project and the State Water Project. Agriculture accounts for almost 90% of the water demand within the basin; the remaining demand is mostly from urban consumers.

Santa Agueda Creek in the Santa Ynez Watershed

The basin is pumped by private agricultural and domestic users, and by the Santa Ynez River Water Conservation District Improvement District #1 (SYRWCDID#1). In addition, the City of Solvang pumps about 375 AFY of groundwater from one well located within the basin. Domestic demand supplied by SYRWCDID#1 is estimated to be 2,350 AFY, including about 550 AFY supplied to the City of Solvang. Based on survey reports, Solvang's total domestic usage is estimated to be about 1,800 AFY (Santa Ynez River Water Conservation District, 1996).

The SYRWCDID#1 holds an entitlement of 2,000 AFY in the State Water Project, 500 AFY of which will likely go toward filling some of its water demand, and therefore, eliminating some of the estimated basin overdraft. The remaining 1,500 AFY, which was to be delivered to the City of Solvang, is currently in litigation and the final amount of SWP water to be used within the basin has yet to be determined. Although there is not yet sufficient basis for changing the 1977 conclusion that a small overdraft exists within the basin, the importation of supplemental supplies and the implementation of a Groundwater Management Plan may bring the basin into balance.

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Buellton Uplands Groundwater Basin

Physical Characteristics:

The Buellton Uplands Groundwater Basin encompasses about 29 square miles located about 18 miles east of the Pacific Ocean and directly north of the Santa Ynez River. The basin boundaries include the impermeable bedrock of the Purisima Hills to the north, the Santa Ynez River Fault to the south, a limited connection to the Santa Ynez Upland Groundwater Basin to the east and a topographic (drainage) divide with the Lompoc Basin to the west.

The Santa Ynez River Riparian Basin sediments overlie portions of the Buellton Uplands in the southeast part of the basin. Due to the hydrologic gradient (generally north to south), it is likely that the Buellton Uplands Basin discharges into the Santa Ynez River Riparian Basin. The Santa Ynez River Riparian Basin is discussed later in this section.

The SBCWA has estimated average annual rainfall in the basin to be about 16 inches per year.

Water Quality:

Current water quality data for the basin is limited. However, data from late 1950s and early 1960s indicate TDS concentrations between 300 and 700 mg/L for several wells within the basin.

Basin Supply and Demand:

The Buellton Uplands Basin has been a recognized hydrologic unit for decades and is designated on the groundwater basin maps adopted into the *Santa Barbara County Comprehensive Plan* (Santa Barbara County Planning and Development Department, 1994). Until 1990-91, however, this basin was not subject to detailed analysis by either the USGS or the SBCWA. At that time, the SBCWA evaluated this basin and found it to be in a moderate state of overdraft (Baca, 1994). Subsequently, further analysis of the basin was conducted and the SBCWA (Almy *et al.*, 1995) determined that the basin is in a state of surplus.

Available Storage in the Buellton Uplands Basin is estimated to be 154,000 AF. The total volume of water in storage in this basin is estimated by the SBCWA to be about 1.4 million AF (assumes a specific yield of 10%). Safe Yield for consumptive use (Net Yield) is estimated to be 2,768 AFY (Almy *et al.*, 1995). Based on an estimated average of 26% return flows, Safe Yield for gross pumpage (Perennial Yield) is estimated to be 3,740 AFY. Estimated pumpage from the basin is 2,599 AFY (gross) and 1,932 AFY (net). Thus, the basin is considered by the SBCWA to be in a state of surplus with natural recharge exceeding pumpage by a net 800 AFY. This surplus represents the amount of groundwater from the Buellton Uplands Basin that discharges annually into the Santa Ynez River Riparian Basin.

Recharge to the basin is from deep percolation of rainfall, stream seepage, underflow into the basin from adjacent basins and return flow from agriculture. As stated above, the basin discharges to the Santa Ynez River via natural seepage.

