2002
Santa Barbara County Groundwater Report

Santa Barbara County Public Works
Water Resources Department
Water Agency Division

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This report satisfies requirements of the Santa Barbara County Comprehensive Plan, Conservation Element, Groundwater Resources Section that was adopted May 24, 1994, and amended November 8, 1994.

Specifically, Conservation Element Goal 4, Policy 4.1, Action 4.1.1 states that:

The County Water Agency shall continue to monitor water levels from existing monitoring wells and, in coordination with the U.C. Cooperative Extension/Farm Advisor, shall request, on a voluntary basis, private and public water purveyors and major private groundwater users, including agricultural users, to provide periodic records of groundwater production. Unless deemed unnecessary by the Water Agency's Board of Directors for any year, the Agency shall compile an annual report on the status of pumping amounts, water levels, overdraft conditions, and other relevant data, and shall submit this report to the Board of Supervisors for its acceptance and possible further action. The annual report to the Board shall include a review of the results of all groundwater quality monitoring conducted in the County.

Upon completion of this report, the Water Agency will forward it to the County's Planning and Development Department to aid in land use decisions. However, according to Conservation Element Policy 3.2, "The County shall conduct its land use planning and permitting activities in a manner which promotes and encourages the cooperative management of groundwater resources by local agencies and other affected parties, consistent with the Groundwater Management Act and other applicable law." The annual report is part of that effort but is not to be the sole basis for any land use decisions.

In addition, as other local agencies complete groundwater management plans, the Water Agency will review these plans and both forward salient information from those plans to the Planning and Development Department and reflect that information in the next groundwater report update. Conservation Element Policy 3.3 States, "The County shall use groundwater management plans, as accepted by the Board of Supervisors, in its land use planning and permitting decisions and other relevant activities."

The information and conclusions contained in this report reflect data developed by the Water Agency and data contained in documents and reports listed in the "References". The Water Agency recognizes that other individuals/agencies might reach different conclusions based on different sources of data or interpretations.

As Conservation Element Action 4.1.3 states, "The County recognizes the need for more accurate data on all groundwater basins within the County and shall continue to support relevant technical studies, as feasible". As a result, the Agency continues to gather water resources data through cooperative programs, and its own collection of data.
Finally, as stated in the Conservation Element, "The County recognizes that it has no authority to regulate or manage the use of groundwater except as provided for in the Groundwater Management Act (Water Code ss 10750. Et seq.) and other applicable law. Further, the County does not assume any authority under this section to make a determination of the water rights of any person or entity".

For consistency in County usage, much of the information in the following sections has been condensed from the following sources:

- *Adequacy of the Groundwater Basins of Santa Barbara County, 1977*
- *The Santa Barbara County Groundwater Thresholds Manual, 1992*
- *Santa Barbara County Comprehensive Plan, Conservation Element, 1994*
- *The Santa Barbara County Groundwater Resources Report, 1996*

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

Introduction

Groundwater supplies about 77% percent of Santa Barbara County's domestic, commercial, industrial and agricultural water. It is also the last line 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 2 to four times per century over the last 460 years (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. These potential consequences depend 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 cause or increase pumping "lifts" which could make pumping economically infeasible for some existing 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 years or 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) cycles. However, some factors likely to effect the condition of the basins, such as the importation of supplemental water supplies, the implementation of basin management plans, and 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 substantial 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 Environmental Thresholds and Guidelines Manual, 1995, and assessed for consistency with County Land Use Plan policy.

Included in this sixth annual report are updated water level data and hydrographs for selected wells, a general discussion of basin characteristics, a discussion of climate through 2002 and its likely effect on groundwater basin conditions and developments in supplemental supplies and basin management plans, if significant.

Groundwater Terms

There are several terms used in this section that warrant definition. For consistency, these terms are defined as used in the County Planning and Development Department "Environmental Thresholds and Guidelines" (1995), 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" (1995), **Safe Yield** is defined as the maximum amount of water which 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 Net Yield value refers to consumptive use of water that can be removed (without accounting for return flows) on an average annual basis without causing severe adverse affects. 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.

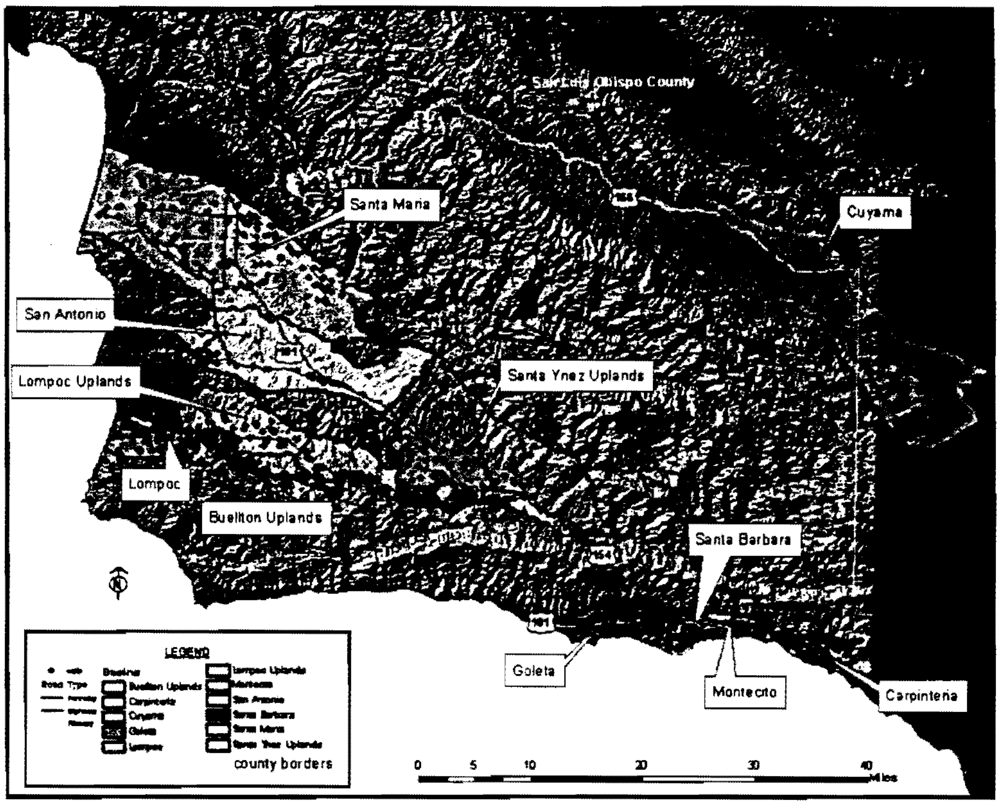
Available Storage is the volume of water in a particular basin that can be withdrawn economically without substantial environmental effects. This storage value reflects the amount of water in the basin on a long-term basis (a point on a long-term trend line of water levels) not the current storage level in 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 overlain by an impermeable layer which prevents any significant upward flow when the aquifer is totally saturated (filled) with water. When this type of aquifer is penetrated by a well the water in the well will rise above the aquifer surface, due to the pressure head exerted on the aquifer.

Well Monitoring and Data Collection

The Santa Barbara County Water Agency (SBCWA) currently monitors approximately 260 wells for depth to groundwater throughout the County. Approximately 20 sites include water quality. Individual water districts monitor many more wells. The diagram below shows the groundwater basins and indicates the locations of these observation wells.

SANTA BARBARA COUNTY OBSERVATION WELLS



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The County and local water districts cooperate with the United States Geological Survey (USGS) to collect and publish groundwater data. Because it is not feasible to include a discussion of each of these wells in this document, wells have been selected because each represents some hydrologic influence or portion of the basins in which they are located. Favorable characteristics of selected representative wells include long term records, lack of use or consistent water use over the period of record and centralized locations with respect to the aquifers. Selected hydrographs for the entire period of record for representative wells are included in Appendix A.

The majority of the representative wells used to create the hydrographs displayed in this report are currently measured by the County Water Agency. For these wells, groundwater depth is measured directly, one or two times per year, using a graduated steel tape. If conditions in a well preclude the use of the steel tape (such as if the well casing leaks), an electric sounder is used. Under ideal conditions, it has been the experience of Water Agency personnel that the steel tape is accurate to within two or three one hundredths of a foot. The accuracy of the electric sounder used by the Water Agency has been found to be somewhat less, typically five one hundredths of a foot.

Other methods for acquiring well measurements might include water stage (float) recorders that record water depths on graphs or punched tape. Stage recorders most often consist of a float and pulley device inserted into a well. Similarly, airline systems measure the pressure required to bubble gas out of a tube, the bottom of which is inserted below water in the well. If the precise elevation of the lower end of the tube is known, it is possible to determine the water depth. However, this method might only have an accuracy of plus or minus a foot (or more) depending on the accuracy of the pressure gage.

To track and record groundwater data, the SBCWA has developed a GIS geographic information system) for analyzing and displaying historical groundwater data. Groundwater data may also be obtained from USGS, local water districts and SBCWA publications and files.

Agencies that currently have cooperative agreements with the USGS include the Santa Barbara County Water Agency, Carpinteria Valley Water District, Goleta Water District, City of Santa Barbara, Santa Ynez River Water Conservation District and the Santa Maria Valley Water Conservation District. The United States Bureau of Reclamation currently measures around 70 wells monthly in the Santa Ynez Valley. Agencies that provided information for this report but are not participants in the USGS program are Montecito Water District, the City of Santa Maria and California Cities Water Company. Monitoring frequencies vary among agencies and wells.

Although partially funded by SBCWA, groundwater quality data is not collected directly by the SBCWA. Much of the data used in this report comes from the USGS, the Regional Water Quality Control Board, or local water agencies. 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 standards are provided for comparison purposes: the California Department of Health Services (DHS) secondary standard for total dissolved solids (TDS) in drinking water is 1,000 milligrams per liter (mg/l), maximum contaminant level. Secondary standards are applied at the point of delivery to the consumer. The DHS primary standard for nitrates (as

NO3) in public drinking water systems is 45 mg/l and the DHS secondary standard for chloride in drinking water is 250 mg/l.

State Water Project Developments

State Water Project deliveries began in 1997. These deliveries will have a significant impact on groundwater conditions by helping to reduce overdraft and improve groundwater quality in some areas. To some extent, State Water will take the place of groundwater supplies and, because the quality of State Water is better than that of most local sources, return flow to groundwater basins will be of improved quality.

Variables influencing quantities of State Water delivered include local demand and state climate. For example, total statewide entitlements of the project exceed its yield in dry years. Therefore, allocations listed on the following page are likely somewhat higher than will actually be delivered in some years. A drought buffer is available to project participants in the event of delivery shortages and increases the project reliability. For these reasons, the amount of state water offsetting groundwater consumption and the amount returning to groundwater basins is not fully known and thus it is difficult to determine to what extent overdraft will be alleviated. However, for basins in which the total allocation is substantial compared to the basin overdraft, the benefit will likely be significant.

The table on the following page shows the allocation of State Water to which local entities are entitled and usage during the 2001 and 2002 calendar years:

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2001 and 2002 State Water Project Allocations & Deliveries

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PROJECT PARTICIPANT	2001 REQUEST	2001 ACTUAL	2002 REQUEST	2002 ACTUAL
City of Santa Maria	16,322	10,353	16,689	12,871
California Cities Water Co.	550	208	550	223
City of Guadalupe	605	334	605	441
Vandenberg Air Force Base	6,050	3,962	6,050	4,084
City of Buellton	578	373	578	571
City of Solvang	1,500	2	1,000	459
Santa Ynez River WCD ID#1	700	304	700	310[1]
Santa Barbara Research Center	55	0	55	55
Morehart Land Company	100	21	100	0
La Cumbre Mutual Water Co.	1100	637	1,100	797
Goleta Water District	4,950	2,019	4,538	3,724[2]
City of Santa Barbara	0	4	418	888[3]
Montecito Water District (includes Summerland)	1,200	365	844	1244[4]
Carpinteria Valley Water District	600	364	244	270[5]
TOTAL FOR COUNTY	34,310	18,946	33,471	25,937

[1] An additional 1933 A.F. was received for the exchange program

[2] An additional 929 A.F. was received as exchange water from the Cachuma Project

[3] An additional 464 A.F. was received as exchange water from the Cachuma Project

[4] An additional 270 A.F. was received as exchange water from the Cachuma Project

[5] All 270 A.F. was received as exchange water from the Cachuma Project

Groundwater Basin Management Plans

Several cities and water districts are working to prepare groundwater management plans in accordance with Assembly Bill AB 3030. Enacted in 1992, the Bill allows local agencies, with public involvement, to prepare, adopt, and enforce groundwater management plans for the protection of groundwater. These plans are in various stages of completion and there have been few changes since last year. Montecito Water District has adopted a plan. The Carpinteria Valley Water District has approved and adopted a plan for the Carpinteria Basin. In addition, the City of Santa Maria is working with the Santa Maria Water Conservation District and other entities within the basin to devise a plan for the Santa Maria Groundwater Basin. The following table summarizes the status of groundwater management plans for the major county basins.

GROUNDWATER MANAGEMENT PLAN STATUS

BASIN	PUBLIC AGENCY PARTICIPANTS[1]	STATUS
Carpinteria	Carpinteria Valley WD	Plan Adopted
Montecito	Montecito WD	Plan Adopted
Santa Barbara	City of Santa Barbara	In progress
Goleta	Goleta WD	Court Action[2]
Santa Ynez Uplands	Santa Ynez River WCD Santa Ynez River WCD ID#1 City of Solvang	Court Action
Buellton Uplands	Santa Ynez River WCD, City of Buellton	Plan Adopted
Lompoc Uplands	City of Lompoc, Mission Hills CSD, Vandenberg Village CSD	Not initiated
Lompoc Plain	City of Lompoc, Santa Ynez River WCD	In Progress
San Antonio	Los Alamos CSD	Not initiated
Santa Maria Valley	City of Santa Maria, Santa Maria Valley WCD, Cal Cities	Court Action
Cuyama	Cuyama CSD	Not initiated

[1]Other participants include private water companies and overlying property owners.

[2]The "Wright Suite" Settlement stipulates management actions in the North and Central sub-basins.

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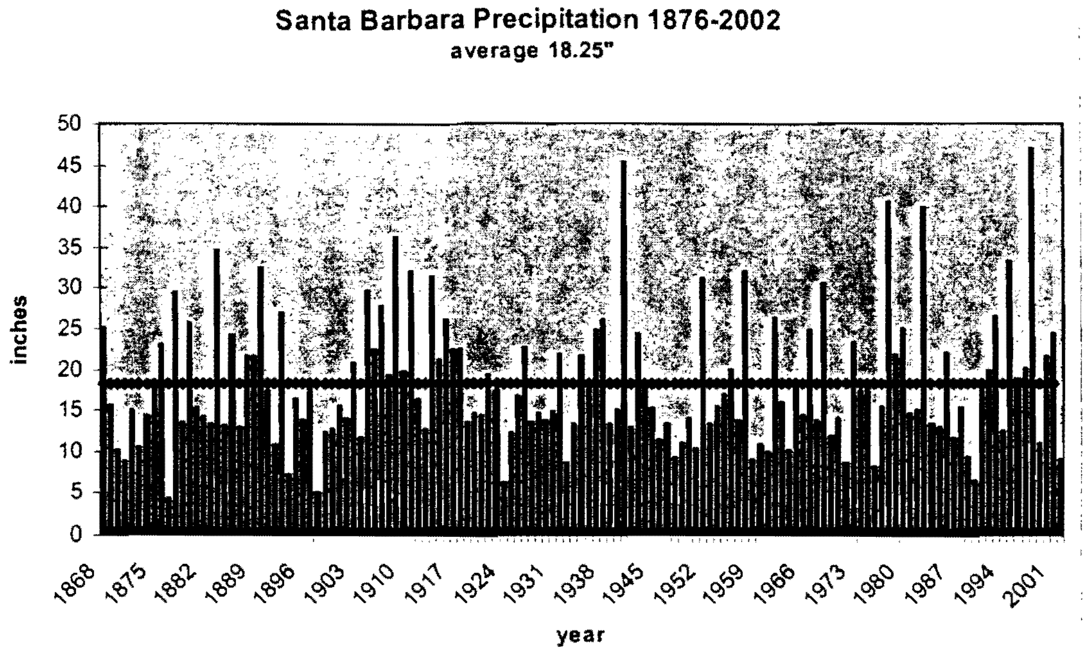
General Trends

Many of the monitoring wells discussed in this report exhibit pronounced water level declines and rises as a result of varying weather patterns of the area's semi-arid climate. These variations may be seen in the yearly rainfall chart shown below. Note that in most years the area receives below *average* rainfall.



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 (see hydrograph 6N/29W-8P1, Appendix A). Shallow aquifers such as those near creeks and rivers and those located in relatively shallow basins with surface material of high porosity 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 (see 10N\34W-4R1, Appendix A).

