

**BAY AREA WATER SUPPLY AND CONSERVATION AGENCY
BOARD OF DIRECTORS MEETING**

September 12, 2024

Correspondence and media coverage of interest between August 12, 2024 and September 10, 2024

Correspondence

From: Dave Warner
To: Bay Area Water Stewards
Date: September 6, 2024
Subject: Backgrounder for Future Demand and Water Rates Discussion

From: Info@losvaquerosjpa.com
To: Stakeholders
Date: August 30, 2024
Subject: Los Vaqueros Reservoir Joint Powers Authority Update

From: G. Diane Matthews-Marcelin – Carson, Ca
Guillemette Epailly – Santa Monica, Ca
To: BAWSCA Board of Directors
Date: September 11, 2024
August 28, 2024
Subject: Restore Remote Public Comment at BAWSCA

Press Release

From: State Water Contractors
Date: August 16, 2024
Subject: Healthy Rivers and Landscapes Program advances before the State Water Board

From: Department of Water Resources
Date: August 15, 2024
Subject: California Aims to Improve Ability to Measure How Much Water is Flowing throughout The State, Critical to Managing Water Supplies

Water Supply Conditions:

Date: September 4, 2024
Source: Courthouse News Service
Article: Drought emergency lifted for parts of California

Date: August 23, 2024
Source: The Tribune
Article: A third of California is 'abnormally dry,' drought monitor says. Where are conditions dry?

Date: August 22, 2024
Source: LA Times
Article: How likely is a La Nina system this fall?

Water Management:

Date: September 4, 2024
Source: Office of Governor Gavin Newsom
Article: Governor Newsom adapts state's drought response to changing conditions, continues action to support recovery and build resilience

Water Infrastructure:

Date: September 9, 2024
Source: Smart Water Magazine
Article: Biden-Harris administration unveils \$7.5 billion boost

Date: August 27, 2024
Source: New York Times
Article: With Dams Removed, Salmon Will Have the Run of a Western River

Date: August 23, 2024
Source: Maven's Notebook
Article: AGU: US water reservoirs are shrinking and becoming less reliable

Date: August 15, 2024
Source: The Independent
Article: Los Vaqueros Reservoir may Expand Storage

Water Policy:

Date: September 10, 2024
Source: San Francisco Chronicle
Article: Head of powerful S.F. commission slams Mayor Breed for not reappointing him

Date: August 23, 2024
Source: San Francisco Chronicle
Article: California judge issues first-of-its ruling to rein in groundwater pumping

Date: August 12, 2024
Source: Smart Water Magazine
Article: California's Office of Administrative Law approves direct potable reuse regulations

Water Supply

Date: September 3, 2024
Source: Maven's Notebook
Article: Where does California's water come from?

September 6, 2024

Re: Backgrounder for Future Demand and Water Rates Discussion

Dear BAWS Participants,

Would you take a few minutes to review this letter prior to our BAWS meeting on September 9th? Our steering committee was able to get Laura Busch, SFPUC Deputy CFO and talented financial planning expert to join our meeting, but only for the first 45 minutes. To maximize our time with her, this letter has background information that will shorten my presentation on future demand and water rates.

The purpose of the presentation is to expand our understanding of affordability and reliability in an environment of uncertain water demand.

We're in difficult times for California water managers. Urban water use has plateaued despite population growth. Will population growth continue? Will per capita demand continue to decline? If demand or water sales decline, that puts pressure on water rates and the ability to make infrastructure investments. If demand grows and water managers haven't made needed investments, there could be adverse consequences. Water managers are living in an environment where growth in water demand is uncertain.

Actions that some agencies have taken:

- The Metropolitan Water District of Southern California projected declining demand and provided scenarios and options to its Board for different ways to address the decline and impact to its financial health.
- Valley Water, as part of its long-term planning, provided the board with lower demand planning scenarios, "balancing affordability and reliability."
- The San Diego County Water Authority experienced bigger drops in demand than expected and is in the process of working through challenging financial times.

The SFPUC's Water Enterprise division has a couple of additional unique challenges. It has a supply guarantee to BAWSCA that could cause a massive investment in alternative water supplies (AWS). Water Enterprise is also carrying a large debt load due to the needed Water System Improvement Program (WSIP).

The debt load is a primary cause of the SFPUC already having amongst the highest per unit water rates in the State.

By looking at various scenarios of future demand and water rates, it provides a chance to be better prepared for an uncertain future. This is the topic I will be addressing at our BAWS meeting on Monday.

What demand scenarios should we look at?

Water managers are generally strong at planning for increasing demand scenarios. Declining scenarios, not as much.

Figure 1 plots SFPUC Regional Water System (RWS) per capita demand (GPCD) since 1990 within a statistical control chart¹. Historical data points stay within the chart's control limits, the blue dashed lines, meaning that the decline in demand since 1990 is a stable process and should continue to generate results within the control limits. During this time a lot has been happening: People have been buying water from the SFPUC for decades, through droughts, up and down economic cycles, water conservation programs and innovation, price increases, population changes, etc. And still demand continued to stay within the control limits. The chart also projects the trend line and control limits to 2045 along with plotting UWMP projections and SFPUC Finance projections.

¹ For further information see: Joiner, Brian L., *Fourth Generation Management: The New Business Consciousness*, R.R. Donnelley & Sons Company, 1994, pages 147-150