Approximately 80% of the 2,599 AFY of pumpage in the basin is attributable to agricultural irrigation. The remaining 20% is used by the City of Buellton and scattered farmsteads around the rural area.

Lompoc Groundwater Basin

Physical Characteristics:

The Lompoc Groundwater Basin consists of three hydrologically connected subbasins: the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands. Together, these subbasins encompass about 76 square miles. The basin surrounds the lower reach of Santa Ynez River and is bordered on the north by the Purisima Hills, on the east by a topographic

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divide (the Santa Rita Hills) with the Buellton Uplands Basin, on the South by the Lompoc Hills and on west by the Pacific Ocean. The Lompoc Plain Alluvial Subbasin is divided into three horizontal zones: an upper, middle and main zone. Based on recent hydrologic and water quality studies, these zones have points of hydrologic continuity and exchange limited amounts of water.

Precipitation within the basin is influenced by orographic effects and other meteorological factors. The maximum average rainfall is about 18 inches and occurs near the southern edge of the basin in the Lompoc Hills; near the Pacific Ocean precipitation averages approximately 10 inches per year. The average rainfall in the City of Lompoc is 13 inches. Rainfall averages about twelve inches per year over the entire basin.

Water Quality:

Water quality in the shallow zone of the Lompoc Plain tends to be poorest near the coast and in heavily irrigated areas of the subbasin. TDS concentrations of up to 8,000 mg/L near the coast were measured in the late 1980s. The poor quality water in this area is attributed to upwelling of poor quality connate waters, reduction in fresh water recharge from the Santa Ynez River beginning in the early 1960s, agricultural return flows, and downward leakage of seawater from an overlying estuary in the western portion of the basin (Bright, *et al.*, 1992). The presence of elevated boron and nitrates (constituents common in seawater and agricultural return flow, respectively) supports this conclusion.

In the middle zone, water samples taken from below agricultural areas of the northeastern Plain contained TDS concentrations averaging over 2,000 mg/L. However, some middle zone groundwater from the western plain exhibited TDS levels below 700 mg/L. Areas of recharge, adjacent to the Santa Ynez River, contained TDS concentrations of less than 1,000 mg/L in the eastern plain. It is believed that leakage from the shallow zone is responsible for elevated TDS levels in the middle zone in the northeastern plain.

Central coast oak woodland

Groundwater from the main zone exhibited TDS concentrations as high as 4,500 mg/L near the coast. It is thought that contamination of the main zone (mainly near the coast) is due to percolation of seawater through estuary lands and upward migration of poor quality connate waters from the underlying rock. Groundwater of the Lompoc Terrace and Lompoc Upland Subbasin is generally of better quality than that of the Lompoc Plain, averaging less than 700 mg/L TDS. Some of the natural seepage from these subbasins is of excellent quality. For an in-depth discussion of water quality, see the Water Quality section of this report and documents referenced therein.

Groundwater users and public agencies within the basin are working to clarify and resolve water quality concerns.

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Basin Supply and Demand:

The supply/demand status of this basin was updated in 1998 (Ahlroth, 1998).

Available Storage within the Lompoc Groundwater Basin is estimated to be approximately 170,000 AF (Santa Barbara County Planning and Development, 1994). Safe Yield is estimated by the SBCWA to be 28,537 AFY (gross or Perennial Yield) and 21,468 AFY (net). Net pumpage or consumptive use from the Lompoc Basin is estimated to be 22,459 AFY. Based on water level trends evaluated in 1998, the basin is in a state of overdraft with net extractions exceeding recharge by 991 AFY.

Groundwater is the only source of water supply within the basin. Agricultural uses account for 70% of the total water consumed within the basin. Municipal uses account for the remaining demand and include the City of Lompoc, the Vandenberg Village Community Services District and the Mission Hills Community Services District.

