Major California Water Projects

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1. Introduction

Today is the nineteenth of August in 2026 as I'm starting this paper. I just saw a program on ABC News Bay Area (SF Bay Area), where they reviewed major water projects in our area. This raised a question in my mind: "Are there any major projects in on the Pacific Coast to desalinate seawater, store it reservoirs and ultimately use it for population water-supply and agriculture? So, I did what any sensible Computer Technologist would do: (1) Since computers, and thus the Internet Applications are really simple-minded, I greatly simplified the question to: "Major Pacific Coast Desalination Projects for Water Supply and Agriculture?" then I posed this query to Microsoft Bing (my preferred Internet Browser). It replied with a pretty good answer which provided most of Section 2 below. Thereafter in the remaining sections, I added related information on CA water initiatives.

2. Major Pacific Coast Desalination Projects

Several large-scale initiatives along the Pacific coast are advancing to desalinate seawater, store it, and integrate it into both urban and agricultural water systems.

2.1. Water Farm 1 (OceanWell, California)

This is the first subsea reverse osmosis desalination project in the U.S., deployed off Malibu in Santa Monica Bay. Dozens of modular pods are anchored at ~1,300 ft depth, using natural ocean pressure to power desalination without mechanical pumps. Each pod produces ~1 million gallons/day, with the goal of 60 million gallons/day by 2030—enough for ~450,000 people. The water is filtered to remove salt, microplastics, bacteria, viruses, and PFAS, and is fed via pipeline to shore. The design aims to cut energy use by ~40% compared to traditional plants and avoid the brine discharge issues common in onshore facilities. Partners include Las Virgenes Municipal Water District and six other California water agencies.[1]

2.2. Interstate Desalination Swap (CA – AZ – NV)

A framework signed in June 2026 allows California to sell surplus desalinated Pacific Ocean water to Arizona and Nevada to offset Colorado River shortages. The nearest Pacific desalination plants (e.g., Carlsbad) are ~300 miles from Arizona, making a pipeline impractical. Instead, California would cover the cost of Arizona's desalinated water needs, and in return, California would transfer some Colorado River entitlements. This swap could significantly expand the use of Pacific Ocean water for both urban and agricultural supply in the Southwest.[2]

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[1] Mike Franco, Refractor, "Subsea desalination plant will turn Pacific Ocean into tap water," August 19, 2025, https://refractor.io/environment/subsea-desalination-pacific/

[2] Marcus Reichley, Cronkite News, "Desalinated Pacific Ocean water won't be cheap but Arizona is scrambling to offset Colorado River cuts," June 25, 2026, https://cronkitenews.azpbs.org/2026/06/25/water-swap-desalination-arizona/

2.3. Carlsbad Desalination Plant (San Diego County)

Although not new, the Carlsbad facility remains a major Pacific coast source. It produces large volumes of desalinated water for San Diego County and is now part of the interstate swap framework. Its output could be integrated into broader regional water storage and distribution networks, potentially supporting agriculture in Southern California.

2.4. Storage and Distribution

While the provided sources focus on production, California's water agencies are integrating desalinated water into existing reservoirs and aqueducts. For agriculture, this means expanded irrigation water supplies from the Pacific coast, especially in drought-prone regions like the Central Valley and Southern California.

2.5. Summary

Yes—Water Farm 1 (subsection 2.1 above) is the most prominent new Pacific coast project, with large-scale desalination, pipeline delivery, and potential for both urban and agricultural use. It is complemented by interstate water swaps (subsection 2.2 above) that could vastly expand the reach of Pacific Ocean desalinated water, including for agriculture. These projects aim to address climate-driven water shortages by tapping into the Pacific Ocean as a reliable (if costly) long-term supply source.