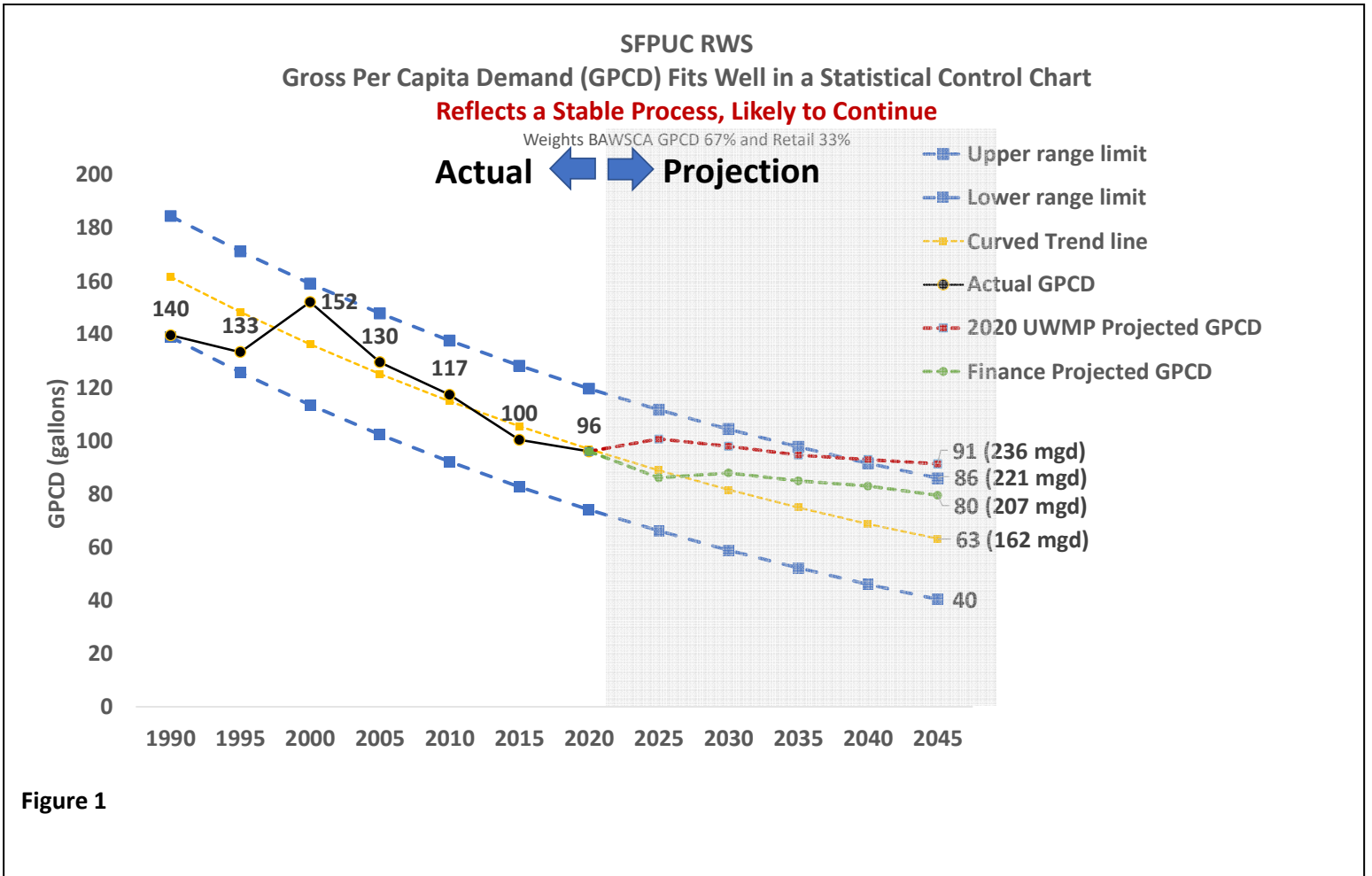


Figure 1

Some water managers argue that the system will experience “demand hardening,” where the limit has been reached for how much water can be conserved, particularly pointing out how low San Francisco’s per capita water demand is relative to the rest of the State. Demand hardening might be in our future. But it doesn’t preclude being prepared for a scenario where it’s not the case.

Figure 1 shows that based on the curved/flattening trend line that demand will be 63 GPCD in 2045, with an upper bounds of 86 GPCD and a lower bounds of 40 GPCD. For convenience and with simplifying assumptions the associated total annual demand has been added for each GPCD result. For example 63 GPCD in 2045 equates to annual demand of 162 mgd. The red dashed line shows demand from the 2020 Urban Water Management Plan (UWMP) at 236 mgd in 2045. The green dashed line is the SFPUC’s finance department projection for 2045, at 207 mgd.

A water manager might scoff at such a low demand projection, 162 mgd. In 2000, when RWS demand was 261 mgd, the 2000 UWMP projected 2020 demand to be 292.5 mgd. Back then no one could have imagined that 2020 demand would be 198.6 mgd. It's worth taking a look at the implications of 162 mgd demand in 2045, just in case.

My rates analysis will look at the demand scenarios in **figure 2** for 2045.

Ordered low to high

• Trend projection	162 mgd
• Modest decline from today's demand	175
• Demand is flat	190
• SFPUC Finance Projection	207
• Upper bounds of process analysis	221
• 2020 UWMP	236
• BAWSCA 2021 projection	244
• Supply guarantee	265
• Add Santa Clara & San Jose	274

Figure 2

All Demand Scenarios Require Alternative Water Supplies

The SFPUC RWS provides a firm yield of 152 mgd. Any demand above that requires AWS. For example, for demand of 162 mgd, there's a supply gap of 10 mgd. 12% of the gap, or 1 mgd can be covered by rationing, the other 9 mgd require AWS.

Figure 3 shows AWS needed for each of the scenarios. It should be noted, that for the Finance projection, the cost of the needed 48 mgd of AWS was not included.

Alternative Water Supply Amounts Needed for Each Scenario					
Scenario	Demand (mgd)	RWS Firm Yield (mgd)	Gap (mgd)	Supplied by Rationing (mgd)	AWS Needed (mgd)
Trend projection	162	152	10	1	9
Small decline	175	152	23	3	20
Flat	190	152	38	5	33
Finance projection	207	152	55	7	48
Upper bounds	221	152	69	8	61
UWMP	236	152	84	10	74
BAWSCA projection	244	152	92	11	81
Supply guarantee	265	152	113	14	99
+San Jose & Santa Clara	274	152	122	15	107

Figure 3

The AWS Plan Projects are Expensive

The average capital cost per mgd for the 6 projects listed in the June 2024 AWS plan report comes to \$204 million. This is a surprisingly costly figure, likely in part due to the small scale of the projects. Figure 4 shows the derivation of the \$204 million per mgd

Average Cost Per MGD for Projects Listed in AWS Plan					
Project	mgd	Capital Cost (\$ millions)	Budget+10 year CIP allocation (\$ millions)	Capital cost per mgd (\$ millions)	
Daly City	0.7	\$ 120	\$ 125	\$	171
PureWater Peninsula	6	\$ 1,168	\$ 12	\$	195
ACWD-USD	5.4	\$ 1,301	\$ 10	\$	241
South Bay Purified Water	3.5	\$ 658	\$ 7	\$	188
Los Vaqueros expansion*	3.9	\$ 539	\$ 55	\$	138
Calaveras expansion	28.6	\$ 6,011	\$ 5	\$	210
Total	48.1	\$ 9,797	\$ 213	\$	204

* Used midpoint of capital cost estimate range

Note: 2% of AWS funding in 10 year capital plan
Appears no significant funding in years 11-20

Both San Diego's and Los Angeles' current recycling projects are in the price range of \$50 million per mgd of capital cost (and have much larger scale than the SFPUC AWS Plan projects). It should be noted that San Francisco's Eastside and Westside potential recycling projects, not included in the latest AWS plan, both have a per mgd capital cost under \$50 million². **For this rates analysis the assumption used is \$100 million per mgd capital cost, about half of the average of what was in the AWS plan report, but still a relatively high figure.**

Figure 5 shows the estimated AWS cost for each of the demand scenarios. For example, the Finance scenario of 207 mgd would require \$4.8 billion in capital

² Per the SFPUC "San Francisco Purified Water Opportunities Study" dated May 2022

investment. This would raise the projected 2045 cost per acre foot from \$2,900 to \$4,500.³ The current cost per acre foot is \$2,470.