The most recent drought of 1987 to 1991 led to significant declines in water levels (see Appendix A, well 10N/34W-14E5). Following 1991 seven out of nine years produced above average rainfall, and as a result of this wet period groundwater levels in many areas throughout Santa Barbara County were generally the highest since the mid 1940's, and in some areas highest since the 1920's. The historic winter of 1998, which produced some of the highest rainfall totals ever recorded caused shallow wells to rise sharply during that year, and deeper wells to rise for up to 3-4 years. **Now after the moderate winters of 1999 through 2001 and the extremely dry year of 2002 the deep wells have hit their high peak and are falling off while the shallow wells continue to exhibit a pronounced annual variation in response to winter rains.**

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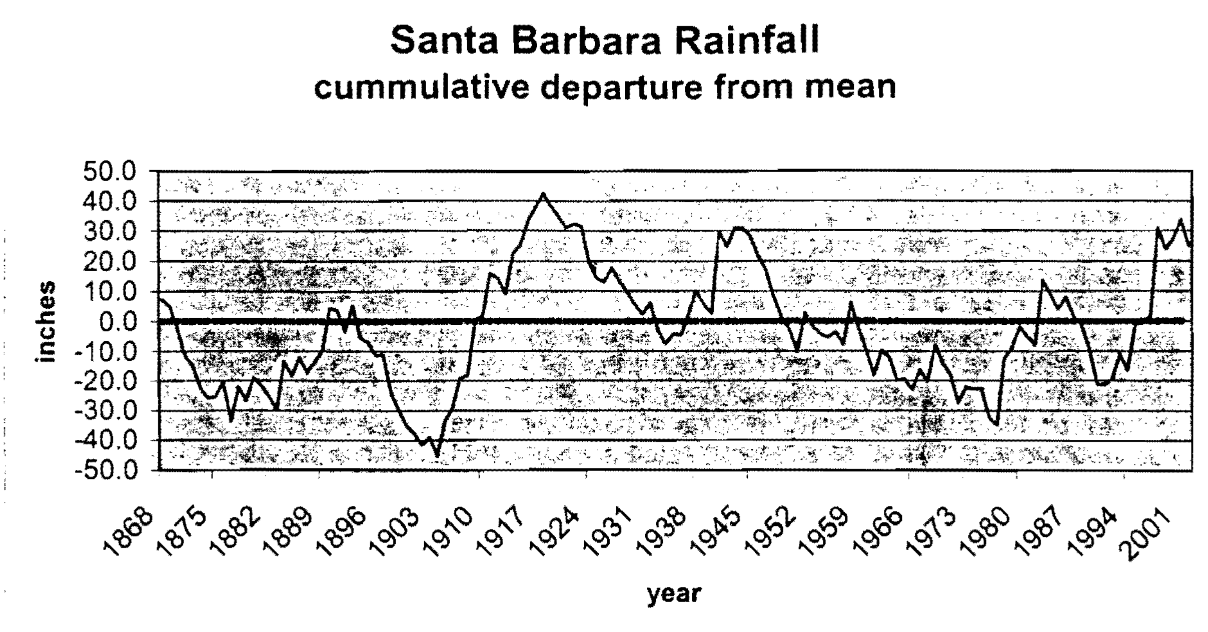
The graph below describes the long-term fluctuation of the local area. You can see that the area experiences long-term trends that affect groundwater levels and storage within the County. The late part of the 19th century shows a dry trend lasting through 1904, after which an extremely wet trend is exhibited, which lasted through 1918. The recent wet trend of 1991 to 2001 is one of the wettest periods on record, second only to the trend of 1905-1918. The critical long-term dry period as shown on this graph is 1946-1977, although that varies somewhat at different rainfall gauging stations throughout the County.

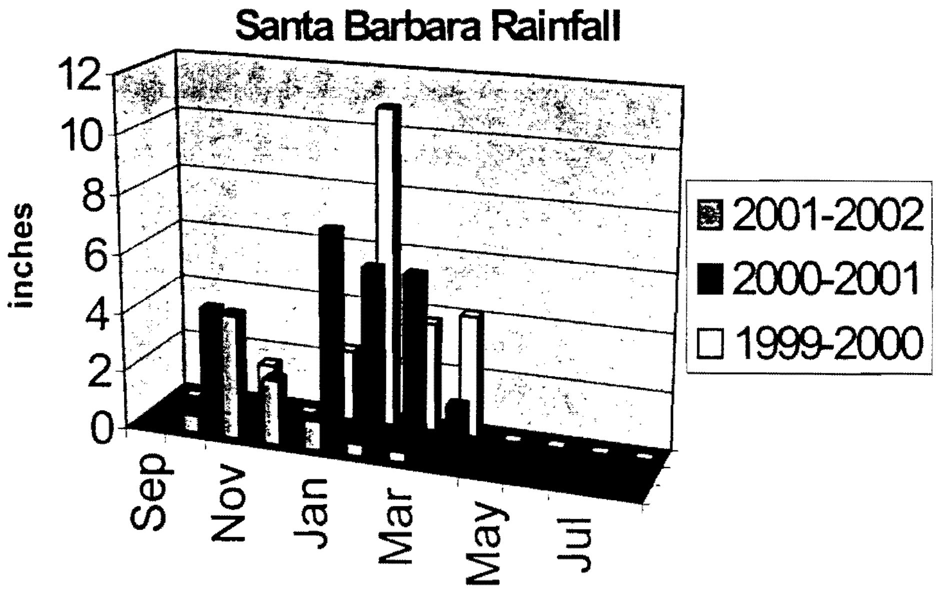


It is important to note that localized influences such as variations in pumping can obscure general trends. Thus every effort is made to use well data collected during periods of no local pumping. Factors affecting trends displayed by well hydrographs include length of record, proximity to sources of recharge and active wells, and short-term climatic variations. As a result of these factors, in the Santa Barbara County region **single year or short term groundwater trends are of limited value in assessing overall basin conditions due to rainfall fluctuations.**

Historic trends and hydrologic balance studies using available data indicate slight to moderate overdrafts in groundwater basins in Santa Maria Valley, San Antonio Valley, Santa Ynez Uplands and Lompoc Uplands. *Significant* overdraft is evident only in the Cuyama Valley at this time. Effects of importation of State Water in the Santa Maria area and Santa Ynez Uplands are being evaluated and may help eliminate part or the entire overdraft in those Basins the future.

2001-2002 Precipitation

The winter of 2001-2002 was dominated a "blocking high pressure system" in the Eastern Pacific Ocean that led to an extremely below average year of rainfall. The season started off with no rainfall in September, which is not unusual, and then some light showers in October. November was the sole rain producer of the year, yielding above average amounts throughout the County. By the way November came in it appeared as though the 2001-2002 season would be a wet one. However the rainfall quickly disappeared and December, January, February and March, the biggest rain producers historically, only yielded scant amounts of rainfall. The season ended with severely below average rainfall amounts throughout the County, including 9.19" in Santa Barbara, a mere 50% of normal. The chart below details rainfall for the past three seasons and shows how both the 1999-2000 and 2000-2001 seasons produced decent rainfall in the key winter months but that the 2001-2002 season did not.



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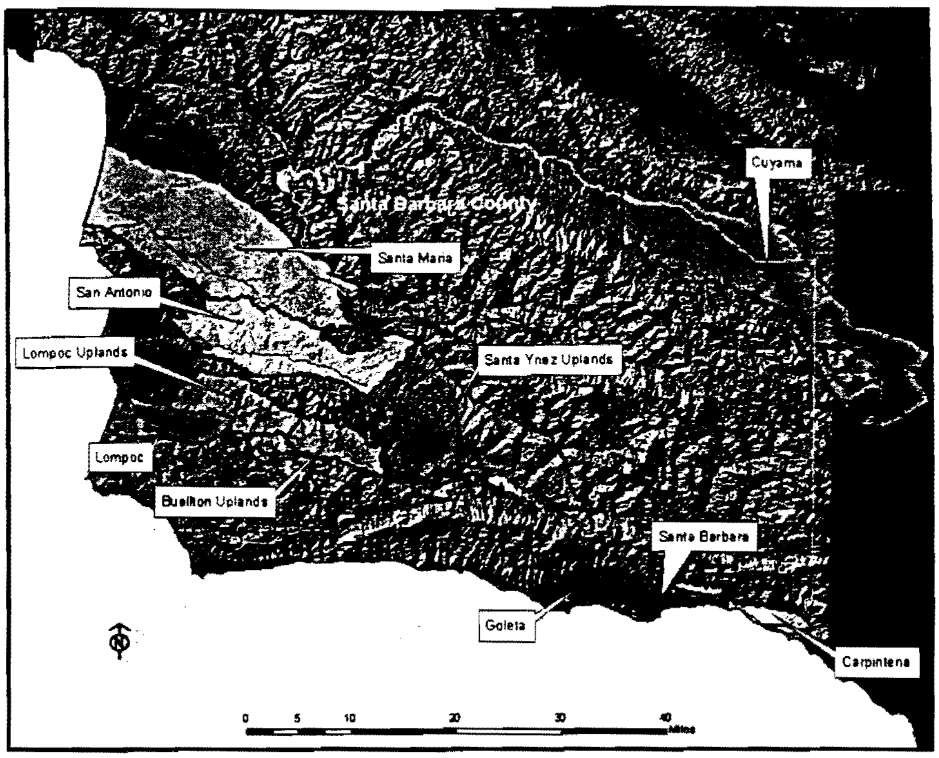
SANTA BARBARA COUNTY GROUNDWATER BASINS



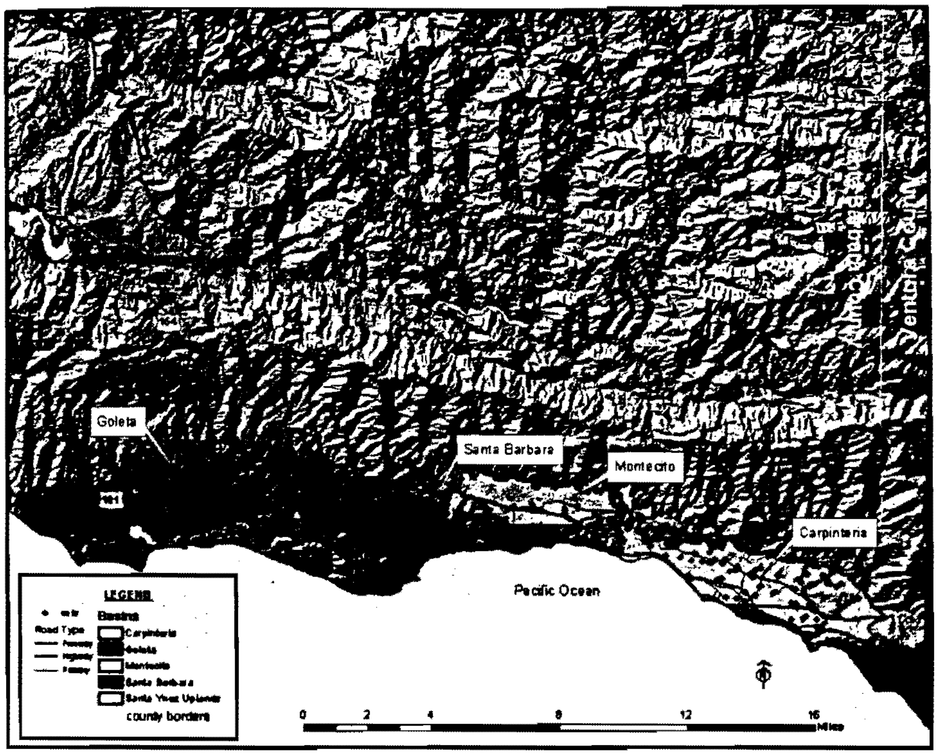
1. Major South Coast Groundwater Basins:
    - Carpinteria
    - Montecito
    - Santa Barbara
    - Goleta

2. The Santa Ynez River Watershed
    - Santa Ynez Uplands
    - Buellton Uplands
    - Santa Ynez River Riparian
    - Lompoc Groundwater Basins

3. The North Coastal Groundwater Basins
    - San Antonio
    - Santa Maria

4. The Cuyama Groundwater Basin

SOUTH COAST GROUNDWATER BASINS



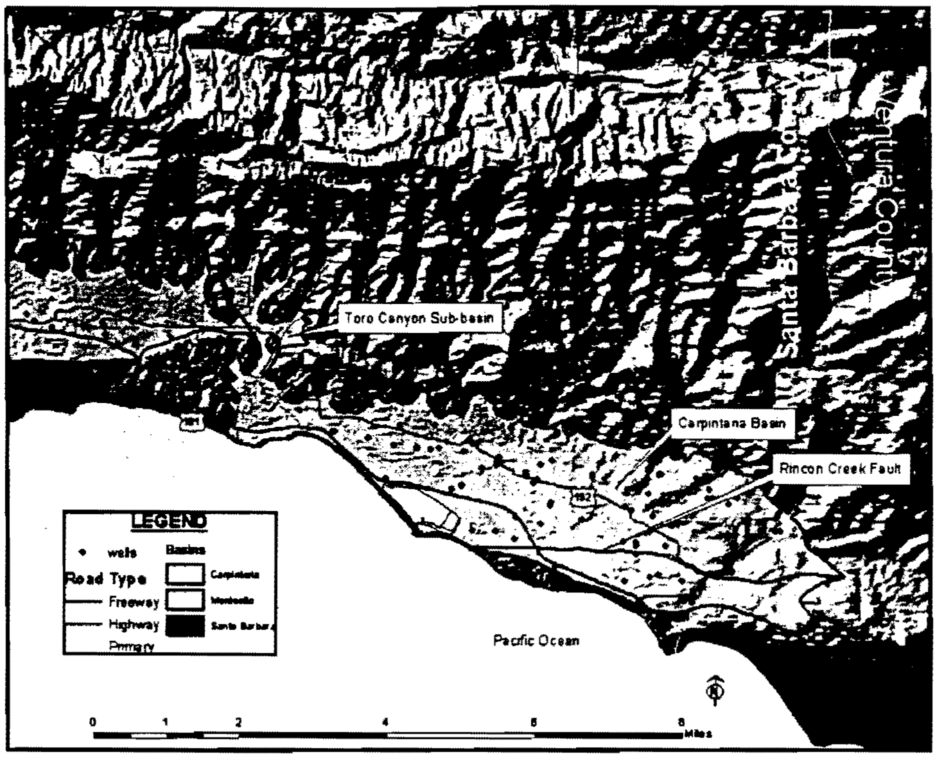
The South Coast basins are located between the Santa Ynez Mountains and the Pacific Ocean. In general, these basins are composed of the unconsolidated material that accumulated as a result of the uplift and erosion of the mountains. Several of the basins are generally differentiated from each other where 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.

CARPINTERIA GROUNDWATER BASIN



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

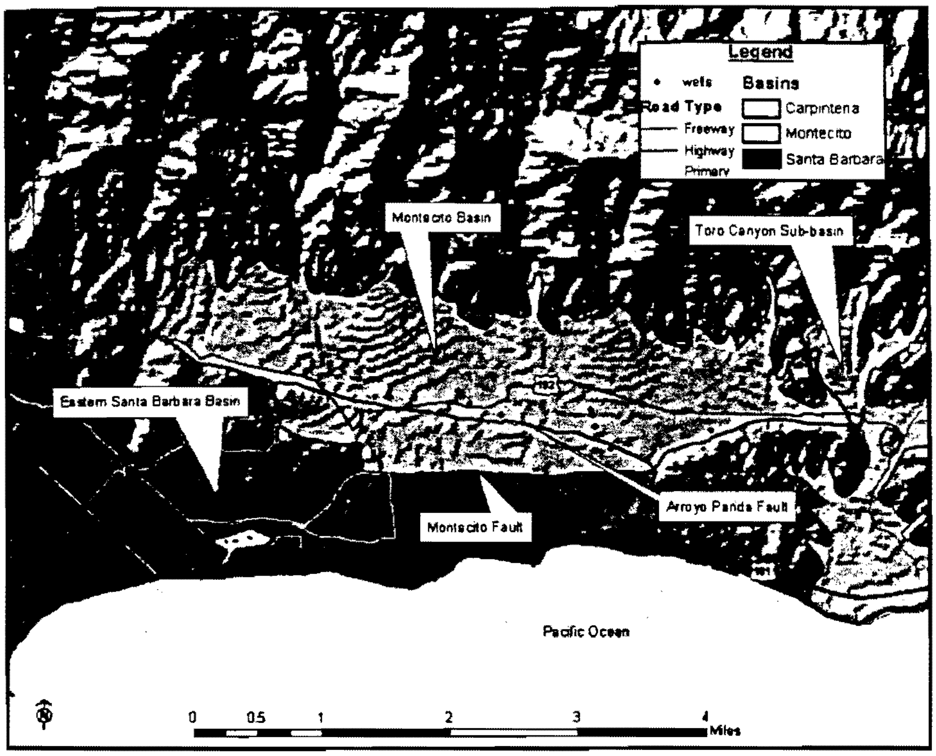
The Montecito Groundwater Basin encompasses about 6.7 square miles between the Santa Ynez Mountains and the Pacific Ocean. The Montecito Groundwater Basin is separated from the Carpinteria Groundwater Basin to the east by faults and bedrock and from the Santa Barbara Groundwater Basin to the west by 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

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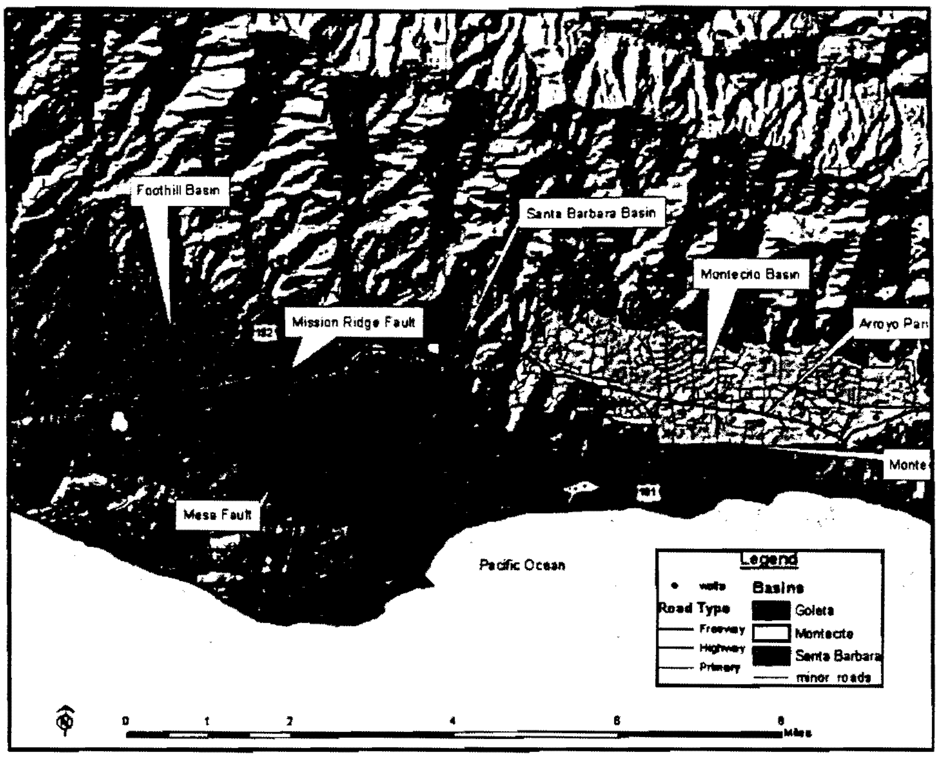
separate Foothill Groundwater Basin discussed in the following section encompasses the hydrologic unit which includes the formerly designated Storage Unit #II of the Santa Barbara Basin and the former "East sub-basin" of the Goleta Groundwater Basin (Freckleton, 1989).]

