Water Resources of Santa Barbara County

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Water Resources of Santa Barbara County

Santa Barbara County Water Agency

July 2000
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Introduction

Water is a resource vital to Santa Barbara County. The availability, quality and cost of water in this area have greatly influenced the economy and the community. Like other areas with limited local water supplies, we must manage our resources carefully and supplement local supplies with water from other regions. Our water sources are diverse and the facilities and programs established to manage those supplies are complex.

It is a major undertaking to plan for and manage our water resources. Managing water resources involves complicated scientific, technological, economic and political decisions. Water supplies are carefully studied, treated, protected and distributed in their journey from source to user. However, most water users know very little about the process of delivering this precious resource to their home or business.

The purpose of this report is to provide a brief overview of the water supplies available within Santa Barbara County, and how those supplies are used and managed within the county. For those who want more information on this dynamic subject, our source publications are listed in the References section of this report.

Properly informed, we can each more effectively participate in the complicated process of managing and protecting our water resources for our own use, the environment and future users.
Setting

Santa Barbara County is located approximately 100 miles northwest of Los Angeles and 300 miles south of San Francisco. Over 409,000 people live in Santa Barbara County. The mild climate, picturesque coastline, scenic mountains, and numerous parks and beaches make the county a popular tourist and recreational area.

Climate

Santa Barbara County has a Mediterranean climate with several microclimatic regions. Summers are warm and dry; the winters are cool and often wet. The county has a unique physical orientation, with a series of east-west transverse mountain ranges. This produces a profound orographic effect when a storm approaches the county from the Pacific Ocean. Most precipitation occurs between November and March with the exception of some far inland mountain areas receiving sporadic late summer thundershowers. Moist air from the Pacific Ocean moderates temperatures in the coastal areas; somewhat lower winter minimums and higher summer maximums prevail in the inland valleys.

Santa Barbara County’s weather is mainly controlled by the Pacific high-pressure system. In the dry season, from about May through September, the Pacific high usually occupies the area northeast of Hawaii. During the winter months it is weaker and positioned further south. For the most part, Santa Barbara County receives relatively gentle but steady rainfall during storm events. At times the persistence of the Pacific high at a latitude farther north than normal keeps the Pacific storm track farther to the north. This “blocking high” results in either no precipitation for part or all of California, or, at most, only light amounts. This climatological scenario is the reason for most of California’s droughts, including those occurring in the 1976-1977 and 1986-1991 seasons.

Rainfall is variable and streamflow is highly variable. The county is divided into six major watersheds each varying in their dominant geography and by types and quality of water supply. Streamflow is directly from rainfall with no significant snowmelt and little base flow from headwaters. Most streams are dry in the summer.

Drought

Historical records show that local drought periods of several years or more are cyclical, recurring about every forty years. Tree ring studies covering time periods of several centuries reveal apparent droughts lasting as long as 16 years or more. The most recent drought occurred from 1986 until 1991 and included some of the driest years on record. Evidence from tree ring analysis indicates that severe droughts occurred as far back as 1544. Droughts in Santa Barbara County have lasted an average of five years, with a maximum of 9 years.

Currently, the impacts of drought on our community result from the interplay between a natural event (less precipitation than expected resulting from natural climatic variability) and the demand people place on water supply. In order to lessen the impacts of droughts, local water purveyors have developed water management plans that provide long-term options for augmenting water supplies in preparation for future droughts.
**Rainfall Highlights**

Annual precipitation varies from 7" - 9" near Cuyama to a maximum of about 36" at the uppermost elevations of the San Rafael Mountains.

**Most rainfall in a year:**
- 1997-1998 .......... 46.75" .......... Santa Barbara
- 1941-1942 .......... 30.76" .......... Santa Maria

**Wettest Month:**
- February 1998 ...... 21.36" .......... Santa Barbara

**Biggest Storm Event:**
- January 1969 ...... Highest flow in Santa Ynez River in 2,900 years — 89,000 cfs (about 40 million gallons per minute) flowed into Lake Cachuma

**Santa Barbara County is subject to some of the highest short-duration rainfall intensities in California:**
- In 1995, 1.6" of rain fell in a 30 minute period near San Marcos Pass
- In 1993, 1.25" of rain fell during a 15 minute period at the Buellton Fire Station
- In 1969, 16" of rain fell in a 24 hour period at Juncal Dam

**Driest year:**
- 1877 ...................... 4.49" ....... Santa Barbara
The county occupies 2,745 square miles, one-third of which is located in the Los Padres National Forest.

The five principal drainage areas of the county are:

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Square Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Maria Watershed</td>
<td>1,845</td>
</tr>
<tr>
<td>Including Cuyama and Sisquoc Watersheds</td>
<td></td>
</tr>
<tr>
<td>Cuyama Watershed</td>
<td>1,140</td>
</tr>
<tr>
<td>San Antonio Watershed</td>
<td>165</td>
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<tr>
<td>Santa Ynez River Watershed</td>
<td>900</td>
</tr>
<tr>
<td>South Coast Watershed</td>
<td>416</td>
</tr>
</tbody>
</table>

**Annual Average Rainfall:**

<table>
<thead>
<tr>
<th>Location</th>
<th>Average (Inches, Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Santa Barbara</td>
<td>18&quot; (1868-1999)</td>
</tr>
<tr>
<td>City of Santa Maria</td>
<td>14&quot; (1907-1999)</td>
</tr>
<tr>
<td>Figueroa Mountain</td>
<td>23&quot; (1961-2000)</td>
</tr>
<tr>
<td>New Cuyama</td>
<td>9&quot; (1955-1998)</td>
</tr>
</tbody>
</table>
Terrain

Like most of Southern and Central California, Santa Barbara County is very mountainous. The steep Santa Ynez Mountains bound the coastal communities of Goleta, Santa Barbara and Carpinteria on the north; farther north the San Rafael Mountains rise to the highest elevations in the county; and the Sierra Madre Mountains occupy the northeast portion of the county. About 65% of Santa Barbara County’s 2,745 square miles are hilly or mountainous. Most of the remaining 35% of the land is taken up by a few valleys and plains.

Water Resource System

The county’s residents obtain their potable water from several sources: storm runoff collected in reservoir systems, groundwater withdrawal, and the State Water Project. The county’s potable water supply is delivered to the public through a variety of water purveyors: incorporated cities, community service districts, water districts, public utility companies, conservation districts and others.

There are four major reservoirs located in the County of Santa Barbara. Two reservoirs, Cachuma and Twitchell, are owned by the federal government, administered by the Santa Barbara County Water Agency, and operated by local water districts. The third, Gibraltar Reservoir, is owned and operated by the City of Santa Barbara. The fourth, Jameson Reservoir, is owned and operated by the Montecito Water District. Water from Cachuma, Gibraltar and Jameson is delivered to the South Coast through three tunnels built into the Santa Ynez Mountains.

Groundwater is another source of potable water for county residents. Since groundwater fluctuations are cyclical and sensitive to overdraft, groundwater withdrawal is closely monitored. In the South County, water purveyors use groundwater as a secondary source of potable water. However, the North County is nearly 100% supported by groundwater and/or shallow, riparian basin water, both of which are recharged by surface flows. The Santa Ynez River Water Conservation District Improvement District #1 (considered as part of the North County for purposes of this report) does receive water from the Cachuma Project.

The State Water Project (SWP) has served as another source of potable water since 1997. Water is delivered to Santa Barbara County from the Lake Oroville Reservoir located in Plumas County through a series of aqueducts, reservoir systems, and open river transport. Since SWP water is used primarily as a supplemental supply for urban users, its portion of the county’s total water supply is likely to vary each year. At maximum rates of delivery, the SWP could supply up to one-third of the region’s municipal and industrial demands.

For More Information

Population/Employment:
Santa Barbara County Association of Governments:
http://www.sbcag.org/

Rainfall:
Santa Barbara County Water Agency:
http://www.publicworkssb.org/water/
History

Santa Barbara County has a rich water development history, dating back to the Mission founders in the earliest settlements of what is now the city of Santa Barbara. Residents of Santa Barbara County recognized its limited and seasonal water supply as a crucial factor for the region’s continued growth and development even before the incorporation of local cities.

South Coast

The Mission in Santa Barbara was the area’s first major European population center and supported surrounding ranching and fruit-growing efforts. When water supplies became limited due to higher concentrations of people in the area, plans were made to construct the South Coast’s first large dam and reservoir which was completed in 1807. A rock and masonry dam approximately 20 feet high, 80 feet long, and 12 feet wide was constructed 1.5 miles above the Mission. The dam still stands today in the Santa Barbara Botanic Garden, along with remnant portions of an aqueduct that conveyed water to a reservoir north of the Mission, which held approximately 500,000 gallons of water (1.5 acre-feet). After incorporation as a city in 1850, Santa Barbara’s population expanded and the City continued to experience the pressures of limited water supplies. A report written in 1889 by the City Engineer concluded that the only feasible long-term source of water for Santa Barbara would have to come from the Santa Ynez River. He recommended land purchases for two possible dam and reservoir sites on the Santa Ynez River, but the City’s initial bond proposal was defeated.

Droughts in 1894 and from 1898 through 1900 re-emphasized the report’s conclusions. While the Cold Spring Tunnel (constructed in 1896) initially provided approximately 290 acre-feet of water per year, its yield steadily decreased to about 100 acre-feet per year and attention again turned to potential dam and reservoir sites on the Santa Ynez River. A 1905 report by the USGS recommended the construction of a tunnel (the Mission Tunnel) from the Santa Ynez River to the coast side of the mountains, in conjunction with building a dam and reservoir at the Gibraltar site on the river (Santa Barbara County Water Agency, 1949).

The main obstacle to this plan was that the tunnel would have to pass through lands held by the Santa Barbara Water Company, a private firm which had bought extensive tracts of land on the headwaters of the Santa Ynez River that encompassed all practicable reservoir sites. The City negotiated a contract with the Santa Barbara Water Company to allow construction of the tunnel in exchange for maintenance of flows in Mission Creek. The 3.7 mile-long Mission Tunnel was completed in 1912, the same year that the City purchased the holdings of the Santa Barbara Water Company.

The presence of major reservoirs in Santa Barbara County began in 1920 with the completion of Gibraltar Dam and Reservoir on the Santa Ynez River. Gibraltar Reservoir is located north of Santa Barbara on the northern side of the Santa Ynez Mountains. Continuing pressure due to increasing population in Santa Barbara County (mainly on the South Coast) and problems associated with rapid siltation of res-
Reservoirs, which led to diminished storage capacities, required the development of additional water supplies. Descriptions of the development of the county’s four major reservoirs are presented in subsequent sections of this report.

North County

For the purposes of this report, the North County is defined as the region encompassing the area from the San Luis Obispo County line south through the Santa Maria, Lompoc and Santa Ynez Valleys.

Santa Maria Valley

Up until the importation of State Water Project water in 1997, the northern portion of the county has been largely dependent on groundwater. Development of groundwater resources was accelerated in the early 1900s as a result of advances in drilling and pumping technologies. Agricultural development increased dramatically after World War II due to advances in refrigerated transport technology that allowed crops grown in the Santa Maria Valley to be transported by train in refrigerated rail cars for sale in distant locations.

Prior to the construction of the Vaquero Dam and Reservoir (now called Twitchell Reservoir), large portions of the Santa Maria Groundwater Basin were subject to periodic flooding, as documented in the Lippincott report (1931) to the Santa Maria Valley Water Conservation District (SMVWCD). In an effort to provide relief from flooding disasters, the SMVWCD, the Santa Barbara County Water Agency (SBCWA) and the U.S. Bureau of Reclamation (USBR) evaluated a number of potential dam sites on the Santa Maria River in the 1940s and 1950s. In the 1950s the USBR constructed the Vaquero Dam for water conservation and flood control. The project was intended to provide water for beneficial uses within the District that rely on the groundwater supplies underlying the Santa Maria Valley, and to protect urbanized and agricultural areas from flood damage.

During the past 25 years some of the urban areas in the North County have been expanding rapidly as the population has been increasing. This urbanization has displaced some agricultural lands. At the same time, improvements in agricultural technology have allowed increases in crop yield and intensification of agricultural development on an acre-by-acre basis. In some cases, water demand per acre has increased to allow for double and triple cropping and for higher water-using (and income-producing) crops to be grown, such as strawberries. Irrigation technologies have also improved, reducing the amount of water used by some crops. These improvements include drip irrigation, seedling propagation in controlled greenhouse environments, laser leveling of fields, and use of tailwater recovery systems in furrow-irrigated fields.

In some parts of the Santa Maria Groundwater Basin, the water quality is not high enough to support urban development. Due to declining water quality and modest overdraft in the Santa Maria Groundwater Basin, urban water purveyors moved to develop their entitlement to imported State Water Project (SWP) water. The SWP benefits all basin users through improved water quality and will eventually improve water quality in the basin. In addition, the SWP will offset a portion of the groundwater overdraft, through reduced pumping and improved quality return flows. Today, most of the water supply for the City of Santa Maria comes from the State Water Project.
Santa Ynez and Lompoc Valleys

As discussed above, agricultural development increased significantly after World War II. Water supplies in the Santa Ynez and Lompoc Valleys were obtained from groundwater and from the Santa Ynez River.

In order to augment water supplies by capturing flood flows on the Santa Ynez River, the USBR, together with water users and purveyors on the South Coast and the Santa Ynez River Basin area, evaluated potential dam sites on the river in the 1940s and 1950s. By 1956 site selection for and construction of the Bradbury Dam and Lake Cachuma were complete. The project included construction of a transmission tunnel (Tecolote Tunnel) through the Santa Ynez Mountains, and a distribution system along the South Coast.

The Cachuma Project provides a water supply for both urban and agricultural users, 90% of whom are on the South Coast. The diversion of water from the Santa Ynez River Valley to the South Coast has created a number of issues regarding these water supplies.

In the years since the Cachuma Project was completed there have been legal challenges by various downstream users. These challenges allege that construction of the Bradbury Dam has resulted in reduced water availability and declining water quality in the lower reaches of the Santa Ynez River and in the Lompoc Groundwater Basin. One result of this, and a greater understanding of the Cachuma Project’s effects on riparian groundwater users downstream, is that the State Water Resources Control Board (SWRCB) has issued several orders that govern water rights releases from Lake Cachuma. In addition, Cachuma Member Units (five water purveyors that contract for water from the reservoir) have voluntarily established an allocation of water to maintain fish downstream from the Dam. The SWRCB will consider the existing orders and the “fish account” during its re-evaluation of the Cachuma Project permit, which is scheduled for late in the year 2000.

State Water Project

The concept of a statewide water development project was raised in 1919, when Colonel Robert B. Marshall published a plan for transferring water from the Sacramento River system to the San Joaquin Valley and through the Tehachapi Mountains to Southern California. His proposal led to the first State Water Plan, published in 1931, which identified facilities and means of accomplishing the north-to-south water transfer. Although the plan was approved by the voters, the bonds to fund the project could not be sold as the state was in the midst of the Great Depression. In 1937, the federal government took over the funding and began constructing the Central Valley Project (CVP). Today, the CVP is operated and maintained by the U.S. Bureau of Reclamation and delivers about 7 million acre-feet of water through its system.

During and following World War II, California’s population nearly doubled and agriculture became big business so more water was needed beyond that provided by the CVP. Therefore, the Legislature asked the State Water Resources Board to update and expand the prewar water studies. In response to this request, the Division of Water Resources (precursor to the Department of Water Resources) of the Public Works Department produced Bulletin 1 (1951), Bulletin 2 (1955) and Bulletin 3
(1957), which included data on water resources, forecasts of future demand, and plans for the infrastructure needed to transfer water from areas of surplus in the north to the water-deficient areas to the south.

Concurrently, other specialists completed the first proposal for a “Feather River Project” (eventually named the State Water Project) in 1951 to meet the state’s immediate water needs. The proposed project was authorized by the State Legislature in 1951. In 1955, a second report on the Feather River Project was completed and included the addition of another reservoir in the system.

That same year, Northern and Central California experienced one of the greatest floods on record, which caused more than $200 million in property damage and took 64 lives. In response to this disaster, the Legislature appropriated $25.2 million to the Department of Water Resources (officially created in July 1956) to construct the State Water Project for flood control and water supply purposes. Work began in May 1957 in the Oroville area to make way for the dam and reservoir. In 1959 the California Water Resources Development Bond Act, known as the Burns-Porter Act, was passed authorizing the issuance of $1.75 billion in general obligation bonds to finance the SWP and any additional facilities needed to augment water supplies to meet local needs. Federal funding was provided for flood control and federal-state joint-use facilities. In November 1960, voters approved the bond act.

The initial facilities of the State Water Project, completed in 1973, included 18 reservoirs, 17 pumping plants, 8 hydroelectric power plants, and 550 miles of aqueduct. Additional facilities have been added to the system since that time including the Coastal Branch that serves Santa Barbara County. For more information refer to the State Water Project section of this report.

For More Information

Historical photographs available on compact disk from Goleta Water District. Call 964-6761.


Santa Barbara County Water Agency. 1949. *A Water History and the Cachuma Project.*


City of Santa Barbara: http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

Goleta Water District: http://www.goletawater.com/

Montecito Water District: http://www.montecitowater.com/

Vandenberg Village Community Services District http://www.impulse.net/~vvcسد
Water Supplies

Groundwater
Surface Water
State Water Project
Desalination
Introduction

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

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

Significant changes in groundwater basins generally occur over a period of decades. In larger basins, trends in groundwater level and groundwater quality are recognizable only by examining data the length of one or more hydrologic (rainfall)
cycles. However, some factors likely to affect the condition of the basins, such as the importation of supplemental water supplies, the implementation of basin management plans, and short-term climatic influences, may change from year to year.

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

**Groundwater Terms**

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

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

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

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

The basins are discussed in groups arranged geographically:

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

**The Santa Ynez River Watershed:**
- Santa Ynez Uplands
- Buellton Uplands
- Santa Ynez River Riparian
- Lompoc Groundwater Basins

**The North Coastal Groundwater Basins:**
- San Antonio
- Santa Maria

**The Cuyama Groundwater Basin:**
The only major basin located in the northeast section of the county.

**Others:**
Areas of limited groundwater extraction and areas that have not been analyzed in detail.
Well Monitoring and Data Collection

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

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

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

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

General Trends

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

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

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

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

<table>
<thead>
<tr>
<th>Basin</th>
<th>Size</th>
<th>Perennial Yield for:</th>
<th>Estimated Net Demand on Groundwater</th>
<th>Net Surplus/ (Overdraft)</th>
<th>Available Storage</th>
<th>Land Use Summary</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Acres</td>
<td>AFY</td>
<td>AFY</td>
<td>AFY</td>
<td>AFY</td>
<td></td>
</tr>
<tr>
<td><strong>South County Groundwater Basins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpinteria</td>
<td>6,700</td>
<td>4,294</td>
<td>3,865</td>
<td>2,605</td>
<td>1,260</td>
<td>50,000 One city, orchards, irrigated crops and greenhouses</td>
</tr>
<tr>
<td>Montecito</td>
<td>4,300</td>
<td>1,350</td>
<td>1,215</td>
<td>N/A</td>
<td>14,400</td>
<td>Primarily low-density residential use; unincorporated</td>
</tr>
<tr>
<td>Santa Barbara</td>
<td>4,500</td>
<td>847</td>
<td>805</td>
<td>N/A</td>
<td>10,000</td>
<td>Primarily residential, industrial and commercial</td>
</tr>
<tr>
<td>Foothill</td>
<td>3,000</td>
<td>953</td>
<td>905</td>
<td>898 (Maximum long-term pumpage. Basin managed by City of S.B.)</td>
<td>5,000</td>
<td>Primarily residential</td>
</tr>
<tr>
<td>Goleta North/ Central</td>
<td>5,700</td>
<td>3,600</td>
<td>3,420</td>
<td>3,420</td>
<td>18,000</td>
<td>Primarily residential, industrial and commercial. Basin has been adjudicated and is not subject to overdraft.</td>
</tr>
<tr>
<td>Goleta West</td>
<td>3,500</td>
<td>500</td>
<td>475</td>
<td>220</td>
<td>255</td>
<td>10,000 Primarily residential, industrial and commercial.</td>
</tr>
<tr>
<td><strong>Santa Ynez River Groundwater Basins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Santa Ynez Uplands</td>
<td>83,200</td>
<td>11,500</td>
<td>8,970</td>
<td>10,998</td>
<td>(2,600)</td>
<td>900,000 Three towns, one city, and other low density residential; varied, high-value agriculture</td>
</tr>
<tr>
<td>Buellton Uplands</td>
<td>16,400</td>
<td>3,740</td>
<td>2,768</td>
<td>1,932</td>
<td>800</td>
<td>154,000 Agriculture; one city</td>
</tr>
<tr>
<td>Lompoc</td>
<td>48,600</td>
<td>28,537</td>
<td>21,468</td>
<td>22,459</td>
<td>(991)</td>
<td>170,000 One city, unincorporated urban development, Vandenberg AFB; varied agriculture; petroleum</td>
</tr>
<tr>
<td>Basin</td>
<td>Size</td>
<td>Perennial Yield Gross Pumpage</td>
<td>Estimated Net Demand on Groundwater</td>
<td>Net Surplus/ (Overdraft)</td>
<td>Available Storage</td>
<td>Land Use Summary</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------</td>
<td>------------------------------</td>
<td>-------------------------------------</td>
<td>--------------------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Acres</strong></td>
<td>AFY</td>
<td>AFY</td>
<td>AFY</td>
<td>AFY</td>
<td>AF</td>
<td></td>
</tr>
<tr>
<td><strong>North County Groundwater Basins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Antonio</td>
<td>70,400</td>
<td>8,667</td>
<td>6,500</td>
<td>15,931</td>
<td>800,000</td>
<td>One town; extensive agriculture; some petroleum; VAFB</td>
</tr>
<tr>
<td>Santa Maria</td>
<td>110,000</td>
<td>(80,000 within Santa Barbara County)</td>
<td>120,000</td>
<td>80,000</td>
<td>1,100,000</td>
<td>Two cities; extensive unincorporated urban area (Santa Barbara County); extensive irrigated agriculture; petroleum</td>
</tr>
<tr>
<td><strong>Cuyama Groundwater Basins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuyama</td>
<td>441,600</td>
<td>(81,280 w/in Sta. Barbara County)</td>
<td>10,667</td>
<td>8,000</td>
<td>1,500,000</td>
<td>Extensive agriculture; some petroleum; very low population density</td>
</tr>
<tr>
<td><strong>Other County Groundwater Basins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More Ranch</td>
<td>502</td>
<td>84</td>
<td>76</td>
<td>24</td>
<td>60</td>
<td>Primarily open space; limited residential/agriculture</td>
</tr>
<tr>
<td>Ellwood to Gaviota Coastal Basins</td>
<td>67,200</td>
<td>—</td>
<td>6,000</td>
<td>N/A</td>
<td>N/A</td>
<td>Agriculture, primarily orchards and grazing; limited municipal/industrial</td>
</tr>
<tr>
<td>Gaviota to Pt. Conception Coastal Basins</td>
<td>25,040</td>
<td>—</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Agriculture, primarily grazing</td>
</tr>
<tr>
<td>Santa Ynez River Riparian Basins</td>
<td>12,000</td>
<td>(3 sub-units)</td>
<td>—</td>
<td>N/A</td>
<td>N/A</td>
<td>Storage generally maintained by capture of local runoff &amp; by releases of prior rights water banked in Cachuma Lake Two cities; 7,500 acres of irrigated cropland</td>
</tr>
</tbody>
</table>
South Coast Basins

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

The major groundwater basins (Carpinteria, Montecito, Santa Barbara, and Goleta) are separated from each other by faults, impermeable bedrock, inferred lithologic barriers, or arbitrary (administrative) boundaries. Inferred barriers exist where pronounced changes in water depth and/or water quality exist but where there is no other direct physical evidence of faulting or other physical barriers. It is important to note that basin and subbasin boundaries might change as more is learned about the geologic and hydrologic relationships between the aquifer units.
Physical Characteristics:

The Carpinteria Groundwater Basin underlies approximately 12 square miles in the Carpinteria Valley. It extends east of the Santa Barbara County line into Ventura County and includes the Toro Canyon subbasin to the west. (The Toro Canyon Subbasin is included in the Montecito Water District service area but is hydrologically a part of the Carpinteria Groundwater Basin.)

