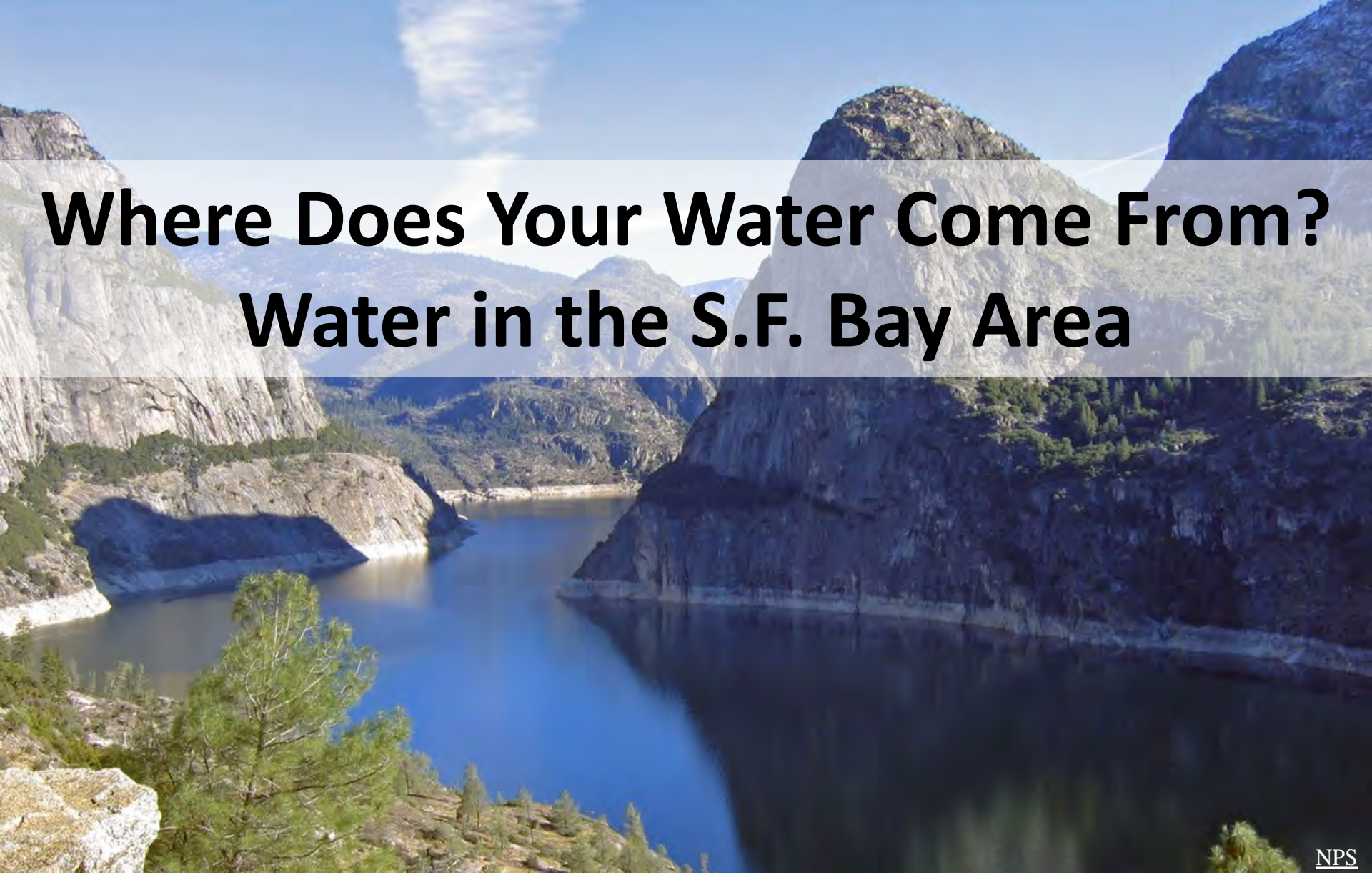
Where Does Your Water Come From?
Water in the S.F. Bay Area



