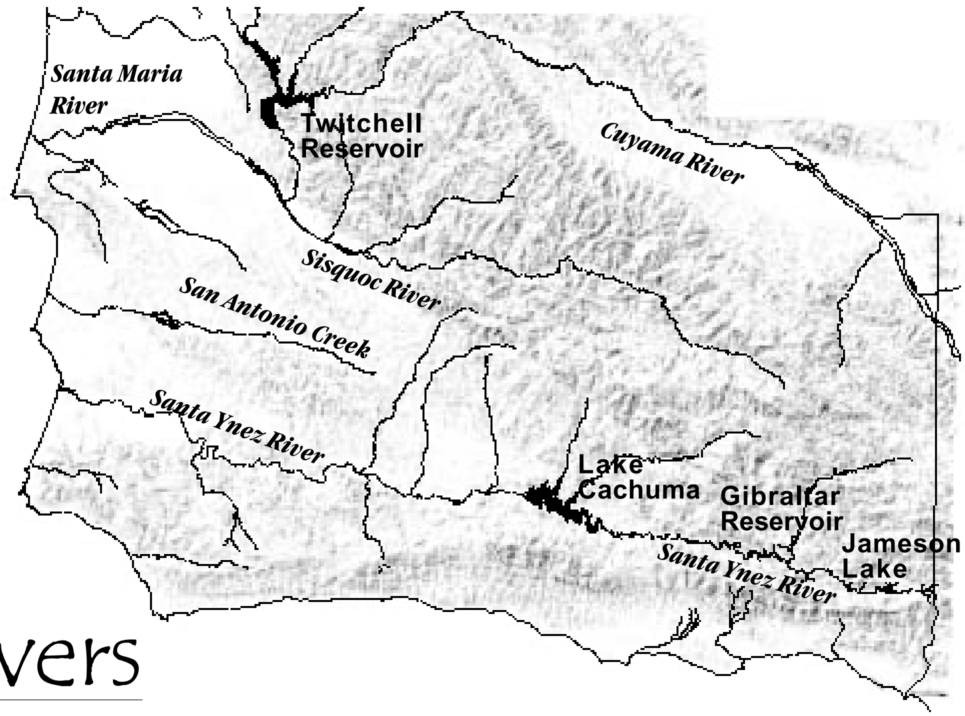
Surface Water

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.

Receding storm runoff bringing rainwater from the back-country

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).

Cuyama River flowing into Twitchell Reservoir

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.

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 Solomon and 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.

Aerial photograph of the mouth of the Santa Maria River

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:

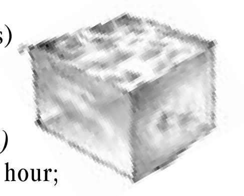
The Santa Maria watershed is much larger than the Santa Ynez River watershed, but it receives far less rainfall. The Santa Maria River is ephemeral, with no surface through flows about 83% of the time. Discharges that occur are highly variable. Historically, the stream meander eroded the banks, stripped 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.

Measuring Water



Cu. Ft.	1 Cubic Foot (7.48 Gallons) 62.37 pounds of water
cfs	Cubic Feet per Second *(water flow measurement)* 1 cfs = 26,929 gallons per hour; 646,300 gallons per day
HCF	Hundred Cubic Feet *This is the measurement used to calculate your water bill*
AF	Acre-Foot *The amount of water required to cover an acre of land one foot deep — 43,560 cu.ft. or 325,851 gallons.*
gpm	Gallons per minute *(water flow measurement)*

For More Information

Jones & Stokes Associates, Inc. and Leeds, Hill & Jewett, Inc. 1979. *Final Environmental & Water Resources Reconnaissance Study for State Water Project and Alternatives.* Santa Barbara County Water Agency.

Santa Barbara County Water Agency and URS Greiner Woodward Clyde Consultants. 2000. *Twitchell Reservoir Sediment Management Plan.* Santa Maria Valley Water Conservation District.

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

U.S. Department of Agriculture, Forest Service. 1951. *Report of Survey - Santa Maria River Watershed, California: For Runoff and Waterflow Retardation and Soil Erosion Prevention.*

Reservoirs

Bradbury Dam and Lake Cachuma from Vista Point

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.

