Yosemite's Opportunity

Options For Replacing Hetch Hetchy Reservoir

Photo: Level Par

O'Shaughnessy Dam and Hetch Hetchy Reservoir

Hetch Hetchy Reservoir is a storage tank — one of four reservoirs on the Tuolumne River and one of nine in San Francisco's Regional Water System. Hetch Hetchy is not a source of water. The reservoir can be replaced and Hetch Hetchy Valley restored while continuing to meet 100% of the water and power needs of every community that depends on the Tuolumne River.

California water agencies have found many ways to reverse environmental damage, restoring ecosystems and wildlife populations on rivers and in wetlands — in the Central Valley, at Mono Lake, in the Bay-Delta and on the Trinity River. The same can be done for Yosemite's Hetch Hetchy Valley.

The recent investments that California's cities have made in groundwater, recycling and local surface storage would replace Hetch Hetchy Reservoir more than 15 times over. The San Francisco Public Utilities Commission has the opportunity to pursue any or all of these technologies.

"The ultimate removal of the reservoir would make possible the restoration of the Valley a few miles from Yosemite Valley and, amazingly, a near twin of that extraordinary gift of nature.

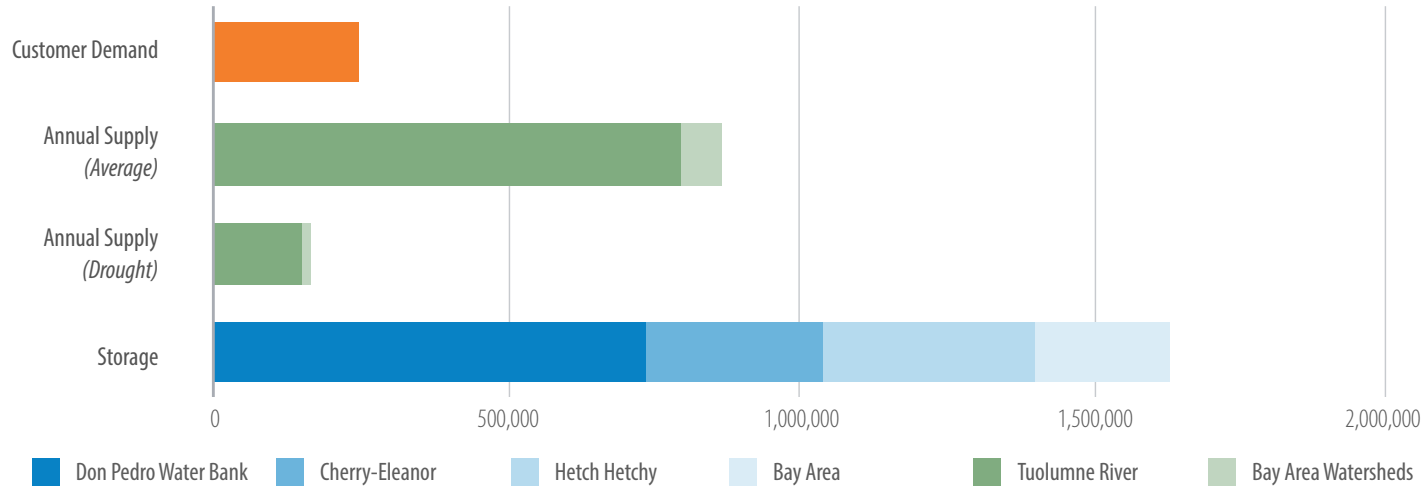
In the case of Hetch Hetchy, it isn't that San Francisco's water supply now stored at the O'Shaughnessy Dam will be lost. Rather, it would be stored at existing dams downstream and perhaps off-stream or in groundwater basins."