NPS

Science Partnership

NSF

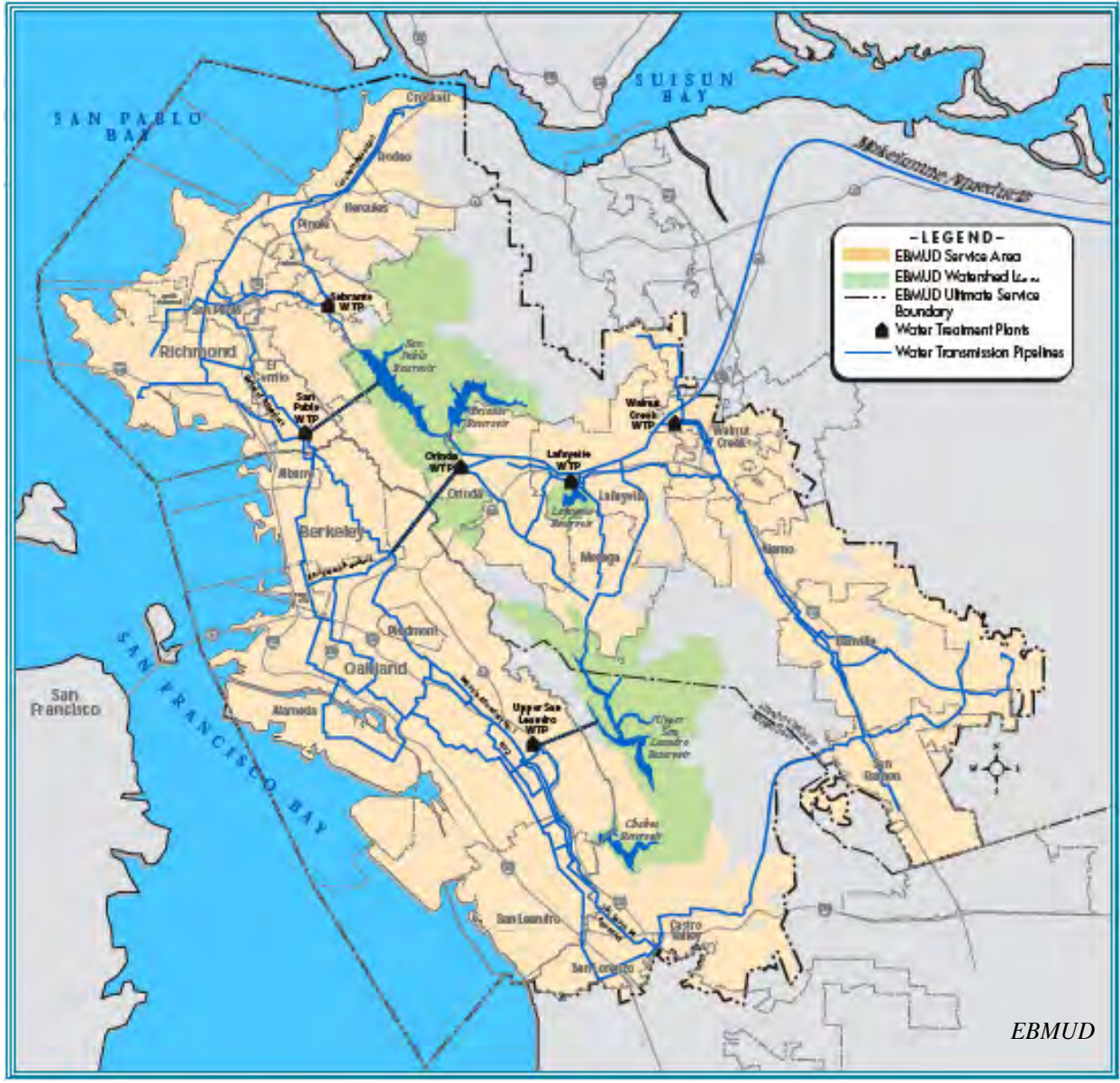
California Science Project

CALIFORNIA STATE UNIVERSITY EAST BAY

ALAMEDA COUNTY OFFICE OF EDUCATION

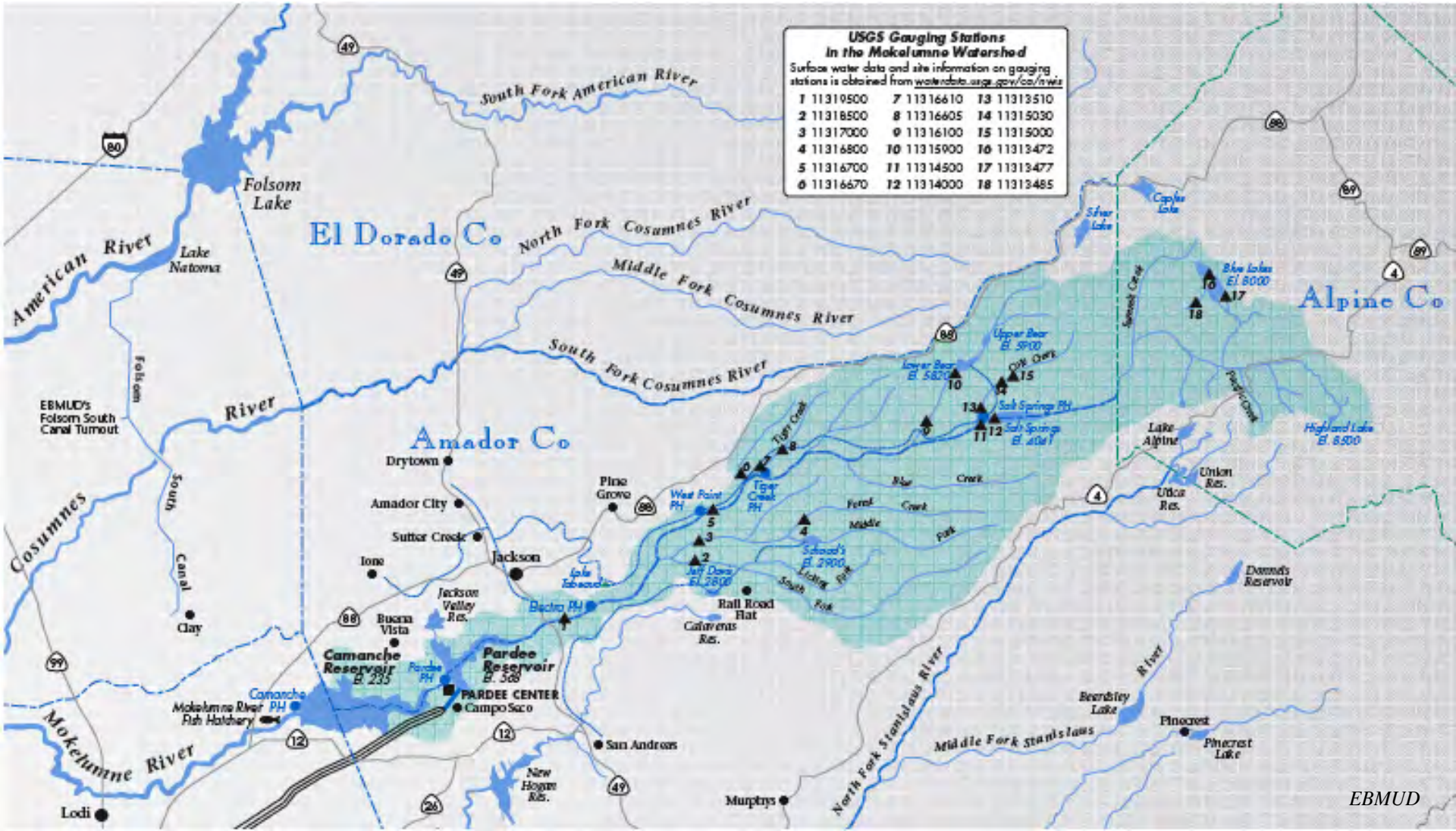
The East Bay Municipal Utility District (EBMUD) serves ~1.3 million people in a 332 square mile region. The population is the service area is expected to increase to ~1.6 million by 2030.

