Cachuma Project
California

Mid-Pacific Regional Office
South -Central California Area Office
Santa Barbara County

Lauro Dam and Reservoir

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General Description

The Cachuma Project is one of three large-scale Federal water projects in the region, the other two are the Santa Maria and the Ventura Projects. These "seacoast projects"capture the seasonal floodwaters that would otherwise "waste to the sea."

The Cachuma project contains a highly variable Southern California stream for the historically water deficient communities of the South Coast area, including the venerable, old Spanish mission city of Santa Barbara, its smaller, urban neighbors, and 38,000 acres of outlying agricultural lands.

The project stores floodwaters of the nearby Santa Ynez River. This river basin's runoff comes from precipitation in the rainy season, October to April. Consequently, trapping what rain fell was critical, especially during the inevitable dry cycles when users could rely only on the storage of past seasons' remaining surplus.

Construction of the project, which was authorized in 1948, began in 1950 and was completed in 1956. The rapid urban growth that has taken place since completion of the project is encroaching on large acreages of previously irrigated and non-irrigated arable lands, especially in the Goleta Valley.

Plan

Bradbury Dam stores floodwaters of the Santa Ynez River which would otherwise waste to the

ocean. Water is diverted from the reservoir through the Tecolote Tunnel to the south coast area. From the tunnel outlet the water is carried through the South Coast Conduit. Lateral systems distribute water from the conduit to croplands of the Goleta, Montecito, Summerland, and Carpinteria Water Districts, and to municipal users in the city of Santa Barbara.

Unit Facilities

Bradbury Dam and Lake Cachuma

Bradbury Dam Dam was originally named the Cachuma Dam. The name was changed in 1971 to honor local water proponent Brad Bradbury. It is located on the Santa Ynez River approximately 25 miles northwest of Santa Barbara. It is a zoned earthfill structure, containing 6,695,000 cubic yards of material. It is 279 feet high from the bottom of the cutoff trench to the top of the dam and. 206 feet above the streambed. The spillway section is concrete-lined, with four 50x30 foot radial gates, and has a capacity of 161,000 cubic feet per second.

Lake Cachuma, has a capacity of 205,000 acre-feet. The lake covers 3250 acres when full and has a 42-mile shoreline.

Tecolote Tunnel

Tecolote Tunnel extends 6.4 miles through the, Santa Ynez Mountains from Lake Cachuma to the headworks of the South Coast Conduit. The horseshoe-shaped tunnel is 7 feet in diameter and has a capacity of 100 cubic feet per second.

The concrete lined tunnel goes beneath the dam and contains the controlled outlet works. These consist of the concrete-lined tunnel through which two 30-inch, hollow-jet valves and one 10-inch butterfly valve pass non-flood flows of the river to downstream users. This special outlet works apparatus allowed for the protection and recognition of downstream water rights by continuing the uninterrupted delivery of Santa Ynez water.

South Coast Conduit

The South Coast Conduit conveys Santa Ynez River water from the Tecolote Tunnel through the South Coast water districts. It is a high-pressure concrete pipeline. The conduit extends 24 miles from the Tecolote Tunnel outlet across the steep canyons, rolling hills, and highly-developed residential and estate areas of the South Coast. It stretches to the Carpinteria Regulating Reservoir in the heart of the Carpinteria County Water District's service area. The conduit includes four regulating reservoirs.

The 10-mile section of the Goleta reach extends from the Tecolote Tunnel portal to the Lauro Regulating Reservoir site. The 16-mile Carpinteria section, completing the conduit, included 36-, 30-, and 27-inch pipeline and terminated at the Carpinteria Reservoir. The Sheffield Tunnel section of the South Coast Conduit goes through a high ridge within the city limits of Santa Barbara. It is 6-feet in diameter, with the conduit itself, 30-inches in diameter at this point, being laid through this 6,000 foot tunnel.

Regulating Reservoirs and Distribution Systems

The Lauro (Santa Barbara), Ortega (Summerland), and Carpinteria Regulating Reservoirs were constructed along and integrated with the South Coast Conduit to gravitate or "float along the line."

Automatic pressure valves controlled the reservoirs' storage so that they supplied additional water during periods of peak demand. The fourth regulating reservoir, the Glen Anne, was located below the outlet portal of the Tecolote Tunnel and serves as overflow storage for the conduit, receiving its water supply by gravity from an outlet near the head of the South Coast Conduit.

Lauro Dam and Reservoir

Lauro Dam and Reservoir are located on Diablo Creek near Santa Barbara. The dam is an earthfill structure with a crest length of 540 feet and a height of 137 feet. The reservoir has a capacity of 640 acre-feet.

Ortega Dam and Reservoir

Ortega Reservoir on Picay Creek near Summerland is a concrete-lined basin with a capacity of 60 acre-feet. The dam is an earthfill structure 131 feet high with a crest length of 430 feet.