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

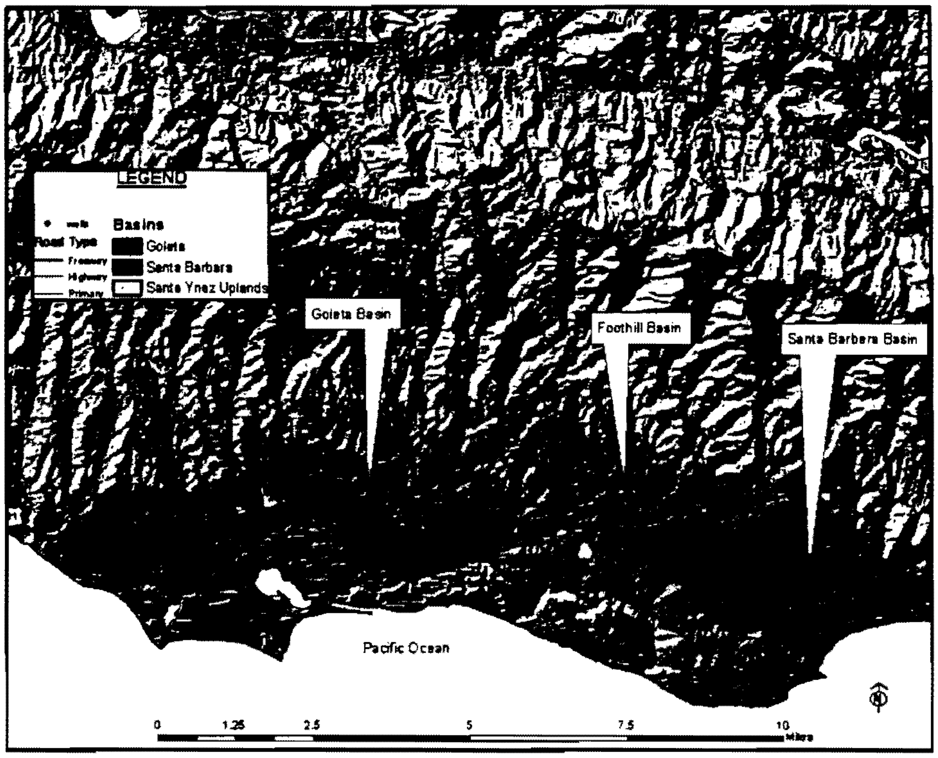
The Foothill Groundwater Basin is described and analyzed in U.S. Geological Survey Water Resources Investigations Report 89-4017 (Freckleton, 1987). The definition and description of this basin is presented below is based on this report. The Foothill Groundwater Basin is comprised of unconsolidated alluvial 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. 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 Storage of the North/Central Basin is estimated to be 18,000AF. Total storage within the basin (including the West Basin) has been estimated to be about 245,000 AF. 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 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 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 10,000 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.

Groundwater Basins of the Santa Ynez River

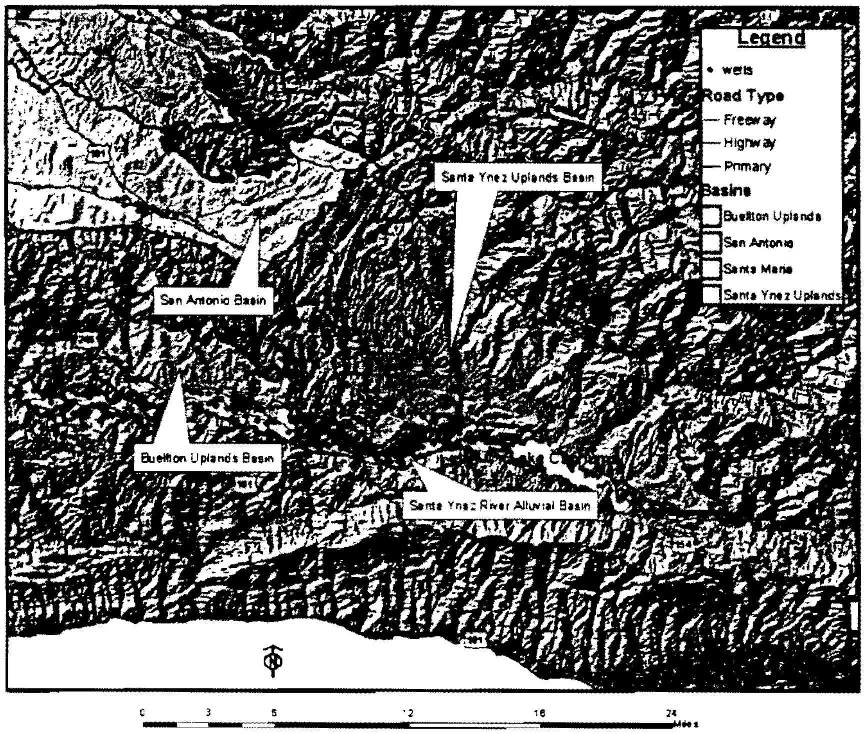
The groundwater basins within the Santa Ynez River drainage lie between the San Rafael Mountains to the northeast, the Purisima Hills to the north, and the Santa Ynez Mountains to the south. The east-west oriented folds and faults of the region control the shape and location of these basins. In addition,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

Santa Ynez Uplands Basin

Physical Description

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.

SANTA YNEZ UPLANDS GROUNDWATER BASIN



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History and Analyses

The basin is best described by Upson and Thomasson (1951), Wilson (1957), LaFreniere and French (1968) and Ahlroth et al (1977). These reports describe the basin in terms of geologic setting and groundwater resources of the area. In addition, work by Singer (1979) and Hamlin (1985) add to the information and focus on water resources for the Santa Ynez Indian Reservation, as well as water quality of the area.

The Paso Robles formation is the major aquifer in the Santa Ynez Upland groundwater basin. The formation consists of poorly consolidated gravel, sand, silt and clay. In places it is difficult to distinguish the Paso Robles formation from overlying terrace deposits.

Groundwater pumping meets about 85% of the water demand within the basin area. In addition to groundwater, water is imported into the basin from the Cachuma Project, the State Water Project and the Santa Ynez River Riperian Corridor. Agriculture accounts for about 80% of the water demand within the basin; the remaining demand is mostly from urban consumers.

A young vineyard in the Santa Ynez Uplands Basin

The basin is pumped by private agricultural and domestic users within Santa Ynez River Water Conservation District ID#1 (SYRWCD ID#1), and by the District itself. In addition, the City of Solvang pumps about 500 AFY of groundwater from two wells located within the basin. Domestic demand supplied by ID#1 is estimated to be 3,300 AFY, including about 235 AFY supplied to the City of Solvang. Based on survey reports Solvang's total domestic usage is estimated to be about

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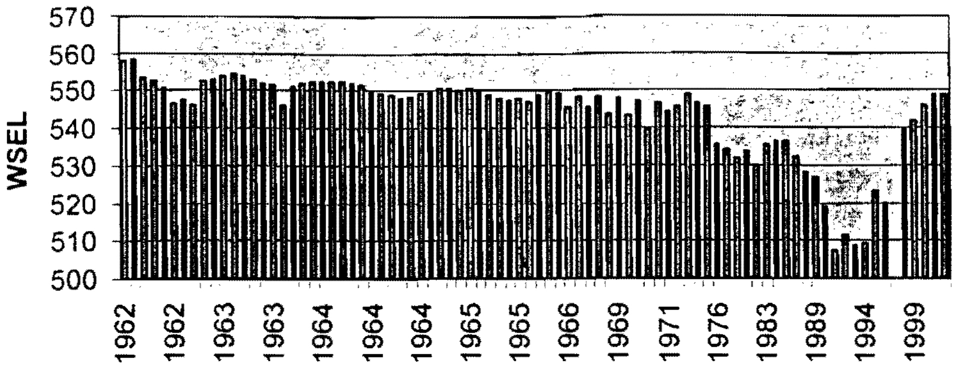
1,560 AF (Hopkins, 2002). The SYRWCD ID#1 holds an entitlement of 500 AFY in the State Water Project, 300 AFY of which will likely go toward meeting some of its water demand, and therefore, eliminating some of the *historical* basin overdraft. In 2002 SYRWCD ID#1 imported 310 AF of state water. The City of Solvang holds an entitlement of 1500 AFY but in 2002 only received 459 AF of state water (please see table on page 7).

Santa Ynez Basin - 6N/30W-7G5



In Santa Ynez 100' W of Meadowvale Rd. SYWCD ID#1 supply well. Diam. 12", depth 158'. LSD is 600' MSL

From the hydrograph shown above located in the southern part of the Santa Ynez Uplands groundwater basin, one can deduce a general dewatering trend of the basin beginning in the mid 1960's and bottoming in the drought of 1987-1991. A significant increase follows with the incredibly wet 1990's. Now after 2 moderate years and 1 extremely dry year we see that the basin appears to have recovered and is not in decline even in the absence of significant rainfall. One possible reason for this is that SYRWCD ID#1, the biggest sole pumper in the basin has shifted most of its pumping activities to the riperain areas of the Santa Ynez River, and this change in pumping patterns has affected water levels in the south-central part of the basin (Hopkins, 2002). The reasons for this change in pumping philosophy may include riparian water as better quality water and establishment of water rights in the riparian basin. The wet cycle of the 1990's, importation of state water and changes in pumping patterns have lead to an analysis that the basin is currently in balance or slight surplus, but under historical groundwater demands is more likely in overdraft on the order of 2,000 AFY. It must be noted that this lies within the "gray area" of groundwater analysis, which is based upon climatological trends and nobody can adequately predict.

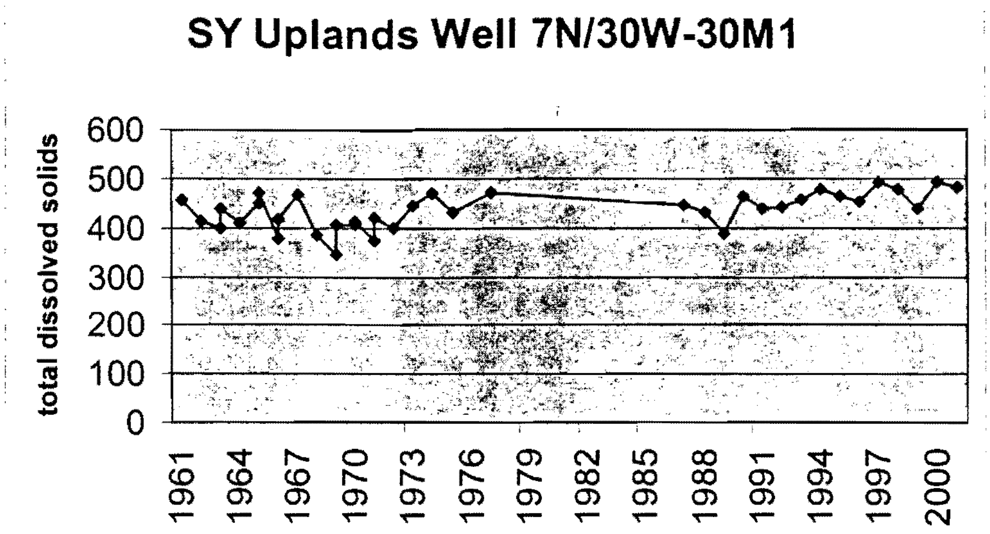
Available Storage within the Santa Ynez Uplands Groundwater Basin is estimated to be about 900,000 AF. Safe Yield of this basin is estimated to be 11,500 AFY (for gross pumpage). Estimated pumpage of the basin is 11,000 AFY.

Water Quality

Water quality within the basin is generally adequate for most agricultural and domestic purposes. The USGS report 84-4131 (Hamlin, 1985) focuses on water quality within the Uplands as well as adjacent basins and should be consulted for water quality information on this area.

Total Dissolved Solids

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 2002 exhibited an average TDS concentration of around 490 mg/l. From the graph below one can see that since the 1960's TDS concentrations in the Basin have been relatively stable, with only a minor trend upward in the last 15 years. The state standard for TDS in drinking water is 1000 mg/l (see page 5).



No data was collected at this site from the period 1979 through 1987 and thus the graph does not depict any change during this time.

Nitrates

According to data collected from observation well 7N/30W-30M1 nitrogen in the water aquifer as *Nitogen Nitrite plus Nitrate dissolved in mg/l* has been on the increase since the late 1970's. Please see the graph on the following page. This is still far below the state drinking water standard of 45mg/l and should not pose a threat to agriculture in the Basin. The RWQCB in 1995 did a study of nitrates in the area and concluded that

It must be noted that in many areas of the County water quality from the water table aquifers or shallow water is dramatically worse than deeper or confined aquifer water.

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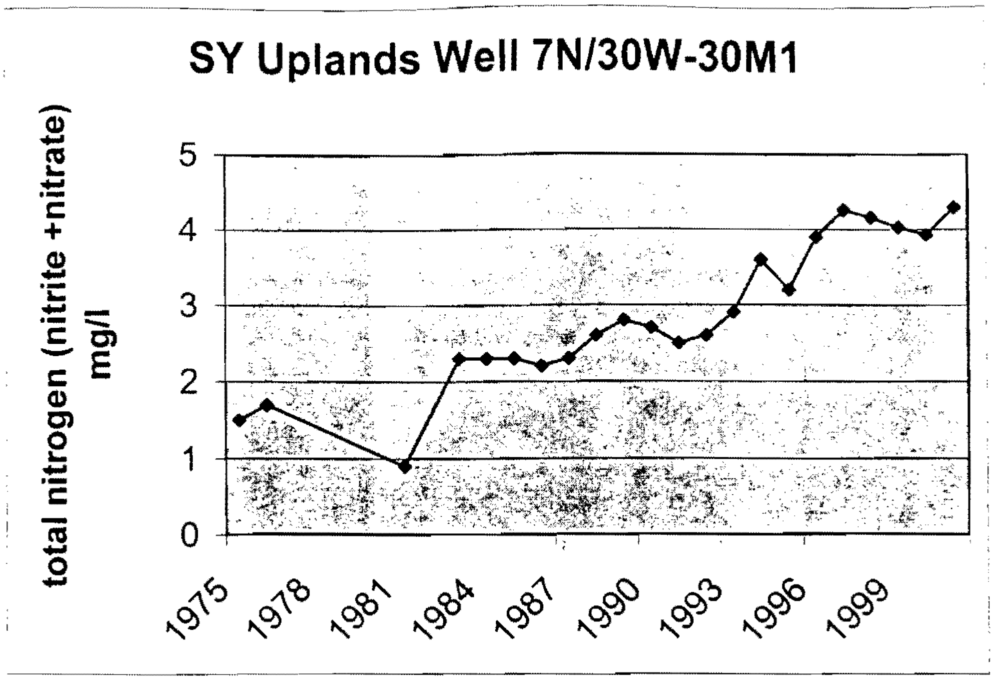
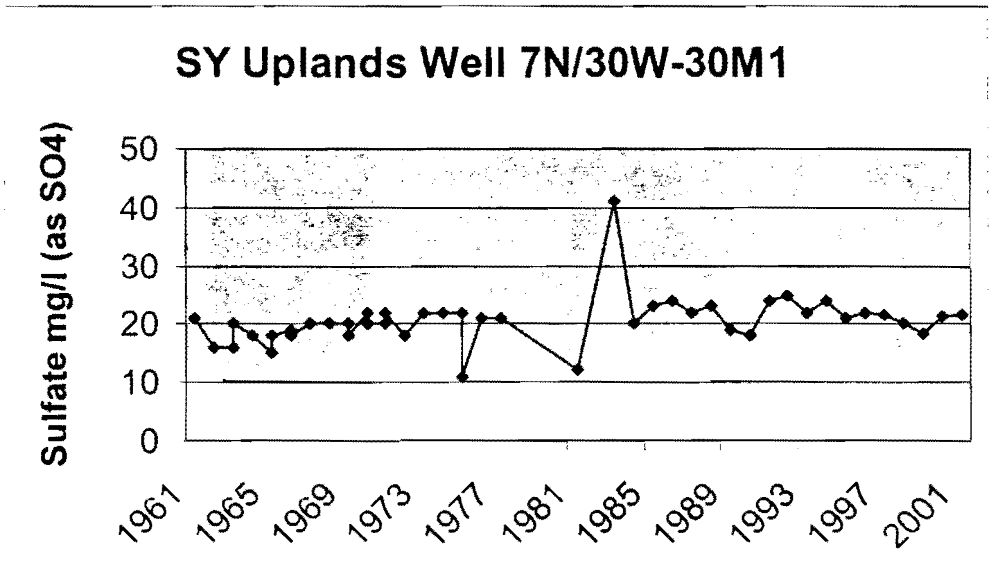


Sulfates

As depicted in the graph below, sulfates in the Santa Ynez Upland Groundwater Basin have been relatively stable in the last 40 years



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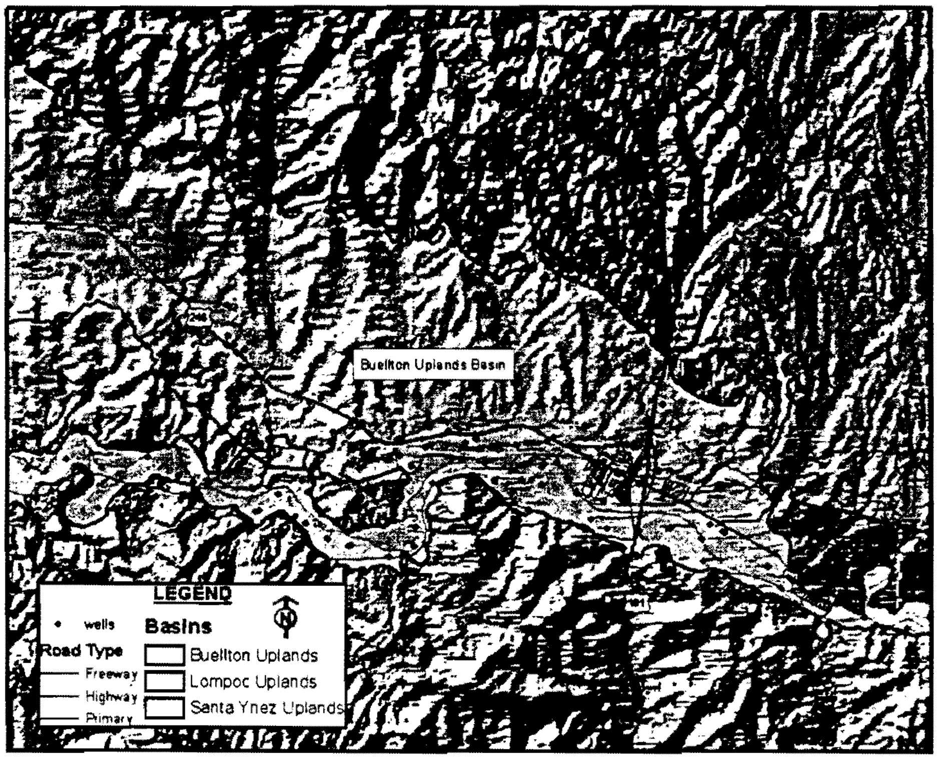
The exception to this appears in late 1983 when rainfall was extremely high and considerable recharge to the aquifer was initiated. It is very possible that this "1983" measurement was somehow contaminated and not representative of conditions of that year.