EBMUD is a publicly owned utility established in 1921 by the California Legislature to provide water service.



EBMUD serves 20 cities and unincorporated areas in Alameda and Contra Costa counties.

90% of EBMUD water comes from the protected Mokelumne River watershed. This 627 square mile watershed is located NE of the Sacramento-San Joaquin Delta on the western slopes of the Sierra.



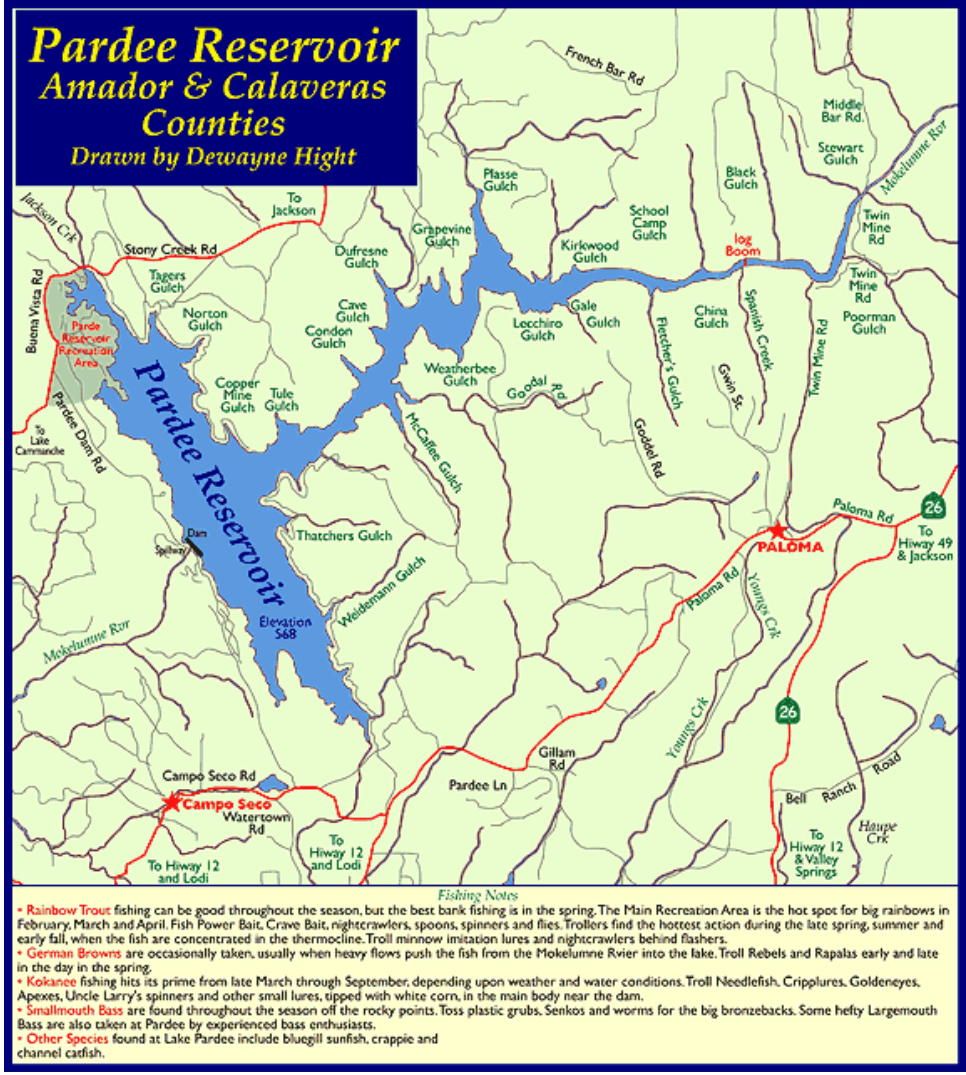
Snowmelt and runoff from parts of Alpine, Amador and Calaveras counties contribute to the Mokelumne watershed.

EBMUD

EBMUD

Most of the watershed is protected and undeveloped - consists of open space and forest land.