Estimated AWS Cost for Each Demand Scenario

Using \$100 million per MGD Capital Cost Assumption

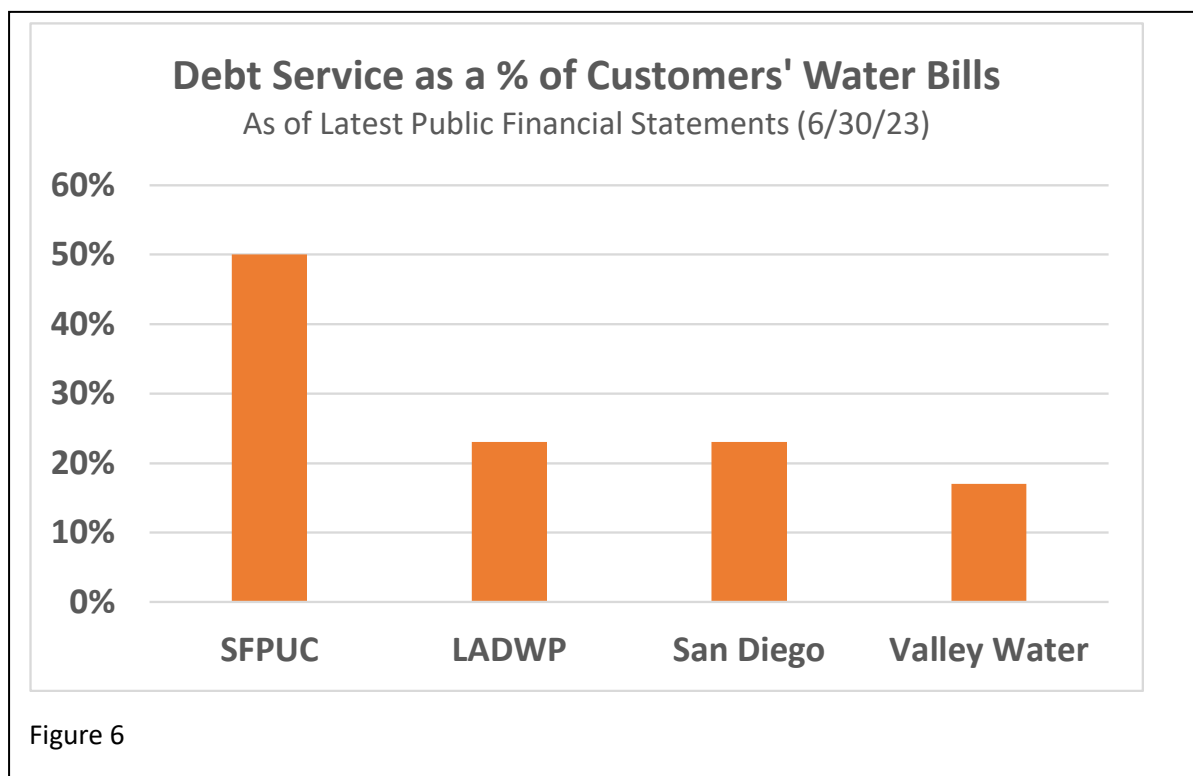
Scenario	AWS Needed (mgd)	Assumed Capital Cost (\$ millions)	Assumed Annual O&M Costs (\$ millions)
Trend projection	9	\$ 900	\$ 7
Small decline	20	\$ 2,000	\$ 17
Flat	33	\$ 3,300	\$ 28
Finance projection	48	\$ 4,800	\$ 41
Upper bounds	61	\$ 6,100	\$ 51
UWMP	74	\$ 7,400	\$ 62
BAWSCA projection	81	\$ 8,100	\$ 68
Supply guarantee	99	\$ 9,900	\$ 84
+San Jose & Santa Clara	107	\$ 10,700	\$ 90

Figure 5

Debt is a Big Contributor to High Water Rates

Today 50% of Water Enterprise revenue goes to debt service. This means that 50% of the \$2,470/af cost is used to pay interest and principal on debt. This is a high proportion compared to other water agencies. Figure 6 provides a comparison to selected other agencies of debt service costs as a percent of customers' water bills. If the SFPUC could reduce its reliance on debt, that would help reduce the high prices charged for water. Aside from grants, the typical way to do this is to reduce capital spending, delay projects until they can be financed with less debt, or raise near term rates even more for more cash to be available.

³ BAWSCA Board members and staff may recall a 2033 projected rate of \$3,093 per acre foot. The SFPUC financial projections show wholesale rates declining starting in 2041, likely due to WSIP debt starting to be paid off.



Thank you for reviewing this background information. My presentation on Monday will look at water rates under various demand and supply scenarios, including taking a closer look at the \$4,500/acre foot rate under the 207 mgd SFPUC Finance department projected demand scenario.

One added note, the SFPUC looks at affordability a little differently from my presentation. I'm looking at per unit cost, what does an acre foot of water cost? They look at average water bills rather than per unit cost. For example, the average SFPUC water and sewer bill is about the same as the average Los Angeles water and sewer bill. However the average water and sewer bill for Los Angeles is for twice as much water as San Francisco and the per unit cost about half that of San Francisco. This is an important way to look at affordability, but in an environment of managing costs and changing demand, understanding per unit costs is also important.