The general direction of groundwater flow is from east to west, parallel to the Santa Ynez River. Historically, underflow from the Lompoc Uplands and Lompoc Terrace contributed to recharge of the Lompoc Plain. As a result of a long-term decline in water levels, very little underflow will move from the Lompoc Upland to the Lompoc Plain in the future. Localized depressions in the water table occur in areas of heavy pumping. One such area is in the northern part of the Lompoc Plain where the City operates municipal supply wells. Pumping depressions are also present in the Mission Hills and Vandenberg Village areas. Sources of recharge to the basin include percolation of rainfall and stream flow (including Lake Cachuma releases), agricultural water return flow and underflow into the basin.

The City is consulting with upstream entities regarding concern over worsening water quality in the Lompoc Plain. Although the cause of the trend is much debated, future Groundwater Management Plans created in accordance with AB 3030 could address the problem. Both the USGS and the City of Lompoc have developed numerical models of the basin that might be used during the implementation of these plans. In addition, the City of Lompoc has implemented recycling and conservation programs. The City and the Santa Ynez River Water Conservation District have also initiated a Groundwater Management Plan for the Lompoc Plain portion of the basin.

Row crops over the Lompoc Plain portion of the Lompoc Groundwater Basin

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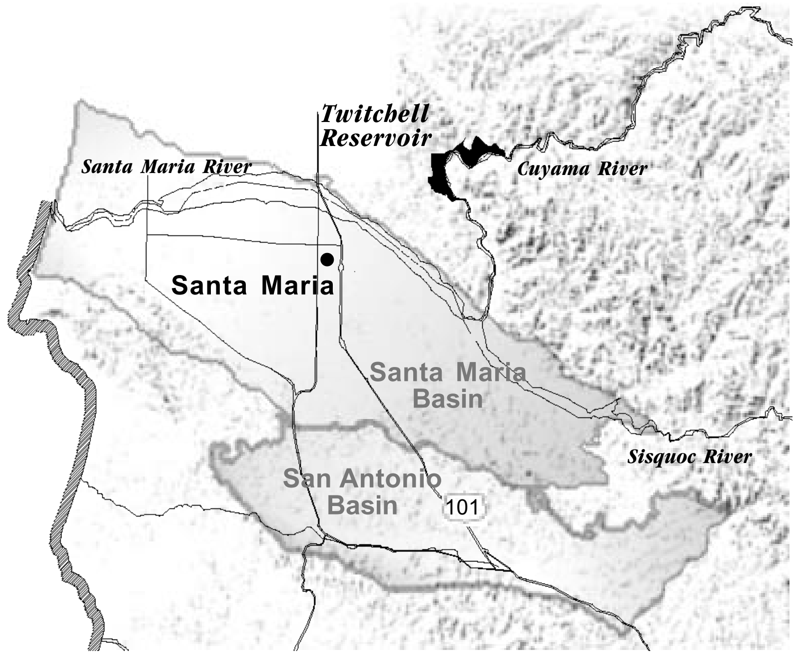
North County Basins

The San Antonio and Santa Maria Groundwater Basins are located north of the Santa Ynez River watershed. These basins are hydrologically separate from each other and the other basins in the county.



San Antonio Groundwater Basin

Physical Characteristics:

The San Antonio Valley Groundwater Basin is approximately 30 miles long and 7 miles wide. The western end of the basin is about 7 miles inland from the Pacific Ocean. It is cradled between the Solomon and Casmalia Hills to the north and the Purisima Hills to the south. The eastern boundary is a groundwater divide with the Santa Ynez Uplands Basin. Land use within the valley consists mainly of agriculture (primarily vineyards), ranching and a small amount of urban development in the town of Los Alamos. In addition, the western part of the basin is within Vandenberg AFB, which uses groundwater for Base operations.

Average annual rainfall within the basin is about 15 inches. Barka Slough, a wetland area in the valley, was created by consolidated rocks below the eastward plunging syncline (a concave upward fold in stratified rock), forming the basin.