The aquifer consists of two storage units: Storage Unit One is located north of the Rincon Creek Fault and Storage Unit Two is located south of the Rincon Creek Fault. Storage Unit One and possibly Unit Two extend beneath the Pacific Ocean an unknown distance. The Toro Canyon area occupies a small extension of Storage Unit One. The Rincon Creek Fault acts as a barrier to groundwater flow between the two storage units. Large portions of the southern Carpinteria Basin aquifer are confined including portions of both storage units.

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

Water Quality:

Water quality has been monitored sporadically over most of the 20th century. Since the initial USGS study (Upson, 1951; Worts, 1951), TDS concentrations within the basin have increased, with recent concentrations ranging from 436 to 980 mg/L. Groundwater analyses conducted in 1985 revealed nitrate levels below the State Maximum Contaminant Level of 45 mg/L for public water systems.

There is no evidence of seawater intrusion into the basin. It is believed that the Rincon Creek and Carpinteria Faults act as barriers to seawater, as do clay layers overlying the aquifer near Carpinteria Slough.

Basin Supply and Demand:

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

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

Physical Characteristics:

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

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

Water Quality:

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

Basin Supply and Demand:

Available storage within the Montecito Groundwater Basin is estimated to be 14,400 AF (excluding the Toro Canyon subbasin). Groundwater from this basin supplies private residences and a small amount of agriculture within Montecito. Many residences are served by private wells or by water pumped by the Montecito Water District (MWD). Historically, water from Lake Cachuma and Jameson Reservoir on the Santa Ynez River has met roughly 90% of the water demand within the MWD. The remaining 10% of the demand has been filled by groundwater. The recent importation of State Water Project supplies has substantially increased the water supply available in the Montecito area.

The water supply available in the Montecito area is approximately 8,700 AFY, including groundwater and the available surface water sources. This figure includes 2,300 AFY from the Cachuma Project, 1,926 AFY from Jameson Lake and other surface water sources, 65 AFY from MWD bedrock wells, 3,000 AFY of SWP water and the Safe Yield of the groundwater basin of 1,350 AFY (for gross pumpage). Water demand in the Montecito area is approximately 5,500 AFY according to a County study (Baca, 1992) which incorporated demand associated with approved projects and vacant lots. Since the available surface supplies provide more than enough water to meet local demand, overdraft of the groundwater basin is not reasonably foreseeable.

Santa Barbara Groundwater Basin

Physical Characteristics:

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

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

**Water Quality:**

TDS concentrations within the two basins range from about 400 mg/L to about 1,000 mg/L. Isolated wells have exhibited much higher TDS concentrations. Seawater intrusion occurred in some areas of the south basin (Storage Unit #1) where heavy pumping from municipal wells caused groundwater levels to drop as much as 100 feet in the late 1970s.

More recently, samples taken from coastal wells have confirmed the presence of seawater intrusion with chloride concentrations greater than 1,000 mg/L. Groundwater pumping within the Santa Barbara Groundwater Basin has been drastically reduced since 1991. Effective pumping practices, together with groundwater injection programs, have restored the previously existing gradient thereby reversing the trend of seawater intrusion.

**Basin Supply and Demand:**

Available Storage within the Santa Barbara Basin is estimated to be 10,000 AF. Groundwater constitutes about 10% of the water supply for the City of Santa Barbara. Groundwater is produced by the City and by a few private businesses and homeowners. Surface water supplies available to the City of Santa Barbara include the State Water Project, Lake Cachuma, Gibraltar Reservoir and desalinated seawater. Other supplies include allocations from the Montecito and Goleta Water Districts and reclaimed wastewater.

The status of the City of Santa Barbara Basin (i.e., Storage Units #1 and #III) has been analyzed by the County on the basis of the overall supply/demand balance of the City of Santa Barbara (Baca and Ahlroth, 1992a). Overall water supplies available to the City total approximately 18,300 AFY, including the groundwater basin Safe Yield (for gross pumpage) of 847 AFY, a yield of 3,000 AFY from the State Water Project, and 14,453 AFY from the other sources listed above. Water demand has been estimated to be 15,121 AFY (Baca and Ahlroth, 1992a). Thus, a substantial surplus in water supply is available to the City and overdraft of the basin would not be reasonably foreseeable. Furthermore, the City of Santa Barbara is actively managing the use of this basin as an underground storage reservoir. This is part of an overall plan for the conjunctive use of the various City water resources. Since the City is the dominant pumper in the basin, it can control the physical conditions in the basin. Based on this circumstance, the City of Santa Barbara Groundwater Basin is not considered to be subject to overdraft (City of Santa Barbara Water Department, 1994).

**Foothill Groundwater Basin**

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

**Physical Characteristics:**

The Foothill Groundwater Basin is comprised of unconsolidated alluvial sediments that have accumulated along the base of the Santa Ynez Mountains in the Santa Barbara and Goleta areas. This basin encompasses about 4.5 square miles and extends from the outcrops of the underlying tertiary bedrock formations on the north to the Modoc...
and Mission Ridge Faults on the south. This hydrologic unit includes the former Storage Unit #II of the Santa Barbara Basin and the former “East Subbasin” of the Goleta Groundwater Basin.

**Physical Characteristics:**

The Goleta Groundwater Basin lies immediately west of the Santa Barbara Groundwater Basin on the county’s south coast. Goleta is an alluvial plain, bordered by the Santa Ynez Mountains to the north and the More Ranch Fault to the south. It is about eight miles long and three miles wide including the hydraulically connected alluvial materials extending into the drainages along the northern border. Foothills and terraces to the southeast of the alluvial plain (Hope Ranch Area) rise to an elevation of over 500 feet above sea level.

Average rainfall within the basin ranges from about 16 inches per year at the coast to about 20 inches per year at the basin’s highest elevation in the foothills of the Santa Ynez Mountains. Surface drainage is to the south toward the Goleta Slough through which several creeks empty into the ocean including Atascadero, Maria Ygnacia, San Jose, Tecolotito, and San Pedro.

The Goleta Groundwater Basin, as defined by the USGS, is divided into two subbasins separated by an inferred low permeability barrier that separates areas of differing water quality. The Goleta North-Central Subbasin extends from the Modoc Fault on the east to a north-west trending line marking an inferred low permeability zone on the west. Extending west from this line to outcrops of Tertiary bedrock is the West Subbasin. Both basins are separated from the ocean on the south by the More Ranch Fault. Although originally defined as portions of a larger basin, these two hydrologic units are distinct and have been analyzed and described in planning and legal documents as separate basins. Two court decisions in 1989 and 1991 declared these basins to be distinct and separate for purposes of water rights. Thus, the discussion presented below refers to the “North-Central Basin” and the “West Basin”. [Note: The term “Goleta Groundwater Basin” is sometimes used as a synonym for the Goleta North-Central Basin.]

**Water Quality:**

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

**Basin Supply and Demand:**

Available Storage of the Foothill Basin is estimated to be 5,000 AF. Safe Yield is estimated to be 953 AFY (for gross pumpage) based on the 1989 USGS study. Demand on the basin falls into three categories: pumpage by the City of Santa Barbara, pumpage by the La Cumbre Mutual Water Company (LCMWC) and extractions by private landowners. The supply/demand status of this basin has been analyzed by the County (Baca and Ahlroth, 1992a). Pumpage of the basin, including commitments to approved projects was estimated to be 898 AFY when the effects of a City of Santa Barbara/LCMWC agreement involving the State Water Project are considered. This agreement limited LCMWC pumpage to a fixed annual volume and included cooperation in the management of the basin. The City of Santa Barbara is conducting conjunctive use water supply management activities by injecting and storing surface water in the basin. Based on the agreement between the two major pumpers (together the City and LCMWC account for about 80% of basin pumpage) and the active management of the basin by the City of Santa Barbara, the Foothill Basin is not considered to be subject to overdraft.
Water Quality:

The USGS compiled water quality data for these basins in the early 1940s. Groundwater analyses completed at that time indicated that chloride concentrations throughout most of the North-Central and West basins were less than the DHS secondary standard of 250 mg/L. TDS ranged from about 170 mg/L to 1,400 mg/L in the North-Central Basin, and was approximately 800 mg/L in the West Subbasin.

More recent studies (Freckleton, 1989) yielded similar TDS ranges as the USGS study with the exception of high concentrations in some wells of the West Basin. The recent study yielded no evidence of seawater intrusion. In addition, seawater intrusion is not likely to have occurred at any time due to the rock formations and the More Ranch Fault along the coast that act as barriers to groundwater migration. Near-surface low permeability sediments cause the southern portion of the North-Central and West basins to be under confined conditions and provide a barrier to contamination from potential surface sources of water quality degradation such as agricultural return flow or infiltration of brackish water in the overlying Goleta Slough. High TDS perched water is present in shallow aquifers above the confining layers. This water is not in general use. Water quality in the North-Central Basin is sufficient for many agricultural uses but might require treatment for domestic uses. Water in the West Basin requires treatment for domestic use and can be used for irrigation of a limited variety of crops.

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

Basin Supply and Demand:

Goleta North/Central Basin:
Available Storage of the North/Central Basin is estimated to be 18,000 AF. Total storage within the basin (including the West Basin) has been estimated to be about 245,000 AF. Safe Yield (for gross pumpage) of this basin is estimated to be 3,600 AFY. Historically, this basin was in a state of severe overdraft. This state of overdraft resulted in lengthy legal proceedings and a long-term moratorium on new water connections to the Goleta Water District (GWD). The Wright Judgement in 1989 served to adjudicate the water resources of this basin and assigned quantities of the basin Safe Yield to various parties, including the GWD and the LCMWC. The judgement also ordered the GWD to bring the North/Central Basin into a state of hydrologic balance by 1998. The GWD has achieved compliance with this order through the importation of SWP water and the development of other supplemental supplies. These supplemental supplies have offset the court mandated reduction in pumpage from the basin. Given that the basin has been adjudicated and pumpage is controlled by the Court, overdraft is not foreseeable in the North-Central Basin.

Goleta West Basin:
Available Storage of the Goleta West Basin is estimated to be 10,000 AF. Safe Yield (for gross pumpage) is estimated to be 500 AFY. Based on the results of a meeting in April, 1992 between the County and the GWD, gross pumpage in the Goleta West Basin is estimated to be approximately 232 AFY and is entirely attributable to private landowners. Thus, based on the most recent analysis the West Basin has a surplus of 268 AFY for gross pumpage. This state of surplus is anticipated to extend for many years into the future given the availability of high quality supplies from the GWD and the generally poor quality of the water in this hydrologic unit.

Other Supplies:

The Goleta area receives surface water from two sources, the Cachuma Project and the State Water Project. These projects are the major sources of water for the area and provide about 16,300 AFY.
The groundwater basins within the Santa Ynez River drainage lie between the San Rafael Mountains to the northeast, the Purisima Hills to the north, and the Santa Ynez Mountains to the south. The shape and location of these basins are controlled by the east-west oriented folds and faults of the region. In addition, the formations of the basins have been influenced by the former stages and flow of the Santa Ynez River, creating terraces and uplands which comprise some of the primary aquifers.
Santa Ynez Uplands Groundwater Basin

Physical Characteristics:

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

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

Water Quality:

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

Basin Supply and Demand:

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

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

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

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

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

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

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

Water Quality:

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

Basin Supply and Demand:

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

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

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

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

Physical Characteristics:

The Lompoc Groundwater Basin consists of three hydrologically connected subbasins: the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands. Together, these subbasins encompass about 76 square miles. The basin surrounds the lower reach of Santa Ynez River and is bordered on the north by the Purisima Hills, on the east by a topographic...
Groundwater users and public agencies within the basin are working to clarify and resolve water quality concerns.
Basin Supply and Demand:

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

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

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

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

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

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

San Antonio Groundwater Basin

Physical Characteristics:

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

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

Water Quality:

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

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

Basin Supply and Demand:

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

Available Storage within San Antonio Groundwater Basin is estimated to be about 800,000 AF. Safe Yield of the basin is 8,667 AFY (gross) and 6,500
AFY (net), according to the USGS (Hutchinson, 1980). Baca and Ahlroth (1999) estimate net pumpage (net consumptive use) of groundwater in the basin to be 15,931 AFY (equivalent to gross pumpage of 21,128 AFY). Thus, the basin is in a state of overdraft at a level of 9,431 AFY (net).

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

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

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

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

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

Water Quality:

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

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

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

Basin Supply and Demand:

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

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

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

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

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

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

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

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

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

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

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

### More Ranch Groundwater Basin

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

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

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

### Ellwood to Gaviota Groundwater Area

**Physical Characteristics:**

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

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

**Water Quality:**

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

**Basin Supply and Demand:**

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

Groundwater in the Ellwood-Gaviota area is produced from wells that tap bedrock aquifers or alluvial sediments which accumulated along canyon floors. Land uses supported by this pumpage include the Exxon Las Flores Canyon oil processing facility; the Chevron Gaviota oil processing facility; residential development and agriculture at the El Capitan Ranch; the El Capitan, Refugio and Gaviota State Parks; the Tajiguas Landfill and several large avocado orchards. A detailed land use and water
demand survey of this area has not been conducted. Water resources are evaluated by the County on a project-by-project basis during the review of applications for discretionary and ministerial County land use permits. *The Groundwater Thresholds Manual for Environmental Review of Water Resources in Santa Barbara County* (Baca, 1992) describes the adopted County methodology for estimating the Safe Yield of bedrock aquifers.

### The Santa Ynez River Riparian Basin

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

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

### For More Information


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

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

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

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

Surface water refers to water resources that flow or are stored in surface channels (streams and rivers, or lakes and reservoirs). Surface water can be naturally occurring, or can be created or altered through human design. A surface reservoir is formed when a dam is built to trap natural flows along a river and to temporarily store water behind the dam in the reservoir. Water can then be released in a controlled fashion for flood control, recreational purposes, or as needed for water supply. The land area that collects water which feeds into surface flows, such as creeks and rivers, is called a watershed. A watershed includes the areas up to the mountain ridges that collect rainwater, the valleys with streams within these areas, and the lakes where the water flows are stored.

Rivers

General Information

In Santa Barbara County there are several rivers that flow from back-country watersheds into the ocean. The flow of the rivers in Santa Barbara County is highly variable with more years of low and intermediate flow than years with high flow. In Santa Barbara County flow is dependent on rainfall, as there is little base flow and no significant snowmelt. The years within the top 25% for rainfall create most of the volume in Santa Barbara County rivers, so during normal years many streams are dry throughout the summer and fall. Four reservoirs have been built to capture these surface flows for a variety of uses.

Santa Ynez River

Geology, Topography, Location:

The Santa Ynez River watershed, located in the central part of Santa Barbara County, is about 900 square miles in area. The Santa Ynez River originates in the San Rafael Mountains in the Los Padres National Forest, at an elevation of about 4,000 feet near the eastern border of the county. A small portion of the Santa Ynez River watershed lies in Ventura County. The river flows westerly about 90 miles to the ocean, passing through Jameson Lake, Gibraltar Reservoir and Lake Cachuma. The terrain on the south side of the river rises steeply to
the crest of the Santa Ynez Mountains. These mountains range in elevation from about 2,000 to 4,000 feet and separate the Santa Ynez River Basin from Santa Barbara and the South Coast. The north side of the basin is formed by the Purisima Hills and San Rafael Mountains, which range in elevation from 1,000 to 6,000 feet.

As the river descends from higher elevations, it passes through a narrow trough between the mountains just upstream of Lake Cachuma. Below Lake Cachuma, the river passes along the southern edge of the Santa Ynez Upland and flows past the broad part of the valley near Buellton. West of Buellton it flows through a narrow meandering stretch to the Lompoc Narrows and emerges onto the broad Lompoc Plain before it empties into the Pacific Ocean at Surf Beach.

The river is characterized by both narrow channel sections on bedrock and broad alluvial floodplains more than 2,000 feet wide near Solvang and Lompoc. Near Bradbury Dam, the active channel is approximately 400 feet wide. Further downstream near the confluence with Alamo Pintado Creek, the active channel is more than 400 feet wide.

**Flow Rates/Flooding History:**

Streamflow in the Santa Ynez River watershed is derived primarily from surface runoff and shallow groundwater inflow following storm events, which vary greatly in frequency and intensity from year to year. The soils, geology, and topography of the watershed create relatively rapid runoff conditions, with streamflow hydrographs showing a rapid rise and fall in response to precipitation. As a result, the Santa Ynez River is characterized as a “flashy” system, with streamflow rising and falling in response to precipitation.

When water rights releases are made from Gibraltar and Bradbury Dams in the summer months, there are flows downstream of Gibraltar Reservoir and Lake Cachuma. In addition, the Lompoc Regional Wastewater Treatment Plant discharges approximately 3.5 million gallons of treated wastewater per day, creating almost year-round flow from the plant facility to the ocean.

Several major tributaries downstream of Bradbury Dam contribute significant flows to the lower Santa Ynez River, including Santa Agueda, Alamo Pintado, Zaca, Alisal, Salsipuedes, and San Miguelito Creeks.

Data taken from several stream gages demonstrate year to year variability in streamflow within the watershed. The data also demonstrate the intermittent nature of streams in the watershed, with high flows occurring in the winter and the likelihood of little or no flows in the summer. Annual median flow from the Santa Ynez River into Lake Cachuma is 20,000 acre-feet (AF) with an annual average inflow of approximately 74,000 acre-feet per year (AFY). The maximum flow into Cachuma is approximately 500,000 AFY. The highest flow in the Santa Ynez River occurred near Solvang during the 1969 floods when flows reached 82,000 cubic feet per second (cfs).

**Water Use:**

In the Santa Ynez River Basin there are three storage reservoirs that divert Santa Ynez River water to users primarily on the South Coast of the county.

**Juncal Dam** was completed in 1930 and is one source of water for the customers of the Montecito Water District. For more information see Reservoirs section.
**Gibraltar Dam** has been in place since 1920 creating Gibraltar Reservoir, which serves as a water supply for the City of Santa Barbara. For more information see the Reservoirs section.

**Bradbury Dam** created Lake Cachuma in 1952 and supplies water for the USBR’s Cachuma Project, which provides water to project members including the City of Santa Barbara, Montecito Water District, Goleta Water District, Carpinteria Valley Water District, and Santa Ynez River Water Conservation District, Improvement District #1. The Project yield and downstream water rights releases serve over 290,000 people in Santa Barbara County and over 38,000 acres of cropland in Santa Ynez Valley that supports a multimillion dollar agricultural industry. For more information see Reservoirs section.

The watershed above Bradbury Dam is primarily undeveloped open space under the jurisdiction of the Los Padres National Forest and the Lake Cachuma County Park. Lands downstream of Bradbury Dam are mainly in private ownership and fall under the jurisdiction of the County with the exception of Vandenberg AFB at the river’s mouth. Existing land uses in the lower watershed include irrigated and non-irrigated agriculture, residential and urban areas (cities of Lompoc, Buellton, and Solvang along with several small towns), a federal prison, Vandenberg AFB, cattle grazing, undeveloped open space, and mineral extraction (quarries, surface mines, oil fields). Crops grown in this watershed include wine grapes, beans, lettuce, broccoli, artichokes, and various flowers and trees.

The Santa Ynez watershed provides habitat to a wide variety of fish and wildlife species. Ten fish species are native to the river basin, four in freshwater and six in estuarine habitats. Two species are listed as federally endangered: steelhead trout and tidewater goby. Fifteen introduced species have populations in the basin, most of which are game species or baitfish that were originally planted in Lake Cachuma, but have since spread. Other species of note include the California red-legged frog, least Bell’s vireo, the southwestern willow flycatcher, and the southwestern arroyo toad.

State, federal and local agencies signed a Memorandum of Understanding (MOU) in 1993 for Cooperation in Research and Fish Maintenance on the Santa Ynez River downstream of Bradbury Dam. Since then, a program of cooperative fisheries investigations and basin management planning has been underway in the Santa Ynez River. The goal of the plan is to identify and evaluate potential management actions that will benefit fish and other aquatic resources in the lower Santa Ynez River.