3. $268.9 million Approved for Sites Reservoir

California water officials have approved an additional $268.9 million in funding for the proposed Sites Reservoir project, bringing the project's total potential state funding commitment to more than $1.36 billion as officials seek to strengthen water storage capacity amid increasing climate pressures.[3]

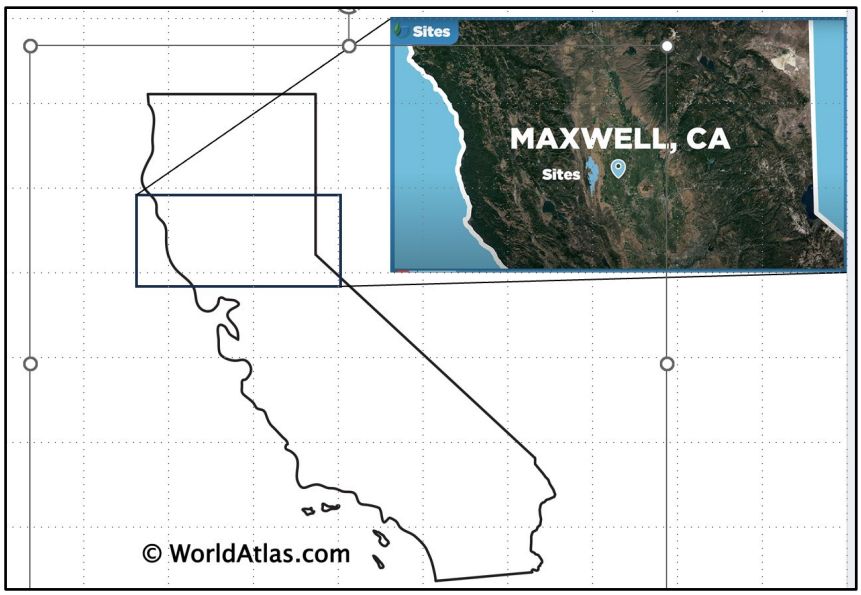
The California Water Commission approved the funding increase through the state's Water Storage Investment Program, which is supported by voter-approved Propositions 1 and 4.

The Sites Reservoir project, planned for Colusa County west of the Sacramento River, is a cornerstone of Gov. Gavin Newsom's long-term water strategy. The off-stream reservoir would capture water from the Sacramento River during wet periods and store it for use during droughts and dry seasons (see map on the top of page 3)

Once completed, the reservoir would hold up to 1.5 million acre-feet of water, enough to supply more than 4.5 million households for a year, according to state officials.

"Year after year, we see climate change putting pressure on California's water system in real time with hotter, drier weather, and more intense storms that strain our communities and the environment," Newsom said in a statement. "With this additional funding for Sites Reservoir, we are expanding our water storage capacity and turning challenges into opportunities to capture more water for millions of California residents."

[3] California Construction News, "California approves additional $268.9 million for Sites Reservoir project," June 22, 2026, https://www.californiaconstructionnews.com/2026/06/22/california-approves-additional-268-9-million-for-sites-reservoir-project/



The project is designed to improve water supply reliability while providing environmental and flood-control benefits. State officials said the reservoir would capture and store high river flows that might otherwise move through the system during storms, helping reduce flood risks while creating additional water supplies for dry years.

The reservoir also would provide water for wildlife refuges, including the Sacramento National Wildlife Refuge Complex, Upper Butte Basin Wildlife Area and San Luis National Wildlife Refuge. Officials said the project could deliver up to 200,000 acre-feet of emergency drought water supplies and create new recreational opportunities expected to attract roughly 187,000 visitors annually.

Commission Chair Fern Steiner said the project represents a significant step toward California's long-term water goals.

"The Sites Project proponents have shown consistent progress in making this reservoir come to fruition," Steiner said. "The California Water Plan calls for a statewide goal of nine million acre-feet of additional water, water conservation, or water storage capacity by 2040. This project will go a long way toward meeting that goal."

Before receiving state funding, project developers must still satisfy several voter-mandated requirements, including securing financing, obtaining permits, completing environmental reviews and finalizing agreements with state agencies responsible for administering public benefits associated with the project.

The funding announcement comes as California officials warn that climate change is increasing pressure on the state's water infrastructure. State projections indicate California could lose up to 10% of its water supply by 2040 because of hotter and drier conditions, while the reliability of the State Water Project could decline by as much as 23%.

State officials also continue to advance the proposed Delta Conveyance Project, which they say would improve the ability to move and capture water during increasingly intense winter storms. According to the administration, the project could have captured an additional 585,000 acre-feet of water through late May this year if it had already been in operation.

Construction timelines for Sites Reservoir have not been announced, but state officials have identified the project as one of California's most significant planned water infrastructure investments.

Authors comment: Although the above text mentions several California state water entities, it does not mention the California State Water Project. I would even guess many California readers know little or nothing about this entity. I decided to remedy this below.