Water Quality:

Water quality studies conducted by the USGS in the late 1970s indicated an average TDS concentration within the basin of 710 mg/L, with concentrations generally increasing westward. The cause of the westward water quality degradation is thought to be the accumulation of lower quality water from agricultural return flow and the dissolution of soluble minerals. The highest TDS concentration (3,780 mg/L) was found in the extreme western end; the lowest concentration (263 mg/L) was found at the extreme eastern end.

Analyses compiled for samples taken between 1958 and 1978 indicate that groundwater quality remained fairly stable during that period. Analyses of water sampled in 1993 for several wells show only slight increases in TDS since the previous study. There is evidence that poor quality connate waters exist within fracture zones of the bedrock and that this water might be induced into overlying strata through excessive pumping. There is no evidence of seawater intrusion in the basin, nor is the basin considered susceptible to seawater intrusion due to the consolidated rock that separates the basin from the ocean.

Basin Supply and Demand:

The supply/demand status of this basin was updated in 1999 (Baca and Ahlroth, 1999). The discussion presented below reflects this recent update.

Available Storage within San Antonio Groundwater Basin is estimated to be about 800,000 AF. Safe Yield of the basin is 8,667 AFY (gross) and 6,500

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AFY (net), according to the USGS (Hutchinson, 1980). Baca and Ahlroth (1999) estimate net pumpage (net consumptive use) of groundwater in the basin to be 15,931 AFY (equivalent to gross pumpage of 21,128 AFY). Thus, the basin is in a state of overdraft at a level of 9,431 AFY (net).

All but 500 AFY of the total of 15,931 AFY of consumptive use in the San Antonio Basin is attributable to agricultural irrigation, primarily vineyards. The minor municipal demand is for Vandenberg AFB and the small community of Los Alamos. Groundwater is the sole source of water supply within the basin boundaries. It should be noted that Vandenberg AFB historically pumped approximately 3,000 to 4,000 AFY from the San Antonio Basin. With the recent importation of SWP water, Vandenberg AFB pumpage has dropped to about 300 AFY. This drop in Vandenberg AFB pumpage has been offset by the increase in pumpage associated with the recent and extensive vineyard development in this area.

Recharge to the basin occurs through the percolation of rainfall and seepage from streams. Water leaves the basin through well extractions and surface outflow to the Pacific Ocean. The surface outflow at the western end of the basin supports the Barka Slough wetland.

As stated above, the basin is in overdraft at an estimated level of 9,431 AFY (net). This, depending upon future climatic conditions, could lead to adverse effects over the long-term. Because of the impermeable character of the west basin boundary, seawater intrusion will not occur as a result of overdraft. However, underflow of connate water from bedrock formations in contact with the basin may cause gradual deterioration of groundwater quality. Overdraft could also result in a gradual progressive reduction in the amount of water discharged on an average annual basis from the basin. Thus, the basin outflow which supports the Barka Slough wetland, and stream flows in the western portion of San Antonio Creek, could progressively decline.

Agricultural land in the Santa Maria Valley

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Santa Maria Valley Groundwater Basin

Physical Characteristics:

The Santa Maria Valley Groundwater Basin is an alluvial basin that is situated in the northwest portion of Santa Barbara County and extends into the southwest portion of San Luis Obispo County. The basin boundaries include: 1) an east-west line just south of the Nipomo area, 2) the Sierra Madre Mountains to the north and east, and 3) the Casmalia and Solomon Hills to the south and west. The Santa Barbara County portion of this basin equals 170 square miles, with a thinning northern continuation that terminates in the Five Cities area in San Luis Obispo County.

Average rainfall varies from about 12 to 16 inches per year within the basin. Surface drainage is primarily from the Sisquoc and Santa Maria Rivers which traverse the north side of the basin from east to west. Orcutt Creek, Bradley Canyon, Cat Canyon and Foxen Canyon are the primary drainages on the south side of the basin.