**Sisquoc River**

**Geology, Topography, Location:**

The Sisquoc River receives runoff from a watershed area of approximately 470 square miles. The watershed of the Sisquoc River is defined by the northwestward-trending Sierra Madre Mountains on the north and the westward trending San Rafael Mountains on the south. The San Rafael mountains rise to 6,828 feet (U.S. Bureau of Reclamation, 1951). Most of the Sisquoc River drainage lies within the boundaries of the Los Padres National Forest.

**Flow Rates/Flooding History:**

Streamflow in the Sisquoc River has averaged 54.6 cfs for water years 1942-1998. Flows of up to 33,600 cfs have occurred in extremely wet years like 1983, however it is not uncommon for long periods of no flow to occur each year. Floods from the Sisquoc River basin are short in duration with relatively high peak discharges. Shallow erodible soils, steep slopes, and high rainfall combine to make possible destructive flood flows whenever the cover is destroyed or reduced in density (U.S. Department of Agriculture, Forest Service, 1951).

**Water Use:**

Land use occurring along the reaches of the river varies from wilderness to agriculture. Hiking trails and campgrounds are established in the section
within the Los Padres National Forest. The remoteness of this region allows for relatively pristine, diverse and abundant wildlife habitat. The Sisquoc River is known to provide habitat to native trout and is within the range of the peregrine falcon (Jones and Stokes Assoc, Inc. and Leeds, Hill and Jewett, Inc., January 1979).

The Sisquoc Plain is intensely cultivated. Land uses along lower reaches of the river include vineyards, wineries, sand/gravel mining, and cattle ranches. The Sisquoc is unregulated so irrigation occurs through pumping from wells along the river. Crops grown in this area include cauliflower, broccoli, carrots and strawberries.

### Cuyama River

#### Geology, Topography, Location:

The Cuyama River drains an 1,140 square mile watershed area that includes southeastern San Luis Obispo County, northeastern Santa Barbara County and relatively small portions of Ventura and Kern Counties. Major tributaries to the Cuyama River are Huasna River and Alamos Creek. On the north, the Cuyama River basin is flanked by the dry, semibarren Caliente Mountains, which attain a maximum elevation of 5,095 feet (U.S. Bureau of Reclamation, 1951). The rugged, chaparral-covered Sierra Madre Mountains form the southern boundary of the Cuyama River basin and reach an elevation of 5,880 feet. Since February 1959, flow in the Cuyama River has been regulated by Twitchell Reservoir, which retards a portion of intercepted storm flow for later release. Below the dam, the Cuyama River meanders approximately five miles through vineyard farmland in a valley less than a mile wide surrounded on both sides by hills that rise quickly to elevations of 800 feet. About a half mile before Fugler Point the river enters the flattened terrain of the Santa Maria Valley.

The Cuyama River with its two principal tributaries, Huasna River and Alamos Creek, is the largest contributor of silt and floodwater to the Santa Maria River system. The major sediment sources are the semibarren badlands at the head of the drainage and the channel banks in the Cuyama Valley. The Cuyama River has cut a deep channel in the lower half of the Cuyama Valley. Enough material is available in the steep banks to load any flow of the river. The semidesert area, about two-fifths of the watershed, has very scant cover, consequently rainfall in even small amounts produces debris (U.S. Department of Agriculture, Forest Service, 1951).

#### Flow Rates/Flooding History:

The Cuyama River is characterized as “flashy” with relatively rapid response to rainfall and little or no flow in its reaches during the summer months. The annual mean flow is approximately 27.8 cfs, however during the 1998 floods flow rates reached 26,200 cfs. Due to the variation of flow in the river, no significant surface water diversions from the Cuyama occur. Water quality is variable, ranging from 800 to 1000 mg/L TDS depending on which tributary is contributing the majority of the flow to the river. In addition the Cuyama River carries significant volumes of silt during high flow. Due to coarse alluvial deposits and low annual precipitation in the eastern Cuyama watershed, during years of low to moderate precipitation, most of the runoff percolates into the ground before reaching the Twitchell Reservoir. Only in years of high precipitation is there a significant contribution to Twitchell from the eastern Cuyama River. In years of average rainfall, most of the runoff is from the Huasna and Alamo watersheds directly north of Twitchell Reservoir.

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*Water Resources of Santa Barbara County*
Water Use:

Twitchell Dam was constructed in 1959 north of Fugler Point on the Cuyama River. It is both a flood control and water conservation reservoir. Water conserved in Twitchell is released to the Santa Maria River during dry months for the purpose of recharging the groundwater basin. No water is diverted directly from the reservoir for any other uses. Inflow into Twitchell Reservoir from the Cuyama River averages 41,000 AFY.

The Cuyama Valley is a sparsely populated area with small urban areas and mainly agricultural land use. Irrigation began in the Cuyama Valley around 1938. Initially, irrigated crops were chiefly potatoes and alfalfa, but a potato rust caused the phasing out of potato planting. More recent crops include pistachios, apples, carrots, and alfalfa.

Santa Maria River

Geology, Topography, Location:

The Santa Maria River is formed by the confluence of the Cuyama and Sisquoc Rivers at Fugler Point, a location 20 miles inland from the Coast. The Santa Maria River Valley covers the 260 square mile watershed area downstream of the Cuyama-Sisquoc River confluence. Much of the valley consists of a broad alluvial area known as the Santa Maria Plain. A broad syncline underlies this plain. Anticlines are expressed as adjacent highlands and mountains. The Sierra Madre Mountains and the Casmalia Hills are representatives of the latter topography, and respectively form the northeast and the southwest boundaries of the valley basin. Relatively elevated terrace surfaces and dune sands border the Santa Maria Plain on the north and south. These deposits comprise the Nipomo Mesa, which rises gently northward to the western extension of the Sierra Madre Mountains, and the Orcutt Upland, which rises southward to the Solomon and Casmalia Hills.

The Santa Maria River is bounded on the north by a levee that starts at Nipomo Mesa and ends at Highway 1 near Guadalupe. There is also a levee on the south that begins at Fugler Point and continues up to the Highway 1 crossing, just north of Guadalupe.

The Santa Maria River historically has possessed two outlets to the ocean through sand dune deposits in the westerly extreme of the basin. The active river channel presently discharges to the coast downstream of Guadalupe. Flow at Guadalupe is zero during much of the year, except for agricultural tailwater flows, and additional flows may occur in winter during periods of heavy storm runoff. An additional point of discharge, now blocked, occurred through Oso Flaco Lake along the northern boundary of the valley. The abandoned channel veers from the active river course about three miles upstream from Guadalupe. It follows the course of Oso Flaco Creek, which presently conveys drainage to Oso Flaco Lake. Oso Flaco Creek does not possess flow adequate to maintain an opening to the ocean through the dunes.

A historically inactive channel of the Santa Maria River is situated in the southern portion of the Santa Maria Plain. This drainage, known as Green Canyon, encompasses the area south of Guadalupe from US Highway 101 to the mouth of the Santa Maria River. This inactive channel generally exhibits characteristics typical of the alluvial valley plain. The
western-most portion of Green Canyon serves to collect runoff from a local drainage of about 17 square miles as well as storm inflow from the watershed of Corralitos Canyon and Orcutt Creek. The latter two tributaries intersect Green Canyon at locations approximately one and one-third miles south of Guadalupe. These watercourses convey drainage from watershed areas of about 4½ and 38 square miles, respectively. Flows conveyed to Green Canyon are discharged to the Santa Maria River at a location slightly more than one mile east of the river mouth.

Flow Rates/Flooding History:

The Santa Maria watershed is much larger than the Santa Ynez River watershed, but it receives far less rainfall. The Santa Maria River is ephemeral, with no surface through flows about 83% of the time. Discharges that occur are highly variable. Historically, the stream meander eroded the banks, stripped farmland of soil, and undercut portions of the flood control levees downstream from Fugler Point. The highest flows in the Santa Maria system have been around 30,000 cfs at Fugler Point.

Water Use:

The climate, soil, and topography of the Santa Maria Valley contribute to the agricultural nature of the region. Intensely irrigated agriculture dominates much of the Santa Maria Valley. Groundwater pumpage for agriculture began in the Santa Maria Valley in 1898 with the inception of the sugar beet industry. Irrigated lands gradually expanded with the introduction of vegetable farming in the valley in the 1920s and 1930s. Vegetables were historically rotated with sugar beets, beans, alfalfa, and dry land crops (U.S. Department of Agriculture, Forest Service, 1951). Recent crops include strawberries, broccoli, various flowers, and alfalfa.

The area around the mouth of the Santa Maria River has been designated as a National Natural Landmark by the US Secretary of the Interior because of the presence of extensive sand dunes, dune uplands, lakes and wetlands (Santa Barbara County Water Agency and URS Greiner Woodward Clyde Consultants, 2000). In addition to oil development activities and agricultural activities, the coastal area is a popular recreation destination. There is public access at Oso Flaco Lake Natural Area and at Rancho Guadalupe Dunes County Park just south of the Guadalupe oil field.

For More Information


U.S. Bureau of Reclamation. 1951. Santa Maria Project, South Pacific Basin, California.

Reservoirs

Santa Ynez River Watershed

The Santa Ynez River Watershed extends from the south slope of the San Rafael Mountain Range to the north slope of the Santa Ynez Mountains, and westward from the Ventura County line to the Pacific Ocean. The three reservoirs that have been constructed on the Santa Ynez River supply most of the water used in the South Coast area of Santa Barbara County. The largest of these is Lake Cachuma, followed by Gibraltar and Jameson Reservoirs, which are located upstream.

Lake Cachuma and Bradbury Dam

The United States Bureau of Reclamation (USBR) constructed Lake Cachuma and Bradbury Dam in the early 1950s as part of the Cachuma Project. The construction of Bradbury Dam began in August of 1950 and was completed on June 17, 1953. Filling of the reservoir was completed in 1958.

The principal features of the Cachuma Project are Bradbury Dam, Lake Cachuma, Tecolote Tunnel, the South Coast Conduit and distribution systems. Included in the main conduit system are four regulating reservoirs and the Sheffield Tunnel.

Tecolote Tunnel was one of the most difficult tunnel projects undertaken by the USBR. The tunnel was completed in 1956 following a difficult six year construction period. Tunnel construction was hampered by groundwater inflow reaching 9,000 gallons per minute, temperatures up to 117°F, and dangerous levels of methane gas.
The City of Santa Barbara completed construction of Mission Tunnel in 1912 and Gibraltar Dam in 1920, and thus accomplished the first diversion of water from the Santa Ynez River Basin to the South Coast area. Mission Tunnel, about 3.7 miles in length, was designed to intercept groundwater flow and to later convey water from Gibraltar Reservoir to the City of Santa Barbara. Infiltration into Mission Tunnel varies with rainfall, but averages approximately 1,100 AFY. Gibraltar Dam construction began in 1914 and was completed in 1920. During the construction of the dam and reservoir, the City’s water supply became so deficient that residents had to revert to the use of well water, and even that use was restricted.

In the winter of 1920-21, the first rainy season after the completion of the dam, the reservoir failed to fill because the rainfall was below average. In the 1921-22 season, with rainfall only slightly above average, the reservoir filled to capacity, and a large volume went over the spillway, causing extensive damage.

By 1945, sedimentation had reduced storage in Gibraltar Reservoir from 14,500 AF to approximately 7,800 AF. In 1948, the dam was raised 23 feet and storage capacity was restored to approximately the original volume. However, sedimentation has continued to decrease the storage capacity of the reservoir by an average of 150 AFY.

The Montecito Water District completed construction of Juncal Dam and Jameson Lake in 1930. Water is diverted to the Montecito area through the Doulton Tunnel. Construction of Doulton Tunnel began in 1924 and initially penetrated only the first mile of the Santa Ynez Mountains due to substantial groundwater inflow. The tunnel was finally completed in 1928. Groundwater inflow to Doulton Tunnel currently averages approximately 440 AFY.
Twitchell Reservoir

The United States Bureau of Reclamation constructed the Vaquero Dam and Reservoir in the late 1950s as part of the Santa Maria Project. The Project provides recharge to the groundwater basin underlying the Santa Maria Valley and provides for flood protection. The project was completed in 1959 at a cost of approximately $11 million dollars, which was 30% less than the original estimate. The name was eventually changed to Twitchell Dam and Reservoir to honor Mr. T.A. Twitchell of Santa Maria, who was instrumental in bringing about the project. Twitchell Reservoir is operated and maintained by the Santa Maria Valley Water Conservation District.

Twitchell Reservoir is important to both the water supply and the flood protection of the Santa Maria Valley. The reservoir supplies about 20,000 AF of recharge to the Santa Maria Groundwater Basin annually. The replacement cost of getting this water from other sources would be millions of dollars every year.

Since its completion, Twitchell Reservoir has been trapping sediments from the 1,140 square mile Cuyama River watershed. Original studies estimated that 40,000 AF of sediment would accumulate in the reservoir during the first one hundred years of operation. In 1981, a study found that the rate of sedimentation was about 70% greater than the original estimate. As of 1998, the accumulated sediment had reached an estimated 44,000 AF. Because of this, the SBCWA and the Santa Maria Valley Water Conservation District are preparing a sediment management plan. This plan will help to ensure the continued safe operation of the reservoir’s water release works, and also extend the usable life of the reservoir.

Santa Maria River Watershed

The Santa Maria River is formed by the confluence of the Cuyama and Sisquoc Rivers about 20 miles from the Pacific Ocean. The Cuyama River Basin, with a drainage area of about 1,140 square miles, drains essentially all of the northern half and easternmost portion of the Santa Maria River Basin. Twitchell Dam is located on the Cuyama River six miles above its junction with the Sisquoc River.
## County Reservoir Information

<table>
<thead>
<tr>
<th></th>
<th>Bradbury Dam</th>
<th>Gibraltar Dam</th>
<th>Juncal Dam</th>
<th>Twitchell Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Dam</strong></td>
<td>Earth and rock fill</td>
<td>Constant radius</td>
<td>Concrete arch</td>
<td>Earth and rock fill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>concrete arch</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Structural Height</strong></td>
<td>275 feet</td>
<td>175 feet</td>
<td>160 feet</td>
<td>241 feet</td>
</tr>
<tr>
<td><strong>Height Above Streambed</strong></td>
<td>205 feet</td>
<td>150 feet</td>
<td>N/A</td>
<td>218 feet</td>
</tr>
<tr>
<td><strong>Crest Length</strong></td>
<td>2,975 feet</td>
<td>600 feet</td>
<td>1,407 feet</td>
<td>1,804 feet</td>
</tr>
<tr>
<td><strong>Reservoir Area</strong></td>
<td>3,108 acres</td>
<td>244 acres (1998)</td>
<td>138 acres</td>
<td>3,600 acres</td>
</tr>
<tr>
<td><strong>Drainage Area Above Dam</strong></td>
<td>417 sq. mi.</td>
<td>216 sq. mi.</td>
<td>14 sq. mi.</td>
<td>1,135 sq. mi.</td>
</tr>
<tr>
<td><strong>Tunnel Name</strong></td>
<td>Tecolote Tunnel</td>
<td>Mission Tunnel</td>
<td>Doulton Tunnel</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Tunnel Length</strong></td>
<td>6.4 miles</td>
<td>3.7 miles</td>
<td>2.2 miles</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Tunnel Diameter</strong></td>
<td>7 feet</td>
<td>4 feet to 20 feet</td>
<td>7 feet</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Tunnel Slope</strong></td>
<td>3”/1,000 feet</td>
<td>NR</td>
<td>.0018”/1,000 feet</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Tunnel Capacity</strong></td>
<td>100 cfs</td>
<td>40 cfs</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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**For More Information**

Cachuma Operations and Maintenance Board (COMB): 3301 Laurel Canyon Road, Santa Barbara, CA 93105, (805) 687-4011

City of Santa Barbara:
http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

Montecito Water District: http://www.montecitowater.com/

Goleta Water District: http://www.goletawater.com/

USBR: http://www.usbr.gov/

Trapped or accumulated sediment surrounding the intake structure in the dry bed of Twitchell Reservoir.
The State Water Project (SWP), managed by the Department of Water Resources (DWR), is the largest state-built, multipurpose water project in the country. The SWP system collects, stores and distributes water from northern California, where most of the state’s rainfall occurs, to southern California, where most of the state’s population lives. Approximately 20 million of California’s 32 million residents receive at least part of their water from the SWP, and SWP water is used to irrigate approximately 600,000 acres of farmland.

In 1951, the state legislature authorized construction of the SWP, a water storage and supply system to capture, store, and redistribute surface runoff on a massive scale. Eight years later, legislation was passed to provide the mechanism for obtaining funds necessary to construct the initial facilities. In 1960, California voters approved a $1.75 billion bond issue to build the SWP. The initial facilities of the SWP were completed in 1972, although some parts of the Project have been delivering water to Californians since 1962.

Total entitlements to the SWP are approximately 4.2 million AFY, while the firm yield (i.e., during drought periods) of existing SWP facilities is 2.4 million AFY. The average annual yield of the project approaches 3 million AFY. It is projected that future improvements to the SWP system, both structural and operational, will increase both the firm and average yields.

In 1963, the Santa Barbara County Flood Control and Water Conservation District contracted with the DWR for the delivery of SWP water. At that time, the County began payments to DWR to retain an entitlement to SWP for 57,700 AFY, but funds were not allocated to construct the necessary delivery system. The contract with the DWR was handled by the SBCWA. In 1981, the contract was amended to reduce the County’s State Water entitlement to 45,486 AFY.

In 1979, a bond measure was placed on the ballot to secure funds to construct the delivery system to bring SWP water into the county. Fear of growth, environmental concerns, and opposition to high water costs caused a majority of voters to vote against this measure.

In 1991, after six years of extremely dry conditions, voters throughout Santa Barbara County voted to import SWP water. This included the communities of Carpinteria, Summerland, Montecito, Santa Barbara, Hope Ranch, Goleta, Buellton, Solvang, Santa Ynez, Orcutt and Guadalupe. The Santa Maria City Council and Vandenberg Air Force Base also decided to participate in the SWP. The communities of Lompoc, Vandenberg Village, and Mission Hills voted not to participate in the SWP.

As a result of numerous favorable bond elections, the Central Coast Water Authority (CCWA) was formed to finance, construct, manage, and operate Santa Barbara County’s 42 mile extension of the SWP water pipeline and a regional treatment plant to treat SWP water for both San Luis Obispo and Santa Barbara Counties. The CCWA is made up of eight member agencies, one associate member, and four additional participants. The CCWA is governed by an eight member Board of Directors, with a representative from each member agency.

The following table presents the allocated entitlement of SWP water to each project participant. Existing entitlements range from 50 AFY (Raytheon Construction of the State Water Project Pipeline in Santa Barbara County began in 1994
Water Resources of Santa Barbara County

Systems Company) to as high as 16,200 AFY (City of Santa Maria), though actual water deliveries may be less than the entitlement in any given year depending on a number of factors, primarily customer demand and weather in northern California. Factors other than drought that may cause short-term delivery reductions of SWP water include equipment failure and natural disasters such as floods and earthquakes. Other factors that affect the long-term reliability of the State Water Project include timing of additional SWP storage facility development, ongoing environmental challenges to the SWP, and eventual utilization of full SWP entitlement by other SWP water contractors.

Construction of the facilities to import SWP water to the county began in 1994, including pipelines, pumping plants and treatment costing almost $600 million. The Coastal Branch portion of the project brings water 117 miles from the California Aqueduct in Kern County, through San Luis Obispo County and the Santa Maria Valley, and continuing to the northerly portion of Vandenberg AFB. The DWR financed this section of the pipeline and constructed it with the CCWA’s assistance.

At Vandenberg AFB, the Coastal Branch connects to the 42-mile pipeline comprising the Mission Hills and the Santa Ynez Extensions. The Santa Ynez section, which was financed and constructed by the CCWA, ends at Lake Cachuma. Water is then delivered through existing facilities to the south coast of Santa Barbara County. The CCWA also constructed and operates the Polonio Pass Water Treatment Plant, located in northern San Luis Obispo County. In addition, under a joint powers agreement with the DWR, the CCWA operates all of the Coastal Branch facilities downstream of the treatment plant.

<table>
<thead>
<tr>
<th>State Water Entitlements in Santa Barbara County</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Participant</strong></td>
</tr>
<tr>
<td>California Cities Water Co. <em>(Orcutt area)</em></td>
</tr>
<tr>
<td>Carpinteria Valley Water District <em>(Includes Summerland)</em></td>
</tr>
<tr>
<td>City of Buellton</td>
</tr>
<tr>
<td>City of Guadalupe</td>
</tr>
<tr>
<td>City of Santa Barbara</td>
</tr>
<tr>
<td>City of Santa Maria</td>
</tr>
<tr>
<td>Goleta Water District</td>
</tr>
<tr>
<td>La Cumbre Mutual Water Co.</td>
</tr>
<tr>
<td>Montecito Water District</td>
</tr>
<tr>
<td>Morehart Land Company</td>
</tr>
<tr>
<td>Raytheon Systems Company</td>
</tr>
<tr>
<td>Santa Ynez River WCD, I.D. #1 <em>(Includes City of Solvang)</em></td>
</tr>
<tr>
<td>Vandenberg Air Force Base</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

*Drought buffer** 3,908

*Note: Santa Ynez River WCD, I.D. #1 exchanged 2,989 AF of their delivery. Exchange recipients were Goleta (2,444 AF), Montecito (99 AF) and Carpinteria (446 AF).
**The drought buffer entitlement of 3,908 AFY increases the reliability of each project participant’s entitlement. This entitlement can be stored for future use and/or requested in dry years when cutbacks are expected to SWP allocations. By storing this water and/or increasing the CCWA’s water request in dry years, even after a percentage cutback by the DWR, the CCWA project participants will reduce shortages in their entitlement deliveries.

+ Goleta Water District has an additional 2,500 AF drought buffer.
The cost per AF for SWP water varies depending on the location of each project participant along the pipeline. All participants pay their share of the costs for the water treatment plant located at Polonio Pass based on (1) SWP water entitlement for capital and fixed operating costs and (2) entitlement deliveries for variable costs. Each participant also pays for its share of the Coastal Branch and CCWA Extension fixed and variable costs essentially to the point where it takes delivery of water. Therefore, costs for participants in the northern part of the county are less than for those on the South Coast.