4. California State Water Project

The California State Water Project (map on page 5), commonly known as the SWP, is a state water management project in the U.S. state of California under the supervision of the California Department of Water Resources. The SWP is one of the largest public water and power utilities in the world, providing drinking water for more than 27 million people and generating an average of 6,500 GWh of hydroelectricity annually. It is the largest single consumer of power in the state and has a net usage of 5,100 GWh.[4]

The SWP collects water from rivers in Northern California and redistributes it to the water-scarce but populous cities through a network of aqueducts, pumping stations and power plants. About 70% of the water provided by the project is used for urban areas and industry in Southern California and the San Francisco Bay Area, and 30% is used for irrigation in the Central Valley. To reach Southern California, the water must be pumped 2,882 feet (878 m) over the Tehachapi Mountains, with 1,926 feet (587 m) at the Edmonston Pumping Plant alone, the highest single water lift in the world. The SWP shares many facilities with the federal Central Valley Project (CVP), which primarily serves agricultural users. Water can be interchanged between SWP and CVP canals as needed to meet peak requirements for project constituents. The SWP provides estimated annual benefits of $400 billion to California's economy.

Since its inception in 1960, the SWP has required the construction of 21 dams and more than 700 miles of canals, pipelines and tunnels, although these constitute only a fraction of the facilities originally proposed. As a result, the project has delivered an average of only 2.4 million acre-feet annually, as compared to total entitlements of 4.23 million acre-feet. Environmental concerns caused by the dry-season removal of water from the Sacramento–San Joaquin River Delta, a sensitive estuary region, have often led to further reductions in water delivery. Work continues today to expand the SWP's water delivery capacity while finding solutions for the environmental impacts of water diversion.

[4] Wikipedia Article on "California State Water Project."
https://en.wikipedia.org/wiki/California_State_Water_Project

Author's comment: Note that the SWP provides a backbone network for all of the state and federal water projects in California. See section 4.1 below.

4.1. SWP History

The original purpose of the project was to provide water for arid Southern California, whose local water resources and share of the Colorado River were insufficient to sustain the region's growth. The SWP was rooted in two proposals. The United Western Investigation of 1951, a study by the U.S. Bureau of Reclamation, assessed the feasibility of inter-basin water transfers in the Western United States. In California, this plan contemplated the construction of dams on rivers draining to California's North Coast – the wild and undammed Klamath, Eel, Mad and Smith River systems – and tunnels to carry the impounded water to the Sacramento River system, where it could be diverted southwards. In the same year, State Engineer A.D. Edmonston proposed the Feather River Project, which proposed the damming of the Feather River, a tributary of the Sacramento River, for the same purpose. The Feather River was much more accessible than the North Coast rivers, but did not have nearly as much water. Under both of the plans, a series of canals and pumps would carry the water south through the Central Valley to the foot of the Tehachapi Mountains, where it would pass through the Tehachapi Tunnel to reach Southern California.

Calls for a comprehensive statewide water management system (complementing the extensive, but primarily irrigation-based Central Valley Project) led to the creation of the California Department of Water Resources in 1956. The following year, the preliminary studies were compiled into the extensive California Water Plan, or Bulletin No. 3. The project was intended for "the control, protection, conservation, distribution, and utilization of the waters of California, to meet present and future needs for all beneficial uses and purposes in all areas of the state to the maximum feasible extent." California governor Pat Brown would later say it was to "correct an accident of people and geography". You may have heard of Pat Brown's son, His name in Jerry. Go through the link below.
https://en.wikipedia.org/wiki/Jerry_Brown

The diversion of the North Coast rivers was abandoned in the plan's early stages after strong opposition from locals and concerns about the potential impact on the salmon in North Coast rivers. The California Water Plan would have to go ahead with the development of the Feather River alone, as proposed by Edmonston. The Burns-Porter Act of 1959 provided $1.75 billion of initial funding through a bond measure. Construction on Stage I of the project, which would deliver the first 2.23 million acre-feet of water, began in 1960. Northern Californians opposed the measure as a boondoggle and an attempt to steal their water resources. In fact, the city of Los Angeles – which was to be one of the principal beneficiaries – also opposed the project; locals saw it as a ploy by politicians in the other Colorado River basin states to get Los Angeles to relinquish its share of the Colorado River. Historians largely attribute the success of the Burns-Porter Act and the State Water Project to major agribusiness lobbying, particularly by J.G. Boswell II of the J.G. Boswell cotton company. The bond was passed on an extremely narrow margin of 174,000 out of 5.8 million ballots cast. In 1966, the Metropolitan Water District passed Proposition W, a Southern California property tax bond to connect its regional water system to the new state project.