— Carl Boronkay
Former General Manager of the
Metropolitan Water District of Southern California

Photo: Tim Connor

FIGURE 1

San Francisco Regional Water System: Demand, Annual Supply & Storage *(acre-feet)*



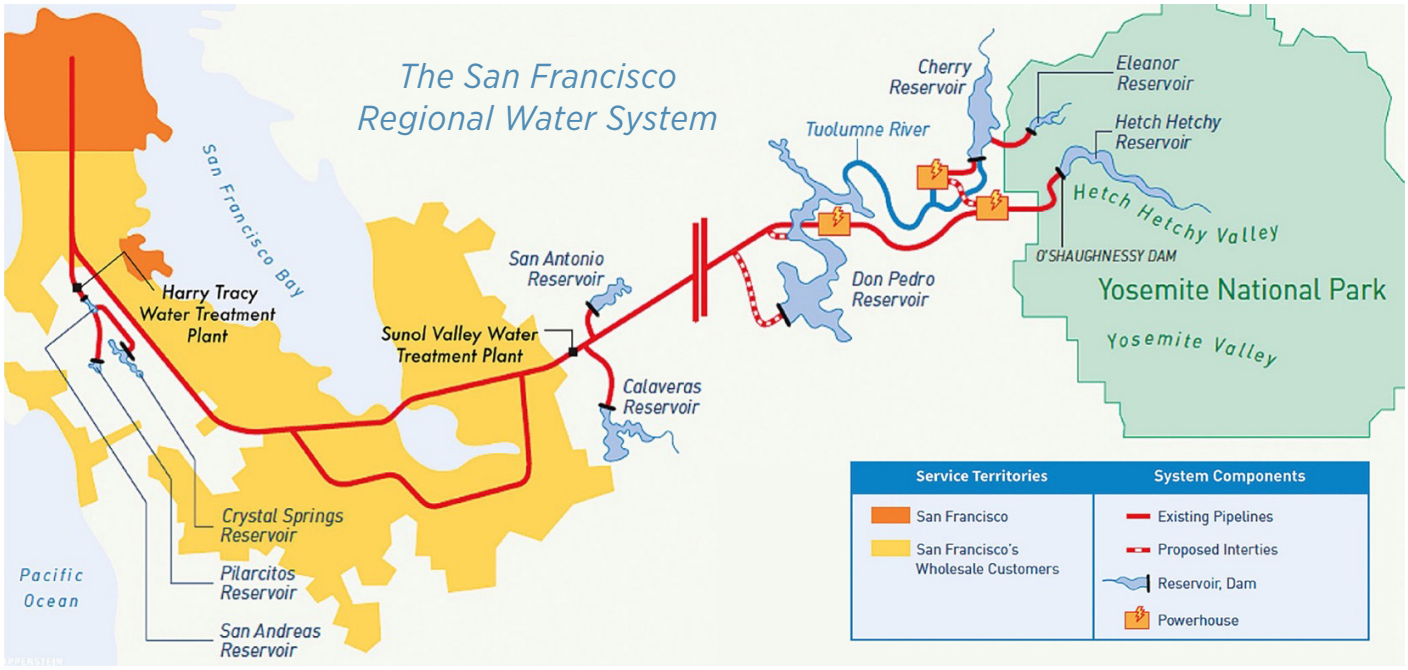
The San Francisco Public Utilities Commission delivers about **250,000 acre-feet**[1] of water annually. Flows in the Tuolumne River are more than adequate to meet that demand in most years.[2]

In dry years, water is withdrawn from storage. The driest period on record for San Francisco's Regional Water System is the 6-year drought from 1987–1992, when the Tuolumne River provided only **151,000 acre-feet per year**.

To make up the shortage in a repeat of that drought lasting six years, or even a worse one, the SFPUC has invested in multiple storage projects to meet customer needs (see Figure 1).

Replacing Hetch Hetchy Reservoir requires additional investments.[3] Other urban water agencies throughout California are actively continuing to invest in groundwater storage, local surface storage, and recycling. The SFPUC can and should do the same.

The San Francisco Public Utilities Commission (SFPUC) performs an essential public service *by delivering water to homes and businesses in San Francisco as well as to other Bay Area communities. Hetch Hetchy Reservoir is an important component of San Francisco's Regional Water System — but it can be fully replaced, and then some, with alternative investments.*



[1] One acre-foot equals 325,851 gallons, roughly enough to supply two households for a year.

[2] References for this document can be found at hetchhetchy.org/yosemites-opportunity/

[3] Like all water agencies, the SFPUC also increases reliability with demand-side programs — by encouraging conservation and efficient use through a variety of regulations and incentives.

River and Wetland Restoration

Californians have supported ecosystem and wildlife renewal throughout the state, including restoration of rivers and wetlands in the Central Valley, at Mono Lake, in the Bay-Delta and on the Trinity River. Affected water agencies have found ways to invest in additional supplies and/or use water more efficiently.