The unit cost of SWP water ranges from about $900 per AF in Santa Maria to about $1,500 per AF in the Santa Ynez Valley and South Coast of Santa Barbara County. The unit cost differs for each project participant for a number of reasons including, but not limited to: (1) location along the pipeline (e.g., participants that are located in the north county do not share in the cost of facilities downstream of their turnouts), (2) financing of the CCWA project facilities (certain participants paid cash for their share of the CCWA facilities instead of financing them through the CCWA revenue bond issue), (3) financing of local project facilities using the CCWA revenue bond funds, and (4) capitalizing revenue bond interest during the first three to six years of the bond issue.

Environmental Impact Reports (EIRs) were completed prior to constructing each segment of the pipeline and associated facilities. These reports documented potential environmental impacts of the project and identified ways to lessen or avoid those impacts. Identified mitigation methods included using existing facilities and avoiding new construction where possible, and locating the pipeline away from environmentally sensitive areas. Changes in the pipeline’s location were made to protect sensitive habitats, animal species and cultural resources.

Where it was necessary to remove sensitive native vegetation such as oak trees and Burton Mesa Chaparral, replacement trees and chaparral were planted along the pipeline right-of-way and in other “offsite” areas. During construction of the project, environmental experts were hired to observe and monitor construction activity, and to assist construction teams in avoiding or mitigating impacts to wildlife, biological and cultural resources.

The SWP, as with many other sources of water, is not 100% reliable. This is particularly true during droughts or when operational problems occur within the SWP system. Another major factor affecting the reliability of SWP water is the fact that the SWP is not complete. The total complement of facilities needed for the SWP to deliver all of its entitlements is not yet constructed. This is, of course, the subject of much discussion and planning among engineers and planners for the SWP and SWP water contractors. In the meantime, when shortages occur along the system, all contractors must take a proportionate reduction in their entitlement deliveries during the shortage.

The Sacramento-San Joaquin Delta is part of the system that supplies water to SWP water contractors south of the Delta. Since 1995, a group of state and federal resource agencies known as CALFED
has been developing an unprecedented program to restore the Delta's ecosystem and reliability as a water source. In the summer of 1996, after an exhaustive year-long public process, CALFED's Bay-Delta Program identified three alternative solutions that involve different Delta water conveyance facilities and varying levels and locations of water storage. Formal environmental review of these alternatives is ongoing.

Each conveyance system would have an optimal amount of storage to meet overall CALFED goals of an improved ecosystem, improved water quality and more reliable supplies. Implementation of the selected alternative will enhance the reliability of SWP water supplies and reduce shortage reductions.

**Benefits**

State Water Project water helps:

- Reduce the overdraft in all major groundwater basins in the county except the Cuyama Basin, which does not have a water purveyor that receives SWP water;
- Improve water quality in areas that directly receive SWP water (i.e., participants from San Luis Obispo County in the north and Santa Ynez in the south);
- Increase overall water supply in Santa Barbara County.

**For More Information**


Central Coast Water Authority: (805) 688-2292 or CCWA's web site: http://www.ccwa.com/
Desalination is the process of removing salt from seawater. Desalination is used in many arid countries around the world to provide a reliable source of drinking water. The process dates back to the 4th century B.C. when Greek sailors used an evaporative process to desalinate seawater. Most United States desalination plants are used to clean brackish groundwater or to produce highly purified water for industrial use. Desalination separates saline water into two products: fresh water and water containing the concentrated salts, or brine. Such separation can be accomplished by a number of processes. The three most common processes are distillation, electrodialysis, and reverse osmosis. Distillation works by heating salty water to produce water vapor that is then condensed to form fresh water. Both the electrodialysis and the reverse osmosis processes use membranes to separate salts from water.

The City of Santa Barbara Charles Meyer Desalination Facility, located at 525 E. Yanonali Street, was built in 1991-1992 as a temporary emergency water supply in response to the severe drought of 1986-1991. The facility is the largest seawater reverse osmosis desalination facility in the United States. First, ocean water is pumped at a very low pressure through a 2,500 foot seawater intake line to the facility. The incoming seawater is pretreated in round horizontal media filters. There are two sets of filters — primary, consisting of sand, gravel, and anthracite, and secondary consisting of the same media as primary, plus garnet. Next, the cartridge filters act as a check to catch any material that gets through the primary and secondary stages. At this point all particulate matter has been removed from the water; only dissolved salt remains. Then, pumps drive the water at 800 pounds per square inch (p.s.i.) through reverse osmosis membranes that separate the dissolved salt from the water. Approximately 45% of the pressurized seawater goes through membranes and becomes drinking water. The drinking water is pumped into the existing Yanonali Street water main for distribution to water customers. The remaining seawater and concentrated salts (brine) are combined with treated wastewater from the adjacent wastewater treatment plant, and discharged to the ocean at the end of the 1.5 mile long outfall line.

Electricity is used to operated the facility. At this facility, it takes approximately 6,600 kilowatt hours of electrical energy to produce one acre-foot (AF) (326,000 gallons) of desalted water. (This is approximately the amount of energy one family uses in a year.)

The 1986-1991 drought showed that the City of Santa Barbara’s pre-drought water supplies were inadequate. In 1990-91, an extensive analysis was done to determine which water supply alternatives would best ensure adequate water supplies for the future. The analysis showed that either desalination alone, at a capacity of 5,000 acre-foot per year (AFY), or the State Water Project at an entitlement of 3,000 AFY plus a desalination capacity of 3,000 AFY as a drought backup, were the best alternatives. In June 1991, City voters supported both the State Water Project and desalination as permanent water supplies and the City has included the combined State Water Project/desalination option in its Long-Term Water Supply Program (LTWSP).
As a result of the analysis in the LTWSP and the 1991 vote, the Santa Barbara City Council decided that the temporary facility would be converted to permanent status for use as a backup during future droughts. The facility also has the potential for use during non-drought periods, which would help meet regional or statewide needs for water by operating under a water exchange agreement.

To obtain permanent status the facility went through additional environmental review and permitting which was completed in December 1995. The facility was dedicated as the Charles Meyer Desalination Facility on December 11, 1995 in honor of Mr. Meyer’s long and dedicated service on the City Water Commission, and in recognition of the facility’s permanent role in the City’s water future.

The City’s facility was built by a private company, Ionics, Inc., under a “take or pay” contract. Over the 5-year contract period, the City, along with the Montecito and Goleta Water Districts, paid off the $34 million construction cost and either paid for water produced or paid to maintain the facility in standby mode. Due to abundant rainfall since 1991 the facility has been on standby since the initial testing period was completed in June 1992. The facility has permits to operate as a permanent part of the City’s water supply and all equipment is compatible with long-term use.

There are several other desalination facilities located in coastal communities throughout the state. These include Catalina Island and the City of Morro Bay. For communities in semiarid climates, desalinated ocean water provides a water source that is not dependent on rainfall. This gives the community the ability to provide fresh water as a backup for depleted surface water supplies, thereby easing the hardship of drought. As technology advances and other water sources become less available, desalination will become more cost-effective and more communities may turn to this as a viable source of water.

For More Information


American Desalting Association:
http://www.webcom.com/ada/

City of Santa Barbara:
http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

USBR: http://www.usbr.gov/water/desal.html/

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**Unit Cost**

Because a relatively high proportion of the cost of desalination is in operation rather than capital costs, savings accrue when the water is not needed. This means that desalination will be as cost effective as other new water supplies, such as State Water, for which costs remain relatively constant regardless of the amount of water delivered. The cost of desalted water is approximately $1,100 per AF including labor, chemicals, power, maintenance, and a sinking fund to replace worn components.
Water Quality

Influencing Factors
Water Treatment
Influencing Factors

General Information

Water quality is a term used to describe the chemical, physical, and biological characteristics of water with respect to its suitability for a particular use. Water quality standards have been developed through nearly a century of trial and error and advances in technology. Currently, both state and federal standards regulate the quality of water that is provided to users. The importance of water quality as it relates to human activity is directly related to the intended use(s) of the water. The highest quality standards apply to drinking water, while somewhat lower standards apply to water used for irrigation or recreation. The California Department of Health Services’ (DHS) drinking water standards provide one example of how water quality can be evaluated.

California DHS has set Maximum Contaminant Levels (MCLs), which are enforceable, regulatory levels under the Safe Drinking Water Act that must be met by all public drinking water systems to which they apply. Primary MCLs are established for a number of chemical and radioactive contaminants, while Secondary MCLs are set for taste, odor, or appearance of drinking water. Action Levels (ALs) are health-based advisory levels established by DHS for chemicals for which primary MCLs have not been adopted. They are not enforceable standards, but exceedances do prompt requirements for local government notification, recommendations for consumer notice and, at higher levels, recommendations for source removal. In addition, there are a number of unregulated chemicals that are or may be required to be monitored, depending on the vulnerability of drinking water sources.

Water quality varies from source to source and is influenced by natural and human factors. Natural influences include the layers of rock and soil surrounding an aquifer or surface conveyance, which determine the types and amount of minerals found in surface water or groundwater. Human impacts on water quality result from such activities as urbanization (storm-water runoff and septic tanks), agricultural irrigation (runoff from irrigated land), direct disposal of wastewater into waterways, and grazing of livestock.

The origin of water pollution is generally characterized as either being from nonpoint (diffuse) or point sources. Nonpoint source pollution is caused by rainfall or snowmelt moving over and through the ground picking up and carrying natural and human-made pollutants, and depositing them into lakes, rivers, coastal waters, and underground sources of drinking water. Point source pollution comes from sources that are concentrated and readily identifiable like discharges from wastewater treatment facilities, solid waste landfills, golf courses, stockyards, poultry farms, and feedlots. Point sources of pollution are more easily controlled and monitored so they have been the focus of most pollution reduction efforts to date. Only recently has the control of nonpoint sources
Water Resources of Santa Barbara County

Contaminants

Water quality comparisons in this report will focus on Total Dissolved Solids (TDS), chloride, and nitrates. The DHS secondary standard for total dissolved solids (TDS) in drinking water is 1,000 milligrams per liter (mg/L) and the secondary standard for chloride in drinking water is 250 mg/L. The DHS primary standard for nitrates in public drinking water systems is 45 mg/L (State of California, 1995).

Chloride contamination is a concern in Santa Barbara County due to a variety of factors. The most prevalent potential source of chloride contamination in the county is from seawater intrusion. Elevated chloride levels associated with seawater intrusion occur when there are no geological barriers (impermeable bedrock or clay layers) between coastal groundwater basins and the basins under the ocean that are saturated with seawater. The likelihood of seawater intrusion is increased when extensive pumping of groundwater basins adjacent to the ocean affects groundwater flow gradients and seawater is drawn inland. Irrigated agriculture also increases chloride levels in groundwater by introducing problems of poor drainage and increasing evaporation.

Nitrates can accumulate in watersheds due to the use of fertilizers or the presence of poorly maintained septic systems. Nitrogen not taken up by plants can leach through the soil to groundwater and then flow to recharge areas or private wells. Nitrates are of particular concern in drinking water sources because nitrates interfere with the absorption of oxygen into the bloodstream. Although Santa Barbara County has extensive agricultural areas and many residents use septic systems, nitrate contamination of groundwater supplies is rare.

High levels of total dissolved solids frequently impair the use of groundwater in California. In Santa Barbara County, several groundwater basins show degradation of water quality due to high TDS levels. Total dissolved solids may be increased through natural dissolution of soluble materials, reduction in recharge from surface waters, and constant cycling and evaporation of irrigation water.

Local Conditions

Surface and groundwater quality in Santa Barbara County is variable but generally of high enough quality for reasonable use. As described above, quality is determined by factors such as native condition of groundwater and surface water, sources of contamination (natural and human induced) and presence of seawater. Several areas in the county (Santa Barbara and near Santa Maria) have experienced signs of seawater intrusion. As of yet, these initial signs of intrusion do not pose a threat to drinking water supplies. Nitrate contamination has been found in some portions of the Santa Maria Groundwater Basin. The Regional Water Quality Control Board has identified this problem and plans to implement a research effort to isolate the causes and seek solutions. Increases in total dissolved solids have also been recorded in many basins within the county. Efforts to increase recharge and improve irrigation efficiency have been implemented to address this problem.

Groundwater Quality: The USGS has performed water quality testing in most of the fourteen groundwater basins in Santa Barbara County. An extensive study of the Lompoc area was conducted in response to increasing groundwater demands and historic documentation of the deterioration of water quality in some parts of the Lompoc Groundwater Basin (Bright et al., 1992). For summaries of water quality information on specific groundwater basins, please refer to the Groundwater section.

Surface Water Quality: Two sources of surface water include local reservoirs/rivers, and water from the State Water Project (SWP). The highest quality water in the county is State Water Project water, which ranges from 222 to 510 mg/L TDS. In portions of the county where SWP water is distributed directly to customers, the water is of very high quality.
Portions of the following information have been adapted from: *The City of Santa Barbara Water and Wastewater Systems Inventory* (1998) and *the City of Lompoc Urban Water Management Plan 1995 - 2000* (1995).

Surface water acquires its characteristics (taste, odor, chemical and mineral make up, temperature, corrosiveness, and clarity) from the environment with which it has contact. Thus surface water quality varies by location and season. During the late summer and early fall, surface water deteriorates slightly in quality because of the growth of algae. Water taken from surface water supplies may contain various contaminants. Possible contaminants include silts and clays, dissolved minerals and salts, organic material from vegetation and wildlife, algae, bacteria, protozoans, viruses and man-made pollutants. In order to remove these contaminants and to comply with state and federal water quality standards, water is treated before it is distributed for consumption.

According to the USGS figures for 1998 (Agajanian *et al.*, 1998) the TDS for the rivers in Santa Barbara County range from 518 mg/L to 1,130 mg/L (see below). Water quality sampling was completed in October, April and May of the 1998 Water Year. Some of the variations in water quality seen along the Santa Ynez River are a partial result of the addition of SWP water mentioned above.

### Total Dissolved Solids in Local Rivers - 1998

<table>
<thead>
<tr>
<th>River</th>
<th>TDS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuyama River</td>
<td>1,130</td>
</tr>
<tr>
<td>Santa Maria River</td>
<td>1,030</td>
</tr>
<tr>
<td>Sisquoc River</td>
<td>862</td>
</tr>
<tr>
<td>Santa Ynez River</td>
<td></td>
</tr>
<tr>
<td>at Jameson Lake</td>
<td>842</td>
</tr>
<tr>
<td>at Lake Cachuma</td>
<td>518</td>
</tr>
<tr>
<td>below Lake Cachuma</td>
<td>625</td>
</tr>
</tbody>
</table>

(Source: Agajanian *et al.*, 1998)

The Health and Safety Code of California State Law plays a role in maintaining surface water quality throughout California by preventing bodily contact of water that serves as drinking water supply. Sections 115825 (a) and (b) prevent bodily contact with water in Lake Cachuma:

(a) It is hereby declared to be the policy of this state that multiple use should be made of all public water within the state, to the extent that multiple use is consistent with public health and public safety. (b) Except as provided in Sections 115840, 115840.5, and 115841, recreational uses shall not, with respect to a reservoir in which water is stored for domestic use, include recreation in which there is **bodily contact** with the water by any participant.

### For More Information

- Environmental Protection Agency; Water Quality - Surf Your Watershed: [http://www.epa.gov/surf/surf_search.html/](http://www.epa.gov/surf/surf_search.html/)
The quality of groundwater is determined by the character of the water entering a groundwater basin, the chemical nature of the groundwater basin, and the time of residence within the basin. Water quality may vary within the same groundwater basin depending on where the well is located within the basin and the depth from which the well draws. Generally, water taken from groundwater supplies was naturally filtered as it passed through the layers of the earth so, unless the basin is contaminated, it usually does not require the same level of treatment as water from surface supplies. However, groundwater may also require some treatment in order to meet water quality standards.

Water Treatment Plants in Santa Barbara County

Communities in Santa Barbara County rely on different types of water supplies. As a result, there is a wide variety of treatment processes in use. The following information provides a description of the treatment processes used in four communities within the county and in the State Water Project.

City of Santa Barbara

William B. Cater Water Treatment Plant

The City of Santa Barbara constructed the William B. Cater Filtration Plant in 1964. The plant was originally designed as a lime softening plant with a treatment capacity of 10 million gallons per day. The capacity was increased in 1969 to 16 million gallons per day by converting sand filters to dual media (sand and anthracite coal) filters. The “Joint Exercise of Powers Agreement” to expand and operate the Cater Filtration Plant to treat all Cachuma water delivered to the districts was signed in 1978 and is still in effect for the Montecito Water District, the Carpinteria Valley Water District and the City of Santa Barbara. The plant was expanded from 16 million gallons per day to the current 37 million gallons per day capacity in 1982. The increase in capacity was the result of the addition of five filters. The water treated at the plant may be drawn directly from the South Coast Conduit (SCC) or from Lauro Reservoir. The water in the SCC comes directly from Lake Cachuma (via the Tecolote Tunnel). The water in Lauro Reservoir is a combination of water from Gibraltar Reservoir (via the Mission Tunnel into the Penstock pipeline) and water from the SCC. Normal operation is for Cater to draw the water from Lauro Reservoir.

The Cater Treatment Plant method of treatment is considered “conventional treatment” using the pretreatment, aeration, flash mix, coagulation/flocculation, sedimentation, filtration and disinfection process. The water treated at this facility is tested extensively to ensure compliance with state and federal water quality standards. The Plant is located at 1150 San Roque Road and is staffed 24 hours a day. The facility is open to the public and tours are offered. For more information contact the City of Santa Barbara at (805) 897-2609.
Overview of the Treatment Process

There are many methods of treating water so that it is fit for potable uses. The following information outlines several steps that are typically taken to treat water that will be sold for consumption.

**Pretreatment**

Pretreatment is used to kill disease-causing organisms and help control taste and odor causing substances. A pretreatment chemical could be any number of oxidants or disinfectants. Ozone, hydrogen peroxide, potassium permanganate and chlorine are all commonly used in water treatment.

**Aeration**

The purpose of this process is to “off-gas” taste and odor causing substances by passing large quantities of air through the water. This is accomplished by pumping air through a series of diffusers placed on the bottom of the storage basins, which causes the water to “boil”. The resulting air bubbles carry off the most volatile of the taste- and odor-causing organics.

**Flash Mixing**

The flash mix, or rapid mix process, occurs just after coagulation chemicals are added to the raw water. Coagulation chemicals are used to attract particles together that will not readily settle or filter out of the water. Some examples of coagulation chemicals include aluminum sulfate and various polymers.

**Coagulation/Flocculation**

Coagulation starts immediately after flash mixing and is facilitated by the flocculation process. Flocculation is a gentle mixing of coagulated raw water. This mixing allows particles now “sticky” from the addition of coagulant, to gather to form larger, heavier particles called “floc”.

**Sedimentation**

The sedimentation process settles out larger suspended particles and the floc created through the coagulation/flocculation process. As the raw water flows very slowly through the sedimentation basin, heavy particles fall to the floor while the water overflows the basin and is channeled into filters. The particles resting on the floor of the basin are moved into a sludge basin for eventual disposal.

**Filtration**

Through the filtration process, any remaining particles are removed from the raw water. The water may be filtered through layers of sand, gravel and/or coal. The raw water travels through the various filter materials and out into the treatment plant reservoir. Some examples of filter materials include mixed media (layers of various sizes of gravel, high-density garnet, sand and anthracite coal), diatomaceous earth, and granular activated carbon (GAC).

**Disinfection**

The finished water from the treatment plant may be disinfected as it leaves the reservoir and enters the distribution system. Disinfection ensures unwanted bacteria and organisms have been eliminated and helps discourage any further growth of disease-causing organisms in the drinking water.
Goleta Water District

Corona del Mar Water Treatment Plant

The Corona del Mar Water Treatment Plant began operation in 1974. Due to the plant elevation of 192 meters (630 feet), water can move through the plant by gravity flow and be delivered without pumping to the vast majority of district customers. The design capacity of the plant is one cubic meter per second (about 24 million gallons per day), with a peak capacity of 1.6 cubic meters per second (about 36 million gallons per day). The “raw water” received from Lake Cachuma is directed to the plant for removal of suspended matter, such as clay particles and algae, in order to meet state health standards. The stages of treatment completed at this plant include pretreatment, flash mixing, coagulation/flocculation, sedimentation, filtration, and disinfection. These processes are precisely controlled and carefully monitored around the clock. For more information about the plant and treatment process, call the Goleta Water District at (805) 964-6761.

City of Lompoc

The City of Lompoc Water Treatment Plant

The City operates eight wells of varying capacities between 250 and 2,500 gallons per minute. Groundwater is pumped from the wells to the water treatment plant for demineralization and softening. Lime and caustic soda are used to reduce the hardness by approximately 50%. The City of Lompoc Water Treatment Plant has a peak capacity of 8 million gallons per day with a reservoir capacity of approximately 7.5 million gallons of usable storage. For more detailed information about the treatment process, please call the City of Lompoc at (805) 736-1617.

City of Santa Maria

The City of Santa Maria relies mostly on State Water Project water for its water supplies. This water is of sufficient quality that it requires little treatment beyond addition of chlorine and ammonia (see below for information on SWP water treatment). For more information contact the City of Santa Maria at (805) 928-5022.

State Water Project

Polonio Pass Water Treatment Plant

State Water Project water begins as rain and snow melt from the Sierra Nevada Mountain Range. It passes through both natural streams and rivers and man-made conveyance structures on its way to the Polonio Pass Water Treatment Plant in San Luis Obispo County. At this treatment plant, water is sent through the flash mixing, coagulation/flocculation, sedimentation, filtration, and disinfection processes. For more detailed information on the treatment process, please call the Central Coast Water Authority at (805) 688-2292.

For More Information

Central Coast Water Authority: http://www.ccwa.com/

City of Santa Barbara: http://www.ci.santa-barbara.ca.us/departments/public Works/water_ resources/

Goleta Water District: http://www.goletawater.com/
Water Delivery & Oversight

Water Purveyors
Other Agencies
Water Purveyors

Water purveyors in Santa Barbara County are those entities responsible for supplying water to customers (residents, businesses, farmers, institutions) within their service area. The water purveyors in Santa Barbara County include cities, public utility companies, special (water) districts, and community services districts.

The purveyors are responsible for complying with all local, state, and federal regulations regarding water production, distribution, and conservation. In addition, each agency must provide regular summaries and updates regarding their activities to local, state and federal agencies.