In 1961, ground was broken on Oroville Dam, and in 1963, work began on the California Aqueduct and San Luis Reservoir. The first deliveries to the Bay Area were made in 1962, and water reached the San Joaquin Valley by 1968. Due to concerns over the fault-ridden geography of the Tehachapi Mountains, the tunnel plan was scrapped; the water would have to be pumped over the mountains' 3,500-foot crest. In 1973, the pumps and the East and West branches of the aqueduct were completed, and the first water was delivered to Southern California. A Peripheral Canal, which would have carried SWP water around the vulnerable and ecologically sensitive Sacramento–San Joaquin River Delta, was rejected in 1982 due to environmental concerns. The Coastal Branch, which delivers water to coastal central California, was completed in 1997.

4.2. Project Descriptions

4.2.1. Feather River facilities

The Feather River, a tributary of the Sacramento River, provides the primary watershed for the State Water Project. Runoff from the Feather River headwaters is captured in Antelope, Frenchman, and Davis reservoirs, which impound tributaries of the North and Middle forks of the Feather River. Collectively referred to as the Upper Feather River Lakes, these three reservoirs provide a joint storage capacity of about 162,000 acre-feet.

Water released from the Upper Feather River system flows into Lake Oroville, which is formed by the Oroville Dam several miles above the city of Oroville. At 770 feet, Oroville is the tallest dam in the United States; by impounded-volume it is the largest dam in California. Authorized by an emergency flood control measure in 1957, Oroville Dam was built between 1961 and 1967 with the reservoir filling for the first time in 1968. Lake Oroville has a capacity to store approximately 3.54 million acre-feet of water which accounts for 61 percent of the SWP's total system storage capacity, and is the single most important reservoir of the project.

Water stored in Lake Oroville is released through the 819 MW Edward Hyatt pumped-storage powerplant and two other hydroelectric plants downstream of Oroville Dam, which together make up the Oroville–Thermalito Complex. The Thermalito Forebay and Afterbay support the 120 MW Thermalito Pumping-Generating Plant, and the Thermalito Diversion Dam supports a smaller 3.3 MW powerplant. The entire system generates approximately 2.2 billion kilowatt hours per year, making up about a third of the total power generated by SWP facilities.

4.2.2. Delta facilities

From Oroville, a regulated water flow travels down the Feather and Sacramento Rivers to the Sacramento–San Joaquin River Delta. North of Rio Vista, about 120,000 acre-feet per year is pumped into the 27.4-mile North Bay Aqueduct, completed in 1988. The aqueduct delivers water to clients in Napa and Solano counties.

The vast majority of the SWP water is drawn through the Delta's estuary system into the Clifton Court Forebay, located northwest of Tracy on the southern end of the Delta. Here, the Harvey O. Banks Pumping Plant lifts water 224 feet into the California Aqueduct. Completed in 1963, the eleven pump units can lift up to 10,670 cu ft/s of water, upgraded in 1986 from its original capacity of 6,400 cu ft/s across seven units.

From here the water flows briefly south along the California Aqueduct to the 4,800 acre-ft Bethany Reservoir. The South Bay Pumping Plant supplies the South Bay Aqueduct, which has delivered water west to Alameda County since 1962 and Santa Clara County since 1965. The aqueduct carries a maximum of 188,000 acre-ft per year. Up to 77,100 acre-ft of this water can be stored in Lake Del Valle, a reservoir located near Livermore.

4.2.3. California Aqueduct

South of the Bay Area diversions, the bulk of the SWP water – ranging from 1 to 3.7 million acre-feet travels south along the western flank of the San Joaquin Valley through the California Aqueduct. The main section of the aqueduct stretches for 304 miles. it is composed mainly of concrete-lined canals but also includes 20.7 miles of tunnels, 130.4 miles of pipelines and 27 miles of siphons. The aqueduct reaches a maximum width of 300 feet and a maximum depth of 30 feet; some parts of the channel are capable of delivering more than 13,000 cu ft/s. The section of the aqueduct that runs through the San Joaquin Valley includes multiple turnouts where water is released to irrigate roughly 750,000 acres of land on the west side of the valley.