Restoration of Hetch Hetchy Valley in Yosemite National Park would require system improvements to replace **360,000 acre-feet** of storage (or **60,000 acre-feet each year** over a 6-year drought). Water flowing through Hetch Hetchy Valley would be used or captured downstream — it would not go to waste.

The Trinity River Restoration program, jointly developed by the federal government and the Hoopa Valley Tribe, restores flow to the river, reducing diversions to cities and farms by **83,000 acre-feet per year**.

In 1994, the State Water Board ruled that the Public Trust Doctrine required additional inflow to Mono Lake, resulting in reduced diversions to Los Angeles by **46,000 acre-feet per year**.

The 1994 Bay-Delta Accord, an agreement to protect endangered estuarine fish including longfin smelt, reduces diversions to cities and farms by **316,000 acre-feet per year** below previous levels.

The Central Valley Project Improvement Act, enacted by Congress in 1992, added **250,000 acre-feet per year** to wildlife refuges in the Central Valley.

Court rulings in 2007 and 2008 to protect endangered salmon and other species have reduced diversions to cities and farms by **980,000 acre-feet per year**.

California Groundwater Investments

Many California cities have agreements with agricultural water agencies to recharge and manage groundwater, allowing aquifers to be used as "banks" to exchange supplies using California's vast network of canals. California's "Sustainable Groundwater Management Act", passed in 2014, requires long-term sustainability throughout the state and provides incentives for additional agreements.

Banking San Francisco's excess water in aquifers in the eastern portions of the Turlock and Modesto Irrigation Districts and in the Eastside Water District would replace the storage function of Hetch Hetchy Reservoir.

Examples of similar programs abound. Several Bay Area water districts bank groundwater in Semitropic, including Santa Clara Valley (350,000 acre-feet), Alameda County (150,000 acre-feet) and Zone 7 (65,000 acre-feet).

Geology and proximity to the California Aqueduct make Kern County an ideal site for groundwater recharge. Urban water agencies bank groundwater in Semitropic (970,500 acre-feet), Arvin Edison (350,000 acre-feet), Kern Delta (250,000 acre-feet) and other aquifers.

Operating a groundwater bank in Stanislaus County in conjunction with San Francisco's surface storage facilities would eliminate the need for Hetch Hetchy Reservoir and allow Hetch Hetchy Valley in Yosemite National Park to be restored. Groundwater plans in these areas show unsustainable pumping rates that limit farm production over time. Wet year recharge with San Francisco's water would provide benefits to all parties.

Option available to the San Francisco Public Utilities Commission

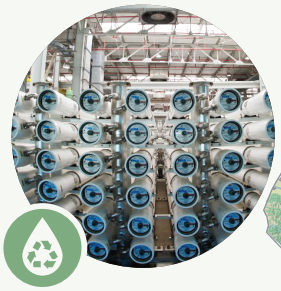
The Metropolitan Water District of Southern California, serving most of urban southern California, manages 212,000 acre-feet of groundwater storage within its service territory, and banks 350,000 acre-feet in Semitropic, 350,000 acre-feet in Arvin Edison, 250,000 acre-feet in Kern Delta, 330,000 acre-feet in Mojave and 30,000 acre-feet in Antelope Valley.

Recycling Water in California

Increases in demand, limits on groundwater pumping and worries of drought have led to a boom in wastewater recycling projects — in California as well as other states and countries.

While Orange County has long been a recycling leader, others are catching up quickly. Most of California's large urban agencies have initiated robust recycling plans, but so far San Francisco has not. Recycled water provides a reliable, drought-proof supply, and the enhanced treatment process reduces pollution to rivers, bays and beaches.

Replacing the water storage function of Hetch Hetchy Reservoir could be accomplished by recycling **60,000 acre-feet per year** (**360,000 acre-feet** over a 6-year drought).



The Orange County Water District recycling plant is the largest in the world. It presently recycles 100,000,000 gallons per day — soon to be increased to 130,000,000 gallons per day (146,000 acre-feet per year or 876,000 acre-feet over a 6-year drought). After a multi-step treatment process which includes nanofiltration (shown above), the water is stored underground.