Public Utility Companies

Public utility companies are private entities that serve the public and are governed by the Public Utilities Commission, which ensures that they meet health and safety requirements and regulations. These utilities have shareholders and a board of directors. There is only one public utility company in Santa Barbara County.

California Cities Water Co.

4854 F. Bradley Rd.
Santa Maria, CA 93455
937-1010 FAX: 934-3240

The California Cities Water Company is a subsidiary of the Southern California Water Company and serves approximately 32,200 customers. They provide potable water for the Orcutt, Sisquoc, Lake Marie, and Tanglewood areas through 11,330 active service connections. The water supplies for this District are groundwater from the Santa Maria Valley Groundwater Basin and surface water from the State Water Project.

Mutual Water Companies

Mutual water companies are private nonprofit entities. The stockholders are landowners who have joined together to develop and use a water supply. Mutual water companies are governed through a board of directors elected by the stockholders.

La Cumbre Mutual Water Company

695 Via Tranquila
Santa Barbara, CA 93110
967-2376 FAX: 967-8102

The La Cumbre Mutual Water Company operates as a nonprofit mutual water company under the laws of the State of California and was organized solely for the purpose of delivering water to its stockholders at cost. The Company serves the communities of Hope Ranch and Hope Ranch Annex, serving approximately 4,900 people with 1,400 active service connections. The water supplies for this Company are groundwater from the Goleta North Central and the Foothill Groundwater Basins, and surface water from the State Water Project.
Incorporated cities provide certain municipal functions, governed by a city council, including but not limited to police protection, land use planning, building safety, and street maintenance. The following cities provide additional services including potable water production and distribution:

**City of Buellton**

P.O. Box 1819  
Buellton, CA 93427  
688-5177  FAX: 686-0086

The City of Buellton furnishes potable water to 3,840 customers through 990 active service connections. The water supplies for this District are wells tapping the Buellton Uplands Groundwater Basin, the Santa Ynez River Riparian Basin, and State Water Project water.

**City of Guadalupe**

Department of Public Works  
918 Obispo St.  
Guadalupe, CA 93434  
343-1340  FAX: 343-5512

The City of Guadalupe serves approximately 6,500 residents with 1,570 active water service connections. The water supplies for this community come from groundwater in the Santa Maria Valley Groundwater Basin and the State Water Project.

**City of Lompoc**

P.O. Box 8001  
Lompoc, CA 93438-8001  
736-1261  FAX: 736-5347

The City of Lompoc has 9,170 active service connections providing water for a population of 42,450. All water provided by the City of Lompoc comes from the Lompoc Groundwater Basin.

**City of Santa Barbara**

P.O. Box 1990  
Santa Barbara, CA 93102  
564-5460  FAX 564-5467  
http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

The City of Santa Barbara has approximately 25,100 active service connections serving a population of 95,000. The sources of water for the City are numerous. They include the Cachuma Project; the Gibraltar Reservoir; groundwater from the Foothill Groundwater Basin and the Santa Barbara Groundwater Basin; the State Water Project; recycled wastewater and desalination, which is used during droughts and emergencies.

**City of Santa Maria**

Public Works  
110 E. Cook Street  
Santa Maria, CA 93454  
925-0951 x220  FAX: 928-4995

The City of Santa Maria serves 72,000 people with 16,590 service connections. The sources of water for the City include groundwater from the Santa Maria Groundwater Basin and the State Water Project.

**City of Solvang**

P.O. Box 107  
Solvang, CA 93464  
688-5575  FAX: 686-2049

The City of Solvang has 1,890 active water connections serving a population of 5,300. The water supplies for the City are the Santa Ynez Uplands Groundwater Basin and the Santa Ynez River Riparian Basin.
Water Districts

Water Districts are political subdivisions of the State of California organized under Division 12 of the California Water Code. They were formed for the purposes of furnishing potable water within their districts.

Carpinteria Valley Water District

P.O. Box 578
Carpinteria, CA 93013
684-2816 FAX: 684-3170

The Carpinteria Valley Water District serves a population of 16,250 with 4,090 active water connections. The water for this District is supplied through the Carpinteria Valley Groundwater Basin, the Cachuma Project and the State Water Project for urban and agricultural use.

Goleta Water District

4699 Hollister Ave.
Goleta, CA 93110
964-6761 FAX: 964-7002
http://www.goletawater.com

The Goleta Water District serves a population of 75,000 with approximately 14,860 active service connections. The water supplies for this District include the Goleta North/Central Groundwater Basin, the Cachuma Project, and the State Water Project. The Goleta Water District also treats and distributes reclaimed water to various golf courses, U.C. Santa Barbara and other sites for irrigation and agricultural purposes.

Montecito Water District

P.O. Box 5037
Santa Barbara, CA 93150
969-2271 FAX: 969-7261
http://www.montecitowater.com

The Montecito Water District serves the communities of Montecito and Summerland, a population of approximately 13,100, with 3,990 active service connections. The water supplies for this District include groundwater from the Montecito Groundwater Basin, the Cachuma Project, the State Water Project, Jameson Lake, Fox and Alder Creeks, and Doulton Tunnel.
Community Services Districts

Community Services Districts are established as local government agencies under California Government Code Section 61000, et seq., for the purpose of providing various municipal services to unincorporated communities in the county. The following Community Services Districts provide water service for residents and businesses within their districts and may provide other services including wastewater collection and treatment, street-lighting, and street sweeping.

Cuyama Community Services District

P.O. Box 368
New Cuyama, CA 93254
766-2780

The Cuyama Community Services District has 242 active service connections and serves a population of approximately 820 people. The water supplies for this District come from the Cuyama Groundwater Basin.

Los Alamos Community Services District

P.O. Box 675
Los Alamos, CA 93440
344-4195

The Los Alamos Community Services District has 418 active service connections that provide water for approximately 1,300 people. The groundwater in the San Antonio Groundwater Basin is the source of water for this District.

Mission Hills Community Services District

1550 E. Burton Mesa Blvd.
Lompoc, CA 93456
733-4366 FAX: 733-4188

The Mission Hills CSD serves 3,200 people with 1,100 active service connections. The Mission Hills water supply comes from the Lompoc Groundwater Basin.

Vandenberg Village Community Services District

3757 Constellation Road
Lompoc, CA 93456
733-3417 FAX: 733-2109
e-mail: vvcsd@impulse.net
http://www.impulse.net/~vvcsd

The Vandenberg Village Community Services District serves 5,970 customers with 2,130 active water connections. The water supply for this District comes from the Lompoc Groundwater Basin.
Other Agencies

Water Conservation Districts

Water Conservation Districts are special districts formed to oversee water conservation and groundwater management and operate pursuant to the Water Conservation District Law, Water Code §74000 et seq.

Santa Maria Valley Water Conservation District

110 S. Lincoln
Santa Maria, CA 93455
925-5212 FAX: 739-0763

The Santa Maria Valley Water Conservation District operates Twitchell Dam and Reservoir and supports water conservation projects within the Santa Maria Valley. The District encompasses the northern half of the Santa Maria Valley including the City of Guadalupe and the northern portion of the City of Santa Maria. It extends from a point east of the town of Sisquoc almost to the Pacific Ocean on the west and from Oso Flaco Lake on the north to Guadalupe Lake on the south. In general, the District includes the land within the historical flood plain of the Santa Maria River, most of which is irrigated farmland.

Santa Ynez River Water Conservation District

Improvement District #1

P.O. Box 157
Santa Ynez, CA 93460
688-6015 FAX: 688-3078

The Santa Ynez River WCD ID#1 serves approximately 8,300 people with 2,240 active service connections. It was formed by the Santa Ynez River Water Conservation District in 1960 for the purposes of furnishing potable water within the communities of Santa Ynez, Los Olivos, Ballard, and the City of Solvang. The water supplies for this District include the Cachuma Project, the State Water Project, and groundwater from the Santa Ynez Upland Groundwater Basin and the Santa Ynez River Riparian Basin.

Santa Ynez River Water Conservation District

P.O. Box 719
Santa Ynez, CA 93460-0719
693-1156 FAX: 688-8065

The SYRWCD protects water rights and provides supplies by managing releases of water from Bradbury Dam to replenish the Santa Ynez River Riparian Basin and the Lompoc Groundwater Basin. It also provides groundwater management planning and related activities on the uplands adjacent to the river throughout the watershed. The District runs from the Pacific Ocean inland to encompass much of the Santa Ynez River watershed including Lake Cachuma and the Cities of Lompoc, Buellton and Solvang. It also operates pursuant to the Water Replenishment District Act (Water Code 60000 et seq.) within portions of the watershed where groundwater management plans have been adopted (Water Code 19750 et seq.).
Other Entities

Cachuma Operations and Maintenance Board

3301 Laurel Canyon Road
Santa Barbara, CA 93105
687-4011/687-0959 FAX: 569-5825

The Cachuma Operations and Maintenance Board (COMB) was formed as part of the Cachuma Project, which was constructed in the early 1950s to deliver water to the Santa Ynez Valley and South Coast communities. Construction was completed by the Bureau of Reclamation, under contract with the Santa Barbara County Water Agency (SBCWA) on behalf of the Cachuma Project Member Units (City of Santa Barbara, Goleta Water District, Montecito Water District, Carpinteria Valley Water District, and the Santa Ynez River Conservation District, Improvement District #1). COMB has operated and maintained the Cachuma Project facilities, other than Bradbury Dam, since 1956 when the Board was formed to take over these responsibilities from the Bureau of Reclamation.

Santa Barbara County Water Agency

See Regulatory Agencies section.

Santa Barbara Water Purveyors Agency

1020 David Road
Santa Maria, CA 93455
937-5241

The Santa Barbara Water Purveyors Agency was formed in the early 1980s to aid the local water purveyors in coordinating their planning and operations of water supplies, their administration of basins and water developments, and their development and distribution of water. In addition, membership with the Agency strengthens the relations between the purveyors and with agencies of the city, county, state and federal governments. The group utilizes Project Service Agreements to finance and conduct projects and programs of mutual interest to all or some member agencies.

Central Coast Water Authority

255 Industrial Way
Buellton, CA 93427
688-2292 FAX: 686-4700
http://www.ccwa.com/

The CCWA was formed in 1991 to construct, manage, and operate Santa Barbara County’s 42-mile portion of the State Water Project. Member agencies (project participants) of the Central Coast Water Authority include cities, special water districts and public utility companies (see the State Water Project section of this report).

Vandenberg Air Force Base

30th Space Wing Environmental Public Affairs
806 13th Street, Suite 116
Vandenberg Air Force Base, CA 93437
734-8232 ext. 6-2071

Vandenberg Air Force Base (VAFB) began operation in 1957 when 86,000 of central coast property was transferred from the United States Army to the United States Air Force. The Base hosts and supports various water use categories including residential housing, schools, recreational parks, wildlife reserves, shopping centers, industrial maintenance, airfield operations, and various other mission-related activities. VAFB has an estimated system demand of approximately 4,500 AFY. The sources of water for the Base include groundwater and SWP water.
Water Use

Urban Water Use
Agricultural Water Use
Predicting Future Use
Urban Water Use

M&I use, which supplies urban users, includes all commercial, industrial, residential and institutional uses. Most M&I use is supplied by water purveyors, though a small number of people have private groundwater wells or belong to a mutual water company that serves their water.

Per-Capita Use

Per-capita use is the average amount of water used by individual residential customers each year, including water that they do not directly use but which benefits them such as fire fighting, park and school irrigation, commercial water use and other municipal and industrial (M&I) water uses. Per-capita use is usually derived by dividing the total M&I use by the total service area population.

Per-capita demand (use) rates are calculated on an annual basis. Evaluating per-capita use is an important way to track water use trends and monitor the effectiveness of water use efficiency programs because per-capita rates factor out the influence of growth – new customers – on fluctuations in demand.

Water Use in the Average Home

The amount of water that is used by customers is influenced by a wide variety of factors: climate variations; the types of water using appliances, plumbing fixtures and irrigation systems used by customers; socioeconomic differences among customers; the price of water; customer awareness of water resources and the need for efficiency; the presence or absence of droughts; varying behavior and beliefs of water users; and the types of programs in place to promote efficient use by the retail water purveyors. See the following tables: County Historical Per-Capita Water Use and 1998 Urban Water Use Summary for detailed information by water purveyor.

Santa Barbara County’s Population

The county has a population of over 409,000 with seven incorporated cities:

<table>
<thead>
<tr>
<th>City</th>
<th>Population (1999)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Barbara</td>
<td>95,000 (County Seat)</td>
</tr>
<tr>
<td>Santa Maria</td>
<td>72,000</td>
</tr>
<tr>
<td>Lompoc</td>
<td>42,450</td>
</tr>
<tr>
<td>Carpinteria</td>
<td>14,950</td>
</tr>
<tr>
<td>Guadalupe</td>
<td>6,500</td>
</tr>
<tr>
<td>Solvang</td>
<td>5,300</td>
</tr>
<tr>
<td>Buellton</td>
<td>3,840</td>
</tr>
</tbody>
</table>

The unincorporated area, with a population of 2,200 includes several communities, among them: Goleta, Orcutt, Los Alamos, Isla Vista, Los Olivos, Santa Ynez, Vandenberg Village, New Cuyama, Sisquoc, Montecito, Mission Hills, Hope Ranch, Casmalia, Gaviota and others.

The largest employment categories in the county:

- Services
- Wholesale and retail trade
- Public administration
- Education
- Manufacturing
## 1998 Urban Water Use Summary

<table>
<thead>
<tr>
<th>WATER PURVEYOR</th>
<th>Population Served (Number of People)</th>
<th>Total M&amp;I* Water Demand (AFY)</th>
<th>Per-Capita Water Use Single-Family Residential (gallons per person per day)</th>
<th>Multi-Family Residential (AFY)</th>
<th>Commercial Institutional (AFY)</th>
<th>Industrial (AFY)</th>
<th>Landscape Irrigation (AFY)</th>
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</thead>
<tbody>
<tr>
<td>City of Buellton</td>
<td>3,500</td>
<td>806</td>
<td>206</td>
<td>295</td>
<td>102</td>
<td>216</td>
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<tr>
<td>Cal-Cities Water - Orcutt</td>
<td>32,172</td>
<td>7,394</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Carpinteria Valley Water Dist.</td>
<td>16,250</td>
<td>2,192</td>
<td>120</td>
<td>1,583</td>
<td>(Combined w/single family)</td>
<td>431</td>
<td>129</td>
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<tr>
<td>Cuyama CSD</td>
<td>820</td>
<td>166</td>
<td>180</td>
<td>117</td>
<td>9</td>
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<td>Goleta Water District</td>
<td>75,000</td>
<td>8,863</td>
<td>103</td>
<td>3,875</td>
<td>2,317</td>
<td>2,260</td>
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<td>City of Guadalupe</td>
<td>6,450</td>
<td>574</td>
<td>79</td>
<td>425</td>
<td>12</td>
<td>112</td>
<td>0</td>
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<td>La Cumbre Mutual Water Co.</td>
<td>4,900</td>
<td>1,258</td>
<td>229</td>
<td>1,258</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>City of Lompoc</td>
<td>39,149</td>
<td>4,264*</td>
<td>97</td>
<td>2,123</td>
<td>1,237</td>
<td>660</td>
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<td>Los Alamos CSD</td>
<td>1,300</td>
<td>238</td>
<td>170</td>
<td>136</td>
<td>44</td>
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<td>Mission Hills CSD</td>
<td>3,200</td>
<td>540</td>
<td>151</td>
<td>257</td>
<td>0</td>
<td>12</td>
<td>0</td>
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<tr>
<td>Montecito Water District</td>
<td>13,100</td>
<td>3,829</td>
<td>261</td>
<td>2,989</td>
<td>153</td>
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<tr>
<td>City of Santa Barbara</td>
<td>95,064</td>
<td>11,336</td>
<td>111</td>
<td>4,994</td>
<td>3,176</td>
<td>2,087</td>
<td>565</td>
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<tr>
<td>City of Santa Maria</td>
<td>69,326</td>
<td>9,983</td>
<td>129</td>
<td>5,172</td>
<td>1,850</td>
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<tr>
<td>Santa Ynez River WCDID#1</td>
<td>8,298</td>
<td>2,482</td>
<td>267</td>
<td>2,436</td>
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<td>0</td>
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<tr>
<td>City of Solvang</td>
<td>5,242</td>
<td>1,277</td>
<td>217</td>
<td>712</td>
<td>132</td>
<td>298</td>
<td>0</td>
</tr>
<tr>
<td>Vandenberg Village CSD</td>
<td>5,971</td>
<td>1,071</td>
<td>160</td>
<td>825</td>
<td>29</td>
<td>114</td>
<td>0</td>
</tr>
</tbody>
</table>

* Includes other water use not identified by one of the other categories listed

M&I (Municipal and Industrial) refers to all urban use, not including agricultural irrigation
Urban Use: 26%

<table>
<thead>
<tr>
<th>S.B. County Historical Per-Capita Water Use</th>
<th>Gallons/Person/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Buellton</td>
<td>230</td>
</tr>
<tr>
<td>California Cities Water Co.</td>
<td>199</td>
</tr>
<tr>
<td>Carpinteria Valley Water Dist.</td>
<td>108</td>
</tr>
<tr>
<td>Guyama CSD</td>
<td>183</td>
</tr>
<tr>
<td>Goleta Water District</td>
<td>98</td>
</tr>
<tr>
<td>City of Guadalupe</td>
<td>108**</td>
</tr>
<tr>
<td>La Cumbre Mutual Water Co.</td>
<td>241</td>
</tr>
<tr>
<td>City of Lompoc</td>
<td>113</td>
</tr>
<tr>
<td>Los Alamos CSD</td>
<td>NR</td>
</tr>
<tr>
<td>Mission Hills CSD</td>
<td>170</td>
</tr>
<tr>
<td>Montecito Water District</td>
<td>268</td>
</tr>
<tr>
<td>City of Santa Barbara</td>
<td>99</td>
</tr>
<tr>
<td>City of Santa Maria</td>
<td>168</td>
</tr>
<tr>
<td>Santa Ynez River WCD, ID#1</td>
<td>212</td>
</tr>
<tr>
<td>City of Solvang</td>
<td>353</td>
</tr>
<tr>
<td>Vandenberg Village CSD</td>
<td>192</td>
</tr>
</tbody>
</table>

NR = Not reported  * First post-drought year  **Based on water production, not sales/use (per City of Guadalupe)
Agricultural use refers to all water used for crop irrigation and production/processing. In Santa Barbara County, most agricultural water supplies are obtained from private groundwater wells. Some farmers on the South Coast buy some or all of their water from a water purveyor. Information about total agricultural water use in the county is derived from two sources: 1) water purveyors that serve farmers, and 2) estimates of irrigation water use based on consumptive use factors for each crop type (provided by the Department of Water Resources and the U.C. Cooperative Extension) multiplied by the number of acres of various crops in the county (obtained from the annual Crop Report published by the County Agricultural Commissioner’s Office).

See the following tables for detailed crop information and agricultural water use information by water purveyor: Santa Barbara County Historical Harvested Acres; Irrigation Water Use for Major Crops Grown; and Santa Barbara County Agricultural Water Use.

### Irrigation Water Use for Major Crops Grown

<table>
<thead>
<tr>
<th>Crop (acre-feet)/acre/season</th>
<th>South Coast</th>
<th>Santa Maria/Lompoc</th>
<th>Santa Ynez, Los Alamos, Sisquoc</th>
<th>Cuyama Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broccoli/Cabbage</td>
<td>1.4</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cauliflower</td>
<td>1.7</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>2.3</td>
<td>2.2</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Celery</td>
<td>2.2</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce</td>
<td>1.1</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>1.7</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strawberries</td>
<td>3.0</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td>1.5</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Field Crops</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>1.0</td>
<td>1.3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Corn, field</td>
<td>1.8</td>
<td>2.2</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Grain, irrigated</td>
<td>0.5</td>
<td>0.8</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Sugar Beets</td>
<td>3.0</td>
<td>3.2</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Alfalfa</td>
<td>3.0</td>
<td>3.5</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td><strong>Fruit and Nut Crops</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avocados</td>
<td>1.6</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deciduous Fruits</td>
<td>1.7</td>
<td>2.5</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Grapes</td>
<td></td>
<td>1.2</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Lemons</td>
<td></td>
<td>1.5</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Walnuts</td>
<td></td>
<td>1.5</td>
<td>1.8</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Nursery Products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut flowers/field</td>
<td>1.8</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Greenhouse</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carnations</td>
<td></td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mums, pompom</td>
<td></td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mums, potted</td>
<td></td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turfgrass</td>
<td>2.7</td>
<td>2.7</td>
<td>3.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Adapted from the *Irrigation Water Use for Major Crops Grown in Santa Barbara County: Estimates of Amounts of Water Applied under Normal Conditions in Four Climatic Areas of Santa Barbara County*.

These figures are based on typical practices of local growers and show the amount of water applied in addition to rainfall (assuming average rainfall for each climatic zone). These figures allow only enough water to satisfy the plants’ requirements, to leach salts, and to facilitate the application of water, without waste.

The figures are for the whole season for that particular crop. For land used for several crops in one year, the water used is shown separately for each crop. The units used are acre-feet of water per acre per season.
## Santa Barbara County Historical Harvested Acres

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable Crops</td>
<td>58,234</td>
<td>56,971</td>
<td>58,941</td>
<td>61,543</td>
<td>65,214</td>
<td>63,759</td>
<td>67,530</td>
</tr>
<tr>
<td>Field Crops</td>
<td>623,593</td>
<td>619,111</td>
<td>621,063</td>
<td>620,607</td>
<td>616,871</td>
<td>620,066</td>
<td>615,924</td>
</tr>
<tr>
<td>Fruit and Nut Crops</td>
<td>25,997</td>
<td>26,106</td>
<td>26,247</td>
<td>25,197</td>
<td>25,689</td>
<td>24,526</td>
<td>25,833</td>
</tr>
<tr>
<td>Nursery Products</td>
<td>2,375</td>
<td>2,538</td>
<td>1,510</td>
<td>1,539</td>
<td>1,707</td>
<td>2,067</td>
<td>2,238</td>
</tr>
<tr>
<td>Seed Crops</td>
<td>3,852</td>
<td>2,686</td>
<td>3,165</td>
<td>3,002</td>
<td>3,274</td>
<td>3,615</td>
<td>2,143</td>
</tr>
</tbody>
</table>

## Santa Barbara County Agricultural Water Use

### Estimated Acre-feet for 2000*

<table>
<thead>
<tr>
<th>Water Purveyor</th>
<th>Estimated Acre-feet for 2000*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpinteria Co. Water District</td>
<td>2,188</td>
</tr>
<tr>
<td>Goleta Water District</td>
<td>2,598</td>
</tr>
<tr>
<td>La Cumbre Mutual Water Co.</td>
<td>103</td>
</tr>
<tr>
<td>Montecito Water District</td>
<td>538</td>
</tr>
<tr>
<td>City of Santa Barbara</td>
<td>81</td>
</tr>
<tr>
<td>Santa Ynez River Water Cons. District</td>
<td>2,812</td>
</tr>
<tr>
<td><strong>Total Agricultural Water Use</strong></td>
<td><strong>246,727</strong></td>
</tr>
</tbody>
</table>

* These figures are based on forecasts made by water districts and the Department of Water Resources, estimating the number of acres in production and types of crops grown.