Carpinteria Dam and Reservoir

Carpinteria Reservoir near Carpinteria serves as a terminal reservoir. It is a concrete-lined basin with a capacity of 40 acre-feet.

Glen Anne Dam and Reservoir

Glen Anne Dam is an earthfill structure with a crest length of 240 feet and a height of 135 feet. The Glen Anne Reservoir, with a capacity of live capacity of 470 acre-feet and a maximum capacity of 470 acre-feet, is located on the West Fork of Glen Anne Canyon Creek below the outlet of Tecolote Tunnel. A portion of the land included in the Goleta Water District is served directly from this reservoir.

Sheffield Tunnel

Sheffield Tunnel, horseshoe-shaped and 6 feet in diameter, was bored through a high ridge within the city limits of Santa Barbara. The South Coast Conduit, 30 inches in diameter at this point, extends through the 5,968-foot-long tunnel.

Distribution Systems

The last phase of the Cachuma Project included three separate, localized water distribution systems constructed by Reclamation for direct delivery to Goleta, Carpinteria, and Summerland County Water District consumers. In these primarily agricultural areas, the landscape called for small pumping plants to serve lateral pipelines. In Carpinteria, a 50,000 gallon elevated water tank ensured delivery to more difficult-to-reach areas. These systems were all operable by early 1956.

Operating agencies

Each individual district for which a distribution system was constructed is responsible for its operation and maintenance. Reclamation operates Bradbury Dam. Member units acting through an operation and maintenance board operate the rest of this project.

Development

History

The coast of the Santa Barbara region was first visited in 1542 by navigators under the Spanish Crown. However, no attempt was made to settle the land until 1782 when the Presidio of Santa Barbara was founded at the present location of the city of Santa Barbara. The Santa Barbara Mission was built in 1786. By 1802, the mission was the center of extensive grain fields and fruit orchards and the home range for great herds of livestock. By 1846, cattle raising was the most important industry. Following the decline of the cattle industry after droughts in the 1860's, several of the large ranches were subdivided and sold to eastern immigrants. This started the gradual transition from ranching to intensive farming of smaller acreages. Dry farming of wheat, barley, corn, hay, beans, peas, potatoes, garden vegetables, and fruit expanded rapidly. At the turn of the century irrigation began to develop, first for growing sugar beets and alfalfa, then for vegetables and other crops.

As early as 1903 the Santa Ynez River watershed was recognized as the only feasible long-term source of a dependable water supply for the increasing population of the South Coast area.

The first diversion of water from the Santa Ynez river basin to Santa Barbara took place in 1920 with the construction of the Gibraltar Dam and Reservoir and Mission Tunnel by the City of Santa Barbara. Before this, the city of Santa Barbara had used local streams and tunnels in the Santa Ynez Mountains and ground water. In 1930, Montecito County Water District, to the east of Santa Barbara, completed construction of Juncal Dam upstream from Gibraltar Dam on the Santa Ynez River.

As the population of the South Coast area continued to increase, its water problems compounded. By the 1940's it was evident that the underground springs were being pumped faster than the rate of natural replenishment. If this continued, it was estimated that 30% of the presently irrigated areas would have to revert to dry farming. In addition, post-war population growth caused the City of Santa Barbara to exceed by at least 1/3 planners' safe annual yield of all its sources. The area simply could not keep pace with consumption. The area resorted to water rationing and fines for overuse.

Investigations

The increasing withdrawal of water from underground sources throughout the southern portion of Santa Barbara County caused the ground-water level to start dropping at an alarming rate.City and county wide studies for a long-term solution to the South Coast area's water problems began in 1938. In 1941, the Santa Barbara County Board of Supervisors requested the Bureau of Reclamation to study the water problem.

In 1945, the State of California created the Santa Barbara County Water Agency. This agency entered into a master contract with the Federal Government for development of the project. It also entered into subcontracts with the city of Santa Barbara, the Goleta, Montecito, Summerland County, and Carpinteria County Water Districts, and the Santa Ynez River Water Conservation District, which were all designated as member units of the agency. The SBCWA/Reclamation partnership originally proposed a "Comprehensive Santa Ynez River Basin Plan - Santa Barbara County" which would also incorporate the Santa Maria Project.

In 1947, after 6 years of extensive investigations and conferences with the Santa Barbara County Water Agency, the Bureau of Reclamation submitted a plan recommending the construction of Cachuma Dam, Tecolote Tunnel, and the South Coast Conduit. The plan included proposed rates for furnishing water and an allocation of water to the water districts and to the city of Santa

Barbara.

Authorization

The project was authorized on March 4, 1948, by the Secretary of the Interior pursuant to section 9 (a) of the Reclamation Project Act of 1939.