Governor Newsom praises the Los Angeles County Sanitation District's recycling plan, describing it as a model for others to follow. When completed, the plant will produce 168,000 acre-feet per year of recycled water (1,008,000 acre-feet over a 6-year drought).

The San Francisco Public Utilities Commission reports a capacity to recycle 49,000 acre-feet per year (294,000 acre-feet over a 6-year drought) at its water treatment plants but has no plans to move forward at this time. San Francisco's wholesale customers, who use 2/3 of the system's water, operate their own treatment plants and have similar opportunities.

Option available to the San Francisco Public Utilities Commission

San Diego's PureWater program is scheduled to provide a third of its total supply (83,000 acre-feet per year, or 498,000 acre-feet over a 6-year drought), and will also reduce pollution along its famous beaches. San Diego will store its recycled water locally in Miramar and San Vicente Reservoirs.

Santa Clara Valley Water District

The Santa Clara Valley Water District plans to recycle 40,000 acre-feet per year (240,000 acre-feet over a 6-year drought) by 2035, about 10% of its supply.

Developing Local Storage in California

Today, most of California's major rivers are either already dammed, protected by law, or too remote to be economically developed. Many water agencies have, however, found advantage in building "off stream" reservoirs close to their service areas to assure supply reliability during dry years. These reservoirs are built in canyons with little natural flow, avoiding the damage of damming a large river.

San Francisco has long-term plans to enlarge Calaveras Reservoir, allowing it to hold imported Tuolumne River supplies as well as local runoff. Enlarging Calaveras would replace 90% of the **360,000 acre-feet** of water storage that Hetch Hetchy Reservoir provides.

Diamond Valley Reservoir, first filled in 2003, holds up to **800,000 acre-feet** of water for customers of the Metropolitan Water District of Southern California. Above, Metropolitan General Manager Jeff Kightlinger dedicates a dam at Diamond Valley in honor of his visionary predecessor, Carl Boronkay. Boronkay called Hetch Hetchy Valley a "national treasure" and, after retirement, joined the **Restore Hetch Hetchy** Board of Advisors.

Los Vaqueros Reservoir, initially constructed by the Contra Costa Water District in 1998, was expanded in 2012 to hold **160,0000 acre-feet** of water. It will be expanded further, and San Francisco should consider taking part in the project.

Calaveras Reservoir, the largest of the San Francisco Public Utilities Commission's Bay Area reservoirs, was rebuilt in 2019 and presently holds **97,000 acre-feet**. The SFPUC has plans to increase its capacity by **323,000 acre-feet** (almost the volume of Hetch Hetchy Reservoir). Some of the foundation work to support this larger project has already been accomplished.

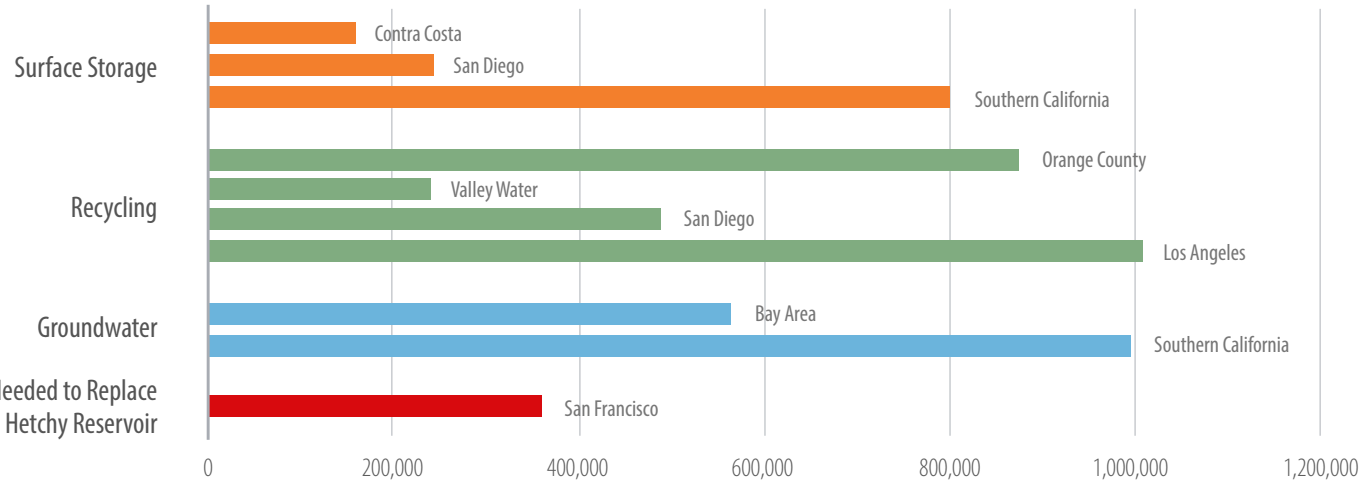
Option available to the San Francisco Public Utilities Commission