Water Quality:

Water quality data indicates that TDS concentrations generally increase from east to west, with the most significant degradation occurring in the western part of the basin. TDS concentrations for shallower wells also tend to increase southward, away from the recharge area of the Santa Maria River. TDS concentrations east of Guadalupe have increased to over 3,000 mg/L in 1975 from less than 1,000 mg/L in the 1930s. In addition, TDS levels have increased significantly in Orcutt wells since the 1930s, but have remained relatively stable since 1987. The importation and domestic use of SWP water now results in better quality discharge water from the treatment facilities.

A recent study conducted by the State of California Water Resources Control Board (1995) indicates that the basin is subject to nitrate contamination, particularly in the vicinity of the City of Santa Maria and in Guadalupe. The study shows that nitrate concentrations have increased from less than 30 mg/L in the 1950s to over 100 mg/L in the 1990s in some parts of the basin.

Coastal monitoring wells are measured biannually for any indication of seawater intrusion, although there has been no evidence that it has occurred. The concern of seawater intrusion is based on evidence that the Careaga Sand crops out on the ocean floor several miles west and there are no known barriers to prevent intrusion. Although it is likely that the seawater-freshwater interface has migrated toward land during the 20th century, the slope of groundwater has remained positive toward the ocean in the western-most part of the basin.

Basin Supply and Demand:

The supply/demand status of this basin was reviewed in the *Orcutt Community Plan Update: Final Environmental Impact Report* (Santa Barbara County Resource Management Department, 1995). The discussion presented below reflects this recent update as well as recent SBCWA reports (Ahlroth, 1992; Naftaly, 1994) on this basin.

Water storage above sea level within the Santa Maria Groundwater Basin was estimated to be about 2.5 million acre-feet (MAF) in 1984 and 1.97 MAF in 1991, and in 1998-99 probably greater than 2.5 MAF. The maximum storage level of record occurred in 1918 and was over 3 MAF. The portion of the groundwater basin located in San Luis Obispo County was estimated by the Department of Water Resources to contain about 226,000 AF in 1975, a part of which is included in the SBCWA estimate. Based on examination of past storage and climate trends, current storage above sea level in the basin is probably greater than 2.3 MAF (year 2000 condition). The basin supplies groundwater to the City of Santa Maria, California Cities Water Company, the City of Guadalupe, Casmalia Community Services District, oil operations and private agriculture throughout the valley. Groundwater was previously the only source of water used within the valley, however, SWP water has provided an additional water source since 1997.

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The aquifer is considered to be essentially continuous hydrologically with the exception of clay lenses that cause localized confinement. Depressions of the water table occur in areas of heavy pumping.

After World War II, agriculture in the valley increased dramatically resulting in significant groundwater declines. The construction of Twitchell Reservoir in 1959 increased recharge significantly. The Twitchell Project is estimated to yield an average of 20,000 AF annually.

Produce from Santa Maria Valley farmland ready for market

Recovery of the basin from extended dry periods became more rapid after the construction of Twitchell Reservoir. Comparison of post-drought recovery periods illustrates this. For example, recovery of the groundwater in some wells from 1937 through 1945 was more gradual than for the period from 1967 through 1971 despite greater pumpage and less rainfall during the later period. The rapid recovery was due to the added recharge from Twitchell Reservoir.

The Perennial Yield for gross pumpage of the basin has been estimated to be approximately 120,000 AFY. Historic hydrologic data indicate an average annual overdraft of approximately 20,000 AF based upon a 45-year base period with very wet and very dry cycles, and with average annual rainfall equal to the long-term average precipitation, but not accounting for importation of SWP water as discussed below.

The Cities of Santa Maria and Guadalupe, and California Cities Water Company of Orcutt have contracted to receive a combined total of 17,250 AFY from the State Water Project, which began delivery in 1997. Santa Maria holds 16,200 AFY of entitlement. According to the *City of Santa Maria State Water Master Plan* (Boyle Engineering Corp., 1994), approximately two-thirds of its SWP supply is designated for blending purposes to meet established City water quality objectives and will not be used to support new development. Thus, this use of SWP water represents a corresponding reduction in long-term pumpage (and overdraft) of the basin. Another benefit of SWP water importation is the relatively low salinity of return flows from water use in the city. This serves to improve overall water quality in the basin.