The waters of the Mokelumne River are collected in the Pardee Reservoir by the Pardee Dam (38 miles NE of Stockton). Its capacity is equivalent to a 10-month supply for 1.3 million customers.



This reservoir has a maximum capacity of 10 months water supply for EBMUD

EBMUD

Drinking water supplied to the East Bay is transferred from the Pardee Reservoir by the 2.2 mile Pardee tunnel to the Mokelumne Aqueducts.

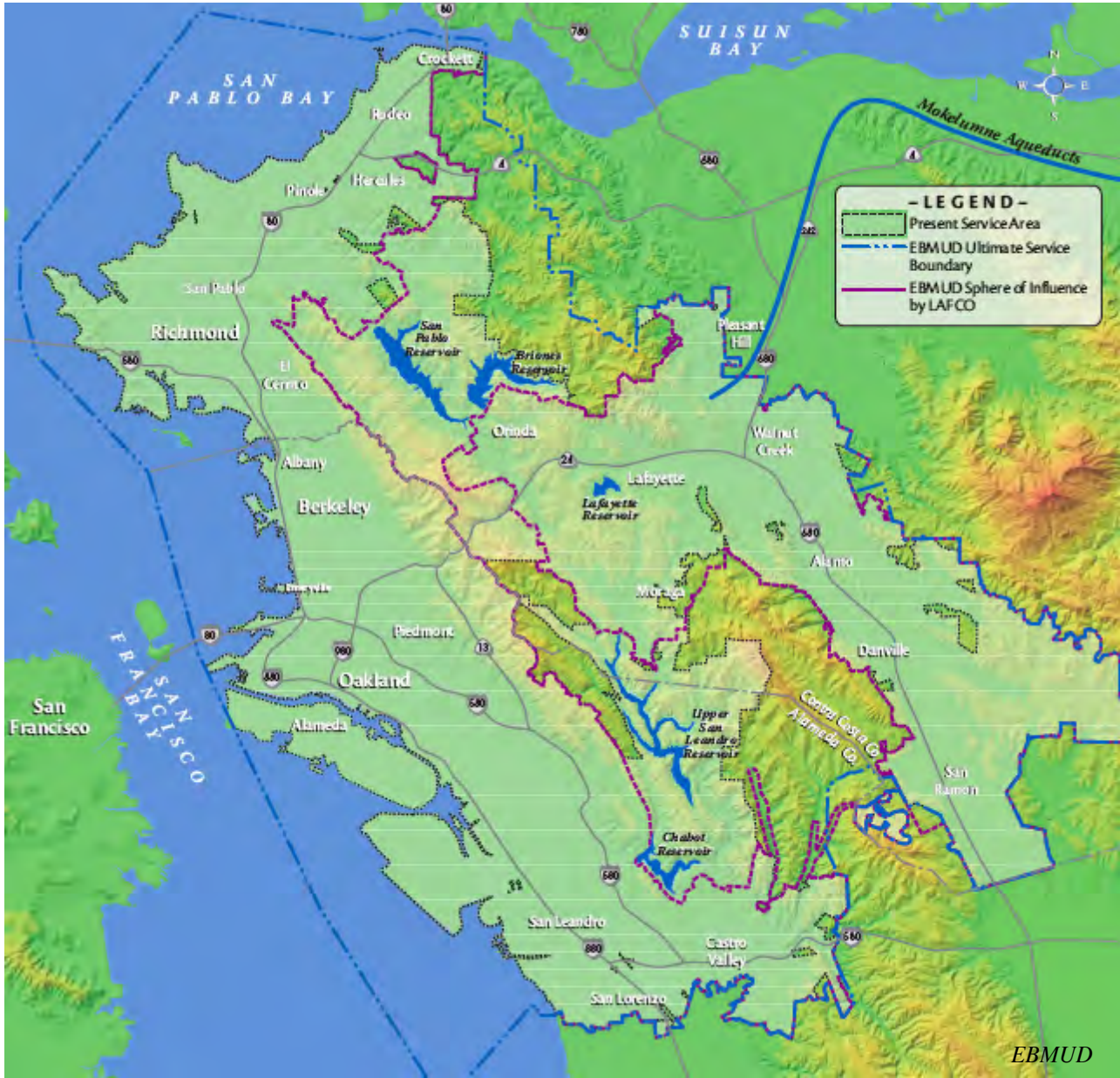
The Mokelumne Aqueducts transport water 82 miles to the East Bay. The Aqueducts consist of 3 steel pipelines ranging in diameter from 5 feet 5 inches to 7 feet 3 inches in diameter.

The Aqueducts carry 200 million gallons/day (MGD) by gravity flow but can be increased to 325 MGD with pumping.