<table>
<thead>
<tr>
<th>Private Wells</th>
<th>Estimated Acre-feet for 2000*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuyama Valley</td>
<td>15,300</td>
</tr>
<tr>
<td>San Antonio Valley</td>
<td>17,020</td>
</tr>
<tr>
<td>Santa Maria Valley</td>
<td>117,852</td>
</tr>
<tr>
<td>Santa Ynez Valley</td>
<td>59,980</td>
</tr>
<tr>
<td>South Coast</td>
<td>28,255</td>
</tr>
</tbody>
</table>
The amount of water used in Santa Barbara County varies from one area to another and from one year to the next. Information about how and where water is used for different purposes is collected and compiled by the Santa Barbara County Water Agency (SBCWA). Every year, the SBCWA gathers water production (how much water is produced from each source) and demand (how much water is used by metered customers) figures from water purveyors throughout the county. The data collected from each retail water purveyor includes water produced from all sources, water delivered to all customers by class (single-family, multi-family, commercial, industrial, and landscapes) and the total number of customers.

Understanding water use, and predicting future water demand, is not an exact science. It is nearly impossible to account for or predict all of the variable factors (listed above) that influence water use. Municipalities and water purveyors must develop estimates based on their best knowledge of water use patterns and project growth rates in their service areas. Some communities in California have developed water use forecasting models that are designed to calculate future demand based on a variety of assumptions about population, water efficiency programs, water prices, and climate. As water becomes more scarce and expensive, these models will be refined and more communities will use such models in planning for how they will meet the future needs of their customers.

For More Information

City of Santa Barbara: http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

Goleta Water District: www.goletawater.com

Montecito Water District: http://www.montecitowater.com/

Santa Barbara County Agricultural Commissioner’s Office: http://www.co.santa-barbara.ca.us/agcomm/

Santa Barbara County Water Agency: http://www.publicworkssb.org/water/

University of California Cooperative Extension Santa Barbara County: http://www.sbceo.K12.ca.us/~uccesbl/
Water Supply Enhancement

Water Use Efficiency
Cloud Seeding
Water Reuse
An effective way to manage water supplies is to increase the efficiency of use in order to reduce demand. The semiarid climate, periodic droughts and high cost of water locally make efficient use of valuable water supplies essential. This means that all water consumers use only the amount of water required to meet their needs. Water consumers include farmers, residents, businesses, schools, municipalities, parks and others. Efficient use of water results in little or no waste.

Some benefits of using water efficiently include saving energy, reducing flow into wastewater treatment facilities, and minimizing the need to develop new supplies, with associated costs, to meet expanding needs. Individual water consumers can also benefit by saving money on their water and energy bills when using water efficiently.

Efficient use of water entails responsible design of landscapes and appropriate choices of appliances, irrigation equipment and the other water-using devices that enhance our lives. In recent years, laws have been passed that require efficient plumbing devices, appliances, and landscape designs. However, it is still up to individual water consumers to use water wisely and minimize waste.

The Santa Barbara County Water Agency (SBCWA) operates the Regional Water Efficiency Program to assist water purveyors and residents. Though the SBCWA does not sell water, it supports a variety of programs that are effective when administered at the County level in cooperation with individual water districts. These regional programs include:

- Landscape education
- Public information
- School education
- Irrigation efficiency training
- New development review
- Data collection
- Research regarding new technologies
- Compliance with regulations
- Planning and participation in state and federal technical committees.

Each of the regional program elements is described briefly below:

### Landscape Efficiency Education

Roughly half of the water consumed in urban communities in Santa Barbara is used to irrigate residential and commercial landscapes, parks and golf courses. The climate of Santa Barbara County is perfect for low-water-using landscapes that are lush, attractive, and easy to maintain. The SBCWA, in cooperation with local water purveyors, provides information, training and demonstrations of water efficient landscape design and maintenance strategies. A major component of this effort is the promotion of appropriate, low water using plant species (natives and others that thrive in Mediterranean climates). Local demonstration gardens are listed on page 86.

Sustainable landscaping is a term that refers to landscapes that make efficient use of resources such as water and energy, while reducing pollution due to runoff of fertilizers and pesticides, and minimizing waste from excess pruning.
Typical landscapes require an input of time, money, labor, water, chemicals, and fertilizers. Maintained landscapes also create waste: plant trimmings and weeds, polluted runoff from the use of chemicals and fertilizers, and water lost by evaporation from plants and soils. In sustainable landscaping, the input and output of landscaping are both minimized.

Sustainable landscaping practices result in landscapes that are an integral part of the local environment. For more information on sustainable landscaping, see the free, full-color brochure *Sustainable Landscaping: Resource Efficient Landscapes for Southern California* produced by the SBCWA with support from local water purveyors and the Bureau of Reclamation. Call the SBCWA at (805) 568-3546 to obtain a copy.

**Cachuma Resource Conservation District Large Landscape Audits**

In Santa Barbara County, trained professionals from the Cachuma Resource Conservation District (CRCD) use the Mobile Irrigation Lab to provide irrigation evaluations to property managers with large areas of turf that require irrigation. Some of the properties that are targeted by this program include City and county landscapes, parks, golf courses, school grounds, and cemeteries. Evaluations include the measurement of the Distribution Uniformity of the sprinklers, a sprinkler inspection, a soil survey, and recommendations for controller settings. Following the evaluation, property managers receive a report from the CRCD that outlines recommendations and projections for potential savings.

**Public Information**

The SBCWA works closely with local water purveyors to inform the public about water issues and ways to use water efficiently. Some of the public information programs include: planning or participating in special events throughout the year such as the fairs, workshops and tours held during Earth Day (April) and Water Awareness Month (May), preparing and distributing literature regarding specific techniques to save water, and preparing a newsletter on current topics in water resources efficiency.

**School Education**

The SBCWA distributes free, locally developed water education materials that are available to teachers and other interested people. A brief description of those materials and services offered appears below:

**Water Activities Manual** (Grades 6 - 8)

This manual is especially designed for Santa Barbara County. It gives general information about water as well as specialized information on the county’s unique water supply situation. Reading units are complemented by activities, worksheets, experiments, and field trip suggestions. Maps and tables give students a close-up view of water use and supply in the county. This publication is available in teacher and student versions.

**Water Education Web Site**

Through a partnership of local water purveyors, educators and the Bureau of Reclamation, this web site provides teachers, students and others with easy access to information about water including lesson plans, activities, resource materials, water quality and weather data, other web sites, photos, ways to access local water purveyors and other helpful information. The web site address is <www.sbwater.org>.

**Water Education Resource Guide**

This guide provides ordering information on free and low-cost water education materials. In addition to classroom materials, the guide provides information on films, maps and posters, local field trips, speakers, and on-line resources.

**Water of Santa Barbara County**

(Grades 4-12)

This publication describes the various water sources used in Santa Barbara County, and provides general information on the water cycle, how water is used in the county, and water conservation tips.
Water Resources of Santa Barbara County

This general information report is suitable for students grades 6 through 12, and adults. It provides an overview of rainfall, water sources and supplies, and water demand.

Classroom Presentations

SBCWA staff give classroom presentations (on a limited basis) on a variety of water supply and conservation topics. Local water purveyor personnel provide most classroom presentations.

Teacher Workshops

The SBCWA also sponsors training in water education curriculum, including Project WET. Call the SBCWA to learn about this program and currently scheduled workshops.

Statewide Water Education Committee

The California Department of Water Resources (DWR) holds semiannual meetings for water purveyors and educators in California. SBCWA staff participates in these meetings, which facilitate the exchange of information and ideas regarding water education.

Irrigation Efficiency Training/Assistance for Farmers

The County supports a variety of services for agricultural water users. In cooperation with the County, the Cachuma Resource Conservation District offers irrigation system evaluations for agricultural water users, conducts workshops on irrigation efficiency and provides a toll free CIMIS (California Irrigation Management Information System) Hotline. The SBCWA provides funding assistance to the Cachuma Resource Conservation District to conduct these programs.

California Irrigation Management Information System (CIMIS)

CIMIS is a network of more than 90 computerized weather stations located at key agricultural and municipal sites throughout California. Six of these stations are located in Santa Barbara County. Stations are located in Santa Barbara, Goleta, Santa Ynez, Santa Maria, Guadalupe, and Cuyama. The California Department of Water Resources operates the system.

How does CIMIS work?

Each weather station automatically reads and collects information on wind speed and run, average vapor pressure, air temperature, relative humidity, dew point, solar radiation, soil temperature, and precipitation. The information is transmitted to a central computer database in Sacramento that converts the data into reference evapotranspiration, or ETo. ETo is the combined value of the water needs of cool-season grass and soil evaporation. The daily water needs of crops or landscape plants can then be estimated using ETo and crop coefficients, factors that adjust ETo for specific types of plants.

From this information, agricultural or landscape irrigators can establish a water budget irrigation schedule. In many cases, this method of irrigation...
scheduling can reduce the amount of water used in irrigation, and at the same time improve growth performance.

**How to access CIMIS**

A toll-free hotline has been established to access CIMIS information. The number is 1-888-CIMIS2U (1-888-246-4728). The SBCWA provides brochures that can assist growers and landscapers in using ETo to determine irrigation schedules. For a brochure, call the SBCWA or the Cachuma Resource Conservation District.

**Tours and Demonstrations**

Local agencies sponsor tours and demonstrations for farmers and others to learn more about efficient water use in agriculture. Some of these efficient water use practices include laser levelling land for more efficient furrow irrigation application; tailwater recovery systems for reuse of irrigation water; nursery cultivation of plant cuttings that are then transplanted to the field, thus eliminating more consumptive pre-irrigation in the field; use of drip irrigation and other efficient technologies.

**Irrigation Water Management Program**

The objectives of the Irrigation Water Management Program are to conserve water and energy in Santa Barbara County. This is accomplished through the implementation of Best Management Practices (BMPs) for operating and maintaining agricultural irrigation systems. Staff from the Cachuma Resources Conservation District (CRCD) provides irrigation system evaluations to local agricultural water users to help implement the BMPs. The CRCD manages the Mobile Irrigation Lab, which travels to the site to be evaluated. As part of the evaluation CRCD staff analyzes the Distribution Uniformity of the sprinklers; provides an estimate of seasonal evapotranspiration, effective rainfall, leaching and irrigation water requirements; tests pumping plants for energy efficiency; and measures the water quality by testing pH, electrical conductivity, nitrates, hardness and iron in the irrigation water. Following the evaluation, the agricultural water user will receive a report from the CRCD that outlines recommendations and projections.

**Statewide Agricultural Water Efficiency MOU**

There are many ways that irrigation water suppliers can promote efficient use by farmers. In the late 1990s, legislation (AB 3616) was passed that created a Memorandum of Understanding (MOU) outlining practical and cost effective efficient water management practices (EWMPs) for irrigation districts. The EWMPs contained in the MOU include such practices as water pricing, education, efficient irrigation technology, water management practices (irrigation scheduling, moisture monitoring) and weather monitoring. As a result of this legislation, a council was formed which includes the California Department of Water Resources (DWR), a number of large irrigation districts, public and environmental interest groups and agricultural agencies such as the Farm Bureau and the Natural Resources Conservation Service. This statewide council, comprised of the above entities and individuals that have signed the MOU, was formed to oversee implementation of the EWMPs. The SBCWA participates in these quarterly council meetings and promotes implementation of EWMPs by local irrigation water suppliers.
New Development Review

There are many ways that water use in new development can be minimized. Some methods include careful design and planning, the inclusion of efficient plumbing devices and appliances, appropriate landscaping (plants and irrigation systems) and efficient processes used in commercial and industrial projects that have high water demands. The County Planning and Development Department reviews all new development in the unincorporated areas of the county and coordinates this review with local water purveyors to assure an adequate water supply. At this time water purveyors, as well as staff in the SBCWA, have the opportunity to comment on design features as mentioned above and to recommend more efficient alternatives if needed. This is an important aspect of the Regional Water Efficiency Program because it is easier to influence water use before a project is installed than to change behavior of the occupants once the project is complete.

Data Collection

The SBCWA collects and analyzes data regarding water production and demand, water rates and use of recycled wastewater. This data provides valuable feedback to staff regarding water use patterns and the effectiveness of efforts to promote efficient use of water.

The SBCWA also participates in regional or national studies which enhance our understanding of water use patterns. In 1998-99 the SBCWA helped fund a national study regarding the residential end uses of water, which included one local study site — the City of Lompoc. Results of this study are helping local agencies better understand the impact of their conservation programs, and how residential water uses affect their water needs.

Research Regarding New Technologies

Each year new technologies and devices are developed that help consumers save water and energy. Water has become a scarce and expensive resource in most regions of country, at least periodically, as a result of short-term climatic changes.

Federal and state laws have changed in the past 15 years to require the manufacture and sale of efficient plumbing fixtures.

Compliance with Regulations

It has been proven that using water more efficiently can be less expensive and result in fewer impacts than developing new sources of water — such as building new reservoirs. This is especially true in many areas of California where water is a limited resource. Due to these economic and resource constraints, laws have been enacted that require efficient use of water. These laws address manufacture
and sale of water efficient plumbing fixtures and appliances, design standards for landscapes and in some cases require water purveyors to develop and implement water efficiency plans. State and federal agencies have also adopted standards for efficiency that affect local water purveyors.

The Regional Water Efficiency Program staff review regulations and standards and assist local water purveyors with compliance. Many elements of the Regional Program satisfy specific requirements.

Individual water purveyors conduct many of their own water efficiency programs, directed at their customers’ unique needs. For more information about water efficiency programs conducted by local water purveyors, contact the individual purveyors listed in the Water Purveyors section.

**California Urban Water Conservation Council**

In 1991 water purveyors, public and environmental interest groups, cities and counties, consultants and others joined together to sign a statewide agreement for implementation of far-reaching urban water conservation measures in California. The SBCWA was among the first public agencies to sign the agreement. This agreement (MOU) contains best management practices (BMPs) to be implemented by water purveyors serving urban customers, with the support of the environmental interests and others. The recently revised agreement contains 14 BMPs that are being implemented by signatory agencies. These BMPs include water conservation pricing, landscape water management, education, replacement of high water using plumbing fixtures, promotion of more efficient washing machines, residential and commercial water use audits, and other conservation practices.

A statewide council of signatories was formed in 1991 and has been meeting quarterly for over nine years. The SBCWA is an active participant in this group and promotes participation in the Council to all local water purveyors. As of early 2000, five local water purveyors have become signatories to the MOU. Implementation of the urban BMPs is required by state and federal law for some local purveyors.

**U.S. Bureau of Reclamation (USBR)**

The USBR owns two local reservoirs: Lake Cachuma and Twitchell Reservoir (see Surface Water section in Water Supply Chapter). These reservoirs supply urban and agricultural water supplies to local contracting water purveyors. The SBCWA is the master contractor for both projects. All agencies contracting for water provided by a USBR facility are required to prepare and implement a water efficiency plan. For the Cachuma Project contractors, comprehensive water efficiency plans have been in place since 1994 when the contract with the USBR was renewed. The plans must be updated annually, and incorporate water efficiency measures for both urban and agricultural water users. For urban agencies one of the primary components is implementation of the best management practices (BMPs) contained in the statewide urban water conservation MOU (see above). The regional water efficiency program conducted by the SBCWA addresses many of those BMPs.

**Urban Water Management Plans**

In 1985, statewide legislation (AB 797) was passed requiring all water purveyors with 3,000 customers, or serving over 3,000 acre-feet of water for urban uses, to prepare an urban water management plan. These plans must be updated every five years. An urban water management plan is a comprehensive plan that addresses past, current and future water supplies for each affected district. These plans must include a water shortage contingency plan for droughts and other water shortage emergencies, a plan for using recycled wastewater if feasible, a comprehensive assessment of all water sup-
County farmers need to be assured of a reliable water supply

Drought Planning

Periodic droughts, like wet-cycles, occur throughout California and are an expected event in a semi-arid climate. Water managers plan for droughts by obtaining ample water supplies to meet normal needs and holding a reserve, or “buffer”, aside for periods of shortage. More severe droughts, particularly those occurring over multiple years, provide a challenge to water managers. The prolonged drought of 1986-91 is an example of a sustained shortage resulting from six years of below-average rainfall and corresponding decline in the replenishment of local water supplies. By the end of that six-year drought, water supplies on the south coast of Santa Barbara County were drastically reduced. Residents and businesses were asked to cut back their use to essential levels. Water purveyors adopted penalties for excessive use (through water rates), implemented rationing programs, prohibited wasteful use and the City of Santa Barbara actually banned lawn watering (Aston, 1992).

There are two ways that water purveyors can prepare for droughts or other water supply shortages: 1) hold enough water supplies in reserve to draw on during shortages; and 2) prepare water demand management contingency plans to reduce demand during shortages. One water supply solution includes developing additional or supplemental water sources such as the State Water Project and desalination. Both of these supplemental supplies were developed after the last drought and have helped extend local supplies to meet existing and future demand. The water purveyors contracting for State Water Project water have set aside a reserve for shortages. The City of Santa Barbara’s desalination plant, which is now decommissioned, will be brought on line when there is a need, such as a drought that affects both southern and northern California (the source of State Water Project water).

Most local water purveyors have prepared water shortage contingency plans that identify how they will reduce demand during a shortage. These plans address water savings over and above ongoing water efficiency practices that are now an integral part of customer demand management. Ongoing (long-term) efficiency measures include the best management practices described above (pricing, education, efficient landscapes and irrigation, efficient
plumbing fixtures and appliances). Short-term water shortage contingency measures include steeply tiered (penalty) water rates, prohibitions against certain unnecessary uses of water (i.e., car washing), water rationing programs, restricted landscape irrigation (i.e., designated days for watering) and public information campaigns. Typical contingency plans are based on scenarios of shortages, such as 10%, 20% and 30% reductions in supply. The demand reduction contingencies are planned according to the severity of the water supply reduction, with the most severe restrictions being carried out during the most severe shortage. In the last local drought water demand was actually reduced by over 50% during the peak of the shortage. For more information regarding water shortage plans, see the urban water management plans prepared by each water purveyor.

**For More Information**

Goleta Water District: http://www.goletawater.com/

City of Santa Barbara: http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

Montecito Water District: http://www.montecitowater.com/

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


Santa Barbara County Water Agency: http://www.publicworkssb.org/water/
The following is a list of the public demonstration gardens in Santa Barbara County that provide living examples of resource efficient landscaping.

**Goleta Water District**

4699 Hollister Avenue  
(corner of Puente Street), Santa Barbara  
(805) 964-6761

Features many native California plants and other non-native low-water using plants. Open 8:00 a.m. to sunset every day. **Admission is free.**

**Santa Barbara City College Lifescape Garden/ Chumash Point Ethnobotanic Preserve**

721 Cliff Drive, Santa Barbara  
(805) 965-0581

The Lifescape Garden features a variety of low-water using and edible plants, as well as composting systems and efficient irrigation. Chumash Point emphasizes native plants from the range of the Chumash Indians. These plants have medicinal, nutritional and spiritual importance to the Chumash. Open sunrise to sunset every day. **Admission is free.**

**Santa Barbara Botanic Garden**

1212 Mission Canyon Road, Santa Barbara  
(805) 682-4726

A 65-acre garden of native plants of California, representing a variety of plant communities and important botanical and horticultural collections. The Home Demonstration Garden at the Botanic Garden is a working model of water efficient California native landscaping for residential settings.

The Garden is open Monday-Friday from 9:00 a.m. - 6:00 p.m. and on weekends from 9:00 a.m. - 5:00 p.m.  **Small admission fee.**
Alice Keck Park Memorial Garden

City block bounded by Arrellaga, Santa Barbara, Garden and Micheltorena Streets, Santa Barbara

A 4.6-acre informal park emphasizing exotic flora. The planting areas are separated according to cultural conditions, ranging from boggy to arid, with a special section on low-water using plants. Plant directory is near center of the park, above the pond, and a list of low-water using plants is available. Open 8:00 a.m. to sunset every day. Admission is free.

Firescape

2411 Stanwood Drive / Route 192 (corner of Mission Ridge Road)
Santa Barbara
(805) 564-5703

Located across the street from Fire Station #7, this 1.7-acre labeled garden demonstrates how risks of wildfire can be reduced through appropriate planting of low-water using plants, irrigation, and management. Open 8:00 a.m. to sunset every day. Admission is free.

Montecito Water District

583 San Ysidro Road (above East Valley Road), Montecito
(805) 969-2271

A labeled, low-water using garden featuring a variety of Mediterranean plants. Open 8:00 a.m. to sunset every day. Admission is free.

Santa Maria Valley Sustainable Garden

Curtis Tunnel Center
624 West Foster Road, Santa Maria

This demonstration garden features low-water using plants, efficient irrigation, composting, mulch, lawn alternatives, and use of paved areas. Brochures and plant lists are available on-site. Open every day during daylight hours. Admission is free.