Deliveries of SWP water to the basin were approximately 12,000 AF in 1999. If the rate of these deliveries continues or increases, and if net usage remains the same, the estimated overdraft would be reduced.

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Cuyama Groundwater Basin

Cuyama Groundwater Basin

Physical Characteristics:

The Cuyama Groundwater Basin is comprised of unconsolidated sands and gravels that fill a 225-square-mile intermontane topographic depression named the Cuyama Valley. This valley lies about 35 miles north of the City of Santa Barbara between the Sierra Madre Mountains on the south and the Caliente Mountain Range on the north. The basin trends northwest-southeast. The basin extends east into Ventura County and north into Kern and San Luis Obispo Counties. Rainfall within the basin ranges from about 24 inches per year at the crest of the Sierra Madre Mountains to as little as 6 inches per year in the central valley.

Water Quality:

Agricultural water use began in 1938 and has since progressively increased. The constant cycling and evaporation of irrigation water has resulted in decreasing water quality. Groundwater within the basin makes up 100% of the water supply for Cuyama Valley agriculture, petroleum operations, businesses and homes. Agriculture accounts for over 95% of the water use within the valley.

Basin Supply and Demand:

The supply/demand status of this basin was updated in 1992 (Baca and Ahlroth, 1992b). The discussion presented below reflects this information.

Available Storage in this basin is estimated to be 1,500,000 AF. Safe Yield has been estimated to be 10,667 AFY (gross) and 8,000 AFY (net). The gross demand on the Cuyama Valley Groundwater Basin has been estimated to be 48,700 AFY, with a net demand of about 36,525 AFY. The overdraft is therefore in excess of 28,000 AFY. Water level declines since the 1940s in excess of 100 feet are not unusual in some parts of the basin.

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Other Groundwater Extraction Areas

The following extraction areas are relatively small, undeveloped or lacking groundwater data:

More Ranch Groundwater Basin

The supply/demand status of this basin was updated in 1993 (Baca, 1993). The discussion presented below reflects this report.

The More Ranch Basin occupies about 502 acres in the southern Goleta area between the More Ranch Fault and the Pacific Ocean. The unconsolidated sand and silt of Santa Barbara Formation that comprise the basin overlie consolidated bedrock of the Sisquoc and Monterey formations. Average rainfall for this area is approximately 16 inches per year.

Most of the area encompassed by this basin is in open space. Developed land uses include residential dwellings with some open field and greenhouse agriculture. Water quality within the basin averages from 800 to 2,300 mg/L, TDS. The Safe Yield of the basin is estimated to be 84 AFY (gross), 76 AFY (net). The gross demand is estimated to be about 24 AFY, resulting in a surplus of 60 AFY.

Ellwood to Gaviota Groundwater Area

Physical Characteristics:

The Ellwood to Gaviota groundwater area covers about 105 square miles in the southern part of Santa Barbara County between the crest of the Santa Ynez Mountains and the Pacific Ocean. Geologically, the area consists of the south limb of a large anticline (convex upward fold), that forms the Santa Ynez Mountains. The terrace and alluvial deposits located near the coast formed as the mountains uplifted, folded and eroded.

Rainfall in the area ranges from about 18 inches per year near the ocean to over 30 inches at the crest of the Santa Ynez Mountains. Surface drainage is south, down the steep slope of the mountains to the Pacific Ocean. The direction of groundwater flow is also south.

Water Quality:

Samples analyzed from many groundwater wells in the late 1960s indicated that most of the groundwater of the Ellwood-Gaviota area was too hard for domestic use without treatment. In addition, salinity was found at hazardous concentrations in many wells. Seawater intrusion might be occurring in alluvial areas near the coast. However, the presence of impermeable strata might prevent seawater from reaching deeper aquifers.