Kind regards,

Dave Warner

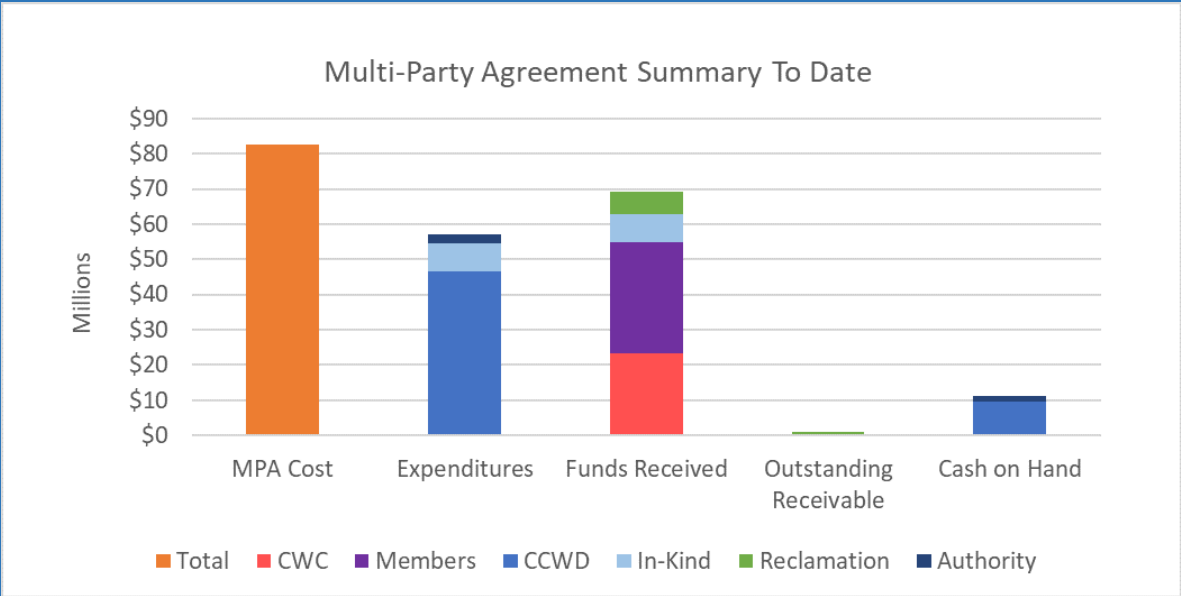
August 30, 2024

Los Vaqueros Reservoir Joint Powers Authority Update



UPDATE ON MULTIPARTY COST SHARE AGREEMENT

The following chart provides an overview of the MPA expenditures through July 31, 2024, as well as in-kind services, funds received, outstanding receivables, and cash on hand.



AUGUST BOARD OF DIRECTORS MEETING RECAP

On August 14, the JPA Board of Directors met in person at Zone 7 Water Agency. Discussion items included a resolution approving the contract amendment with C.J. Brown & Company,

CPAs, for the JPA's Fiscal Year 2023-24 audit and appointment as the JPA's auditor for Fiscal Year 2024. The Board also received updates on budget, schedule, agreements, design, and permitting; federal relations activities; and engagement with Reclamation. The next JPA Board Meeting is scheduled for September 11 at Zone 7 Water Agency. In accordance with the Brown Act, the meeting agenda packet will be posted on the [JPA website](#) in advance of the meeting.

HIGHLIGHTS REEL FEATURES RESERVOIR EXPANSION PROJECT INFORMATION AND BENEFITS

At the JPA's August Board meeting, Taryn Ravazzini, executive director, led an overview presentation of the Phase 2 Expansion Project and its wide-ranging benefits, which include reliable water for South of Delta wildlife refuges, improvements in water quality, increased water supply reliability, emergency water supply storage, expanded recreational facilities, enhanced regional collaboration, and economic growth with significant job creation.

The Phase 2 Expansion Project will increase reservoir capacity from 160,000 acre-feet to 275,000 acre-feet. New and modified conveyance facilities will provide water for wildlife refuges, enhance water supply reliability, regional integration, and operational flexibility in variable climate conditions.

The [highlights reel](#) and [informational presentation](#) now posted on the JPA's website, available for Member Agency use and public information, provide more details about the importance of the Project and its numerous benefits.



ENGINEERING UPDATE

Consistent with the JPA's Capital Preservation Strategy, facility design activities remain on hold and will resume pending receipt of funding from the California Water Commission. Right-of-way coordination and planning continue for the Transfer-Bethany Pipeline alignment.

On August 21, JPA and CCWD representatives met at CCWD's Administrative Building to discuss the terms and conditions of the CCWD Facilities Usage Agreement. Modifications to the agreement were proposed and future meetings will be held to document agreed upon changes.

UPCOMING MEETINGS

September 11 - 9:30 a.m. JPA Board Meeting (Zone 7 Water Agency)

September 19 - 10 a.m.

JPA Operations & Engineering Committee Meeting (Virtual)

September 26 - 1 p.m.

JPA Finance Committee Meeting (Virtual)



ADDITIONAL PROJECT INFORMATION

losvaquerosjpa.com

ccwater.com/lvstudies

Los Vaqueros Reservoir Joint Powers Authority | 1331 Concord Ave. | Concord, CA 94520 US

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From: [G.Diane Matthews-Marcelin \(gdaka57@msn.com\) Sent You a Personal Message](#)
To: [bawscaboardofdirectors](#)
Subject: Restore Remote Public Comment at BAWSCA
Date: Wednesday, September 11, 2024 2:24:16 PM

Dear BAWSCA Board of Directors,

Dear Board Members,

The removal of remote participation in BAWSCA Board meetings has reduced the transparency of the agency and has excluded the voices of the elderly, working-class, and caregiving community members from sharing their vital perspectives on the actions BAWSCA takes.

Remote participation became the new normal during the pandemic and remains in place in the majority of California cities. BAWSCA has made great progress by returning livestreams of Board meetings and the Agency must continue by implementing remote public comment services. As BAWSCA considers continuing its anti-environmental lawsuit against the State Water Board and chooses to support environmentally harmful voluntary agreements (VAs), the Board must remain transparent and ensure the voices of marginalized communities are heard at public meetings.

The Board must restore remote participation, including remote public comment. Thank you for recognizing the impact that remote participation has on increasing the accessibility and transparency of BAWSCA.

Sincerely,

Sincerely,

G.Diane Matthews-Marcelin
19527 Reinhart Ave
Carson, CA 90746
gdaka57@msn.com
(213) 718-3779

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From: [Guillemette Epailly \(gepailly@verizon.net\) Sent You a Personal Message](#)
To: [bawscaboardofdirectors](#)
Subject: Restore Remote Public Comment at BAWSCA
Date: Wednesday, August 28, 2024 12:00:39 AM

Dear BAWSCA Board of Directors,

Dear Board Members,

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The Board must restore remote participation, including remote public comment. Thank you for recognizing the impact that remote participation has on increasing the accessibility and transparency of BAWSCA.

Sincerely,

Sincerely,

Guillemette Epailly
1448 Stanford St
Santa Monica, CA 90404
gepailly@verizon.net
(310) 453-5500

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Press Release

August 16, 2024 1 375

From the State Water Contractors:

Healthy Rivers and Landscapes Program advances before the State Water Board

Today, DWR, Reclamation and public water agencies participating in the Healthy Rivers and Landscapes Program provided responses to questions and comments raised during the April 2024 workshops or submitted to the State Water Board during its public comment period for the Draft Staff Report in support of potential updates to the Bay-Delta Plan. The responses were developed in collaboration with program proponents across the state and highlight how transparency, enforceability and accountability are fundamental components of the program.