Gibraltar Dam and Reservoir

Gibraltar Dam

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.

Juncal Dam and Jameson Lake

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.

Jameson Lake, muddied by storm runoff

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.

Twitchell Reservoir, filled to near capacity with stormwater

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.

County Reservoir Information				
	Bradbury Dam	**Gibraltar Dam**	**Juncal Dam**	**Twitchell Dam**
Type of Dam	Earth and rock fill	Constant radius concrete arch	Concrete arch	Earth and rock fill
Structural Height	275 feet	175 feet	160 feet	241 feet
Height Above Streambed	205 feet	150 feet	N/A	218 feet
Crest Length	2,975 feet	600 feet	1,407 feet	1,804 feet
Reservoir Area	3,108 acres	244 acres (1998)	138 acres	3.600 acres
Recent Capacity	190,409 AF (1990)	7,264 AF (1998)	5,291 AF (1998)	198,339 (2000)
Drainage Area Above Dam	417 sq. mi.	216 sq. mi.	14 sq. mi.	1,135 sq. mi.
Tunnel Name	Tecolote Tunnel	Mission Tunnel	Doulton Tunnel	N/A
Tunnel Length	6.4 miles	3.7 miles	2.2 miles	N/A
Tunnel Diameter	7 feet	4 feet to 20 feet	7 feet	N/A
Tunnel Slope	3"/1,000 feet	NR	.0018"/1,000 feet	N/A
Tunnel Capacity	100 cfs	40 cfs	N/A	N/A

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

State Water Project

History

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.

Construction of the State Water Project Pipeline in Santa Barbara County began in 1994

The State Water Project in Santa Barbara County

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

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.

State Water Entitlements in Santa Barbara County

Project Participant	SWP Allocation (AFY)	1999 Delivery
California Cities Water Co. *(Orcutt area)*	500	215
Carpinteria Valley Water District *(Includes Summerland)*	2,000	00*
City of Buellton	578	583
City of Guadalupe	550	484
City of Santa Barbara	3,000	0
City of Santa Maria	16,200	11,380
Goleta Water District	4,500	32*(+)
La Cumbre Mutual Water Co.	1,000	366
Montecito Water District	3,000	51*
Morehart Land Company	200	1
Raytheon Systems Company	50	55
Santa Ynez River WCD, I.D. #1 *(Includes City of Solvang)*	2,000	3505*
Vandenberg Air Force Base	5,500	3,438
TOTAL	**39,078**	23,853
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.

Unit Cost

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.

State Water Project California Aqueduct bringing Northern California water to the Coastal Branch pipeline

Environmental Effects and Mitigation

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.

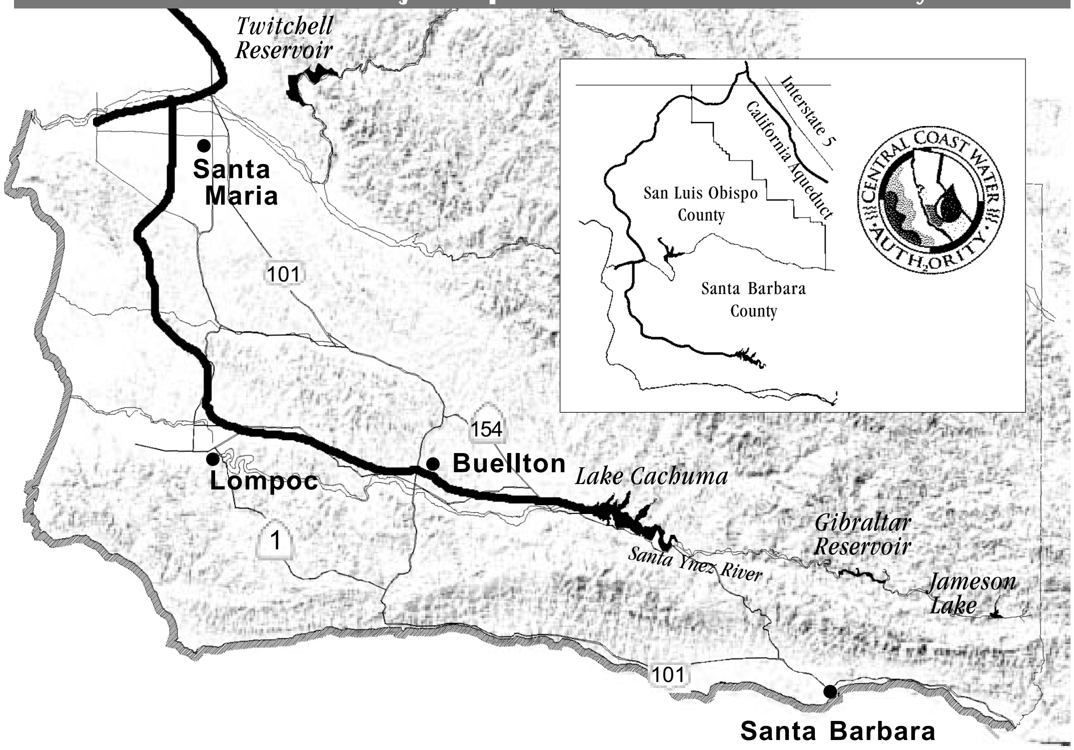
Where it was necessary to remove sensitive native vegetation such as oak trees and Burton Mesa Chaparral, replacement trees and chaparral were planted along the pipeline right-of-way and in other "offsite" areas. During construction of the project, environmental experts were hired to observe and monitor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