The aqueduct enters the O'Neill Forebay reservoir west of Volta, where water can be pumped into a giant off-stream storage facility, San Luis Reservoir, formed by the nearby B.F. Sisk Dam. San Luis Reservoir is shared by the SWP and the federal Central Valley Project; here water can be switched between the California Aqueduct and Delta-Mendota Canal to cope with fluctuating demands. The SWP has a 50 percent share of the 2.04 million acre-feet of storage available in San Luis Reservoir.

South of the San Luis Reservoir complex, the aqueduct steadily gains elevation through a series of massive pumping plants. Dos Amigos Pumping Plant is located shortly south of San Luis, lifting the water 118 feet. Near Kettleman City, the Coastal Branch splits off from the main California Aqueduct. Buena Vista, Teerink and Chrisman Pumping Plants are located on the main aqueduct near the southern end of the San Joaquin Valley near Bakersfield. The aqueduct then reaches A.D. Edmonston Pumping Plant, which lifts the water 1,926 feet over the Tehachapi Mountains that separate the San Joaquin Valley from Southern California. It is the highest pump-lift in the SWP, with a capacity of 4,480 cu ft/s across fourteen units. Initial construction of Edmonston was completed in 1974, with the last three units installed in the 1980s.

Once reaching the crest of the Tehachapis, the aqueduct runs through a series of tunnels to the Tehachapi Afterbay, where its flow is partitioned between West and East Branches.

4.2.4. Coastal Branch

The Coastal Branch diverts about 48,000 acre-ft per year from the California Aqueduct to parts of San Luis Obispo and Santa Barbara counties. The aqueduct stretches for 143 miles, and is mostly made up of buried pipeline. Pumping plants at Las Perillas, Badger Hill, Devil's Den, Bluestone, and Polonio Pass serve to lift the water over the California Coast Range mountains. Once over the crest of the mountains, the water is reregulated in a series of small reservoirs numbered Tanks 1 through 5. The Coastal Branch was completed in 1994 following a harsh drought that led to the importation of SWP water.

Through a pipeline known as the Central Coast Water Authority extension, completed in 1997, the Coastal Branch supplies water to Lake Cachuma, a 205,000 acre-ft reservoir on the Santa Ynez River.

4.2.5. West Branch

From the terminus of the main California Aqueduct at Tehachapi Afterbay, the West Branch carries water to a second reservoir, Quail Lake, via the Oso Pumping Plant. The water then runs south by gravity to the 78 MW William E. Warne Powerplant, located on the 180,000 acre-ft Pyramid Lake reservoir. The West Branch delivered about 537,000 acre-ft per year for the period 1995–2010.

From Pyramid Lake, water is released through the Angeles Tunnel to the Castaic Power Plant on Elderberry Forebay and the 325,000 acre-ft Castaic Lake reservoir located north of Santa Clarita. Castaic Power Plant is a pumped-storage hydroelectric plant capable of producing 1,247 MW on peak demand. Together, Pyramid and Castaic Lakes form the primary storage for West Branch water delivered to Southern California. Water is supplied to municipalities in Los Angeles and Ventura counties.

4.2.6. East Branch

The East Branch takes water from Tehachapi Afterbay along the north side of the San Gabriel Mountains and San Bernardino Mountains to the Silverwood Lake reservoir, which can hold 73,000 acre-ft). From here it passes through a tunnel under the San Bernardino Mountains to the Devil Canyon Powerplant, the largest "recovery plant", or aqueduct power plant, of the SWP system. The water then flows 28 miles through the Santa Ana Tunnel to Lake Perris, which can store up to 131,400 acre-ft.

Water deliveries through the East Branch averaged 995,000 acre-ft per year from 1995 through 2012. The East Branch principally provides water for cities and farms in the Inland Empire, Orange County, and other areas south of Los Angeles. Through Lake Perris, the Metropolitan Water District of Southern California receives a large portion of its water from the SWP. Water is also supplied to the San Diego Aqueduct through a connection from Perris to Lake Skinner, further south.

Final author's comment: see the map below for the Inland Empire (in red).