Buellton Uplands Groundwater Basin

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 south-east 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.

BUELLTON UPLANDS GROUNDWATER BASIN



Current water quality data for the basin is limited. However, data from late 1950's and early 1960's indicate TDS concentrations between 300 and 700 mg/l for several wells within the basin. Although pumpage has increased greatly since the 1950's, the basin does not appear to be in a

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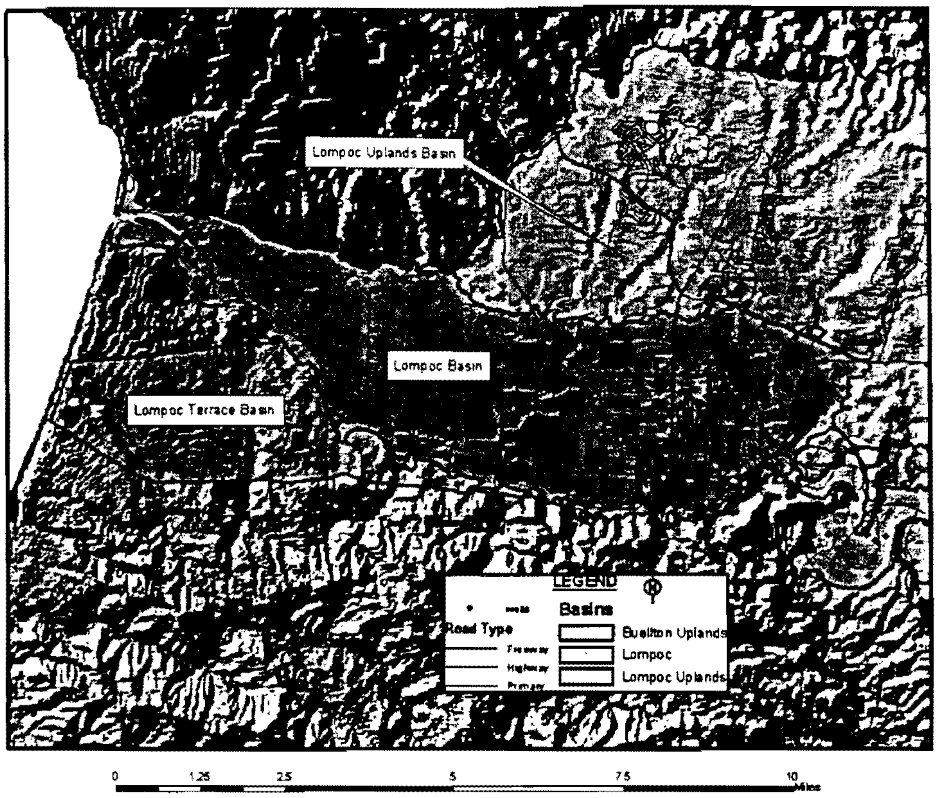
state of overdraft. The Buellton Uplands Basin has been a recognized hydrologic unit for decades and is designated on the 1980 groundwater basin maps adopted into the Santa Barbara County Comprehensive Plan. Until 1990-91, however, this basin was not subject to detailed analysis by either the USGS or the County Water Agency. At that time, the Water Agency 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 Water Agency (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 Water Agency 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 Water Agency 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, and 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 are attributable to agricultural irrigation. The City of Buellton and scattered farmsteads around the rural area uses the remaining 20%. In 2002 the City of Buellton imported 571 AF of state water, further reducing its reliance on groundwater pumping.

Lompoc Groundwater Basins

The Lompoc Groundwater Basin consists of three hydrologically connected sub-basins: the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands. Together, these sub-basins 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 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 sub-basin 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. Orographic effects and other meteorological factors influence precipitation within the basin. The maximum average rainfall is about 18 inches and occurs near the southern edge of the basin in the Lompoc Hills; the minimum precipitation is about 10 inches near the Pacific Ocean. The average rainfall in the City of Lompoc is 13 inches. Rainfall averages about twelve inches per year over the entire basin.

LOMPOC GROUDWATER BASIN



Water quality in the shallow zone of the Lompoc Plain tends to be poorest near the coast and in heavily irrigated areas of the sub-basin. TDS concentrations of up to 8,000 mg/l near the coast were measured in the late 1980's . The poor quality water in this area is attributed to up-welling 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. (Source: Ground-Water Hydrology and Quality in the Lompoc Area, Santa Barbara County, California, 1987-88, 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 north- eastern 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.

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Aerial View of the Lompoc Valley

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 sub-basin is generally of better quality than that of the plain, averaging less than 700 mg/l TDS. Some of the natural seepage from these sub-basins is of excellent quality. For an in-depth discussion of water quality, see USGS Report cited above. Groundwater users and public agencies within the basin are working to clarify and resolve water quality concerns.

Available Storage within the Lompoc Groundwater Basin is estimated to be approximately 170,000 acre-feet (Santa Barbara County Comprehensive Plan, 1994). Safe Yield is estimated by the Water Agency to be 28,537 AFY (gross or Perennial Yield) and 21,468 AFY (net). Based on water level trends evaluated in the 1998 study, the basin is in a state of overdraft with net extractions exceeding recharge by 991 AFY. Thus, net pumpage or consumptive use from the Lompoc Basin is estimated to be 22,459 AFY. Groundwater is the only source of water supply within the basin. Agricultural uses about 70 percent of the total water consumed within the basin. Municipal users account for the remaining demand and include the City of Lompoc, the Vandenberg Village CSD and the Mission Hills CSD. 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 contributes 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 Cachuma Reservoir releases), agricultural water return flow and underflow into the basin.

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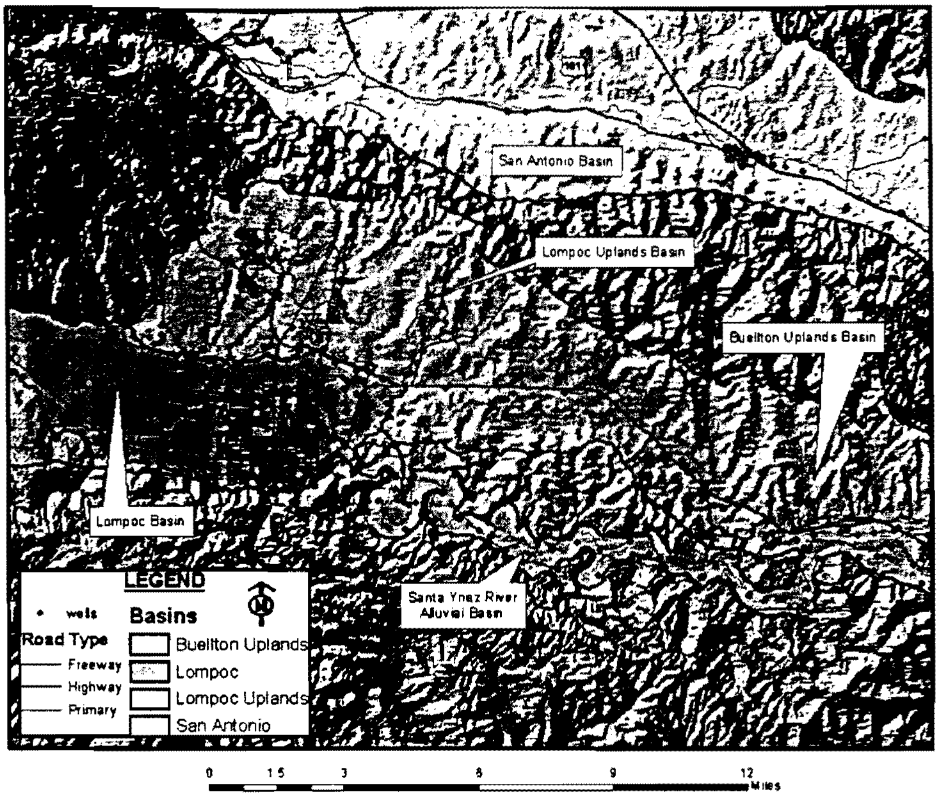
LOMPOC UPLANDS GROUNDWATER BASIN



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 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. The City of Lompoc has implemented reclamation and conservation programs. Also, the City and Santa Ynez River Conservation District have initiated a groundwater management plan for the Lompoc Plain portion of the basin (see Groundwater Basin Management Plan Status, page 8).

Flowers grown in the Lompoc Basin

North Coast 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 based upon landforms.

San Antonio Groundwater Basin

San Antonio Valley is approximately 30 miles long by seven 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 Santa Ynez Valley to the south. 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 the Vandenberg Air Force base, which sometimes uses groundwater for Base operations. Average annual rainfall within the basin is about 15 inches. Consolidated rocks, below the eastward plunging syncline which contains the deposits comprising the groundwater basin, and located

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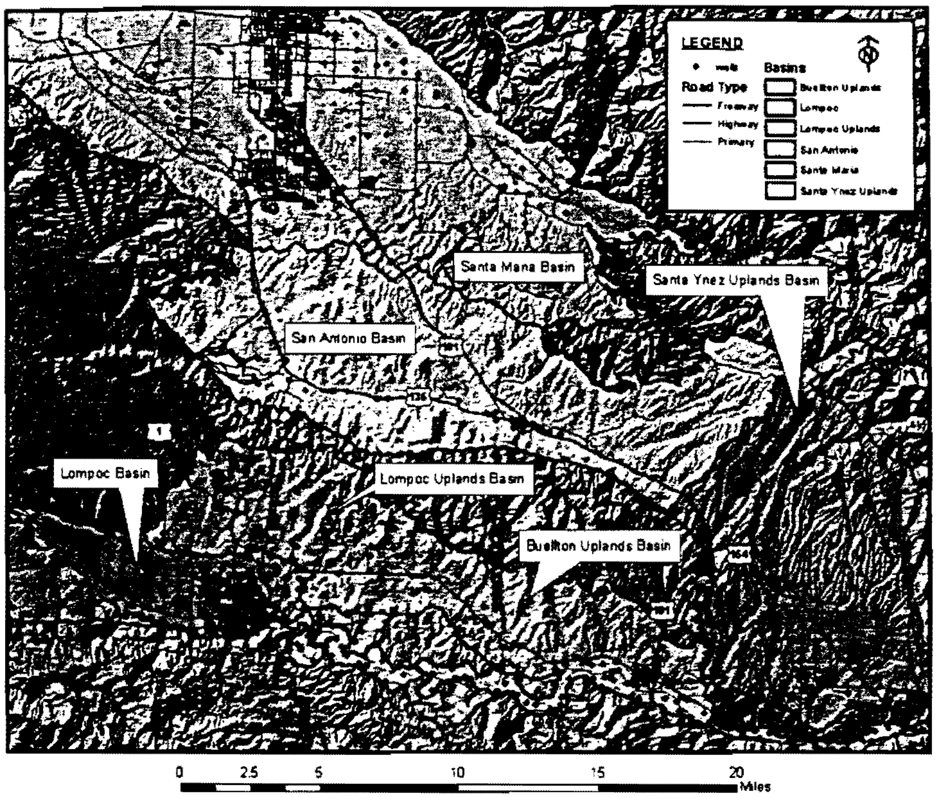
about seven miles east of the ocean, forces groundwater to the surface, creating a wetland area known as Barka Slough. Water quality studies conducted by the USGS in the late 1970's indicated average TDS concentration within the basin of 710 mg/l, with concentrations generally increasing westward toward the ocean. The cause of the westward water quality degradation has been thought to be the accumulation of lower quality water from agricultural return flow and the dissolution of soluble minerals.

SAN ANTONIO GROUNDWATER BASIN



The highest TDS concentration (3,780 mg/l) was found in the extreme western basin; 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 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.

The supply/demand status of this basin was updated in a 1999 study (Baca et al) prepared by the County. 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 AFY (net), according to the USGS (Open File Report, 1980). The 1999 County study estimates 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. Note that Vandenberg AFB historically pumped approximately 3,400 AFY from the San Antonio Basin. With the recent importation of State Water, VAFB pumpage has dropped to about 300 AFY. This drop in VAFB pumpage has been offset by the increase in pumpage associated with the recent and extensive vineyard development throughout the basin. Recharge to the basin occurs through the percolation of rainfall and seepage from streams. Water discharges from 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 may 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 this overdraft. However, underflow of connate water from bedrock formations in contact with the basin may cause gradual deterioration of groundwater quality. Overdraft will 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, will progressively decline.

Santa Maria Groundwater Basin

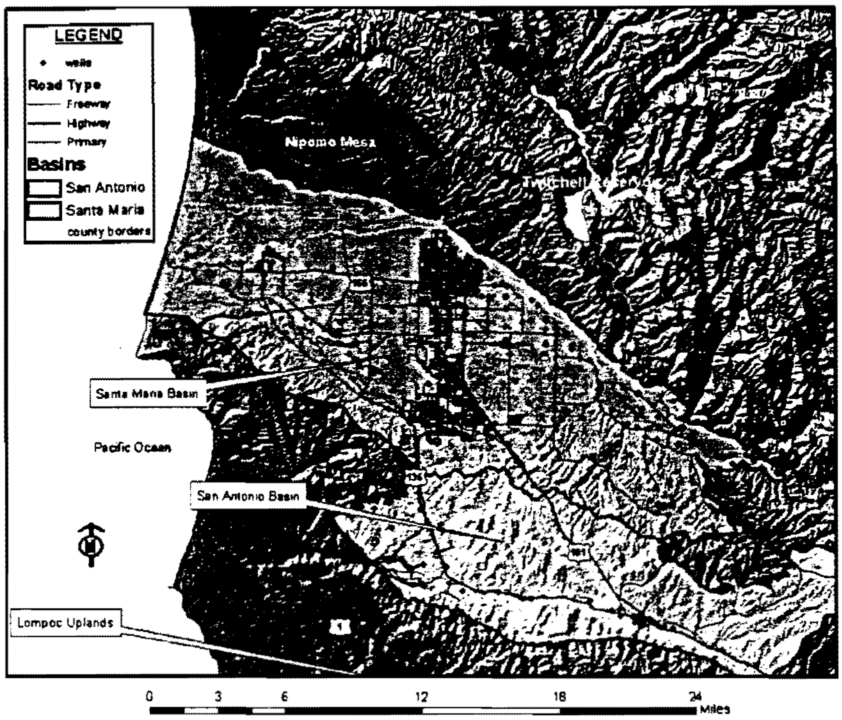
Physical Description

The Santa Maria Groundwater Basin is an alluvial basin 170 square miles of which lies south of an east-west line from near Nipomo to the Pacific Ocean in San Luis Obispo County. The Basin is situated in the northwest portion of Santa Barbara County and extends into the southwest portion of San Luis Obispo County. The Valley is approximately 28 miles long and 12 miles wide. The Basin boundaries include: 1) an east-west line just south of the Nipomo area, 2) the San Rafael Mountains to the north and east, and 3) the Casmalia and Solomon Hills to the south and west. North of this 170 square mile area rests a continuation of the Basin, thinning to the north, and terminating in the 5 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 that 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. 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.

History and Analyses

The Basin is best described by Worts (1947,1951), Miller and Evanson (1966), Ahlroth et al (1977) and Naftaly (1994). As one of the largest agricultural and historically oil producing coastal valleys of California, this basin has been studied extensively. Modern exploration began in 1888 when the State mineralogist arrived in the area for the purpose of geological mapping in conjunction with the University of California Geology Program and the USGS. In 1903 development of the area rapidly intensified for oil, and in 1907 the first comprehensive report on the area was published, USGS Bulletin 322 which focused on the geology as well as some mention of water resources. Water resources examined in this report were limited to surface water diversions, springs, and artesian wells in the western part of the basin. In 1921 the first soil survey of the basin was made. Examination of the basin continued to be limited to oil until 1931 when Lippincott established baseline hydrologic conditions for consideration of federal and state funding towards a project to curb runoff problems on wet years and establishing a need for water conservation practices.

Santa Maria Groundwater Basin



In 1946 USGS Bulletin 222 was released, mentioning a 12,000 AF annual overdraft. The period of the *most comprehensive evaluation* of the basin began in 1947 and continued until 1966 with work by Worts, Miller and Evanson. During this period the perennial yield of the basin was established to be 70,000 AF (revised from 57,000 AF) and an approximate annual overdraft of 20,000 AF was calculated. In 1976 the Toups corporation was hired by the City of Santa Maria to perform a thorough Water Resources study of the basin. This report concluded that in 1976 the annual average overdraft of the basin was 6,000 AF and projected to be 25,000 AF by the year 2025 without implementation of additional water sources. The USGS did a report in 1976 focusing of water quality of the basin, specifically increasing nitrogen levels. This report listed the calculated average annual overdraft to be 10,000 AF.

In 1977 the Water Agency (Ahlroth et al) completed a comprehensive report of the basin using all of the latest data and climate trends that concluded an average annual overdraft of 20,000 AF existed and projected a 30,000 AF overdraft by the year 2000. In 1985 the USGS produced report

85-4129 which focused on recharge of the basin. In 1994 the Water Agency (Naftaly) assembled the "Santa Maria Valley Water Resources Report" which updated and organized all information from previous reports and studies on the basin. This very thorough report served as a precursor to a water management plan for the basin. It presented no new information, but to this day serves as the most complete report on the groundwater resources of the basin.

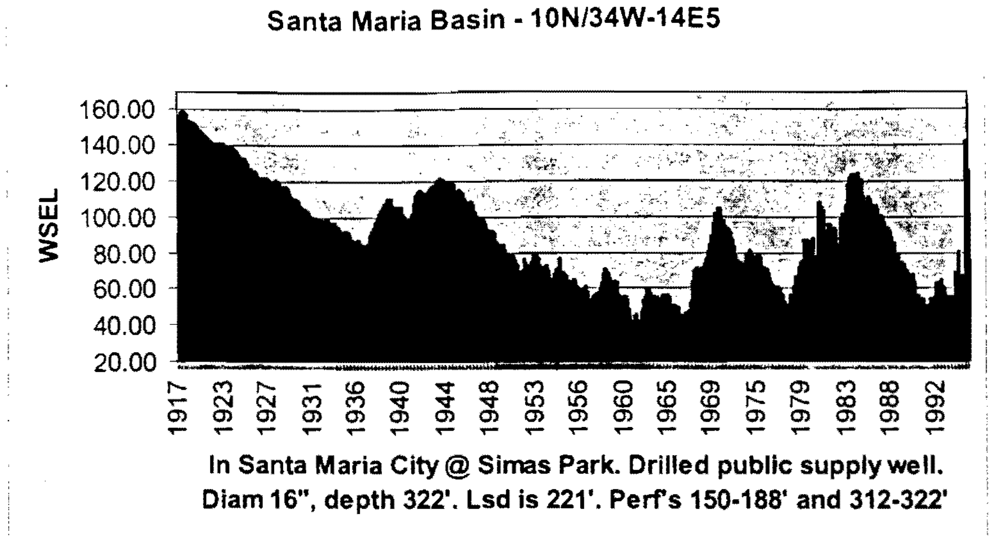
In 1991 the Water Agency with the help of Boyle Engineering produced the report "Santa Barbara County Growth Inducement Potential of State Water Importation" to consider growth inducement potential at the water purveyor level. The report serves as an analysis of 1990 water supply conditions as well as projections for the 21st century. This report calculates the annual average overdraft at about 37,000 AF at 1990 without state water and about 15,700 AF in the year 2000 with the implementation of state water.