“Public water agencies from Redding to the Mexican border are working with state and federal agencies to advance the Healthy Rivers and Landscapes Program as a new and transformational approach to managing California’s water,” said Jennifer Pierre, General Manager of the State Water Contractors. “The collaboration in developing these responses demonstrates broad commitment by these agencies to manage the delta watershed in a way that is inclusive, science-based and responsive to climate extremes.”

The Healthy Rivers and Landscapes Program, included as an alternative implementation action in the State Water Board’s update to the Bay-Delta Plan, will increase flows through the Delta and significantly improve habitat while implementing a modern science and governance structure that will meet state regulatory requirements and improve conditions for the environment, farms, homes and businesses.

“California’s water challenges remind us how quickly we need to move and how much we can get done with a mutual commitment to additional flows, accelerated habitat restoration and accountability. We’ve learned together what works best to meet the needs of the environment and local communities. Now we need to do much more of it, and quickly,” said David Guy, President of the Northern California Water Association.

Responses to common questions cover a wide range of topics, including inclusion and outreach, program funding, accounting for habitat and flow assets, enforcement and accountability, and modeling, among others.

“The Healthy Rivers and Landscapes Program offers a more impactful approach to managing the Delta and its tributaries,” said Federico Barajas, Executive Director of the San Luis & Delta-Mendota Water Authority. “Understanding that the status quo is not a viable option, we’ve been working closely with state, federal and local leaders to develop a program that will improve environmental conditions more quickly and holistically than traditional regulatory requirements that narrowly focus on flows without pairing that with necessary habitat to support species

recovery. We look forward to ongoing collaboration with our partners and the public to advance this important work.”

“We look forward to continued collaboration with the State Water Board, the public, natural resources experts, and other stakeholders in implementing the Healthy Rivers and Landscapes Program. This program can improve resilience for fish in the Delta and its tributaries while balancing water supply needs for communities,” said Mike Tognolini, Director of Water and Natural Resources for the East Bay Municipal Utility District.

#



CALIFORNIA DEPARTMENT OF WATER RESOURCES

Press Release
August 15, 2024

Contact:

Jaden Torres, Public Affairs, Department of Water Resources
916-820-7796 | media@water.ca.gov

California Aims to Improve Ability to Measure How Much Water is Flowing throughout the State, Critical to Managing Water Supplies



A view of the station house for the newly installed North Honcut Stream Gage on Honcut Creek in Butte County, California on May 23, 2019.

New program will work with local partners to measure and plan for how much water is flowing in California rivers and streams, in turn providing a better snapshot of California's water supplies

Public agencies are encouraged to apply for unique partnership opportunity to support infrastructure improvements and statewide data collection to better prepare for climate extremes

SACRAMENTO, Calif. - Today, the Department of Water Resources

(DWR) announced a new partnership opportunity to support the state's ability to measure stream and river flows through the California Stream Gage Improvement Program (CalSIP) as climate extremes continue to impact the state's water supply.

As part of the approximately \$7 million program, DWR is seeking to partner with public agencies to install, upgrade and/or reactivate existing stream gage stations. This effort will expand California's ability to access critical data that can inform important water management decisions during both flood and drought conditions.

"California can't manage what we don't measure. Expanding our network of gages in rivers and streams helps us all make better decisions about managing our precious water supply while protecting vulnerable communities from flooding and drought," said DWR Director Karla Nemeth. "It also benefits our natural environment, improving our understanding of the needs of salmon and other native fish especially during drought conditions."

A stream gage is a set of instruments installed along a river or stream that measures, records, and transmits data on flow, water temperature, and dissolved oxygen levels. Water agencies

and the public rely on the essential information these gages provide for multiple purposes including:

- Planning, forecasting, and warning about floods and drought conditions
- Managing and informing reservoir operations
- Monitoring environmental conditions to protect aquatic habitats
- Planning for safe and enjoyable recreational activities
- Assessing groundwater and surface water interaction
- Monitoring stream flow impacts due to long-term changes in weather patterns

While there are approximately 1,000 active stream gages across the state sharing information publicly, many watersheds lack vital information on their surface water resources. Users of this data include emergency responders, water managers, environmental and transportation agencies, universities, utilities, recreators, researchers, and Tribes.

“Filling gaps in our stream gage network is essential for protecting life and property from flooding, improving water supply forecasting now and into the future amidst an ever-changing climate, and enhancing recreational opportunities like rafting and fishing,” said Teresa Connor, CalSIP program manager with DWR.

DWR is now accepting interest forms which will be reviewed and evaluated monthly to identify eligible projects through December 31, 2024. The funding will allow approved entities to purchase and install stream gage equipment as well as operate and maintain stations through June 30, 2027. Local entities will need to operate and maintain the gage and can elect to perform the operations either with staff or hire an experienced consultant to perform the installation and operations of the gage if the operation is consistent with industry standards. Real-time stream data transmitted from these gages will then be publicly shared on the California Data Exchange Center website. Applicants are encouraged to apply as soon as possible. Additional information on eligible agencies, how to apply, and application deadlines can be found in the program guidelines.

This work is funded by the Budget Act of 2023 and is part of a larger effort authorized by Senate Bill 19 to address gaging information gaps in coordination with the State Water Resources Control Board, the California Department of Fish & Wildlife, and the California Department of Conservation.

For more information about the program and how to apply for technical assistance, visit the CalSIP webpage.

Additional Resources:

- water.ca.gov/CalSIP
- [Stream Gage Improvement Map](#)

###

Drought emergency lifted for parts of California

Governor Gavin Newsom ended a years-long drought emergency declaration for some counties in the state.

Courthouse News Service | September 4, 2024 | Sam Ribakoff



Water drips from a faucet near boat docks sitting on dry land at the Browns Ravine Cove area of drought-stricken Folsom Lake in Folsom, California, on May 22, 2021. (Josh Edelson/AP)

SAN DIEGO (CN) — Coastal and desert communities across California can breathe a sigh of relief. After a few wet winters, Governor Gavin Newsom on Wednesday ended a years-long drought emergency declaration for 19 counties across the state.

“As this week’s weather makes clear, California and the West experience extreme weather swings that exacerbate our water challenges and make it more important than ever that we build a climate-resilient water system. This targeted action is responsive to current conditions while continuing the tools and support for work underway to help future-proof water supplies in the most impacted communities,” Newsom wrote in a press release.