EBMUD

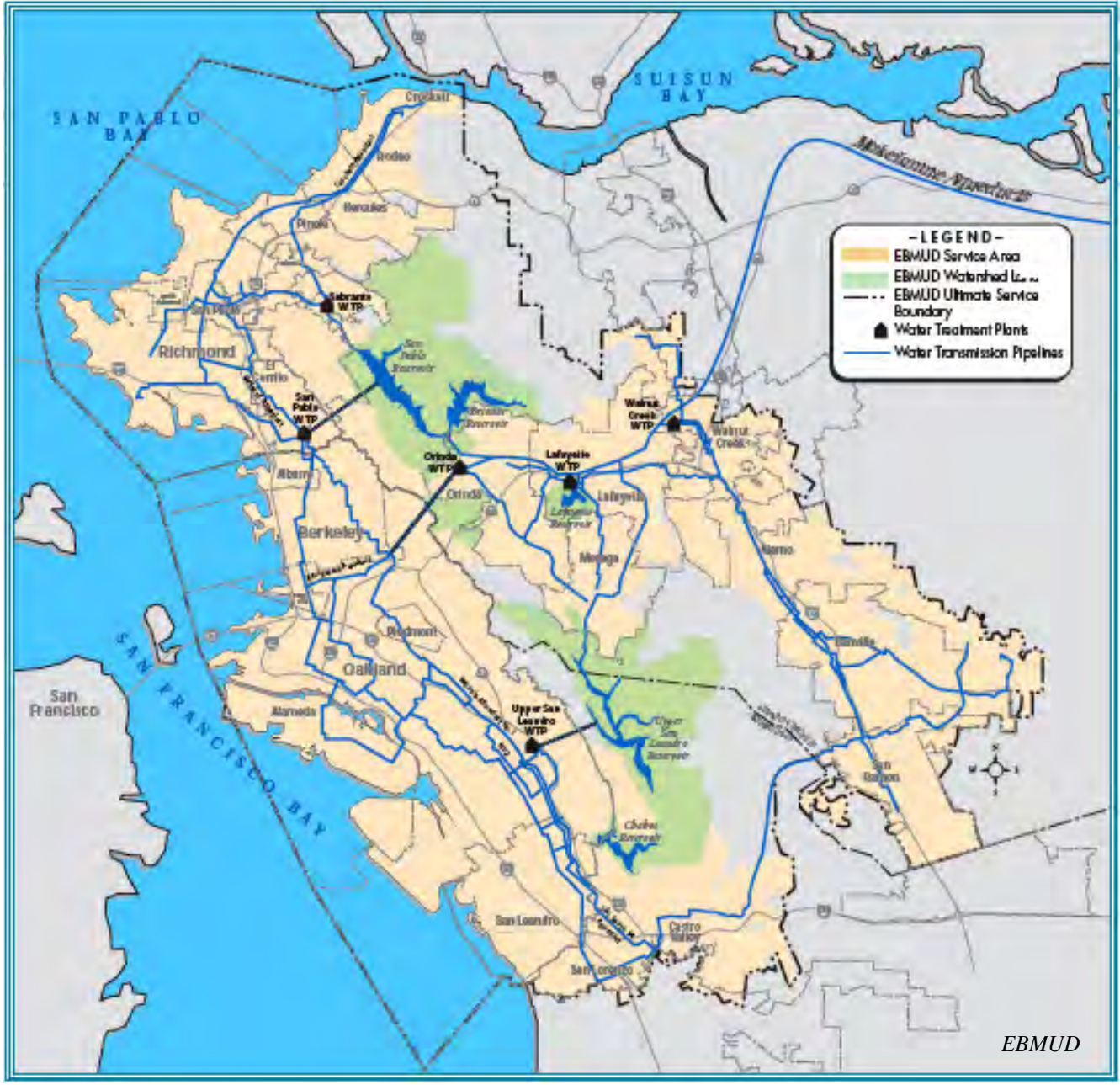
Water from the Mokelumne Aqueducts may be delivered to water treatment plants or diverted to storage reservoirs in the East Bay.

There are five reservoirs in the East Bay: San Pablo, Briones, Lafayette, Upper San Leandro and Chabot. The San Pablo, Briones and Upper San Leandro Reservoirs can supply water throughout the year. The Chabot and Lafayette Reservoirs are secondary are serve as emergency supplies.



Storage of runoff in local EBMUD reservoir watersheds in the East Bay provides ~10% of drinking water.

In dry years, the local reservoirs may not be able to provide water due to losses through evaporation and other reservoir losses.



The local reservoirs can provide ~180 days of water.

Water from the Mokelumne watershed needs minimal treatment because of its purity. EBMUD operates 6 water treatment plants.

All EBMD water is filtered through sand and anthracite coal to remove sediment, algae and other debris. It is then processed to remove fine material and disinfected with chlorine to protect against bacteria and viruses.

As the water leaves the water treatment plants, additional treatments are added included an disinfectant (chloramine), fluoridation and an agent (NaOH) to help prevent corrosion of pipes.