City of Lompoc Drought Tolerant Garden

1801 West Central Avenue, Lompoc
(805) 736-5083

The 1/4-mile garden path features native California plants, mulch, granite pathways, and is irrigated with reclaimed water. Open sunrise to sunset every day. Call ahead to arrange group tours. Admission is free.
Cloud Seeding

Basics

Since as early as 1948 Santa Barbara County has participated in weather modification activities in order to augment local water supplies. Weather conditions are “modified” by seeding clouds with condensation nuclei to increase the amount of rain that falls. There are a number of benefits from doing this, which is supported by statistical analysis. The most significant benefit is that in some years up to 15% more rain falls in areas where clouds have been seeded than in control (unseeded) areas. Other benefits include:

- Infiltration of significant amounts of water into groundwater basins;
- Runoff into reservoirs;
- Irrigation effects on grasslands and crops.

To understand how cloud seeding works, it is important to understand clouds. Clouds are composed of droplets of water vapor of varying size and temperature. These cloud droplets form on microscopic particles of atmospheric dust, called condensation nuclei. Toward the top of the cloud formations, “supercooled” water vapor may exist. This means that the water vapor is suspended in the cloud at temperatures that are below freezing.

Precipitation forms when this vapor contacts a particle or “nucleus”. The vapor freezes to the particle and forms an ice crystal. The crystal grows larger as more vapor contacts it. When it becomes large enough to overcome the forces of “uplift” in the cloud, it falls out as precipitation. This precipitation may reach the ground as hail or snow, or during its descent it may melt and reach the ground as rain. It may evaporate entirely on the way down and rejoin the cloud as vapor. The existence of supercooled water vapor constitutes the most opportune conditions to seed clouds for rainfall augmentation purposes. It is possible, though, to seed clouds without supercooled water vapor, under certain meteorological conditions.

In storms typical to Santa Barbara County, there is much more moisture available than there are condensation nuclei to act as ‘bus’ mechanisms to bring the cloud droplet from a high elevation in the atmosphere down to earth’s surface. For this reason, Santa Barbara County’s weather modification program focuses on adding more condensation nuclei to clouds to increase rainfall.

A number of substances have been shown to work for cloud seeding, including dry ice, but the most commonly used substance is silver iodide (AgI). There are two ways to inject silver iodide into clouds: aerial and land-based methods. In aerial seeding, silver iodide generators are mounted on the wing tips of an airplane which flies directly into the most productive part of the cloud. Land-based generators are placed at the tops of mountains where updrafts carry the silver iodide into passing clouds. The generators burn a solution of silver iodide and acetone which releases the seeding agent in a smoke form.

Local Program

Local aircraft generators are flown on planes leaving the Santa Barbara or Santa Maria Airports. This is a more precise method of seeding because the pilot can fly directly into precipitation bands, the most productive portions of the storm. These bands can be detected by radar and pilots can be directed to them by radio. Ground generators are located at the Refugio Pass and La Cumbre Peak in the Santa Ynez Mountains, and are independently activated by a meteorologist from the control center. A com-
puter model is used to predetermine the effects of seeding. The County cloud seeding program is only conducted in the upper Santa Ynez and Twitchell Reservoir watersheds. It is kept away from the county’s urban areas, partly to avoid inundating populated areas with rain, and partly because runoff south of the mountains goes into the ocean.

The effectiveness of cloud seeding has been evaluated to demonstrate its benefits. Recent statistical studies suggest that seeding results in a maximum increase in precipitation of about 15% over one rain season. This translates to thousands of acre-feet (AF) of additional water captured for storage in local reservoirs. For example, in a wet year such as 1992-93, approximately 20,000 AF of water was generated through cloud seeding, and this figure does not include infiltration into groundwater basins.

The local cloud seeding program is operated between December 1 and March 30 of most years. Seeding is only possible during those months if there are clouds present that might produce rain. During drought periods, cloud seeding is not as effective. Conversely, in large storms, seeding operations are suspended in order to avoid contributing to flooding problems. The most effective seeding occurs during moderately wet years such as 1992 and 1993, although some level of cloud seeding is conducted most years.

The current cloud seeding program in Santa Barbara County uses state-of-the-art technology to reduce the associated risks of excessive rainfall or rainfall occurring in areas not intended. County hydrologists use a network of rain and stream flow gauges together with predictive computer models to prevent potential problems. A set of suspension criteria is established every year which specifies conditions under which seeding may be conducted. For example, all seeding is suspended in the areas recently burned by wildfires (such as the Marre Fire in Santa Ynez Valley) because those areas are sensitive to excessive soil erosion which can lead to landslides and downstream sedimentation. Seeding can resume when geologists and others have determined that there is no longer any danger of landslides or other adverse erosion impacts. The program is under the constant supervision of a certified meteorologist who uses real-time radar and satellite imagery to monitor storm progression and rainfall.

### Costs

The cost of the annual cloud seeding program is shared among the County and the water districts which receive a benefit from it. The cost is well justified when compared to its benefits. The average cost of water produced by cloud seeding is less than $100 per AF. By comparison, the cost of State Water Project water on the South Coast is roughly $1,200 per AF. Desalinated seawater costs approximately $1,100 per AF. Groundwater and water from Lake Cachuma average between $75 and $250 per AF. Thus cloud seeding is one of the least expensive sources of water available to us.

### For More Information

Weather Modification, Inc.: 
http://www.wmi.cban.com/

Santa Barbara County Water Agency. 1977. 
*Potentials for Yield Augmentation through Weather Modification.*

Recycled Wastewater

Wastewater refers to water that has been used and then released into the sewer. Wastewater can contain sewage, urban street runoff or industrial or agricultural waste products. Wastewater enters sewers where it is carried to wastewater treatment plants. During the treatment process solids are removed from the water. Chemicals are added to disinfect the water before it is released into the ocean, neighboring river, other water body or spreading grounds. If treated to an advanced level, wastewater (or “effluent”) can be reused for such purposes as irrigation of pasture grasses, landscaping, and even some crops.

Properly treated wastewater can provide a cost effective alternative to potable (drinking) water for a wide variety of uses. The process of treating wastewater for reuse is called recycling. Water recycling is becoming a more important resource as local water purveyors seek ways to stretch their existing water supplies. Because recycled water can be safely and legally substituted for potable water in agriculture and landscape irrigation, flushing toilets, as well as dust control and compaction on construction sites, it replaces potable water and makes it available for other uses. This effectively creates a new water source.

Recycled water must meet rigorous water quality standards before it can be reused, with the standards varying depending on the type of use. The process of treating water to a high enough level so that it may be recycled is complex and somewhat expensive, so not all wastewater treatment plants can produce recycled water.

There are several steps to the wastewater treatment process. Water is transported from sewers into the treatment plant, where it receives “primary treatment”. This involves removing solids that settle to the bottom, as well as floating materials. Next the water undergoes “secondary treatment”, which removes solids that are suspended or dissolved in the water. Finally, some treatment plants use “tertiary treatment”, which filters and disinfects the water. Most wastewater in Santa Barbara County is treated to the secondary level.

Recycled Water Use

Three wastewater treatment plants in the county, the City of Santa Barbara’s El Estero Wastewater Treatment Plant, the Goleta Sanitary District, and the Lompoc Regional Wastewater Reclamation Plant produce water that is directly reused in the community. These are discussed in more detail below. The remaining treatment facilities produce water that flows into ponds, which allow the water to percolate into the groundwater basin, or they release the treated wastewater into the ocean.
## Wastewater Treatment Plants in Santa Barbara County

There are twelve wastewater treatment (also called “sanitation”) plants in the county. This table contains a list of each of the sanitation plants and describes the level of treatment and the wastewater flow capacity of each plant. Most sanitation plants are operated by public entities such as cities or the County. Several are special districts not affiliated with city or county operations.

<table>
<thead>
<tr>
<th>Treatment Plant</th>
<th>Total Plant Capacity (acre-feet per year)</th>
<th>Level of Treatment</th>
<th>Recycled Water Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buellton Wastewater Treatment Plant</td>
<td>728</td>
<td>secondary</td>
<td>groundwater recharge</td>
</tr>
<tr>
<td>Carpinteria Sanitary District</td>
<td>2,240</td>
<td>secondary</td>
<td>treatment plant landscape irrigation</td>
</tr>
<tr>
<td>Goleta Sanitary District and Goleta West Sanitary District</td>
<td>14,562</td>
<td>blended secondary/tertiary</td>
<td>landscape irrigation, toilet flushing</td>
</tr>
<tr>
<td>Guadalupe Wastewater Treatment Plant</td>
<td>1,344</td>
<td>secondary</td>
<td>pasture irrigation</td>
</tr>
<tr>
<td>Laguna County Sanitation District</td>
<td>3,584</td>
<td>secondary</td>
<td>pasture irrigation</td>
</tr>
<tr>
<td>La Purisima Wastewater Treatment Plant</td>
<td>448</td>
<td>primary</td>
<td>groundwater recharge; pasture/crop irrigation</td>
</tr>
<tr>
<td>Lompoc Regional Wastewater Reclamation Plant</td>
<td>5,600</td>
<td>advanced secondary</td>
<td>sewer line cleaning; dust control and compaction; city street tree irrigation</td>
</tr>
<tr>
<td>Montecito Sanitary District</td>
<td>1,680</td>
<td>secondary</td>
<td>none</td>
</tr>
<tr>
<td>El Estero Wastewater Treatment Plant (City of Santa Barbara)</td>
<td>12,321</td>
<td>secondary/tertiary</td>
<td>landscape irrigation; toilet flushing</td>
</tr>
<tr>
<td>City of Santa Maria Wastewater Treatment Plant</td>
<td>8,737</td>
<td>secondary</td>
<td>groundwater recharge; pasture irrigation</td>
</tr>
<tr>
<td>Solvang Wastewater Treatment Plant</td>
<td>1,120</td>
<td>secondary</td>
<td>groundwater recharge</td>
</tr>
<tr>
<td>Summerland Sanitary District</td>
<td>336</td>
<td>tertiary</td>
<td>none</td>
</tr>
</tbody>
</table>
City of Santa Barbara

The City of Santa Barbara’s water recycling project was implemented in two phases. Phase I, completed in 1989, included upgrading the El Estero Wastewater Treatment Plant to treat the water to the tertiary level. This recycled water is then distributed to user sites through a completely separate distribution system to ensure that there is no cross connection into the potable system. Phase I provides recycled water for landscape irrigation. Sites that use water from this phase include Montecito Country Club, the Red Lion Inn, Santa Barbara Zoological Gardens, Santa Barbara City College, and several schools and city parks.

Phase II, which extended the reach of the recycled water project, was completed in 1991. Sites irrigated by Phase II water include landscaping along Highway 101, Arroyo Burro Beach Park, the Municipal Golf Course and additional schools and parks. Since 1991, new development along the recycled water distribution system has been added including Chase Palm Park Extension and the Garden Street median.

Some irrigation sites receive recycled water from a 600,000 gallon storage tank at the wastewater treatment plant. For the remaining sites, recycled water is pumped to the new 1.5 million gallon storage reservoir at the Municipal Golf Course, and then distributed at night to irrigate those sites.

In 1995, the City began using recycled water to flush toilets and now many of the sites irrigated with recycled water have also converted their public restrooms to flush with recycled water.

Although the total capacity of the recycled water project is 1,200 acre-feet per year (AFY), current total project use is 850 AFY.

Goleta Valley

The water recycling project in Goleta is a joint effort between the Goleta Water District and the Goleta Sanitary District. The Goleta Sanitary District Plant features a blended secondary process, in which primary treated water is mixed with secondary treated water to safely meet all discharge requirements. This effluent is discharged into the ocean. Excess secondary water is then treated to the tertiary level to create usable recycled water.

This recycled water is used to irrigate landscaping at the University of California, local parks, golf courses, school grounds, and business parks. The project has the capacity to produce 1,500 AFY of recycled water, replacing potable water which then becomes available to the community. Several locations in Goleta now use recycled wastewater for toilet flushing.

In this cooperative project, Goleta Sanitary District added the tertiary stage of water treatment to the plant, and continuously monitors the quality of the water produced. The Goleta Water District constructed a separate pipeline to distribute the recycled water to customers. Special sprinkler systems were also designed to use the recycled water. The Goleta Water District also developed a user’s manual containing strict guidelines for usage of the water.

For More Information

City of Santa Barbara:
http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

Goleta Water District:
http://www.goletawater.com/


WateReuse Association:
http://www.watereuse.org/
Regulatory Framework

Legislation

Regulatory Agencies
The regulatory framework for water is extremely complex. Regulations governing water in Santa Barbara County in particular, and California in general, cannot be found in any one source. A variety of state, local and federal laws and regulations control and guide water management in the county. This section contains a brief overview of pertinent regulations and legislation, and a list of references where more information can be obtained.

**Federal**

The Clean Water Act and Safe Drinking Water Act (SDWA) are both enforced by the Environmental Protection Agency (EPA) Office of Water.

**Safe Drinking Water Act (1975)**

The Safe Drinking Water Act of 1975 gave the EPA the authority to establish and enforce guidelines for the achievement of minimum national water quality standards for every public water supply system serving 25 people or more. The State’s primary drinking water standards are based upon the National Interim Primary Drinking Water Regulations (40 CFR Part 141). These standards specify the maximum allowable concentrations or contaminant levels of substances present in drinking water. The substances regulated by the National Primary Drinking Water Act Regulations are those known to cause illness, death or adverse physical effects to humans. These contaminants are referred to as “primary contaminants.” The State’s secondary drinking water standards are based on the National Secondary Drinking Water Regulations (40 CFR Part 143). The secondary standards regulate “secondary contaminants.” These contaminants tend to make the water undesirable. Objectionable odor, taste, particulate matter, hardness and corrosiveness are secondary contaminants. In 1988 and 1989, the Safe Drinking Water Act was amended. The amendments and the regulations for their implementation may be found in Title 22, Chapter 15, Domestic Water Quality and Monitoring. These amendments require water purveyors to test for new types of organic and chemical contaminants. In addition, the testing procedures and techniques that are required have also been revised.

**The Clean Water Act**

The Clean Water Act (CWA) controls the discharge of toxic materials into surface water bodies. The CWA was the result of the 1899 Rivers and Harbors Act, which prohibited discharges that could interfere with interstate transportation. In 1948, another water control act was passed to protect water bodies by imposing effluent limitations at the source of pollution discharge. In 1972, the CWA was amended with the primary purpose identified as “restoring and maintaining the chemical, physical and biological integrity of the nation’s waters” and “to achieve a level of water quality by July 1983 that provides for recreation in and on the water, and for the propagation of fish and wildlife.” The amendments provided for federal primacy (previously there was more state discretion), expanded the coverage of the legislation, changed pollution control methodology and modified prior enforcement provisions.

The CWA can be broken down into six basic areas as follows:

1. Research projects and grants designed to clean up pollution and prevent further pollution;

(Portions of this section were adapted from Volume II of the *Ventura County Water Management Plan* published by the County of Ventura Resource Management Agency and Public Works Agency, 1994)
2. Grant programs for construction of treatment works, wastewater treatment planning and water quality management plans;

3. Effluent limitations on discharges into navigable waters, continuing revisions of water quality standards;

4. A National Pollutant Discharge Elimination System (NPDES) permitting discharge of point source pollutants;

5. Limitations on dredge and fill material (Section 404);

6. Miscellaneous administrative provisions, definitions, EPA powers, provisions for judicial review.

Section 208 of the CWA

Under Section 208 of the 1972 amendments, the governor of each state was mandated to identify those areas in the state that had “substantial water quality control problems”. Once identified, the governor was required to select “a single representative organization, including elected officials from local government” to operate “a continuing area-wide waste treatment management planning process”. Following state certification, plans prepared under the process were to be approved by the EPA.

In February 1987 Congress amended the Clean Water Act with amendments known as the Water Quality Act of 1987. Under these amendments and the EPA regulations, states were required to identify, by February 1989, water segments impaired by pollutants (including toxic pollutants) even where technology-based limits are met. Several lists are required. For each list there must be a control strategy/management plan developed to reduce pollution. The law requires that water quality standards be met within three years.

State

Since water usage affects many areas of State concern, regulations are organized accordingly. Regulations can be found in the California Water Code, Health and Safety Code, Government Code as well as in other codes. The State Department of Health Services regulates drinking water standards, the Public Utilities Commission (PUC) regulates entities that serve water to the public in relation to rates and accounting procedures, the Corporations Commissioner regulates water service provided by water companies that do not fall under the jurisdiction of the PUC, and the Water Resources Control Board and its regional offices regulate discharges of pollutants into navigable waters and water quality in general.

The Dickey Act of 1949 provided the organization for the State of California’s administration of water. The act created nine geographical regions, each to be regulated by a Regional Water Quality Control Board. Santa Barbara County falls within Region 3. These nine boards were granted the authority to establish and enforce water quality standards within watersheds under the direction of a main administrative body, the California Water Quality Control Board. In 1969, the Porter-Cologne Act expanded the supervisory and appellate powers of these boards and required the formulation of specific water quality objectives and plans for their achievement. (See following page for more information.) These objectives are contained in Water Quality Control Plans, referred to as Basin Plans.

The EPA oversees the State Water Resources Control Board’s administration and compliance with federal regulations promulgated by the Clean Water Act.
The Porter-Cologne Water Quality Control Act, 1987 Amendments

The Porter-Cologne Water Quality Control Act (1987) provides the authority and method for the State of California to implement its water management program. The State’s program is a comprehensive water quality control program that includes surface and groundwater. The Porter-Cologne Act establishes waste discharge requirements for both point and nonpoint source discharges, affecting surface water and groundwater.

The State of California’s Water Quality Assessment (305B) Report was prepared by the State Water Resources Control Board in September of 1988 in response to the federal amendments. Within this assessment were three lists required by the federal government:

a. A list of water segments having quality problems due to point source discharges of any of the 126 priority toxic pollutants (Section 304(1) B);

b. A list that identified freshwater and marine water areas affected by toxics, regardless of the source (point or nonpoint) (Section 311.11); and,

c. A list that identifies nonpoint source related surface water problems (Section 319).

To satisfy the requirements of Section 319 of the Clean Water Act, the State prepared a Nonpoint Sources Assessment Report that identifies surface water bodies affected, describes the process by which best management practices to control nonpoint sources are developed and describes existing control programs.

Safe Drinking Water and Toxic Enforcement Act (1986)

The Safe Drinking Water and Toxic Enforcement Act of 1986 prohibits the discharge or release of any significant amount of a chemical known to cause cancer or reproductive toxicity into the drinking water supply, by any person in the course of doing business. Each year the Governor of the State must require the publication of a list of chemicals known to cause cancer or reproductive toxicity. Violation of the discharge provisions under this act is subject to civil prosecution.

This act also requires that if a government employee obtains information about an illegal discharge of hazardous waste within the geographic area of his/her jurisdiction, he/she must report the incident within 72 hours to the Public Health Officer of the county or the Board of Supervisors. Violation of this requirement will subject the government employee to felony prosecution.

AB 3030 – The Groundwater Management Act, 1992

The Groundwater Management Act, commonly referred to as AB 3030, became effective in January 1993. The legislation is designed to provide local public agencies with increased management authority over groundwater resources in addition to existing groundwater management capabilities. The legislation is permissive and provides encouragement for local agencies to work cooperatively and voluntarily towards groundwater management.

A key element of this law is the adoption or implementation of groundwater management plans. As provided in AB 3030, any local agency that provides water service to all or a portion of its service area and whose area includes all or a portion of a groundwater basin may adopt and implement by ordinance or resolution a groundwater management plan. The statutory definition of “local agency”
is expressly limited to “public” agencies, and this would exclude mutual water companies and investor-owned utilities.

For More Information


Federal Water Pollution Control Act (Clean Water Act) 1972.

California Department of Health Services: [http://www.dhs.ca.gov/index.htm/](http://www.dhs.ca.gov/index.htm/)

Department of Water Resources; California Water Page: [http://www.dwr.water.ca.gov/](http://www.dwr.water.ca.gov/)

United States Environmental Protection Agency: [http://www.epa.gov/](http://www.epa.gov/)

Environmental Protection Agency; Water Quality - Surf Your Watershed: [http://www.epa.gov/surf/surf_search.html/](http://www.epa.gov/surf/surf_search.html/)
A number of county, state and federal agencies play a role in the management and protection of water resources in California. They are listed below with a brief description of their responsibilities. (Information contained in this section was obtained from the *California State Water Project Atlas*, published in 1999 by the California Department of Water Resources).

### County Government

**Water Management Structure and Responsibilities**

The County plays an important role in the oversight of local water use and strives to assure the ongoing protection of local water resources. However, since the County does not develop water supplies or deliver water to customers, its role in local water management is indirect. The primary responsibilities of the County are to study water resources, help assess future needs, contract with state and federal agencies that operate local water projects, assure that new development does not exceed available supply, monitor groundwater quality and quantity, conduct public education programs, promote efficient use of water, coordinate with local water purveyors and protect water sources from contamination. The responsibilities of various County departments are discussed below.

**Board of Supervisors/County Water Agency Board**

The Board of Supervisors also serves as the Board of Directors of the County Water Agency (see below). The Board of Supervisors and County Water Agency Board review and set land use policy as it relates to water, consider regional water management in conjunction with local water purveyors and cities, and make pertinent decisions regarding water quality and water supply enhancement (such as cloudseeding) for the unincorporated areas of the county.

### Local Agency Formation Commission

LAFCO has oversight over the boundaries of local water purveyors and of annexations among and within water purveyors and other local governmental entities, and the creation of new water districts within the county.

### County Administrative Office

Among its many other duties, the County Administrative Office monitors federal and state water-related legislation. Budget analysts coordinate with Santa Barbara County Water Agency (SBCWA) staff regarding programs and performance measures related to the SBCWA’s roles and responsibilities.

### Public Works Department

**County Water Agency**

The Santa Barbara County Water Agency (SBCWA) is part of the Water Resources Division of the Public Works Department. The SBCWA was established by the state legislature in 1945 to control and conserve storm, flood and other surface waters for beneficial use and to enter into contracts for water supply. The SBCWA prepares investigations and reports on cloudseeding and conservation augmentation, the county’s water requirements, the water needs of projected development and the efficient use of water. It provides technical assistance to other County departments, water districts, and the public concerning water availability and water well locations and design. The SBCWA also administers the Cachuma Project and the Twitchell Dam Project contracts with the U.S. Bureau of Reclamation. More recently, the SBCWA has become the lead agency for Project Clean Water, a multiagency partnership with the mission of improving water quality in the county’s creeks and beaches.