The new proclamation will roll back a number of water restrictions in Los Angeles, Orange, San Diego, Inyo, Sonoma, and other counties where about 70% of the state’s population lives.

“With the Governor’s proclamation ending the drought, the Orange County Water District reaffirms its leadership in sustainable water management. By investing in water recycling and stormwater capture, and diligently replenishing our groundwater basin, we are prepared for

future challenges. Our proactive approach not only secures Orange County's water resilience but also serves as a blueprint for other California water districts," Cathy Green, president of the Orange County Water District Board of Directors, said in an email.

But in the state's 39 other counties the drought's lingering effects on groundwater, well failures, and harm to native fish, especially on the Sacramento, Scott, Shasta, Klamath and San Joaquin Rivers, mean the state of emergency will be left in place.

The rollbacks, like the state of emergency, are going to be implemented in phases, a press release accompanying the proclamation states.

The governor's action Wednesday also ends certain provisions of prior executive orders addressing water use, which allowed state agencies to pursue more aggressive water conservation policies. One such stricken provision directed the State Water Resources Control Board to expand inspections into illegal diversions of and unreasonable use of water and bring enforcement actions against wasteful water users.

Those provisions are referred to in a press release as no longer necessary, disruptive of state agencies' legal authority, and as interfering with funding aimed at continuing the work of drought resilience planning and providing clean drinking water.

In declaring a state of emergency in 2021, the governor called for municipalities and citizens across California to conserve water.

Coming out of one of California's wettest winters on record last year, Newsom rolled back some water restrictions, including a voluntary initiative that called for counties across the state to decrease their water use by 15%. Another provision from 2022 ordered urban water suppliers to level up what are known as "Water Shortage Contingency Plans."

"The coming winter's hydrology is uncertain and the most efficient way to preserve the State's improved surface water supplies is for Californians to continue their ongoing efforts to make conservation a way of life," Newsom's new executive order states.

###

A third of California is 'abnormally dry,' drought monitor says. Where are conditions worst?

The Tribune | August 23, 2024 | Sarah Linn

About a third of California was “abnormally dry” on Thursday as parts of the state appear poised to return to triple-digit temperatures, according to the U.S. Drought Monitor’s latest update.

As of Thursday, areas of “moderate drought” were isolated to Northern California while a sliver of the state near the Oregon border was under “severe drought,” the Drought Monitor said. TOP VIDEOS
The video player is currently playing an ad.

“Abnormally dry” spots could be found in northern and central California as well as the southeastern corner of the state.

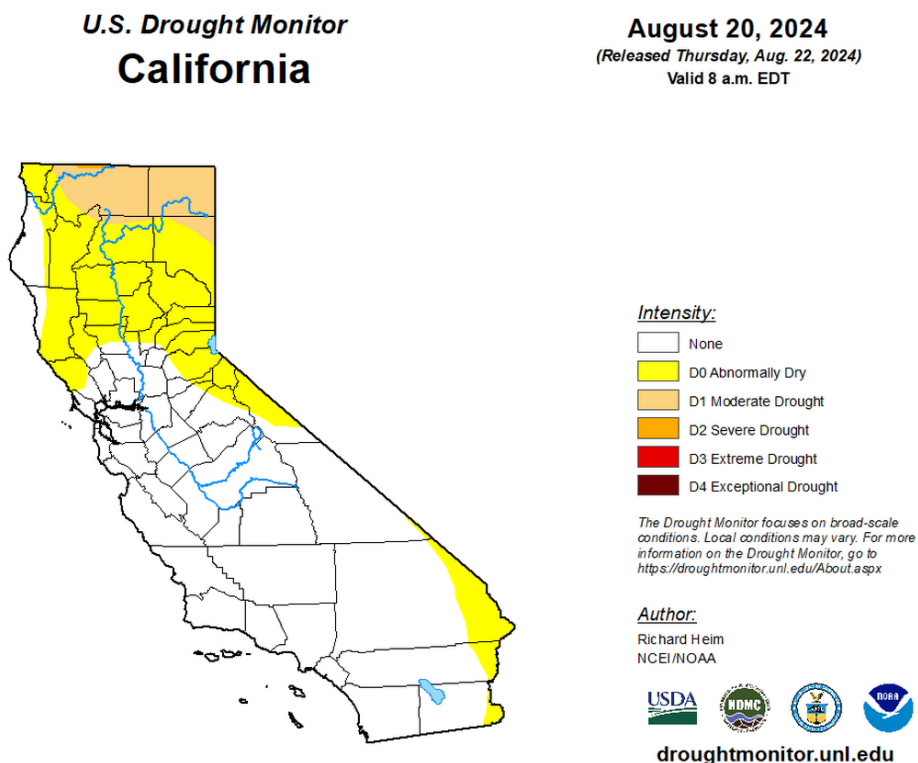
Here’s a look at drought conditions across California:

HOW MUCH OF CALIFORNIA IS IN DROUGHT?

As of Thursday, about 7% of California was in drought, according to the Drought Monitor’s weekly map showing drought intensities across the nation.

That’s an increase of more than a percentage point compared to Aug. 13, when about 5.3% of the state was under drought conditions, and more than 6.3% on July 9 when drought conditions returned to the state.

About 6.9% of California was under moderate drought conditions as of Thursday and 0.1% was under severe drought conditions, the map indicated.



About 33.4% of California is under “abnormally dry conditions” as of Thursday, Aug. 22, 2024, according to the U.S. Drought Monitor. About 6.9% of the state is under “moderate drought” conditions and 0.1% is under “severe drought” conditions. U.S. Drought Monitor

The drought-affected area covers all of Modoc County, most of Siskiyou County and a portion of Lassen County, according to the Drought Monitor map.

Meanwhile, 33.4% of California was battling abnormally dry conditions as of Thursday, the Drought Monitor said.

That included much of the Central Valley and the wider Bay Area as well as parts of Imperial, Inyo, Riverside and San Bernardino counties, the drought map indicated.

Although recent rains and cool temperatures have tamped down drought conditions in some areas of the United States, a lack of precipitation continues to “dry out soils across large parts of the West,” researchers wrote in a weekly national drought summary.

“Contraction of abnormal dryness or drought occurred in a few parts of New Mexico, Utah and Montana, but drought or abnormal dryness expanded in the Pacific Northwest, California and Nevada,” the researchers said.



Rice farmer Don Bransford walks past a dry ditch Wednesday, May 4, 2022. About a third of California was experiencing abnormally dry conditions as of Thursday, Aug. 22, 2024. Paul Kitagaki Jr. pkitagaki@sacbee.com

WHAT IS CALIFORNIA'S DROUGHT STATUS?