Basin Supply and Demand:

The USGS (Miller and Rapp, 1968) estimated the total groundwater in storage above sea level within the area to be over 2 MAF. This study also estimated that average annual recharge (Safe Yield for net consumptive use) to this area is 6,000 AFY on the basis of groundwater discharge measurements. Groundwater comprises the majority of the water supply used within the area, although some Lake Cachuma water was imported into the eastern half of the region in the early 1960s (less than 1,000 AFY) and is still used in support of agriculture at present.

Groundwater in the Ellwood-Gaviota area is produced from wells that tap bedrock aquifers or alluvial sediments which accumulated along canyon floors. Land uses supported by this pumpage include the Exxon Las Flores Canyon oil processing facility; the Chevron Gaviota oil processing facility; residential development and agriculture at the El Capitan Ranch; the El Capitan, Refugio and Gaviota State Parks; the Tajiguas Landfill and several large avocado orchards. A detailed land use and water

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demand survey of this area has not been conducted. Water resources are evaluated by the County on a project-by-project basis during the review of applications for discretionary and ministerial County land use permits. *The Groundwater Thresholds Manual for Environmental Review of Water Resources in Santa Barbara County* (Baca, 1992) describes the adopted County methodology for estimating the Safe Yield of bedrock aquifers.

Gaviota to Point Conception Groundwater Area

This area encompasses about 36 square miles between the crest of the Santa Ynez Mountains and the Pacific Ocean. It is located west of the Ellwood to Gaviota Area described in the previous section.

The geologic structure and hydrology of the Gaviota to Point Conception and the Ellwood to Gaviota groundwater areas are nearly identical. The primary difference between the two is that the Santa Ynez Mountains are lower within the Gaviota to Point Conception area. As a result, there is less annual precipitation, less runoff and less recharge to the aquifer.

Groundwater is the only water supply source within the area. The primary land use within the area is ranching and some limited agriculture. A number of remote ranch homes are also present in this area. A detailed land use and water demand survey of this area has not been conducted. Water resources are evaluated by the County on a project-by-project basis during the review of applications for discretionary and ministerial County land use permits. *The Groundwater Thresholds Manual for Environmental Review of Water Resources in Santa Barbara County* (Baca, 1992) describes the adopted County methodology for estimating the Safe Yield of bedrock aquifers.

The Santa Ynez River Riparian Basin

The Santa Ynez River Riparian Basin consists of unconsolidated sand and gravel alluvial deposits along the Santa Ynez River. These deposits are up to 150 feet thick and several hundred to several thousand feet across, and extend 36 miles from Bradbury Dam to the Lompoc Plain. Storage within the upper 50 feet of the basin is about 90,000 AF. Groundwater in the Riparian Basin is in direct hydrologic communication with surface flow of the river.

Inflow to the basin is from underflow from adjacent basins (Santa Ynez Uplands, Buellton Uplands, Lompoc Basin), percolation from rainfall and infiltration of river flow. In accordance with existing requirements included in State Water Resources Control Board agreements, water is released from Lake Cachuma to recharge the Riparian Basin based on water levels in monitoring wells and "credits" of water held in reservoir storage. Thus, basin water levels are controlled by the Cachuma Project at certain times. This basin is not subject to overdraft because the average annual flow of the Santa Ynez River (the recharge source) is greater than the volume of the basin. Water is extracted from this basin for municipal and agricultural uses by many entities both private and public.

For More Information

Gibbs, D. 1999. *Groundwater Resources Report.* Santa Barbara County Water Agency.

Santa Barbara County Planning and Development. 1994. *Santa Barbara County Comprehensive Plan, Conservation Element, Groundwater Resources Section.*

Groundwater Resources Association: http://www.grac.org/

Department of Water Resources: http://www.dwr.water.ca.gov/

USGS: http://water.wr.usgs.gov/

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