The SBCWA was originally empowered under State Water Code Section 3000 et seq. to cooperate and contract with the United States and State of California on behalf of municipalities and districts within
the Agency’s boundaries. It has since been empowered to also acquire property, condemn for the purpose of right-of-way, and assume indebtedness either as principle, guarantor, or underwriter.

**Water Agency Program Overview**

The SBCWA operates under a nontraditional organizational structure. Instead of sections, it utilizes a matrix management structure to manage three regional programs. They are: (1) implementation and partial funding of operational programs such as the cloudseeding program, (2) implementation of the regional water conservation program and (3) development of county-wide hydrologic data and hydrologic models. Included in these programs are compilation and publication of an annual report on groundwater conditions, sediment management studies, technical support to other public agencies, and public information. Major water projects involving the SBCWA include the State Water Project (Coastal Branch Extension), Cachuma Project, and the Twitchell Project. These projects and programs are described in greater detail elsewhere in this report.

**County Flood Control District**

The Flood Control District is also a part of the Water Resources Division of the Public Works Department. The District was created in 1955 by the state legislature in response to severe flooding and damage suffered from storms in the early 1950s; its primary charge was to implement a program of channel maintenance and capital improvements to mitigate the threat to life and property from flooding. Today, the Flood Control District’s major programs involve channel maintenance, design and construction of capital improvements, review of new development, and operation of a hydrological data collection/flood warning system. The Flood Control District is divided into ten active Flood Control Zones covering most of the unincorporated area and the seven cities in the county, exclusive of federal lands such as Los Padres National Forest and Vandenberg AFB.

**Flood Control Program Overview**

The District constructs regional flood control projects throughout the county and collects hydrologic data that serves as a basis for design criteria, maintenance activities, and mapping floodplains. The highest priority program for the Flood Control District involves operation and maintenance of the District’s basins, channels, and other flood protection facilities and the emergency maintenance and repair of these facilities. In addition, District staff provides advance warning of impending floods and is involved in emergency response flood-fighting and support activities. Post-storm rehabilitation of flood control facilities is provided by the District through the removal of debris from debris basins and channels, and the reconstruction and repair of these facilities. The District is also responsible for reviewing proposed development to ensure conformance with applicable flood plain ordinances and prudent drainage practices.

### Public Health Department

#### Environmental Health Services

**Responsibilities**

Environmental Health Services is a division of the Public Health Department, and is the implementing agency for portions of state water quality laws related to protecting public health and safety. Among other health protection legislation the Department is responsible for enforcing portions of the federal Clean Water Act and amendments, the Safe Drinking Water Act, and the State legal requirements of the Porter-Cologne Act and the Safe Drinking Water and Toxics Enforcement Act (commonly known as Proposition 65). Water management within Environmental Health consists of the following programs: Drinking Water (for small public systems), Liquid Waste, Solid Waste and Recreational Health.

a. Drinking Water - Drinking water programs include those programs that oversee water resources which have not been used by humans prior to their extraction from groundwater basins.
or surface water sources. These drinking water programs include the inspection, monitoring and permitting of small public water purveyors with fewer than 200 connections, and approval of individual water supply systems for proposed projects. Small public water purveyors are required to maintain a cross-connection control program to ensure that drinking water quality is protected from irrigation waters, agricultural fertilizers, and industrial process waters. In addition, public information must be disseminated as required by Proposition 65.

b. Liquid Waste - As a guardian of public health, Environmental Health Services has a vested interest in the containment of communicable diseases and the prevention of surface water pollution. The Liquid Waste program protects the public from direct exposure to contaminated wastewater and promotes the proper treatment and disposal of all sewage. Environmental Health Services reviews the testing, plans, installation and repair of all on-site sewage disposal systems. This helps to ensure the adequate and safe construction of new and remodeled systems.

c. Solid Waste Program - The Solid Waste Program provides regulatory oversight to solid waste facility operators. Environmental Health Services protects the public’s health by ensuring proper placement, design, operation and closure of solid waste facilities and by enforcing regulations that require proper solid waste handling and disposal to help protect ground water supplies near landfill operations.

d. Recreational Health Program - The purpose of the recreational health program is to ensure the safe and sanitary operation of public swimming facilities, as well as preventing the possible transmission of diseases and illnesses at all recreational facilities including public beaches. By monitoring the quality of our recreational waters, Environmental Health Services can keep the public informed if these waters pose a threat to public health.

Planning and Development Department

The Planning and Development Department has several roles with respect to water resource protection and management. These roles fall primarily under either long-range planning functions (Comprehensive Plan, community plans), or short-term planning such as occurs during development review and permitting. The Department has the authority to recommend long-range policies to restrict land development in any given unincorporated area of the county to the level supported by available water supplies. The Department also has the authority to place conditions of approval on projects (the permit review or environmental review process) to minimize the amount of water used by new development. These conditions can include limiting high-water use landscapes and plumbing devices, requiring new commercial and industrial developments to use recycled wastewater or water-efficient processing technologies, and preparing water budgets that limit the overall consumption of water in new development.

Several tools the Department uses to evaluate new developments with respect to water availability and to limit the amount of water demand in new development include: the Santa Barbara County Environmental Thresholds and Guidelines Manual, 1995; the Comprehensive Plan, Conservation Element, Groundwater Resources Section, 1994; the Standard Conditions and Mitigation Measures Manual and Land Use Development Policy #4/4 CCP Policy 2-6 (Adequate Services and Resources).
The Resources Agency
This is the parent agency that oversees the operations of all state departments dealing with natural resources. The Department of Water Resources, the State Water Resources Control Board, Fish and Game, and Parks and Recreation are included among them. Also included are departments responsible for forestry, air, energy and navigation and ocean.

State Water Resources Control Board (SWRCB)
This regulatory agency has the authority over the allocation of water rights and water quality to protect the beneficial uses of California’s water. It has the ability to enforce regulations dealing with water issues. SWRCB also oversees the work of regional water quality control boards that rule on local water rights and quality issues within their geographic jurisdictions. The Board consists of five full-time, salaried members who fill specific specialty positions such as water quality, water rights, engineering, legal, and the public. Within Santa Barbara County, the SWRCB is responsible for surface water rights decisions and reservoir operations.

http://www.swrcb.ca.gov/

California Water Commission (CWC)
The CWC is a policy advisory board to the Director of the Department of Water Resources and the Governor on development, control and use of the State’s water resources. CWC conducts public hearings and investigations statewide for the Department; provides a forum to California residents for examining water resources issues; acts as a liaison between the legislative and executive branches of State government; coordinates planning, funding, and construction of federal water development and flood control projects with state and local projects and conducts an annual review of the progress of State Water Project construction and operation and reports its findings to the DWR and the California Legislature. The Commission consists of nine members appointed by the Governor.

California Department of Water Resources (DWR)
The mission of DWR is “to manage the water resources of California, in cooperation with other agencies to benefit the state’s people and protect, restore and enhance the natural and human environments.” DWR planned, designed, and oversaw the construction of the State Water Project (SWP). The Department operates and maintains the SWP facilities, as well as planning, designing, and overseeing any repairs, modifications, or new construction. DWR also provides technical and financial assistance to local urban and agricultural water agencies for water supply management, reclamation or recycling, and conservation projects; works with other state and federal agencies on environmental compliance, mitigation, and protection programs; and studies, plans and develops water management strategies, reports, and plans to address California’s growing water demands, as well as projects and programs to enhance and protect the estuary of the Sacramento-San Joaquin Delta. Other DWR responsibilities include providing for public safety through dam safety and flood control programs, and educating the public about the Department’s role and the significance of water in their lives. The State Water Project now extends into San Luis Obispo and Santa Barbara Counties. The Central Coast Water Authority is responsible for local operations.
California Department of Fish and Game (DFG)

This is the department that directs the state’s fish and wildlife programs and administers the regulations, such as the Endangered Species Act, that protect and enhance their populations. DFG works with the Department of Water Resources to ensure that all projects comply with these environmental regulations. The department conducts fish and wildlife studies, develops and safeguards wildlife habitat, responds to off-highway oil and hazardous material spills and oversees cleanup operations, manages the state’s fishing and hunting programs, regulates development in streambeds and waterways, and offers interpretive programs to educate the public.

http://www.dfg.ca.gov/dfghome.html/

California Department of Health Services (DHS)

This department administers public drinking water programs and ensures that health and safety standards are met by water agencies that distribute water to residences and businesses. DHS is also responsible for monitoring the effects of stormwater runoff and many other health-related programs.

http://www.dhs.ca.gov/State-Federal

CALFED Bay-Delta Program

This is an interagency entity that represents the signers of the State-Federal Framework Agreement, which called for a cooperative, coordinated process to solve long-term water quality and ecosystem problems in the San Francisco Bay-Sacramento River Delta Estuary. With assistance from urban, agricultural, and environmental interests, and other stakeholders concerned with Bay-Delta issues, the signers of the Agreement developed the Bay-Delta Accord, which set forth major issues of concern in the Delta and fostered a cooperative effort to address these issues. The CALFED Bay-Delta Program was established to investigate potential solutions and propose the long-term solution to the problems in the Delta. The long-term solution selected by CALFED participants will ultimately affect Santa Barbara County water purveyors due to their participation in the State Water Project.

Federal Government

U.S. Fish and Wildlife Service (USFWS)

This bureau within the Department of the Interior works with others to “conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people”. Among its responsibilities is the administration of the federal Endangered Species Act to provide protection for terrestrial and aquatic plants and animals except anadromous fish. Within California, USFWS is responsible for biological opinions and critical habitat and recovery plans for listed species. The Service also works with federal, state, and local agencies and interests on wetland protection issues.

http://www.fws.gov/

U.S. Bureau of Reclamation (USBR)

This is a bureau within the Department of the Interior. The USBR operates and maintains the Central Valley Project and the Colorado River system. In Santa Barbara County, the USBR owns and operates Lake Cachuma and owns the Twitchell Reservoir.
The USBR’s mission is “to manage, develop and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.” The USBR and the DWR signed a 1986 Coordinated Operation Agreement to meet Sacramento-San Joaquin Delta water quality standards and allow exchange of water supply and use of facilities.

http://www.usbr.gov/

**U.S. Geological Survey (USGS)**

The USGS provides reliable, impartial information to describe and understand the Earth. In addition to other purposes, the information is used to manage water, biological, energy, and mineral resources. The USGS, working with other agencies, uses monitoring and recording equipment to gather information from and about California’s waterways, precipitation, and geology. Santa Barbara County works with the USGS on several cooperative programs monitoring streamflow, water quality and groundwater levels.

http://www.usgs.gov/

**U.S. Army Corps of Engineers (COE)**

As the primary federal flood control agency, COE develops guidelines for flood control storage in federally funded reservoirs and monitors the operation of these reservoirs to assure compliance. It also constructs some Congressionally authorized flood control projects and operates multiple-purpose projects. The federal government, through the Corps, contributes funds to local flood control projects. In Santa Barbara County the COE manages flood operations at Twitchell Reservoir.

http://www.usace.army.mil/
Appendix
ACRE-FOOT - The quantity of water required to cover one acre to a depth of one foot; equal to 43,560 cubic feet, or approximately 325,851 gallons.

ALLUVIAL - Sediment deposited by flowing water, such as in a riverbed.

APPLIED WATER DEMAND - The quantity of water that would be delivered for urban or agricultural applications if no conservation measures were in place.

AQUIFER - An underground layer of rock, sediment or soil that is filled or saturated with water.

ARTIFICIAL RECHARGE - The addition of water to a ground water reservoir by human activity, such as irrigation or induced infiltration from streams, wells, or recharge basins. See also GROUNDWATER RECHARGE, RECHARGE BASIN.

BRACKISH WATER - Water containing dissolved minerals in amounts that exceed normally acceptable standards for municipal, domestic, and irrigation uses. Considerably less saline than sea water.

CONJUNCTIVE USE - The operation of a ground water basin in coordination with a surface water storage and conveyance system. The purpose is to recharge to the basin during years of above-average water supply to provide storage that can be withdrawn during drier years when surface water supplies are below normal.

CONSERVATION - As used in this report, urban water conservation includes reductions realized from voluntary, more efficient, water use practices promoted through public education and from state-mandated requirements to install water-conserving fixtures in newly constructed and renovated buildings. Agricultural water conservation, as used in this report, means reducing the amount of water applied in irrigation through measures that increase irrigation efficiency. See NET WATER CONSERVATION.

CRITICAL DRY PERIOD - A series of water-deficient years, usually an historical period, in which a full reservoir storage system at the beginning is drawn down (without any spill) to minimum storage at the end.

CRITICAL DRY YEAR - A dry year in which the full commitments for a dependable water supply cannot be met and deficiencies are imposed on water deliveries.

CUBIC FEET PER SECOND - A unit of measurement describing the flow of water. A cubic foot is the amount of water needed to fill a cube that is one foot on all sides, about 7.5 gallons.

DESALTING - A process that converts sea water or brackish water to fresh water or an otherwise more usable condition through removal of dissolved solids. Also called “desalination.”

DWR - California Department of Water Resources (or successor agency).
**FIRM YIELD** - The maximum annual supply of a given water development that is expected to be available on demand, with the understanding that lower yields will occur in accordance with a predetermined schedule or probability.

**GROUNDWATER** - Water that occurs beneath the land surface and completely fills all pore spaces of the alluvium or rock formation in which it is located.

**GROUNDWATER BASIN** - A groundwater reservoir, together with all the overlying land surface and underlying aquifers that contribute water to the reservoir.

**GROUNDWATER MINING** - The withdrawal of water from an aquifer greatly in excess of replenishment; if continued, the underground supply will eventually be exhausted or the water table will drop below economically feasible pumping lifts.

**GROUNDWATER OVERDRAFT** - The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that replenishes the basin over a period of years.

**GROUNDWATER RECHARGE** - Increases in groundwater by natural conditions or by human activity. See also ARTIFICIAL RECHARGE.

**GROUNDWATER STORAGE CAPACITY** - The space contained in a given volume of deposits. Under optimum use conditions, the usable groundwater storage capacity is the volume of water that can, within specified economic limitations, be alternately extracted and replaced in the reservoir.

**GROUNDWATER TABLE** - The upper surface of the zone of saturation (all pores of subsoil filled with water), except where the surface is formed by an impermeable body.

**M**

**M&I** - Municipal and Industrial (water use); generally urban uses for human activities.

**mg/L** - Abbreviation for “milligrams per liter,” the mass (milligrams) of any substance dissolved in a standard volume (liter) of water. Nearly the same as parts per million (ppm).

**N**

**NET WATER CONSERVATION** - The difference between the amount of applied water conserved and the amount by which this conservation reduces usable return flows.

**NET WATER DEMAND** - The applied water demand less water saved through conservation efforts (= net applied water = actual water used).

**NONPOINT SOURCE** - A contributing factor to water pollution that cannot be traced to a specific spot.

**O**

**OVERDRAFT** - Withdrawal of groundwater in excess of a basin’s perennial yield. See also PROLONGED OVERDRAFT.
PERCOLATION - The downward movement of water through the soil or alluvium to the groundwater table.

PERENNIAL YIELD - "The rate at which water can be withdrawn perennially under specified operating conditions without producing an undesired result" (Todd, 1980). An undesired result is an adverse situation such as: (1) a reduction of the yield of a water source; (2) development of uneconomic pumping lifts; (3) degradation of water quality; (4) interference with prior water rights; or (5) subsidence. Perennial yield is an estimate of the long-term average annual amount of water that can be withdrawn without inducing a long-term progressive drop in water level. The term "safe yield" is sometimes used in place of perennial yield, although the concepts behind the terms are not identical: the older concept of "safe yield" generally implies a fixed quantity equivalent to a basin’s average annual natural recharge, while the "perennial yield" of a basin or system can vary over time with different operational factors and management goals.

PROLONGED OVERDRAFT - Net extractions in excess of a basin’s perennial yield, averaged over a period of ten or more years.

ppm - Abbreviation for “parts per million,” a measure of a substance’s concentration in a solution or other mixture. Nearly the same as milligrams per liter (mg/l).

P&D - Santa Barbara County Planning and Development Department (or successor agency); prior to February 1994, named the Resource Management Department (RMD).

RECHARGE BASIN - A surface facility, often a large pond, used to increase the infiltration of water into a groundwater basin.

RECYCLED WATER - Urban wastewater that becomes suitable for a specific beneficial use as a result of treatment.

RETURN FLOW - The portion of withdrawn water that is not consumed by evapotranspiration and returns instead to its source or to another body of water.

REUSE - The additional use of once-used water.

RMD - Santa Barbara County Resource Management Department; reorganized and renamed as the Planning and Development Department (P&D) in February 1994.

RWQCB - California Regional Water Quality Control Board (or successor agency).

SAFE YIELD (GROUNDWATER) - The maximum quantity of water that can be withdrawn from a groundwater basin over a long period of time without developing a condition of overdraft. Sometimes referred to as sustained yield.

SALINITY - Generally, the concentration of mineral salts dissolved in water. Salinity may be measured by weight (total dissolved solids), electrical conductivity, or osmotic pressure. Where seawater is the major source of salt, salinity is often used to refer to the concentration of chlorides in the water. See also TDS.
SBCFCWCD - Santa Barbara County Flood Control and Water Conservation District (or successor agency).

SBCWA - Santa Barbara County Water Agency (or successor agency).

SERIOUS OVERDRAFT - Prolonged overdraft that results, or would result, within ten years, in measurable, unmitigated adverse environmental or economic impacts, either long-term or permanent. Such impacts include but are not limited to seawater intrusion, other substantial quality degradation, land surface subsidence, substantial effects on riparian or other environmentally sensitive habitats, or unreasonable interference with the beneficial use of a basin's resources. (Also see Policy 3.5 et seq. in main text.)

SWP - State Water Project.

SWRCB - California State Water Resources Control Board (or successor agency).

TDS - Total Dissolved Solids, a quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter (mg/l) or in parts per million (ppm). See also Salinity.

TURBIDITY - A measure of cloudiness and suspended sediments in water. Water high in turbidity appears murky and contains sediments in suspension. Turbid water may also result in higher concentrations of contaminants and pathogens, that bond to the particles in the water.

WATER QUALITY - A term used to describe the chemical, physical, and biologic characteristics of water with respect to its suitability for a particular use.

WATER RIGHT - A legally protected right, granted by law, to take possession of water occurring in a water supply and to divert the water and put it to beneficial uses.

WATERSHED - The area or region drained by a reservoir, river, stream, etc.; drainage basin.

WATER TABLE - The surface of underground, gravity-controlled water.
References

Groundwater Section


City of Santa Barbara Water Department. 1994. *City of Santa Barbara Long Term Water Supply*.


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


Surface Water Section


Santa Barbara County Water Agency and URS


**Water Efficiency Section**


**Water Quality Section**


American Desalting Association: http://www.webcom.com/ada/

CASEC (California Aquatic Science Education Consortium): http://www.rain.org/casec/index.html/

California Department of Fish and Game: http://www.dfg.ca.gov/dfghome.html/

California Department of Health Services: http://www.dhs.ca.gov/index.htm/

California Environmental Resources Evaluation System: http://www.ceres.ca.gov/education/

California State Water Resources Control Board: http://www.swrcb.ca.gov/


Central Coast Water Authority: http://www.ccwa.com/

City of Santa Barbara: http://www.ci.santa-barbara.ca.us/departments/public_works/water_resources/

Department of Water Resources; California Water Page: http://www.dwr.water.ca.gov/
Water Resources of Santa Barbara County

EE Link, Environmental Education on the Internet: http://www.nceet.snre.umich.edu/index.html/

Environmental Protection Agency; Water Quality - Surf Your Watershed: http://www.epa.gov/surf/surf_search.html/

Goleta Water District: http://www.goletawater.com/

Groundwater Education: http://gwrp.cciw.ca/education/index.html/

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

Montecito Water District: http://www.montecitowater.com/

Project Clean Water: http://www.co.santa-barbara.ca.us/project_cleanwater/

Santa Barbara County Agricultural Commissioner's Office http://www.co.santa-barbara.ca.us/agcomm/

Santa Barbara County Association of Governments: http://www.sbcag.org/

Santa Barbara County Water Agency: http://www.publicworkssb.org/water/

Santa Barbara County Water Education: http://www.sbwater.org/

United States Army Corps of Engineers: http://www.usace.army.mil/

United States Bureau of Reclamation: http://www.usbr.gov/

United States Environmental Protection Agency: http://www.epa.gov/

United States Fish and Wildlife Service: http://www.fws.gov/

United States Geological Survey; Water Resources of California: http://water.wr.usgs.gov/

University of California Cooperative Extension: http://www.sbceo.k12.ca.us/~uccesbl/

University of Wisconsin Cooperative Extension; Educating Young People About Water: http://www.uwex.edu/erc/ywc/

Vandenberg Village Community Services District http://www.impulse.net/~vvcsl

Water Education for Teachers Network; WETNET, Project WET: http://www.montana.edu/wwwet/

Water Education Foundation: http://www.water-ed.org/

WaterReuse Association: http://www.watereuse.org/
# Acronyms and Abbreviations Used in This Report

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<tr>
<th>Acronym</th>
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<tr>
<td>ACWA</td>
<td>Association of California Water Agencies</td>
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<tr>
<td>AF</td>
<td>Acre-Feet</td>
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<td>AFY</td>
<td>Acre-Feet per Year</td>
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<td>AWWA</td>
<td>American Water Works Association</td>
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<td>BLM</td>
<td>U. S. Bureau of Land Management</td>
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<td>BMPs</td>
<td>Best Management Practices</td>
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<td>CCWA</td>
<td>Central Coast Water Authority</td>
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<td>CIMIS</td>
<td>California Irrigation Management Information System</td>
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<td>COE</td>
<td>U.S. Army Corps of Engineers</td>
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<tr>
<td>COMB</td>
<td>Cachuma Operations and Maintenance Board</td>
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<td>Cachuma Resource Conservation District</td>
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<td>Granular Activated Carbon</td>
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<td>LAFCO</td>
<td>Local Agency Formation Commission</td>
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<td>Million Acre-Feet</td>
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<td>MOU</td>
<td>Memorandum of Understanding</td>
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<td>SYRWCDID#1</td>
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<td>TDS</td>
<td>Total Dissolved Solids</td>
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<td>ULF</td>
<td>Ultra Low Flow (Toilets, etc.)</td>
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