As of Thursday morning, an estimated 72,714 California residents were living in drought conditions, according to the U.S. Drought Monitor.

Since October, the state has been free of “extreme” and “exceptional” drought conditions.



Irrigation pipes are stacked in a farm field near Highway 1 and Halcyon Road in Arroyo Grande on Dec. 4, 2023. David Middlecamp dmiddlecamp@thetribunenews.com

WHAT'S NEXT FOR THE STATE?

Dry, hot weather could worsen drought conditions in California in the coming months, early forecasts indicate.

According to the Old Farmer's Almanac, all of California will see above-average temperatures this fall, The Sacramento Bee reported previously.

Temperatures are expected to be above normal for most of California for the months of September to October and November, according to a long-range forecast by the National Oceanic and Atmospheric Administration's Climate Prediction Center, although they could drop below normal along the coast.

The Climate Prediction Center said that parts of California may see below-normal rain from September through November.

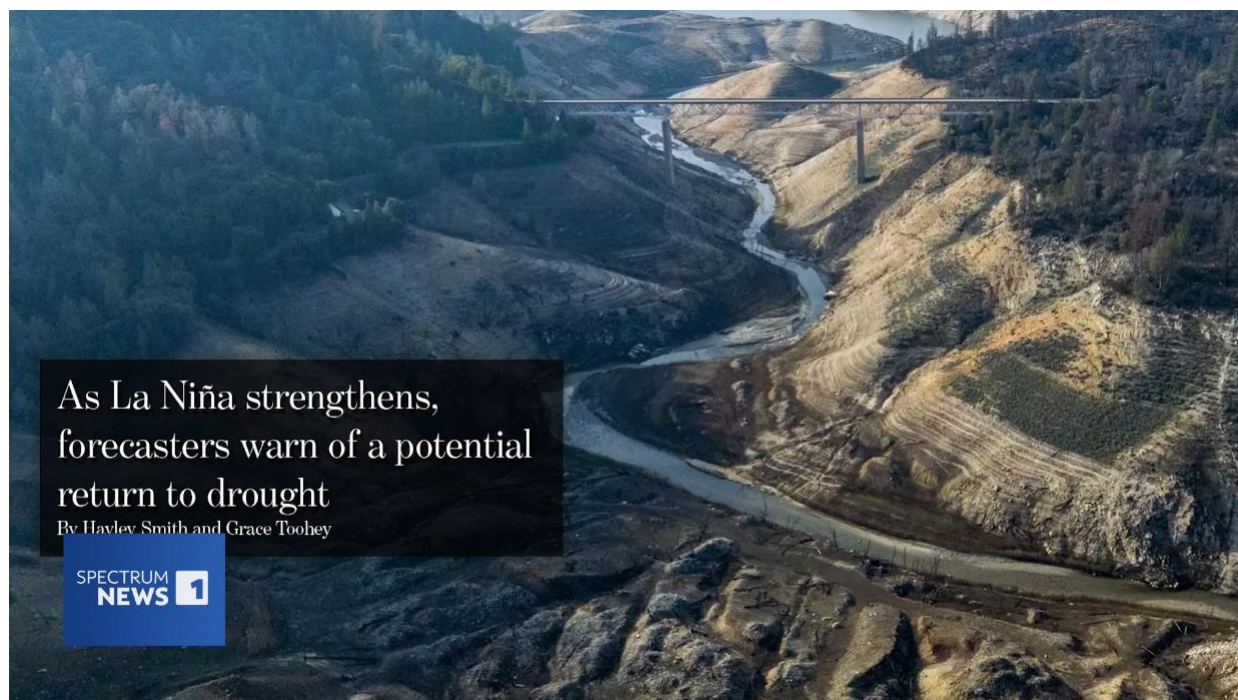
Areas south of the San Francisco Bay Area will likely have below-normal precipitation, the center said, while the region north of the Bay Area has an equal chance of having below or above-normal rain.

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How likely is a La Niña system this fall?

LA Times | August 22, 2024 | LA Times Staff



As La Niña strengthens,
forecasters warn of a potential
return to drought

By Hayley Smith and Grace Toohey

SPECTRUM
NEWS 1

A “bathtub ring” marks low water levels at Enterprise Bridge in Lake Oroville in December 2022, during California’s last drought. (Ken James / California Department of Water Resources) LA TIMES TODAY

Summer is about halfway over, but forecasters say extreme weather isn’t going anywhere for a while.

A La Niña weather system this fall and winter could plummet much of California back into drought conditions.

LA Times staff writer Grace Toohey joined Lisa McRee on “LA Times Today” to talk about the likelihood of La Niña and what it means for California.

Toohey explained the difference between La Niña and El Niño weather systems.

“These are recurring patterns that we see coming from the Pacific. And they’re important because they really affect our weather and climate here in California and across the U.S. El Niño, which is the pattern that we’ve been in for about a year, is this warm, moister, counterpart compared to La Niña, which we think of as kind of the drier counterpart. It tends to bring drier weather across much of the US,” she said.

Toohey reported California is currently in a neutral system.

The state was in a La Niña pattern from 2020 to 2023. She explained how the system impacts the U.S.

“La Niña really affects a broad swath of North America. Southern California, particularly, is vulnerable to those drought conditions during La Niña. In the Bay area, it’s kind of a tossup. Scientists say you might get kind of a drier conditions. It might be kind of normal conditions that might be a little bit wetter. But actually the Pacific Northwest gets all that wet weather that we’re not seeing down in Southern California.

It gets pushed up further north. And then across the U.S., we'll actually see the most of the south tends to be drier during La Niña as well, even over to the east coast," Toohey explained.

While there is no guarantee of La Niña developing this year, Toohey said scientists believe there is a strong chance.

"Scientists are saying there's about a 70% chance La Niña will develop over the next few months. Here's about 25% to 30% chance that you will not be developing. We're not really sure what that means when we're in neutral conditions. It really just means that we could swing one way or the other," she said. "Scientists tend to look toward other patterns and other impacts when they're trying to predict the weather."

In the meantime, Toohey said that Californians should expect high temperatures to last beyond summer and into the fall.

#

Governor Newsom adapts state's drought response to changing conditions, continues action to support recovery and build resilience

The Governor today ended the drought state of emergency in 19 counties where conditions have improved significantly, maintaining it in the remaining 39 counties to address continued impacts to local water supplies and facilitate ongoing recovery. Additional action today rolls back certain provisions of prior drought- and flood-related executive orders that are no longer necessary under current conditions.