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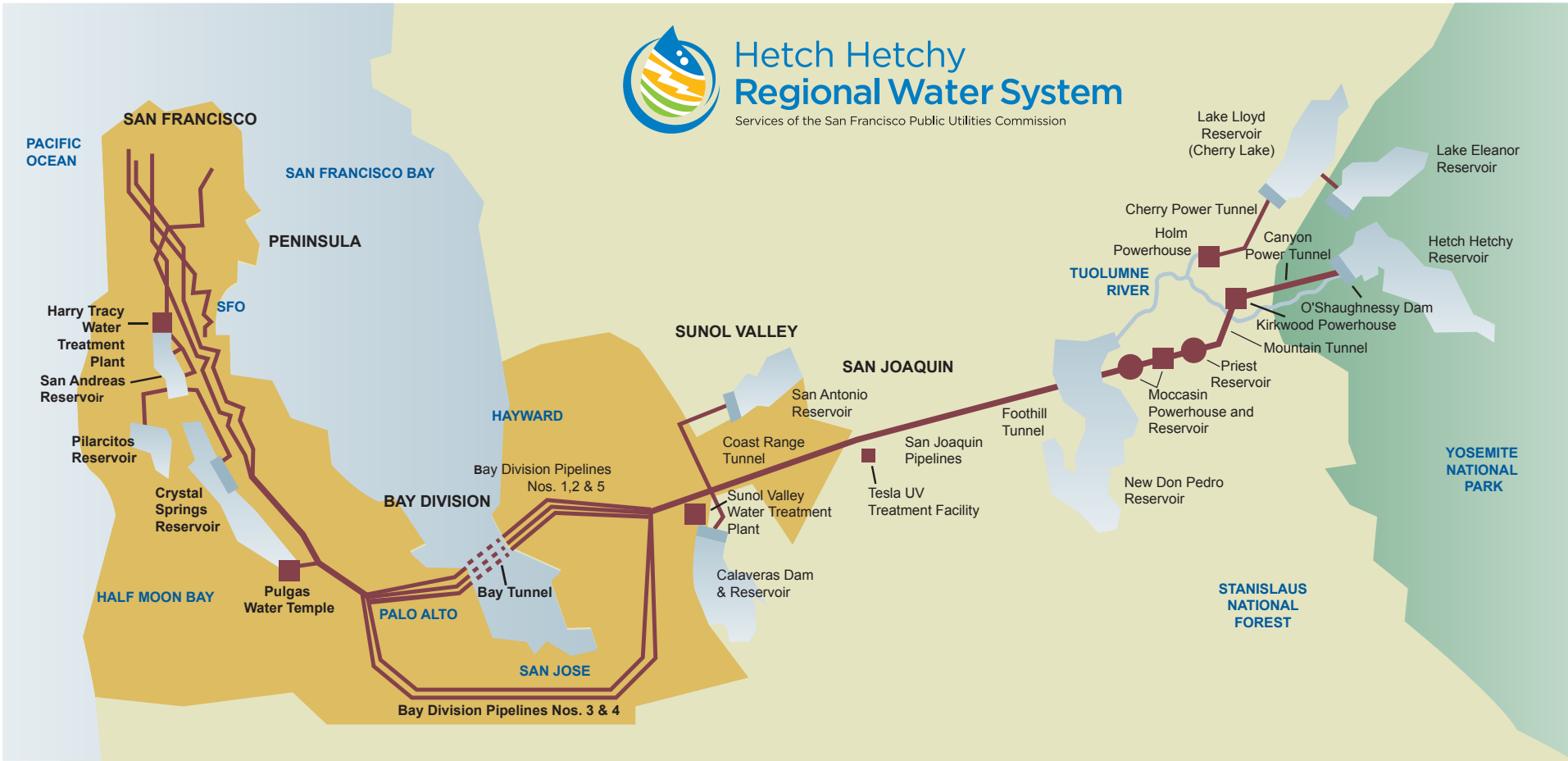
The Hetch Hetchy Regional Water System is similar to EBMUD and delivers water to 2.7 million customers in San Francisco, Alameda, Santa Clara and San Mateo counties.

The majority of the water comes from the Hetch Hetchy watershed near Yosemite. Other sources include surface water stored in reservoirs in Alameda, Santa Clara, and San Mateo counties.



The systems for delivering water from the Sierra Nevada to the Bay area by EBMUD and Hetch Hetchy are energy efficient in that they are almost entirely gravity driven and require little energy to pump or transport water.

Public Policy Institute of California

In addition, the dams in the EBMUD and Hetch Hetchy systems are used to generate electricity (hydroelectric).

The average water consumption per person for EBMUD consumers is ~166 gallons/day.

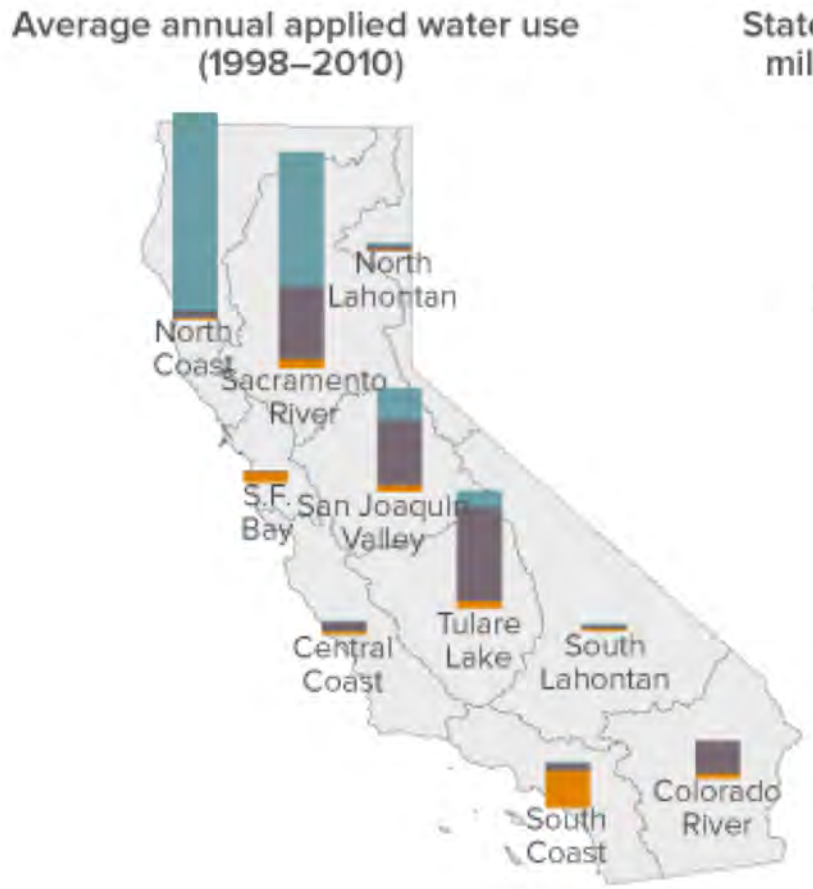
During the drought of 1976-77, the daily consumption of water dropped by ~39%.