In 1997 the Santa Maria Valley Water Conservation District (SMVWCD) hired Luhdorff and Scalmanini Engineers (L&S) to do a report on "Special Assessments of Groundwater Management" for the district as proposition 218, approved by the voters of California in 1996 required such a report before new assessments could be levied on property owners. This report states that the hydrologic conditions of the basin imply a long-term stability comprised of periodic groundwater level declines and recoveries, as versus an average annual overdraft. Luhdorff and Scalmanini were again hired by the SMVWCD to expand on their investigation of the basin and in March 2000 released a report utilizing a numerical flow model to establish an up-to-date perennial yield of the basin based on most recent recharge and discharge conditions. This report concluded that the basin was essentially in balance, relying on a base study period of 1968 to 1989. SBCWA had concerns about the base period and methodology of this report, and requested that Luhdorff and Scalmanini furnish basis for some of the calculations that differ from previous work done on the basin. A letter was sent to SMVWCD in July 2000 requesting the additional information and initiation of discussion between L&S and SBCWA but no response was received by SBCWA to this invitation. Thus, SBCWA has not formally adopted the conclusions found in this report.

In 2001 SBCWA was commissioned by the Santa Barbara County Administrators Office to update the 1991 "Santa Barbara County Growth Inducement Potential of State Water Importation" report as part of the strategic scan of resources the County was going through (the title of this report is "Santa Barbara County Water Supply and Demand Comparisons 2002 Update"). Analyses generated for this report show that a 2,368 AF groundwater overdraft exists (Ahlroth, 2001) and under current trends of usage and climate by 2020 a slightly higher overdraft will exist (the reduction in overdraft from previous SBCWA analyses is mainly due to State Water importation). This analysis is a model result quantifying all inputs and outputs from the basin and using a 1943-1999 base period. The results of this modeling effort are confirmed by water level readings made throughout the basin by the County and USGS. Due to the conflicting conclusions and significance of such previous work SBCWA hired Hopkins Groundwater Consultants Inc. to perform an unbiased evaluation of the methodologies and conclusions of SBCWA work on this basin. Hopkins concluded the overdraft is indeed somewhere between 2,000 to 3,000 AF per year and that the SBCWA methodologies, including use of the SBCWA Santa Maria Valley water budget model (SMVWBM) to assess basin conditions, to be both effective and comprehensive. **It should be noted that a overdraft of 3,000 AF per year lies in the "gray area" of groundwater calculations and as well as previous work which implies the basin is in surplus or balance, is a function of climate, which nobody really can predict. In all the *analyses* of groundwater conditions, the parameter of "base period" of climate is the dominant variable, and by using different "base periods" the analysis shows a range deficit or surplus conditions.** Certainly, the importation of state water takes considerable pressure off of the resource of groundwater in this basin.

Fluctuations in Basin "Water in Storage"

The conditions of the basin can be assessed by looking at the hydrograph below from observation well 10N/34W-14E5:



Note how during the early part of the record whether the basin storage is increasing or decreasing (as depicted here by water level elevation), the slope is less than that of the later part of the century. The higher rate of *filling* in the later part of the century is a function of the presence of the Twitchell Reservoir Project, which adds on average an additional 18,000 AF per year recharge to the basin. The higher rate of *dewatering* is due to increased pumpage of the basin. One can expect that given an extreme drought such as the 1987-1991 or 1945-1951 droughts that the basin would be dewatered at an alarming rate, and may result in the lowest water levels in the history of the basin.

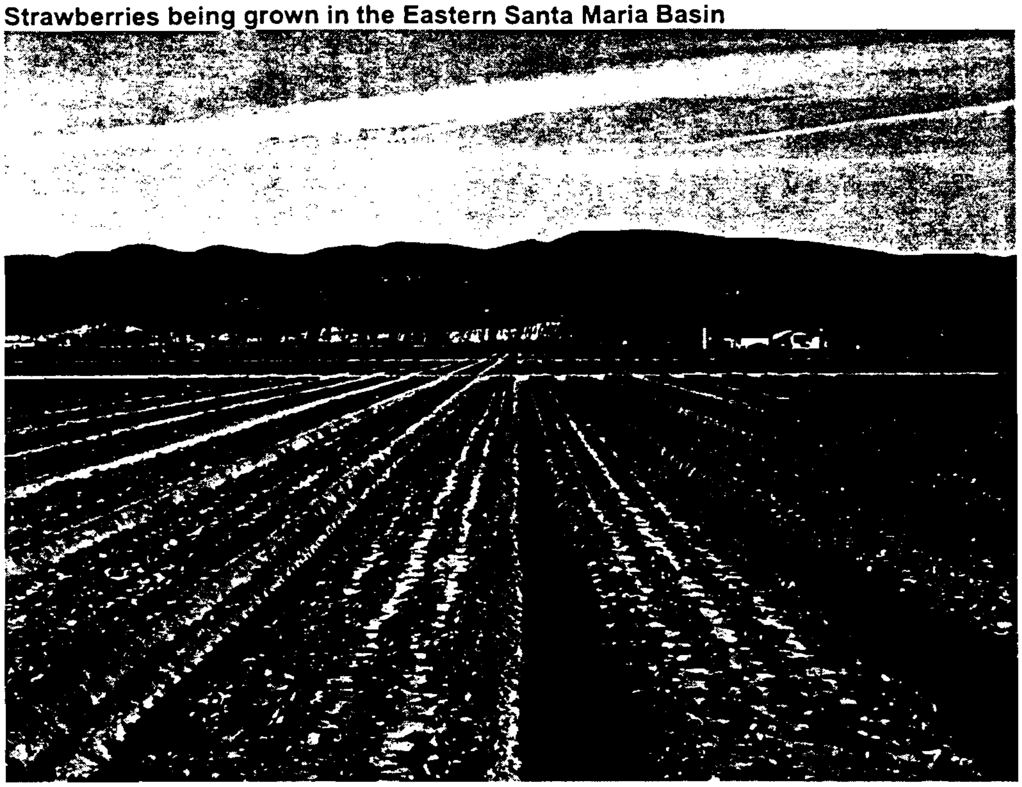
The gross perennial yield of the basin is estimated to be approximately 125,000 acre-feet per year (Ahlroth, 2002). Water storage above sea level within the Santa Maria Groundwater Basin was estimated to be about 2.5 million AF (MAF) in 1984 and 1.97 MAF in 1991, and now, in 2002 probably greater than 2.5 MAF (Ahlroth, 2002). The maximum storage level of record occurred in 1918 and was estimated to be over 3 MAF. The portion of the groundwater basin located in San Luis Obispo County in 1975 was estimated by the Department of Water Resources to contain about 226,000 AF, a part of which is included in the SBCWA estimate.

The basin supplies groundwater to the City of Santa Maria, California Cities Water Company, 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 State Water has been providing an additional source since the end of 1997.

State Water Importation

The Cities of Santa Maria and Guadalupe, and California Cities Water Company (formally Southern California Water Company) of Orcutt have contracted to receive a combined total of 17,250 AFY from the State Water Project (SWP). Actual deliveries in 2002 were 12,871 AF to the City of Santa Maria, 441 AF to the City of Guadalupe and 223 AF to California Cities Water Company. Santa Maria holds 16,200 AFY of entitlement. (Please see State Water Project, page 7). According to the City of Santa Maria Water Master Plan, 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 relative high quality of return flows from water use in the City. This serves to improve overall water quality in the basin. Adjudication of the basin is currently in progress with involvement by the City of Santa Maria, Santa Maria Valley Water Conservation District and private pumpers throughout the basin.

Strawberries being grown in the Eastern Santa Maria Basin



Water Quality

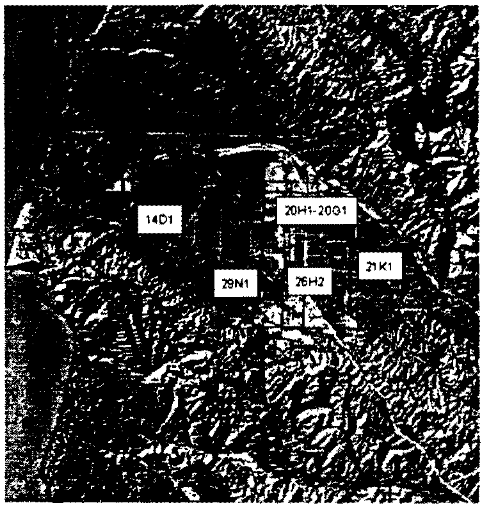
Reports by Worts (1951), Toups Corporation (1976), Brown and Caldwell (1976) and Hughes (USGS, 1976) best describe the conditions of water quality within the Basin. Also, the Cachuma Resource Conservation District (CRCD) produced the *Santa Maria Watershed Non-point Source Pollution Management Plan* in September 2000, which serves as a mitigation plan for water quality impairments in the basin and summarizes water quality conditions. To a large degree water quality within the basin has been affected by the operations of Twitchell Reservoir in a positive manner as Sulfate and Salt loading have been reduced since "low flows" eminating from the Cuyama Valley have been intercepted and replaced by releases from Twitchell which includes runoff from the Huasna and Alamo watersheds (Note that the recharge from Twitchell has been revised from 20,000 AF per year to 18,000 AF per year due to siltation and thus loss of storage of the reservoir and also not accounting for the cloudseeding program and surcharging of the reservoir as they are not long-term approved programs). It is important to realize, as with most groundwater basins that there is a significant difference between the quality of water extracted from the shallow or water table aquifer as versus the deeper or confined aquifer, the prior *usually* containing the most water quality impairments. Water quality data is collected as part of the County Water Resources-USGS monitoring program as well as from area specific programs, such as the City of Santa Maria and Laguna Sanitation District sewage treatment plants and also Southern California Water Company, which serves water to the Orcutt area.

Total Dissolved Solids

Data collected from observation wells in a *1976-1977 USGS study* indicated that TDS concentrations generally increase from east to west, with the highest levels occurring in the western part of the basin and TDS concentrations near Guadalupe at over 3,000 mgl. It must be noted that these measurements most likely were made from wells drawing from the shallow water table and may not be indicative of the complete aquifer. Currenty TDS concentrations near Guadalupe are measured at around 1500 mgl and in the center of the basin under the town of Santa Maria appear to be also be high (well 10N/34W-26H2) but again this is most likely due to recycling of shallow water from irrigation and may not be representative of the aquifer as a whole in that area. At the time of the writing of this report construction records to ascertain *screen* or *perforation* intervals for the water quality wells were not available but are being investigated for future reporting.

Santa Maria Basin TDS readings from County-USGS Program 1987-2002

Well	20H1	20G1	21K1	26H2	29N1	14D3
Area	Fugler	Fugler	Fugler	SMaria	Orcutt	Guad.
1987				1490		
1988				1110	730	1380
1989				1350	739	1380
1990				1260	784	1460
1991				1160	752	1410
1992				1030	633	1400
1993				1010	656	1780
1994				1240	647	1440
1995				1070	658	1460
1996				1250	629	1320
1997	840		981	1430	659	1460
1998		856		1490	687	1470
1999	754			1660	663	1460
2000	848		958		668	
2001	888				672	1490
2002	1040				666	



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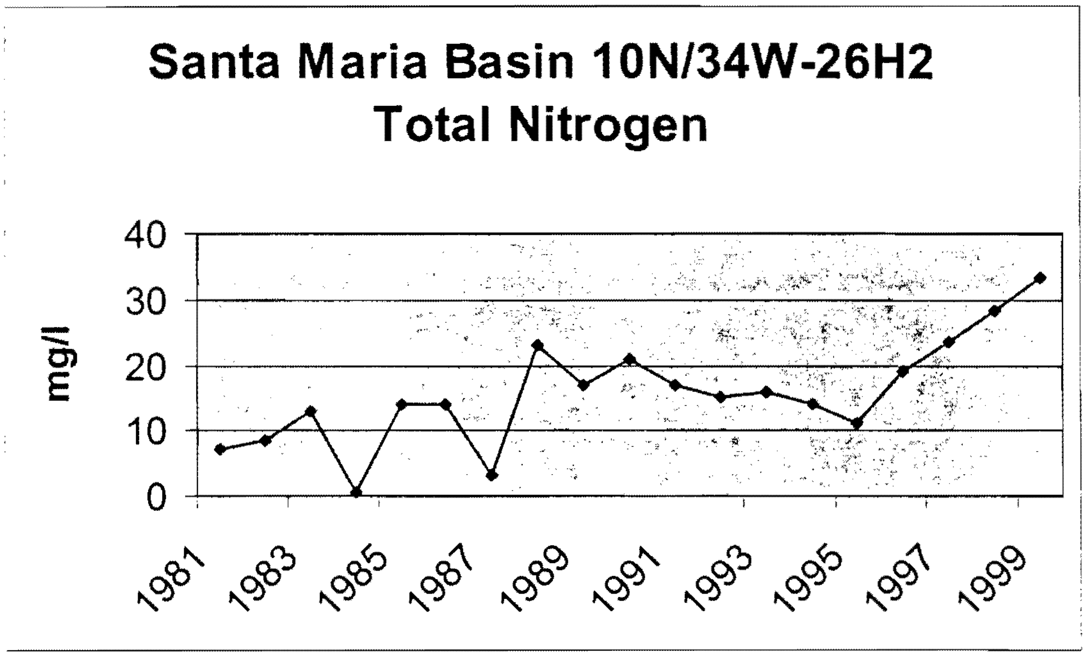
TDS levels increased significantly in Orcutt area wells after the 1930's but have remained relatively stable or even decreased since 1987. The importation and domestic use of State Water Project water now results in better quality discharge water from the City of Santa Maria treatment plant on Black Road and also from Laguna Sanitation District to the south. This may greatly aide future water quality within the basin. The table on the previous page lists recent TDS measurements made as a result for the County Water Resources-USGS monitoring program.

Nitrates-Sulfates

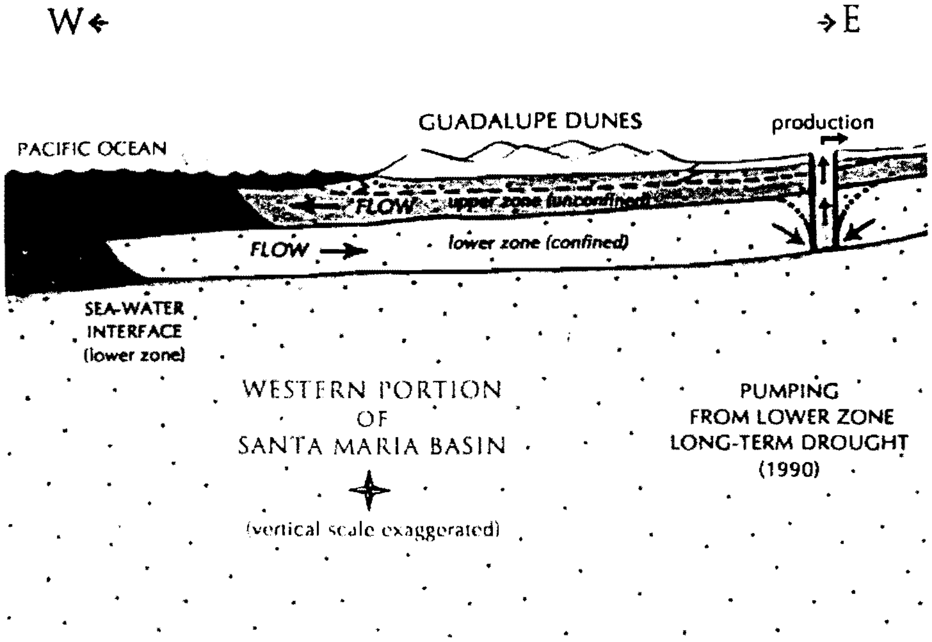
A study conducted by the State of California Regional Water Quality Control Board (1995) indicates that the basin is subject to nitrate contamination, particularly in the vicinity of the City of Santa Maria and in Guadalupe. The study shows that nitrate concentrations have increased from less than 30 mgl in the 1950's to over 100 mgl in the 1990's in some parts of the basin. It is again important to note that there is a significant difference in water quality between shallow and deep water. Movement between these different aquifer zones is not well documented and dependant on many factors. Certainly, the flushing of the basin from a combination of wetter climate and lower usage would help protect against water quality impairments. The graph below depicts the increase of *total nitrogen* measured in the basin at observation well 10N/34W-26H2:



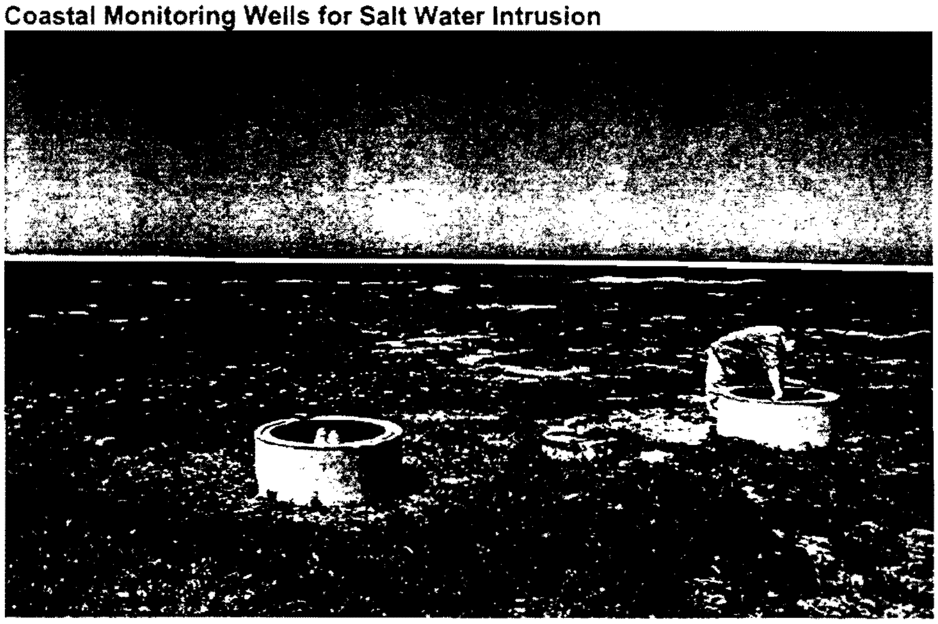
Sea Water Intrusion

Coastal monitoring wells are measured biannually for any indication of seawater intrusion, to date there has been no evidence of seawater intrusion. 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 seawater intrusion. Although it is possible that the seawater-fresh water interface has migrated shoreward during drought periods, the slope of groundwater has remained to the west in the westernmost part of the basin. The graphic below describes how this seawater fresh water interface can migrate during periods of basin overdraft:

Conceptual Drawing of Sea-Water Interface Migration, Santa Maria Basin



Coastal Monitoring Wells for Salt Water Intrusion



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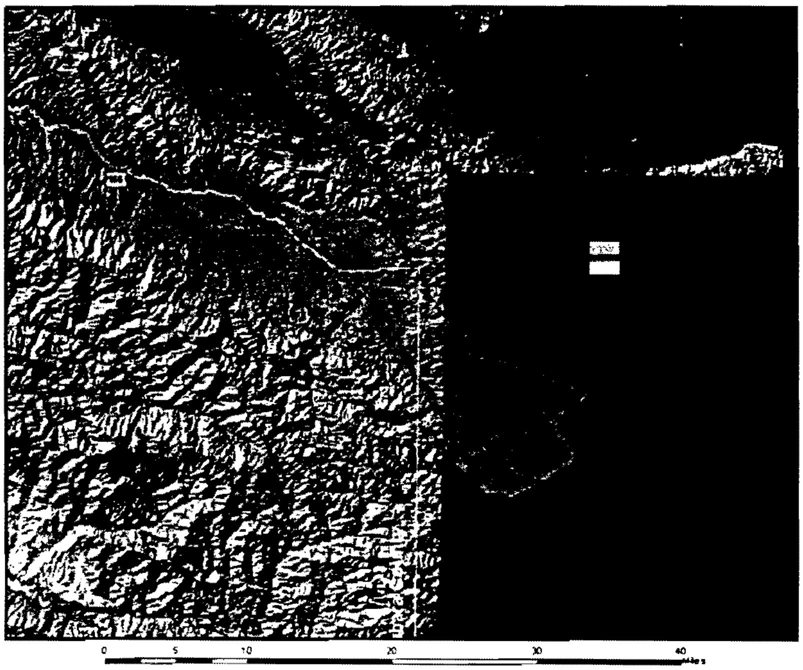
Basin Wide "Salts Balance"

Sources of salt inflow to the Santa Maria Groundwater Basin include surface runoff, precipitation, M&I accretions and agricultural return flows. Salt disposal from the basin occurs through the processes of surface and subsurface outflow. The Water Agency estimated in 1977 that net salt addition to the basin was about 48,000 tons per year (Ahlroth et al) under 1975 conditions and that by 2000 it would be about 53,000 tons per year. A revised analysis of salt loading is a significant task and the Agency is unaware of any other work in this area to date.

The addition of state water to the basin enhances water levels in the basin as well as introducing water with less salt than the native waters of the basin, both leading to more efficient salt discharge or flushing of the basin. However, as groundwater systems such as the type of the Santa Maria Basin respond very slowly to changing conditions it should be noted that the addition of state water in regards to overall water quality may not be seen until well in the future.

Cuyama Groundwater Basin

The Cuyama Groundwater Basin is comprised of unconsolidated sands and gravels that fill a 225-square-mile intermountain 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 and is bordered on the north side by the Caliente Mountain Range. The basin extends east into Ventura County and north into Kern and San Luis Obispo Counties. Please see Basin Map, on the following page. 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.



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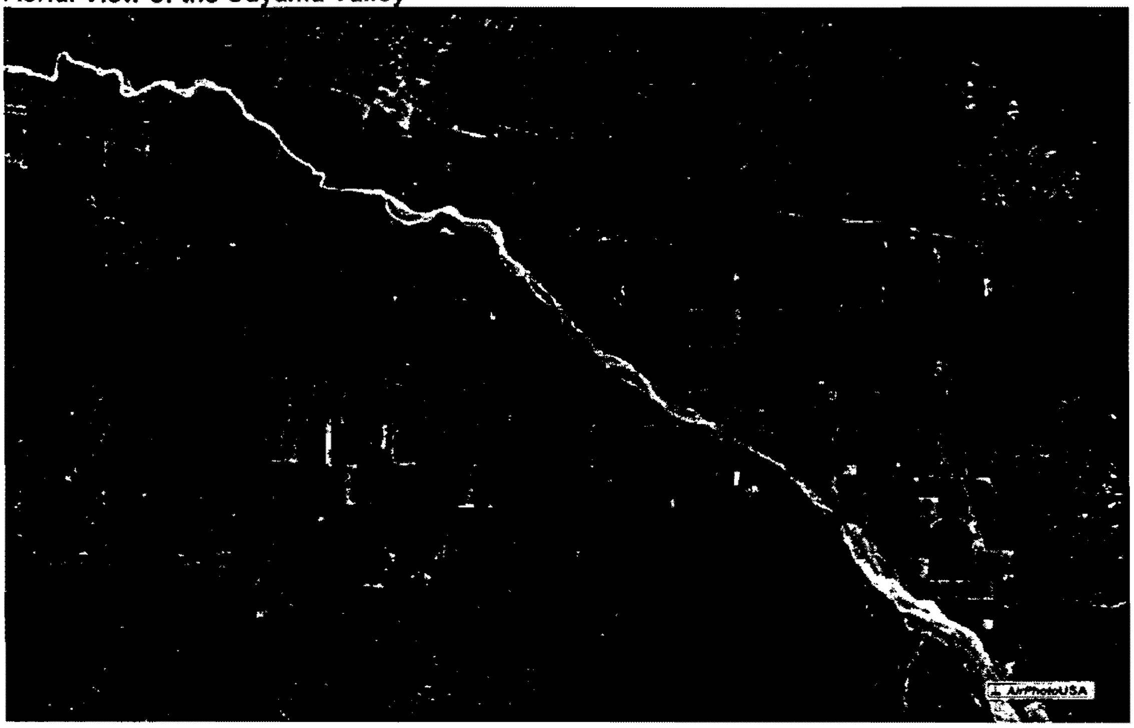
Agricultural water use began in 1938 and has since progressively increased. The constant cycling and evaporation of irrigation water has resulted in decreasing water quality. Groundwater within the basin makes up 100 percent of the water supply for Cuyama Valley agriculture, petroleum operations, businesses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

The supply/demand status of this basin was updated in a 1992 study (Baca et al., 1992) prepared by the County. The discussion presented below reflects this update. 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 1940's in excess of 100 feet are not unusual in some parts of the basin. According to the Cachuma Resource Conservation District (CRCD) irrigated acreage within the basin is about 30,000 and thus the estimates of the gross water demand may be low.

Aerial View of the Cuyama Valley



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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 a 1993 study (Baca, 1993) prepared by the County. 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. 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

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 (concave upward fold) which 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.

Samples analyzed from many groundwater wells in the late 1960's indicated that most of the ground water 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.

The USGS (Miller and Rapp, 1968) estimated the total ground water in storage above sea level within the area to be over 2 million acre feet. 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. Ground water comprises the majority of the water supply used within the area, although some Cachuma Reservoir water was imported into the eastern half of the region in the early 1960's (less than 1,000 AFY) and is still used in support of agriculture to the present time.

Groundwater in the Ellwood-Gaviota area is produced from wells which tap bedrock aquifers or alluvial sediments which have accumulated along canyon floors. Land uses supported by this pumpage include the Exxon Los Flores Canyon oil processing facility, the Chevron Gaviota oil processing facility, residential development and agriculture at the El Capitan Ranch, the El Capitan and Refugio state parks, the Tajiguas Municipal Landfill and several large avocado orchards. 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 Environmental Thresholds and

Guidelines Manual (Baca, 1995) 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. Environmental Thresholds and Guidelines Manual 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 the unconsolidated sand and gravel alluvial deposits along the Santa Ynez River. These deposits are up to 150 feet thick and several hundred 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, and 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 Cachuma Reservoir to recharge the Riparian Basin based on water levels in monitoring wells and "credits" of water held in reservoir storage. Thus, the Cachuma Project at certain times, controls basin water levels. This basin is not subject to overdraft (i.e. a progressive long-term drop in water levels) because the average annual flow to 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.

Conclusions

The 1990's brought 120% of normal precipitation to the local area and thus groundwater basins recovered after the drought of 1987-1991. Most basins peaked in 1999 after the historical wet year of 1998. Now after 116% (2000), a 125% (2001) and then a 50% (2002) of normal rainfall seasons many wells are falling off their peak of 1999 while some slower changing areas have remained stable. Most of the shallow or water table wells are dramatically lower after the extremely dry previous rain season. Many deeper wells are only slightly down from their 1999 and 2000 peaks but continue to drop. If this trend of below average annual rainfall continues groundwater as a resource may be depleted at a possible alarming rate and water supply and/or water quality problems may result.

The County Public Works Department and the United States Geological Survey will continue the cooperative water resources monitoring program providing groundwater depth and quality (as well as surface water flow and quality) to evaluate water resources throughout the County. Groundwater observations of the last year revealed little change to significant conclusions reached in previous annual reports. Slight to moderate overdrafts exist in the Santa Maria Valley, San Antonio Valley, Santa Ynez Uplands and Lompoc Uplands groundwater basins. Significant overdraft is evident only in the Cuyama Valley.

Work on Groundwater management plans continue. Plans have been adopted for the Carpinteria, Montecito and Buellton Uplands Basins. Litigation has initiated the City of Solvang to importing state water from outside the basin. A court action in 1989 set limits on pumping in the Goleta Basin and protects it from overdraft. Litigation continues on the Santa Maria Basin. A plan has been initiated for the Lompoc Plain Basin. State Water Project deliveries began in 1997 and most likely will have a beneficial impact on groundwater supply and quality with time.

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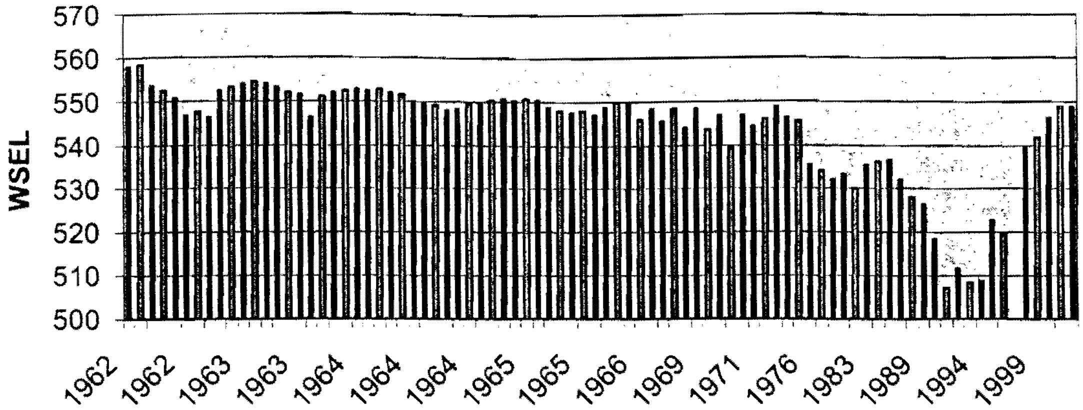
AM 03467

Appendix A- Selected Hydrographs

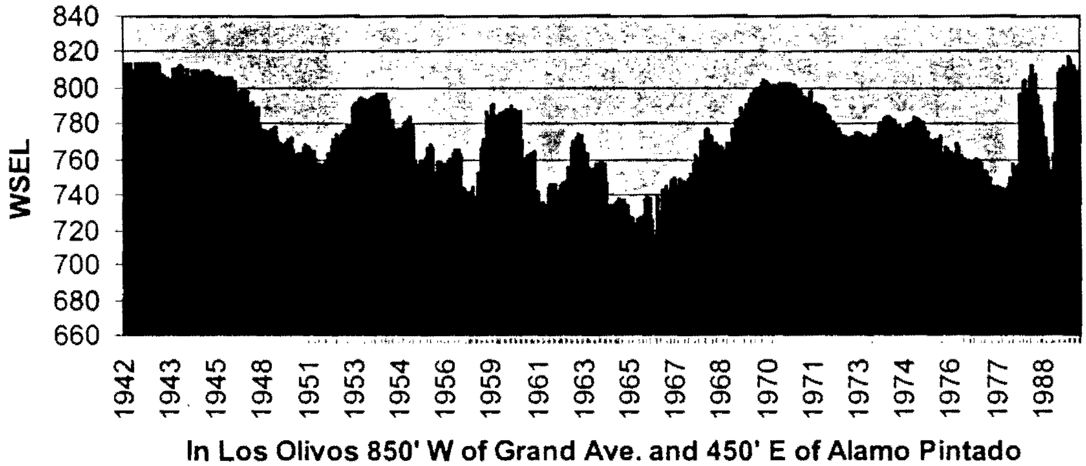
AM 03468

Santa Ynez Basin - 6N/30W-7G5



In Santa Ynez 100' W of Meadowvale Rd. SYWCD ID#1 supply well. Diam. 12", depth 158'. LSD is 600' MSL

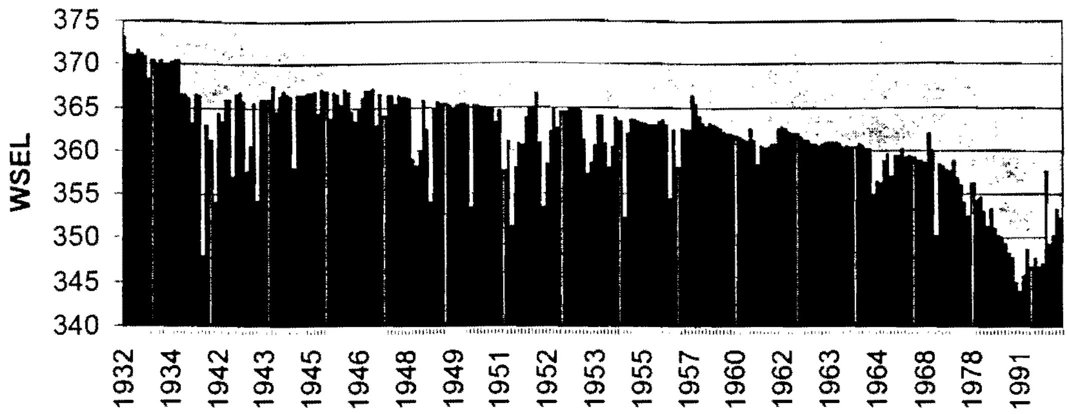
Santa Ynez Basin - 7N/31W-23P1



In Los Olivos 850' W of Grand Ave. and 450' E of Alamo Pintado Ck. Drilled irrigation well. Diam. 8", depth 141'. LSD is 822' MSL

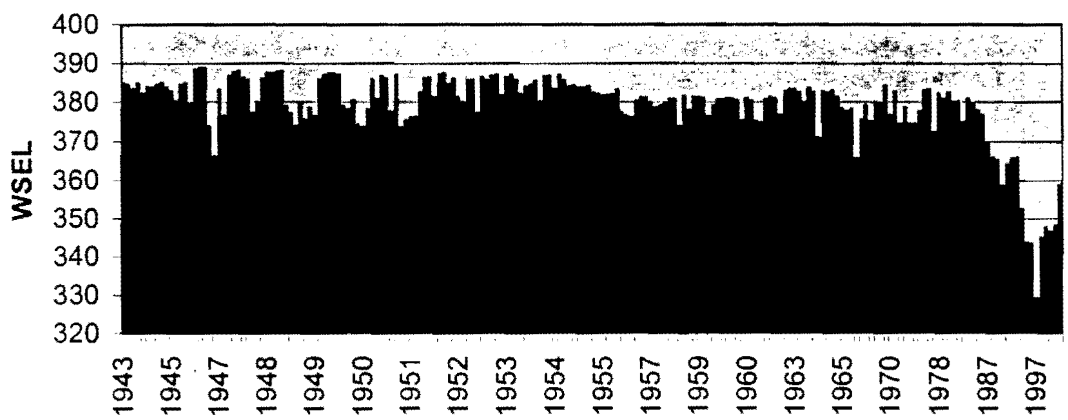
AM 03469

Buellton Uplands Basin - 6N/32W-6K1



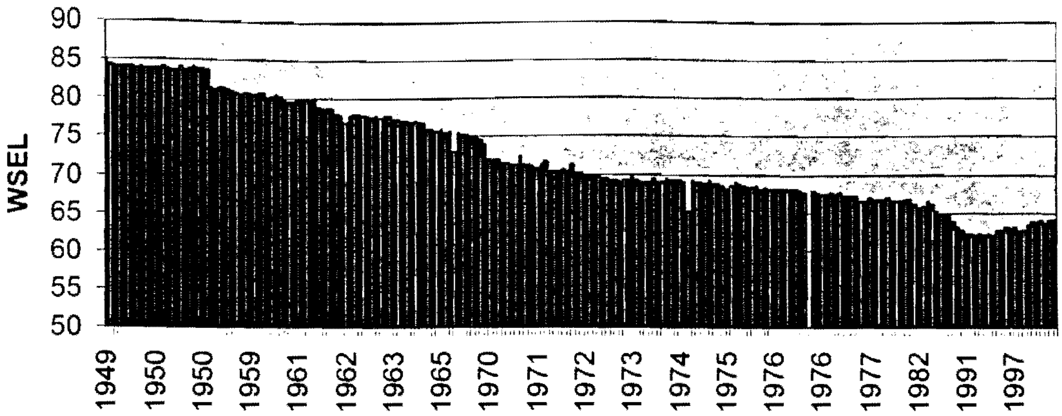
6 mi. WNW of Buellton S of hwy 246 and W of Mail Rd. Drilled domestic well. Diam. 12", depth 74'. LSD is 383.55 MSL