Construction

Construction of Tecolote Tunnel began on March 30, 1950, and was completed in 1956. Construction of Cachuma Dam and the South Coast Conduit was started in 1950 and completed in 1953. The four regulating reservoirs, Glen Anne, Lauro, Ortega, and Carpinteria, were built during 1951-1954. Distribution systems for the Goleta, Carpinteria, and Summerland County Water Districts were constructed by Reclamation during 1952-1956.

Storage Issues

The region's aridity causes Cachuma to lose an estimated 16,000 ac-ft of water to evaporation annually.

The same arid, barren landscape that was so susceptible to natural disaster also lent itself to a another problem causing particular frustration among dam managers in the region - that of sedimentation. The chaparral flora, rainstorms, landslides, and wildfires all resulted in prodigious amounts of silt washing into Lake Cachuma and backing up behind Bradbury Dam. Managers have tried a series of mitigating measures, none of which has made much of a dent in silt build-up. Managers are left pondering ways to combat a process that has robbed Cachuma of an estimated ten percent of its capacity.

Safety of Dams

Minor natural disasters did visit the South Coast area from time to time but failed to do much if any damage to project works.

Since the Cachuma project works were located in Southern California, the seismicity of the area had to be taken into account. Much testing was done prior to construction to ensure the feasibility of locating the project in a region subject to tremors which could register up to 6 or 7 on the Richter scale. Each dam included in Cachuma, except for Lauro (Santa Barbara), was located at least one mile from known faults and was conservatively designed to withstand quakes of at least a 6. Quakes of 7.0 or above were planned to be a possibility, with attendant damage a possibility, but extra liquefaction susceptability tests concluded such construction to be safe. Cachuma Project dams did, in fact, successfully withstand a 6.4 quake whose epicenter was fifteen miles away in 1971. Even so, the 1980's and '90's brought with them improved seismic technology which Reclamation's Division of Dam and Structural Safety put to use, particularly on the agency-built dams of Southern California. When the potential of seismic-induced liquefaction of Bradbury's downstream face material was identified in the early 1990's, the reservoir's storage capacity was reduced until the problem was corrected by constructing a series of dewatering wells to dry the downstream face shell material in question. The dam is now graded satisfactorily.

Landslides also occurred in the vicinity of the South Coast Conduit downstream of Ortega Dam in 1975. These slides temporarily jeopardized the conduit but steel piles with support saddles were installed making the situation safe and preventing distribution shutdown.

Wildfires sparked by the hot, dry Santa Ynez summers are common in the area, with one burning over 200 acres above Lake Cachuma in 1980. The fire was extinguished before it could endanger any project works. The area was then reseeded to prevent future mudslides.

Recent Developments

As southern California precipitation is unreliable, the Cachuma Project was no longer the "be all, end all" solution it was originally planned to be for the South Coast area's long-standing water woes.

Droughts in the 1980s and 1990s forced county water agency officials to look at additional options for a more dependable water supply. The 1980s drought eventually dried up the City of Santa Barbara's Gibraltar Reservoir, which ordinarily supplied thirty percent of municipal water supply, while also draining Lake Cachuma, which provided most of the balance needed by the city and county, down to 20% of total capacity, its lowest level ever. In 1989, the District was forced to install an emergency pumping plant to move what little water was present through the reservoir's outflow tunnel. The plant ended up being employed for two years.

Santa Barbara built an emergency desalination plant and canals to tap into the State Water Project.

Benefits

Irrigation

Although it was initially thought that the project might double the amount of irrigated land within the water district, urban growth has taken place more than anything else, encroaching on formerly agricultural lands. In fact, the total acreage irrigated by the project has stayed relatively flat since the mid-1970's, fluctuating from 10,000 to 12,000 acres annually.

Principal irrigated crops are citrus and other fruits, irrigated pasture, alfalfa hay, and other hay. Most of the products are packed locally and shipped to markets in the eastern States through Los Angeles and San Francisco.

In 1990 the Cachuma Project's years of producing high-value crops gave it membership in Reclamation's "Billionaire's Club," making it one of nineteen reclamation projects nationwide - and next to the neighboring Santa Maria Project, the youngest - that have accumulated over one billion dollars worth of gross crop receipts over the life of the project.

Municipal, and Industrial

The project supplies municipal water to approximately 150,000 individual users in the City of Santa Barbara and other urban areas such as Goleta, Montecito, and Carpinteria located in Santa Barbara County on the southern slope of the Santa Ynez Mountains.

Recreation

Cachuma Lake is a very popular recreation destination. Administered by the Santa Barbara County Parks Department, it provides camping, fishing, picnicking, hiking, and boating opportunities. The recreation area has a store, sanitary facilities, swimming pool, and potable water. For the convenience of visitors, boats are available to rent for fishing or cruising on the lake.

In 1980, the Cachuma recreation area, administered by the Santa Barbara County Parks Department, registered over one million visitors.