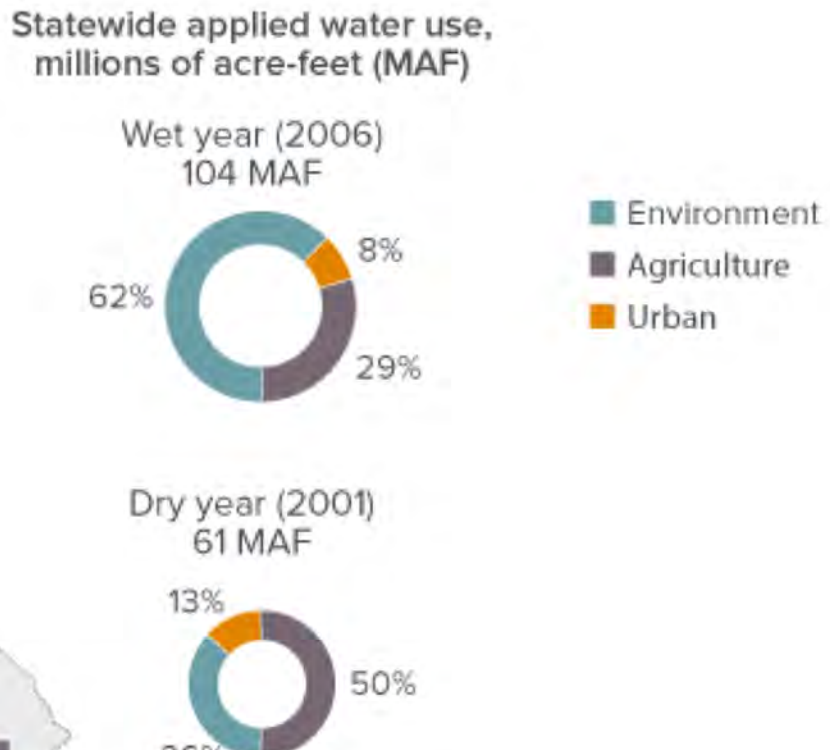
EBMUD promotes water conservation through education programs, consumer incentive programs and leak detection programs.

One drop per second wastes 2700 gallons per year!

Three major uses of water in California:

1. Environment – used to maintain habitat and wetlands
2. Agriculture
3. Urban





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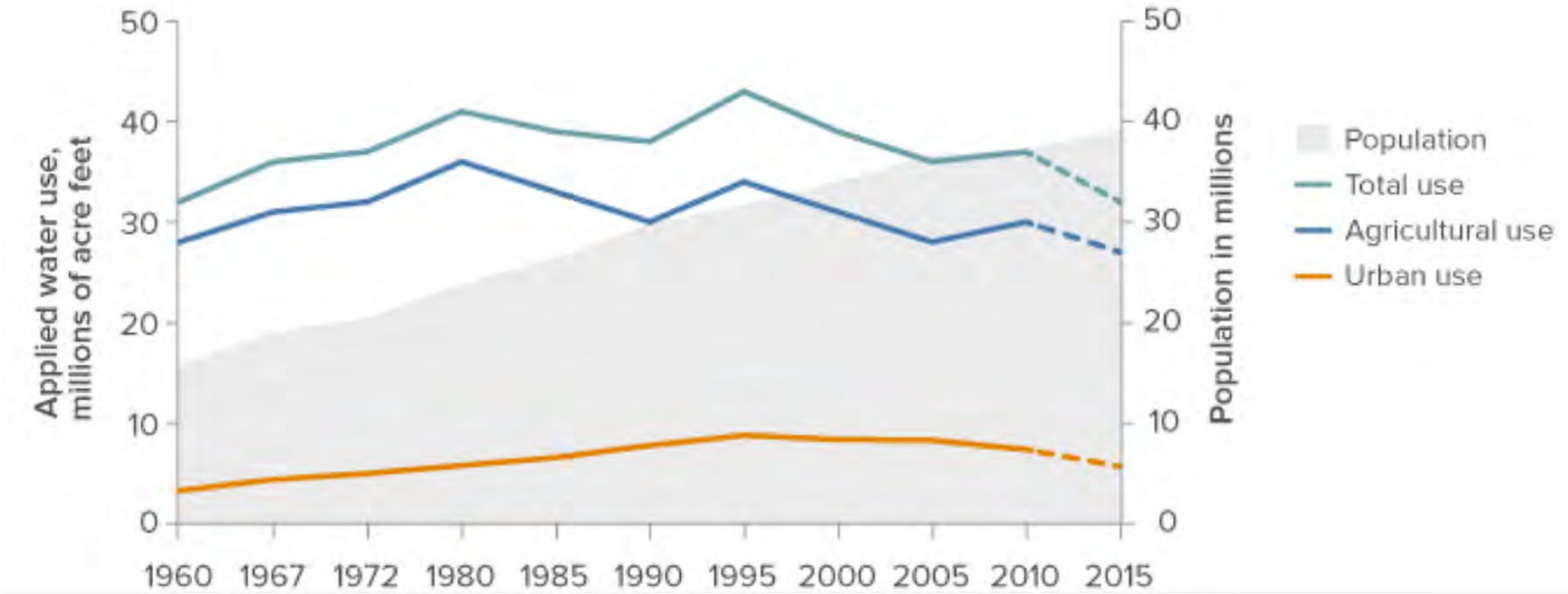
The graph shows water use in CA since 1960

- Agricultural water use has declined in recent years even though the economic value of farm production in CA has increased.
- Urban water use has declined in recent years despite a dramatic growth in the population.