San Antonio Basin - 8N/33W-20R1



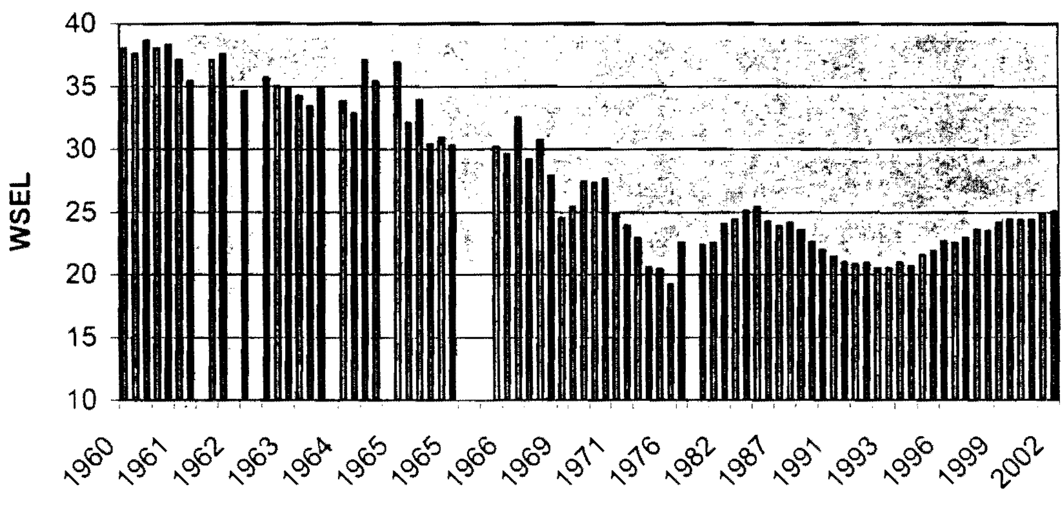
W of Los Alamos on Batchelder Rd. and 50' S of Hwy 135. Drilled water table well. Diam 10", depth 75'. LSD 410' MSL

Lompoc Basin - Well 7N/34W-12E1

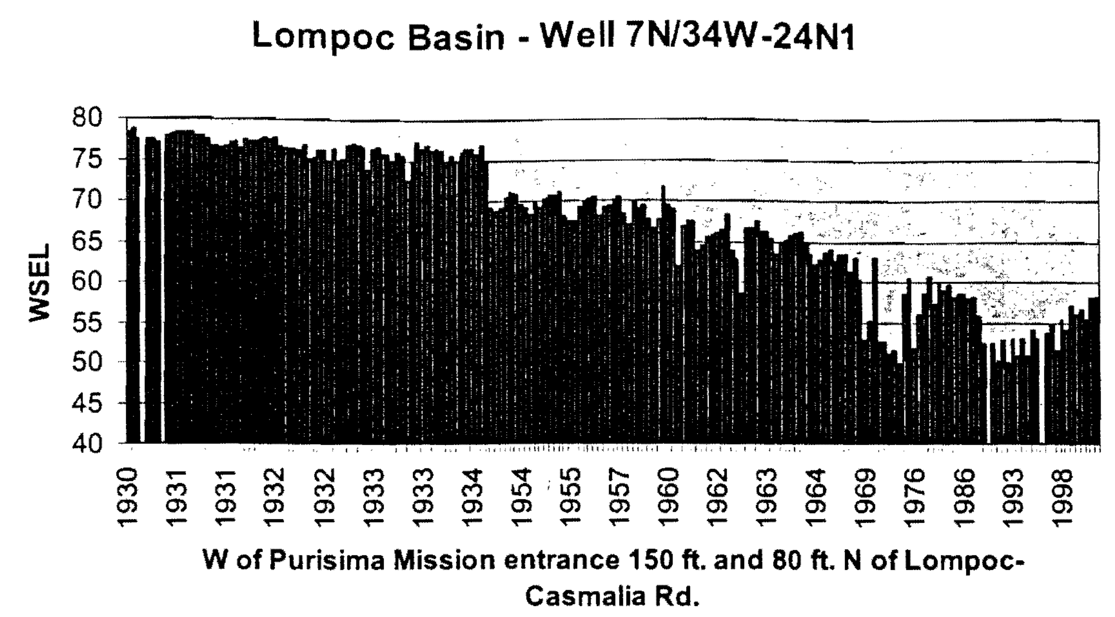


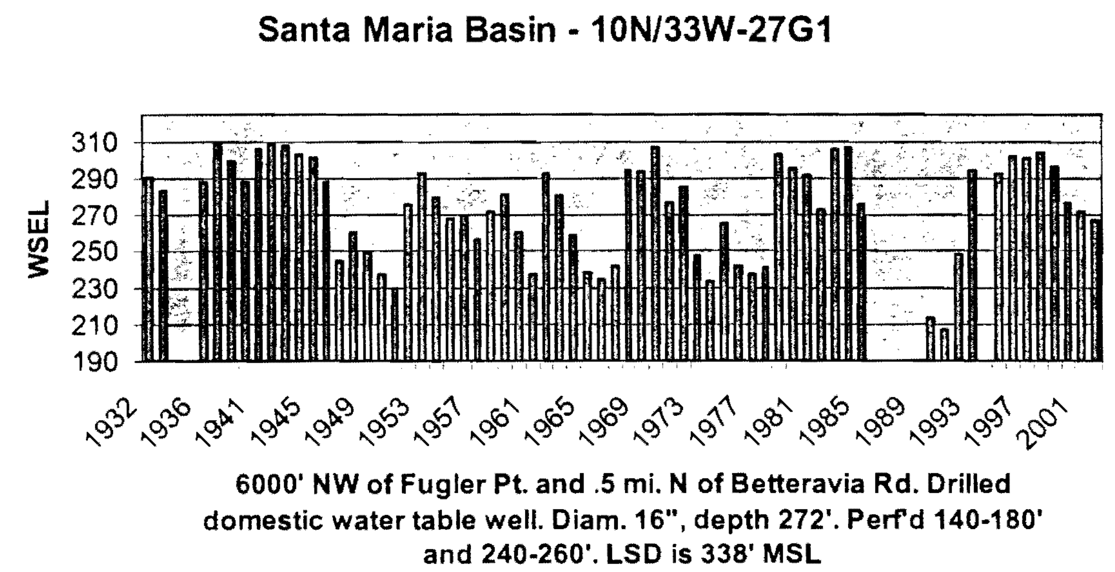
N of Mission Hills, 75 ft. NW of Oil Co. Rd., .95 mi. E and NE from Rucker Rd.

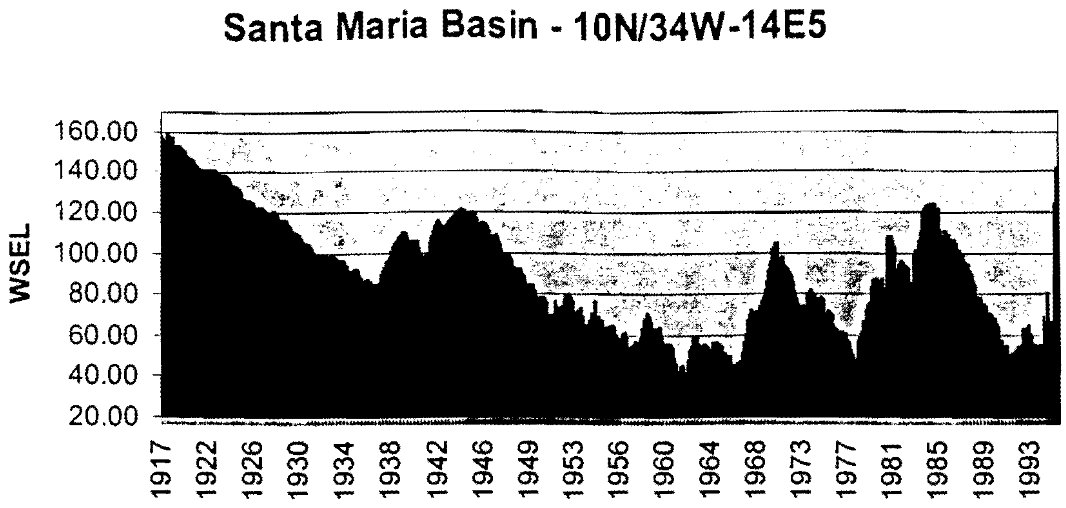
Lompoc Basin - Well 7N/34W-9H5



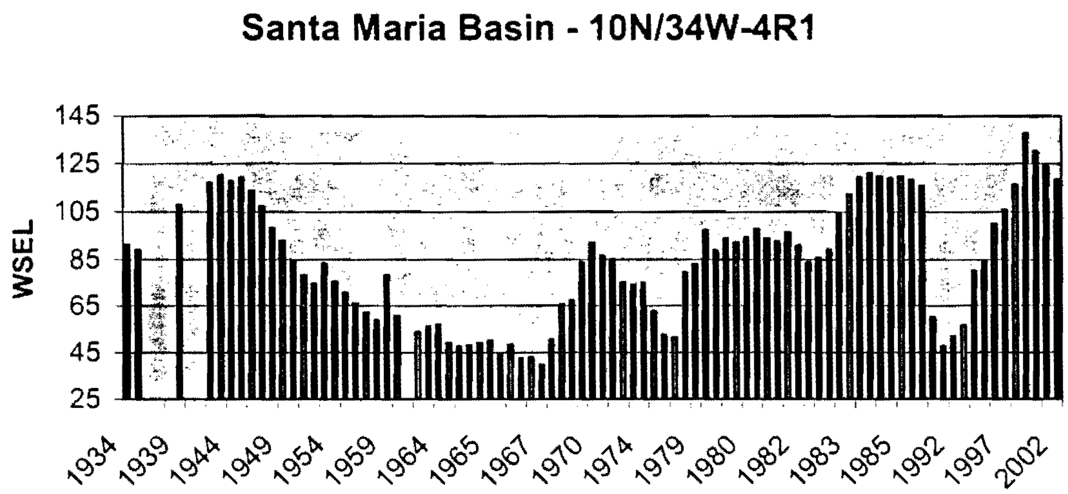
From Vandenberg Village Country Club parking lot S on the golf cart Rd. to well S side of large tank


Lompoc Basin - Well 7N/34W-24N1
WSEL
80
75
70
65
60
55
50
45
40
1930
1931
1931
1932
1932
1933
1933
1934
1954
1955
1957
1960
1962
1963
1964
1969
1976
1986
1993
1998
W of Purisima Mission entrance 150 ft. and 80 ft. N of Lompoc-Casmalia Rd.


Santa Maria Basin - 10N/33W-27G1
WSEL
310
290
270
250
230
210
190
1932
1936
1941
1945
1949
1953
1957
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
2001
6000' NW of Fugler Pt. and .5 mi. N of Betteravia Rd. Drilled domestic water table well. Diam. 16", depth 272'. Perf'd 140-180' and 240-260'. LSD is 338' MSL

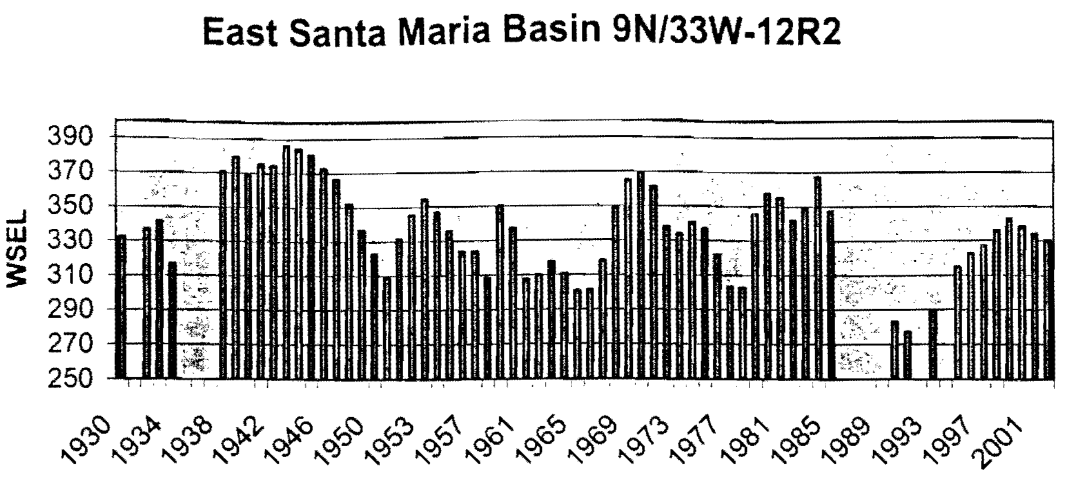


In Santa Maria City @ Simas Park. Drilled public supply well. Diam 16", depth 322'. Lsd is 221'. Perf's 150-188' and 312-322'

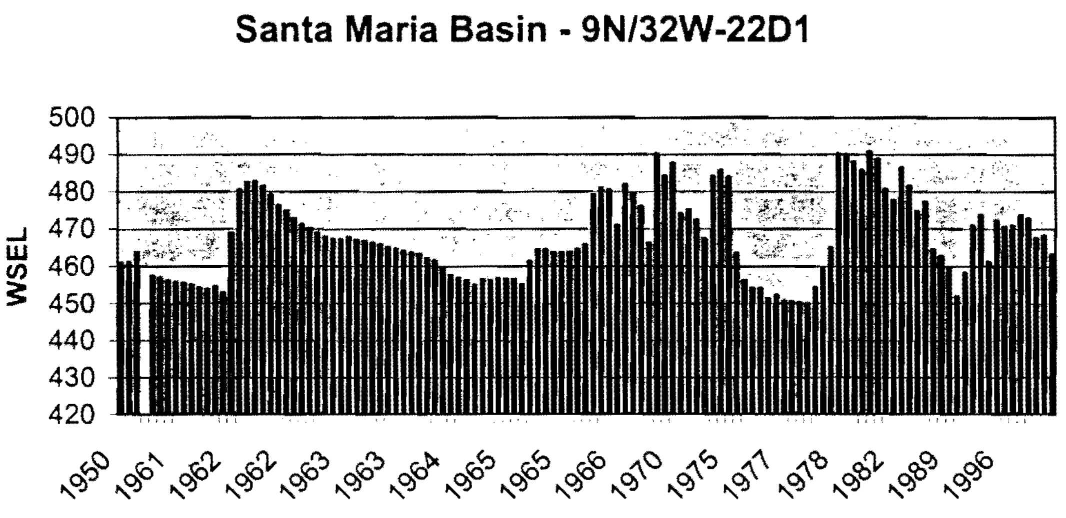


300' N of Donovan Rd. and 25' W of Blosser. Drilled irrigation water table well. Diam. 16", depth 186'. Perf'd 90-184'. LSD 192' MSL

AM 03473

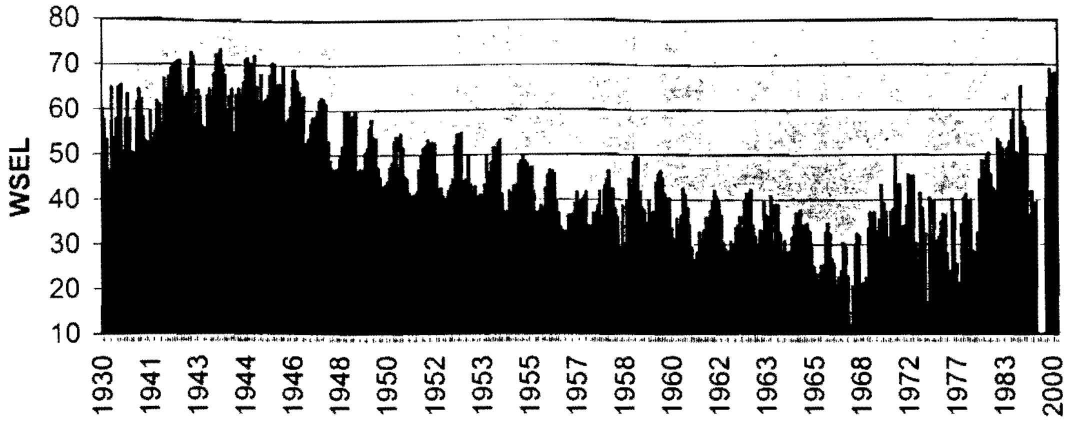


In Sisquoc, across from Blockman Union School. Drilled irrigation well. Diam. is 16", depth is 640'. LSD is 427'. Perf's 190-630'. Appended to record 9N/32W-7N1



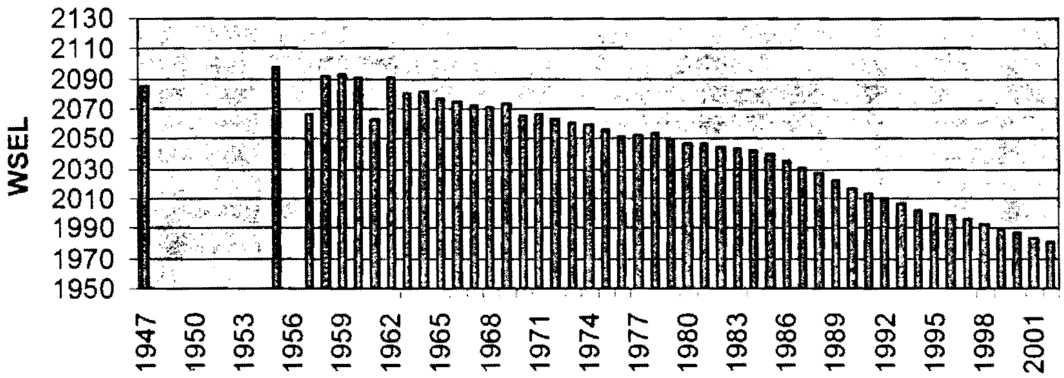
3.5 mi. SE of Sisquoc and .2 mi. E of Foxen Cyn. Rd. Drilled irrigation well. Diam. 14", depth 203' (1992). LSD is 495' MSL

Santa Maria Basin - 11W/35W-33G1



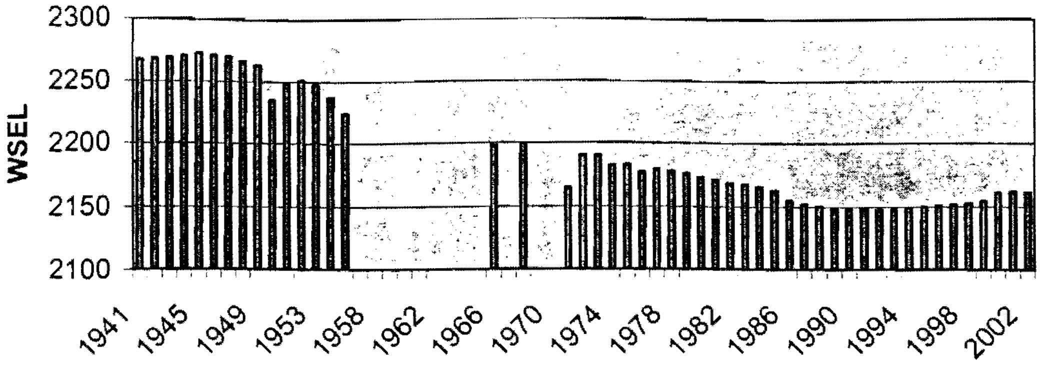
Near Guadalupe .15 mi. E of Jct. hwy 1 and Division St. Drilled irrigation well. Diam. unknown. Depth 141'. LSD is 90' MSL