In 2009, San Diego enlarged San Vicente Reservoir to **242,000 acre-feet**. It not only holds runoff from San Vicente Creek, but also water supplies diverted from the Colorado River.

FIGURE 2

Summary of Recent and Ongoing Water Storage and Supply Projects for Cities in California

AVAILABLE WATER SUPPLY OVER A SIX-YEAR DROUGHT *(ACRE-FEET)*



Recent investments by California's cities in groundwater, recycling and local surface storage would replace Hetch Hetchy Reservoir more than 15 times over. The San Francisco Public Utilities Commission has the opportunity to pursue any or all of these technologies.

Additional Necessary Improvements

While water storage and/or supply are the most obvious system improvements necessary to restore Hetch Hetchy Valley in Yosemite National Park, other steps must be taken as well.

- Replace **350 gigawatt-hours** of electricity that will be lost when water from Hetch Hetchy Reservoir will no longer generate hydropower at the Kirkwood Powerhouse in summer and fall;
- Expand the Sunol Water Treatment Plant so the San Francisco Regional Water System has capacity to filter all system supplies; and
- Build new interties to connect Cherry and/or Don Pedro Reservoir to existing pipelines crossing the San Joaquin Valley.

Plans to remove the reservoir while maintaining water and power supplies have been proposed in a variety of reports by government agencies, environmental groups and academics. The estimated costs in the various reports of restoring Hetch Hetchy Valley without loss of water or power have been the subject of public disagreement but have never been independently reviewed.

Restore Hetch Hetchy's most recent cost estimate, published in a 2015 Superior Court filing, projects a cost of **2 billion dollars** over a fifty year period, including **199 million dollars** for additional interties, **372 million dollars** for water supply, **387 million dollars** for water treatment, **669 million dollars** for renewable electric power, and **374 million dollars** for modifying O'Shaughnessy Dam.

Critical Stakeholders

The Turlock and Modesto Irrigation Districts are intertwined with the SFPUC on the Tuolumne River and at Don Pedro Reservoir. A restoration plan must guarantee, at a minimum, that the Districts suffer no loss of water supply or hydropower production.

Tribal communities were the original inhabitants of Hetch Hetchy. Indigenous peoples must be consulted in all stages of restoration and, if they desire, should be involved in the future management of the valley.

Photo: Sierra Mac River Trips

Rafters and kayakers flock to the Tuolumne River for its world-class whitewater. A restoration plan should assure recreational flows are protected.

The Bay-Delta Plan — Restore Hetch Hetchy supports the State's ongoing effort to improve flows and habitat for fish and wildlife on the Tuolumne River below Don Pedro Reservoir, as well as downstream into the Bay-Delta.

Yosemite's Opportunity

Options For Replacing Hetch Hetchy Reservoir

Painting: Tom Coyle

Hetch Hetchy, Yosemite Valley's lost twin, can be returned to its natural splendor; a majestic glacier-carved valley with towering cliffs and waterfalls where river and wildlife run free.

Hetch Hetchy can be a new kind of national park, with limited development, an improved visitor experience, shared stewardship with Native peoples, and permanent protection of its natural and cultural heritage for future generations.

Restore Hetch Hetchy *urges the San Francisco Public Utilities Commission to pursue system improvements so Hetch Hetchy Reservoir can be replaced without any loss of water supply or electric power production.*

Restore Hetch Hetchy *urges San Francisco, the State of California and the United States Congress to return Hetch Hetchy Valley to all people.*

"The Bay Area does not need Hetch Hetchy reservoir to continue delivery of high-quality water from the Tuolumne River."

— Jay Lund

Professor of Civil and Environmental Engineering and Co-Director of the Center for Watershed Sciences at UC Davis

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HetchHetchy.org