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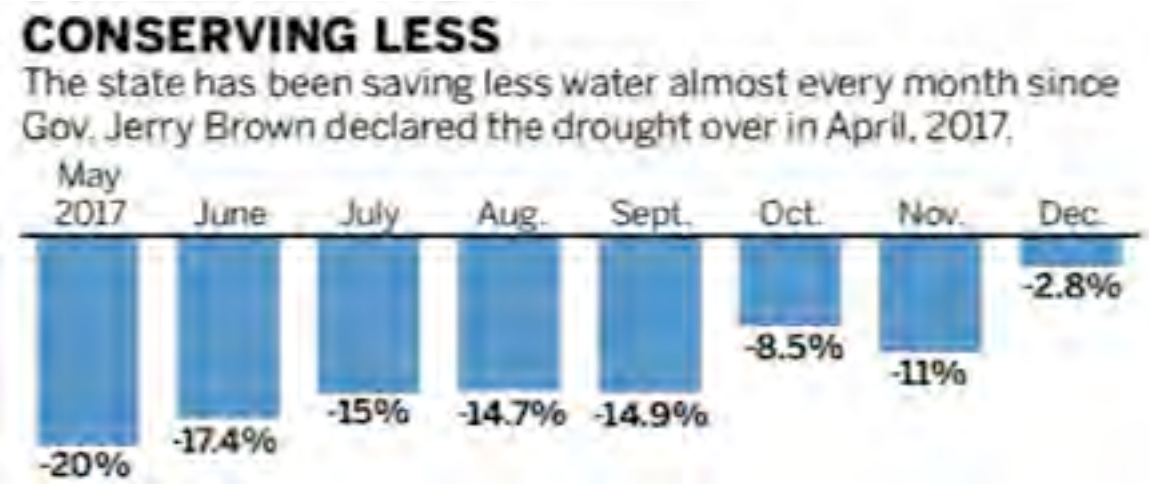
Californians have been conserving water. Per capita water use declined significantly from 232 gallons per day in 1995 to 178 gallons per day in 2010.

In 2015, per capita use fell to 130 gallons per day in response to drought-related conservation requirements.



State Water Resources Control Board

Mandatory and voluntary water restrictions were dropped or eased when the Governor ended the statewide water emergency in April 2017.

Since then, water use has been increasing

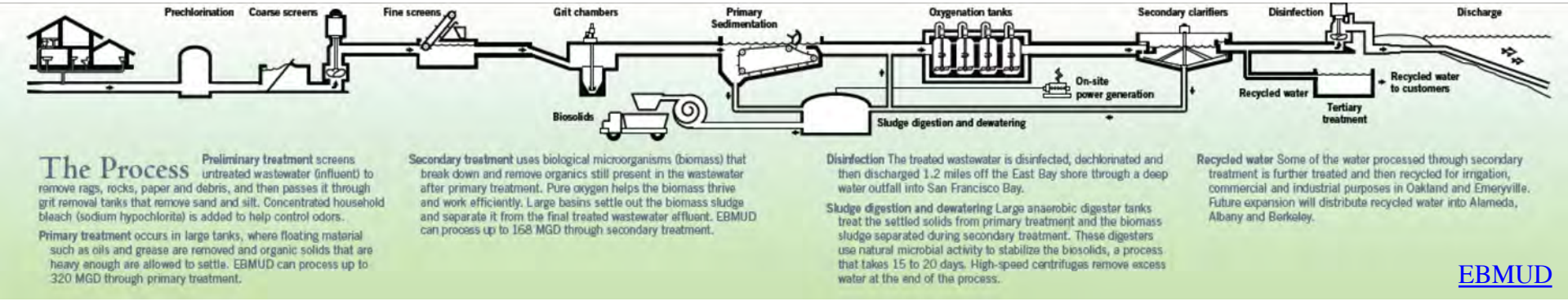
Waste Water Treatment

EBMUD operates a waste water treatment facility for a portion of their service area (from Oakland to El Cerrito).

Primary treatment separates floating material (oils), liquids and solids.

Secondary treatment uses microorganisms that break down organic compounds and results in a sludge. The sludge can be recovered and treated for use as a soil amendment and cover in landfills. Secondary treatment results in water that can be released into the environment.

Tertiary treatment is a final treatment process for water that can be reused. The quality of the treated water is nearly identical to potable water.



Recycled Water

EBMUD recycles water from waste water treatment plants for irrigation, toilet flushing and industrial uses.

Recycled water is an important conservation method since the drinking water supply is limited. In addition, recycled water reduces discharges of treated water in the SF Bay.

EBMUD

Recycled water is highly treated and is safe for may different types of uses.

The recycled water system is separate from the potable water system and is distinguished by the color purple on pipes and hardware.