Cuyama Basin - 10N/26W-4R1



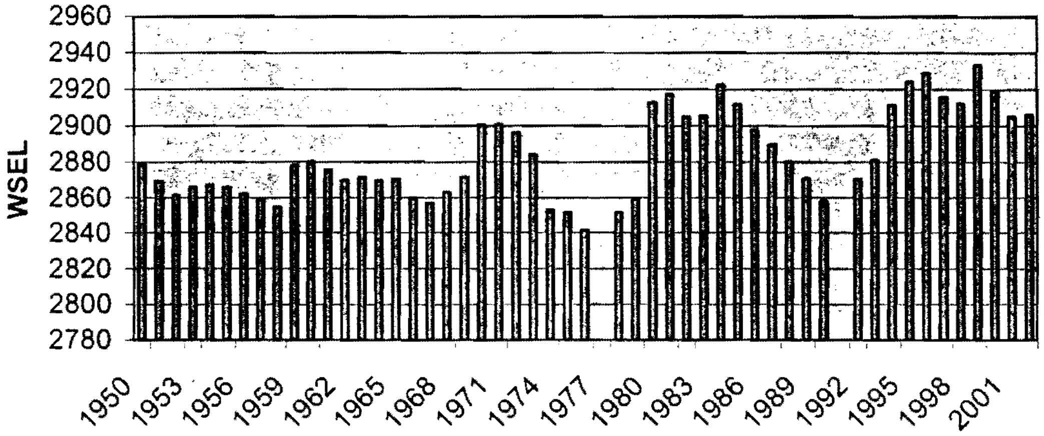
On Russel Ranch .64 mi. N of Cuyama R. crossing. Next to water tower. Drilled domestic well. Diam. 16", depth 238', perf'd 108-232'. LSD 2116' MSL

Cuyama Basin - 10N/25W-30F1



60' W of Kirchenmann Rd. and .84 mi. S of hwy 166. Drilled unused well. Diam 16", depth 212' in 1970. Perf'd 124-370'. LSD is 2320' MSL

Upper Cuyama Basin 9N/24W-33M1



Quatal Cyn. nr Ventucopa. Diam. 13", depth 233'. LSD is 3049'

AM 03476

Appendix B - Depth to Groundwater for selected wells 1998-2002

Well Number	Altitude of Land Surface (ft.)	2002	2001	2000	1999	1998
4N/25W-19F4	105	4/3 - 79.95	3/20 - 72.34	4/1 - 74.0	4/26 - 73.22	SPR - 59.60
4N/25W-28M1	53	4/3 - 15.03	3/21- 12.42	4/1 - 10.6	6/24 - 11.95	SPR - 15.59
4N/25W-30D1	7	4/3 - flowing	3/20 - flowing	flowing	flowing	flowing
4N/25W-34G1	188	3/21 - 102.35	3/21 - 102.35	4/1 - 104.3	3/30 - 106.21	SPR - 109.36
4N/26W-15D2	255		APR - 3.92	SPR - 10.67	SPR- 12.83	SPR - 3.00
4N/26W-17N1	104	6/13 - 71.92	APR - 69.42	SPR - 70.5	SPR - 70.08	SPR - 64.58
4N/26W-23F6	65.24	6/13 - 54.25	APR - 50.83	SPR - 54.58	SPR - 50.68	SPR - 48.91
4N/26W-8L1	250	6/13 - 3.92	APR - 12.33	NA	SPR - 3.83	SPR - -1.00
4N/26W-8P3	220	6/13 - 43.08	APR - 21.75	30.58	SPR - 29.16	SPR - 14.50
4N/27W-13R1	38.63	6/13 - 25.25	APR - 25.15	SPR - 25.75	SPR - 28.71	SPR - 13.61
4N/27W-14P1	18	obstructed	obstructed	SPR- -9.06	obstructed	obstructed
4N/27W-14R1	27.84	obstructed	APR - 0.03	SPR- 0.07	flowing	SPR - .61
4N/27W-15E1	145	MAR - 79.31	APR - 78.61	SPR - 79.37	SPR - 77.78	SPR - 78.69
4N/27W-18Q1	110	MAR - 12.35	APR - 12.37	SPR - 10.38	SPR - 13.11	SPR - 11.02
4N/27W-21B1	68	MAR - 36.26	APR - 30.84	SPR - 31.02	SPR - 31.35	SPR - 31.59
4N/27W-22Q1	13	MAR - 3.71	APR - 3.02	SPR - 2.05	SPR - 2.94	SPR - 2.43
4N/27W-8E1	251	MAR - 98.72	APR - 100.42	SPR - 105.5	SPR - 101.85	NA
4N/28W-12P5	105	discontinued	NA	NA	6/15 - 151.59	6/30 - 161.59
4N/28W-16R2	22	6/19 - 16.31	6/19 - 14.15	6/28 - 19.93	pumping	6/30 - 21.83
4N/28W-2N2	177.9	6/19 - 31.16	6/20 - 29.61	6/27 - 32.0	6/15 - 29.33	6/29 - 33.26
4N/28W-5R1	131	6/18 - 21.69	6/20 - 21.68	6/27 - 24.76	6/15 - 25.94	6/30 - 0.46
4N/28W-9A3	84.1	6/18 - 36.95	6/20 - 38.84	6/27 - 42.03	6/15 - 43.66	6/29 - 45.98
4N/28W-9G3	60.18	6/18 - 46.69	6/20 - 55.31	NA	6/15 - 67.79	6/29 - 79.36
6N/30W-7G5	600	3/28 - 51.38	3/27 - 51.38	3/24 - 53.86	3/24 - 58.06	4/14 - 60.50
6N/31W-7F1	385	3/25 - 64.66	3/26 - 66.29	3/23 - 64.55	3/29 - 62.85	4/8 - 62.07
6N/32W-2Q1	359	3/20 - 60.69	3/26 - 58.32	3/23 - 66.29	3/29 - 61.01	4/6 - 56.46
6N/32W-6K1	384	3/20 - 31.27	3/26 - 30.23	3/23- 33.33	3/29 - 34.21	4/6 - 26.01
7N/30W-33M2	746	4/2 - 177.42	3/28 - 189.59	3/23 - 182.16	4/7 - 185.29	4/22 - 201.49
7N/30W-35R1	880	4/1 - 174.14	3/29 - 171.35	3/25 - 179.1	4/7 - 174.10	4/22 - 181.15
7N/31W-23P1	822	3/25 - 16.60	3/27 - 12.69	3/23 - 9.73	3/30 - 6.66	4/14 - 4.26
7N/31W-36L2	721	3/25 - 27.29	3/28 - 25.09	3/23 - 27.15	3/30 - 26.56	4/14 - 28.30
7N/32W-31M1	450	3/20 - 40.56	3/26 - 41.51	3/23 - 45.68	3/29 - 38.58	4/6 - 44.05
7N/33W-21N1	360	3/20 - 300.99	3/22 - 300.46	3/22 - 301.81	3/12 - 301.35	3/19 - 301.57
7N/33W-36J1	495	3/20 - 127.03	3/26 - 127.28	3/23 - 129.38	3/29 - 145.95	4/6 - 139.4
7N/33W-36J2	478	3/20 - 57.22	3/26 - 55.00	3/23 - 51.74	3/29 - 48.80	4/6 - 50.31
7N/34W-12E1	385.8	3/19 - 322.03	3/20 - 322.04	3/22 - 322.09	3/17 - 322.21	3/20 - 323.3
7N/34W-24N1	130.4	3/19 - 71.86	3/22 - 71.93	3/21 - 73.40	3/17 - 72.94	3/19 - 74.61
7N/34W-35K9	101	3/19 - 21.58	3/22 - 20.30	3/21 - 20.38	3/17 - 20.67	3/19 - 19.10
7N/35W-22J1	31.8	3/16 - 21.72	3/19 - 13.51	3/20 - 15.87	3/9 - 14.85	4/16 - 12.67
7N/35W-27P1	260	3/18 - 221.04	3/22 - 220.86	3/21 - 222.20	3/11 - 232.20	4/16 - 223.52
8N/33W-20Q2	408	3/19 - 36.43	3/23 - 55.07	3/29 - 58.74	4/15 - 62.0	3/24 - 52.47
8N/33W-20R1	410	3/19 - 51.18	3/23 - 61.93	3/29 - 63.46	4/15 - 62.42	3/24 - 65.10
8N/34W-23B1	315	3/19 - 25.94	3/23 - 23.78	3/29 - 24.85	4/15 - 23.78	3/24 - 24.20
9N/24W-33M1	3049	2/20 - 142.88	3/30 - 143.87	4/9 - 130.03	4/21 - 115.77	4/1 - 136.73
9N/26W-1F3	2604.5	2/20 - 308.18	3/29 - 307.40	4/9 - 307.25	4/20 - 306.35	4/3 - 305.64
9N/32W-22D1	495	3/27 - 31.94	3/28 - 26.80	4/8 - 27.39	4/7 - 22.18	4/6 - 21.25
9N/33W-12R2	427	3/27 - 97.07	3/28 - 92.88	4/9 - 88.82	4/7 - 84.44	4/6 - 91.10
9N/33W-2A7	377	4/9 - 84.33	3/28 - 67.44	4/4 - 64.21	4/8 - 56.92	4/6 - 55.85
10N/25W-30F1	2320	3/26 - 158.79	3/29 - 157.98	4/9 - 158.82	4/20 - 165.22	4/3 - 167.45
10N/26W-20M1	2165	2/20 - 69.27	3/29 - 68.58	4/8 - 72.28	4/20 - 67.81	4/1 - 69.75
10N/26W-4R1	2116	3/26 - 134.36	3/29 - 132.19	4/8 - 129.59	4/20 - 127.32	4/2 - 123.81
10N/33W-27G1	338	3/27 - 70.95	3/27 - 66.11	4/3 - 61.10	4/17 - 41.35	4/5 - 33.42
10N/34W-14E5	220	3/21 - 95.50	3/27 - 87.45	4/3 - 83.28	4/22 - 79.18	3/19 - 97.00
10N/34W-4R1	192.1	3/21 - 73.76	3/26 - 68.36	4/2 - 62.02	4/19 - 54.35	4/4 - 75.79
10N/35W-11E4	118	3/17 - 37.63	3/26 - 31.57	3/31 - 35.65	4/18 - 31.27	3/30 - 40.94
10N/36W-12P1	28	3/17 - -2.20	3/25 - -2.33	3/31 - -2.46	4/18 - -2.37	3/27 - -2.32
11N/35W-33G1	90	3/17 - 26.89	3/25 - 21.83	3/31 - 26.30	4/19 - 20.90	3/27 - 27.32

Appendix C – Santa Barbara County Water Production

By Purveyor and Calender Year

Acre-Feet

Year	City of Buell-ton	Cal Cities Water (Orcutt)	Carp. Water District	Cuy-ama CSD	Goleta Water District	City of Guad-alupe	La Cumbre Mutual Water District	City Of Lompoc	Los Alamos CSD	Mission Hills CSD	Mont-ecito Water District	City of Santa Barbara	City of Santa Maria	Santa Ynez River WCD ID#1	City of Sol-vang	Vand-enberg AFB	Vand-enberg Village CSD	Totals
1976	535	4330	5368	300	15844	845	1672	3416	158	500	3995	14463	8080	5409	1264	3795	1543	71517
1977	528	4849	5025	321	14867	781	1565	3327	158	500	3713	12718	7509	6643	1198	3796	1464	68962
1978	641	4621	4305	300	13785	722	1339	3282	161	500	3463	12404	7445	5063	1098	3353	1309	63791
1979	716	5099	4934	295	15405	666	1326	3596	205	500	3858	13719	8069	6006	1122	3278	1525	70319
1980	752	5608	5129	292	16034	762	1533	3753	230	583	4099	14543	8739	6527	1231	4026	1527	75368
1981	770	6109	5338	333	15610	738	1508	3607	211	492	4295	14095	8691	6517	1622	4330	1589	75855
1982	725	5508	4449	262	13331	675	1387	3596	211	417	3612	13475	8311	5343	1569	4169	1291	68331
1983	743	5714	3898	235	11896	733	1284	3618	179	416	3576	14439	8904	4447	1362	3375	1181	66000
1984	971	7079	6130	254	15796	961	2067	4447	240	570	5483	16826	10537	7885	1876	4211	1482	86815
1985	939	7276	5488	258	15344	908	1900	4525	230	522	4905	16335	10635	7159	2028	4063	1486	84001
1986	1057	7625	5068	275	14874	800	1827	5029	269	542	4789	16277	11039	6174	2028	3768	1485	82926
1987	1153	7916	5845	274	15290	757	2008	4884	262	569	4889	16140	11192	6327	1999	3717	1441	84663
1988	1204	8678	5986	218	15358	823	2209	5354	253	700	5314	16517	11848	6529	2153	3850	1577	88571
1989	1221	8860	6280	195	11451	828	1617	5612	256	694	5234	15067	12470	6742	2080	3793	1582	83982
1990	1083	8691	5362	189	10013	724	1298	4930	251	633	5034	9849	12057	6337	1963	3401	1438	73253
1991	955	8210	4055	182	9393	685	1166	4413	238	578	3779	9559	11478	5814	1852	3065	1342	66764
1992	964	8381	4315	173	11066	718	1320	4653	225	600	4025	10507	12074	5402	1868	4124	1401	71816
1993	958	8174	4312	168	11837	653	1321	4670	240	618	4420	11371	11835	7599	1871	4394	1380	75821
1994	918	8572	4489	169	10634	668	1555	4770	236	628	4368	12079	12133	5332	1807	4186	1287	73831
1995	896	8447	4314	181	13317	662	1542	4772	260	604	4155	12716	12265	5202	1611	3916	1293	76153
1996	923	9906	4298	191	12184	585	1648	5086	276	658	4702	13216	12323	6500	1641	4463	1356	79956
1997	991	9376	4635	213	14667	622	1632	5804	256	733	5369	14546	12796	6343	1686	4486	1523	85678
1998	806	8154	3985	165	11758	574	1337	5231	238	540	4200	12970	10665	4290	1425	3958	1291	71587
1999	897	9259	4442	189	12741	749	1849	5408	320	762	5538	13784	11851	6163	1533	4538	1467	81491
2000	975	8262	4379	190	13317	618	1546	4566	263	609	5112	13395	11231	5303	1532	4980	1233	77511
2001	991	8053	3901	183	12225	658	1399	4465	251	591	4473	12531	11155	5355	1559	4476	1201	73467
Avg	897	7414	4873	231	13386	730	1571	4494	233	579	4477	13640	10567	6042	1653	3981	1411	76198
Max	1221	9906	6280	333	16034	961	2209	5804	320	762	5538	16826	12796	7885	2153	4980	1589	88571
Min	528	4330	3898	165	9393	574	1166	3282	158	416	3463	9559	7445	4290	1098	3065	1181	63791

Appendix D - Santa Barbara County Groundwater Basins Summary

Basin	Size	Estimated basin SAFE YIELD		Estimated Net Demand on groundwater (AFY)	Surplus/ (Overdraft) (AFY)	Available Water in Storage (AF)	Land Use Summary
		For gross Pumpage (Perennial Yield) (AFY)	For Net Pumpage (Net Yield) (AFY)				
Carpinteria	6,700 acres	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 acres	1,350	1,215	Pumpage not required due to surplus surface supplies.	2500 (Based on overall Montecito Area supply)	14,400	Primarily low-density residential use; unincorporated
Santa Barbara	4,500 acres	847	805	Pumpage not required due to surplus surface supplies. Basin managed by City of S.B.	2838 (Based on overall City supply.)	10,000	Primarily residential, industrial and commercial
Foothill	3000 acres	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	5700 acres	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	3500 acres	500	475	220	255	10,000	Primarily residential, industrial and commercial.
Buellton Uplands	16,400 acres	3,740	2,768	1,932	800	154,000	Extensive agriculture; one city
Santa Ynez Uplands	83,200 acres	11,500	8,970	10,998	(2,028)	900,000	Three towns, one city, and other low density residential; varied, high-value agriculture
Lompoc	48,600 acres	28,537	21,468	22,459	(991)	170,000	One city, unincorporated urban development, Vandenberg AFB; varied agriculture; petroleum
San Antonio	70,400 acres	8,667	6,500	15,931	(9,431)	800,000	One town; extensive agriculture; some petroleum; VAFB
Santa Maria	110,000 acres (80,000 within Santa Barbara County)	120,000	80,000	100,000 (87,500 with City of Santa Maria reduction in pumpage due to SWP supply.)	(2,368)	1,100,000	Two cities; extensive unincorporated urban area (Santa Barbara County); extensive irrigated agriculture, petroleum

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Basin	Size	Estimated basin SAFE YIELD		Estimated Net Demand on groundwater (AFY)	Surplus/ (Overdraft) (AFY)	Available Water in Storage (AF)	Land Use Summary
		For gross Pumpage (Perennial Yield) (AFY)	For Net Pumpage (Net Yield) (AFY)				
Cuyama	441,600 acres (81,280 within Santa Barbara County)	10,667	8,000	36,525	(28,525)	1,500,000	Extensive agriculture, some petroleum; very low population density
SPECIAL BASINS/LIMITED DATA							
More Ranch	502 acres	84	76	24	60	N/A	Primarily open space, limited residential/agricultural
Ellwood to Gaviota Coastal Basins	67,200 acres						Agriculture, primarily orchards and grazing; limited municipal/industrial
Gaviota to Pt. Conception Coastal Basins	23,040 acres		N/A	N/A	N/A	N/A	Agriculture, primarily grazing
Santa Ynez River Riparian Basins	12,000 acres (3 sub-units)		N/A	N/A	N/A	Storage generally maintained by capture of local runoff and by releases of prior rights water banked in Cachuma Lake	Two cities; 7,300 acres of irrigated cropland

AFY: acre-feet Per Year
AF: Acre-Fee