Reliability

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

State Water Project Pipeline in Santa Barbara County



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

California Department of Water Resources, 1999. *California State Water Project Atlas.*

Central Coast Water Authority: (805) 688-2292 or CCWA's web site: http://www.ccwa.com/

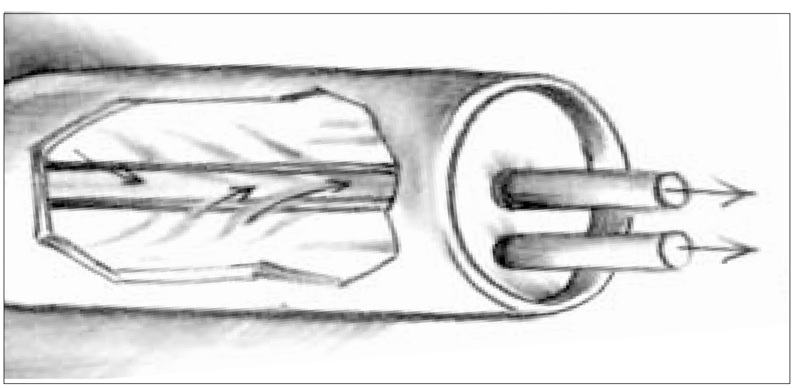
Desalination

The Desalination Process

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.

Filtered seawater is pumped through a reverse osmosis membrane that separates the salt from the seawater, expelling drinking water through one pipe and brine through another



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.)

History

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.

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.

The Charles Meyer Desalination Facility serves the City of Santa Barbara

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

Aston, D. 1999. *Water of Santa Barbara County.* Santa Barbara County Water Agency.

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/

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.

Extensive laboratory tests ensure that local water quality meets state and federal standards

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

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.

In many areas of the county, SWP water is blended with other, lower quality water, which results in a higher overall quality of the water distributed to customers. For the South Coast water purveyors, SWP water is conveyed through Lake Cachuma where it mixes with local surface water. The water is then directed to local water treatment plants, after which it is distributed to customers.

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

Cuyama River	1,130 mg/L
Santa Maria River	1,030 mg/L
Sisquoc River	862 mg/L
Santa Ynez River	
at Jameson Lake	842 mg/L
at Lake Cachuma	518 mg/L
below Lake Cachuma	625 mg/L

(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

Carpenter, A.G.; King, N.J. and Montoya, I. 1994. *Water Quality Control Plan: Central Coast Region - Region 3.* State of California, Regional Water Quality Control Board - Central Coast Region.

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

State of California, The Resources Agency, Department of Water Resources, Division of Local Assistance. 1995. *Quality Assurance Technical Document 3: Compilation of Federal and State Drinking Water Standards and Criteria*.

Water Treatment

General Information

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.

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.

Lauro Reservoir and the Cater Water Treatment Plant

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.

Polonio Pass Water Treatment Plant

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/