Office of Governor Newsom | September 4, 2024

SACRAMENTO – With California's water year drawing to a close later this month, Governor Gavin Newsom today took action to adapt the state's response to the historic drought and flooding that Californians have experienced in recent years.

In response to improved water conditions following two wet winters, the Governor ended the drought state of emergency in 19 counties while maintaining it in the remaining 39 counties where it continues to support long-term recovery from the three driest years on record.

This action builds on the rollback of some drought emergency provisions in March last year and is in keeping with how the state entered the drought state of emergency in phases by region.

The Governor also rescinded certain provisions of prior executive orders related both to the drought and to flooding caused by 2023's late winter storms which are no longer necessary under current conditions. As California grapples with more extreme cycles of wet and dry, the state remains ready to respond to changing water conditions.

"As this week's weather makes clear, California and the West experience extreme weather swings that exacerbate our water challenges and make it more important than ever that we build a climate-resilient water system. This targeted action is responsive to current conditions while continuing the tools and support for work underway to help future-proof water supplies in the most impacted communities." Governor Gavin Newsom

The Governor has terminated the drought state of emergency in 19 coastal and desert counties that are collectively home to 70% of the state's population: Imperial, Inyo, Los Angeles, Marin, Mendocino, Mono, Monterey, Orange, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Sonoma, and Ventura counties. A copy of the proclamation terminating the drought state of emergency in these counties can be found [here](#).

The state of emergency remains in effect in California's remaining 39 counties, where significant impacts from the multi-year drought – including depleted groundwater supplies, domestic well failures and harm to native fish – persist in the Sacramento and San Joaquin River basins, the Tulare Lake basin, the Scott, Shasta and Klamath River watersheds, and the Clear Lake watershed.

The executive order rolling back several provisions of prior drought- and flood-related executive orders further narrows the drought state of emergency in the 39 counties where it remains in effect, while also rescinding orders related to flooding following the 2023 winter storms in 53 counties. The executive order rescinds provisions that are no longer necessary to respond to those emergencies without disrupting state agencies' legal authority and funding to continue expedited work to improve access to clean drinking water and ongoing drought resilience planning work. A copy of the executive order can be found [here](#).

As California approaches the beginning of a new water year, the state remains ready to respond to changing water conditions, including the potential return of dry conditions. With estimates that hotter, drier conditions could reduce California's water supply by up to 10% by the year 2040, the state is implementing an all-of-the-above approach to safeguard and boost water supplies as outlined in the California Water Plan, Water Supply Strategy and Water Resilience Portfolio. Leveraging historic state and federal funding, California is:

- Advancing clear, ambitious targets to build drought and flood resilience, including increasing annual groundwater recharge capacity by 500,000 acre-feet
- Fast-tracking groundwater recharge efforts by streamlining permits
- Maximizing stormwater capture through new projects
- Supporting reservoir repair and expansion to boost water storage above and below ground
- Modernizing water conveyance infrastructure across the state, including the Delta Conveyance Project

###

EXECUTIVE DEPARTMENT
STATE OF CALIFORNIA

EXECUTIVE ORDER N-3-24

WHEREAS on April 21, 2021, May 10, 2021, July 8, 2021, and October 19, 2021, I proclaimed States of Emergency to exist across all counties in the State due to drought conditions; and

WHEREAS the drought emergency has required a dynamic and flexible response from the State, and several provisions in my prior Proclamations and Orders have already been terminated or superseded; and

WHEREAS drought conditions have improved substantially, and lingering effects of the drought have largely abated in several areas of the California coast, Southern California, and the eastern Sierra Nevada; and

WHEREAS today I have therefore terminated the drought State of Emergency in the Counties of Imperial, Inyo, Los Angeles, Marin, Mendocino, Mono, Monterey, Orange, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Sonoma, and Ventura; and

WHEREAS the multi-year nature of this drought, which began three years after the record-setting drought of 2012-2016, continues to have ongoing, significant impacts on the Sacramento and San Joaquin River basins, the Tulare Lake basin, the Scott, Shasta, and Klamath River watersheds, and the Clear Lake watershed, which include many communities with vulnerable water supplies, farms that rely on irrigation to grow food and fiber, and fish and wildlife that rely on stream flows and cool water; and

WHEREAS improved conditions have helped rehabilitate surface water supplies, but have not eliminated the effects of the drought that remain in the Sacramento and San Joaquin River basins, the Tulare Lake basin, the Scott, Shasta, and Klamath River watersheds, and the Clear Lake watershed, and many groundwater basins remain depleted from overreliance and successive multi-year droughts; and

WHEREAS continued action by the State is needed to address ongoing consequences of the drought emergency in the Sacramento and San Joaquin River basins and the Klamath River and Clear Lake watersheds, including groundwater supply shortages, domestic well failures, and drought-related harm to native fishes; and

WHEREAS improved conditions even in the counties where the drought State of Emergency remains in effect warrant a more targeted State response, and certain provisions in my prior Proclamations and Orders provide authority that is no longer needed to mitigate the effects of the drought conditions, or direct actions by state agencies, departments, and boards that have already been completed; and

WHEREAS notwithstanding the rescission of certain emergency authorities for emergency drinking water action, state agencies have existing legal authority and funding to continue expedited work to advance the human right to water, and state agencies will continue all ongoing drought resilience

planning work, including through coordination with local agencies and tribes;
and

WHEREAS the coming winter's hydrology is uncertain and the most efficient way to preserve the State's improved surface water supplies is for Californians to continue their ongoing efforts to make conservation a way of life;
and

WHEREAS on March 1, March 8, March 12, March 14, March 28, April 20, May 15, and June 16, 2023, I proclaimed a State of Emergency to exist in 53 counties, cumulatively, as a result of a series of winter storms that initially struck California beginning in late February 2023; and

WHEREAS on March 31, 2023, and May 17, 2023, respectively, I issued Executive Orders N-6-23 and N-7-23 to further bolster the emergency response to the 2023 Late Winter Storms, particularly in the Tulare Lake Basin; and

WHEREAS improved conditions in the Tulare Lake Basin and other regions affected by the 2023 Late Winter Storms warrant a more targeted emergency response to the effects of those storms.

NOW, THEREFORE, I, GAVIN NEWSOM, Governor of the State of California, in accordance with the authority vested in me by the State Constitution and statutes, including the California Emergency Services Act, and in particular, Government Code sections 8567, 8571, and 8627, do hereby issue the following Order to become effective immediately:

IT IS HEREBY ORDERED THAT:

1. The orders and provisions contained in my State of Emergency Proclamations dated April 21, 2021; May 10, 2021; July 8, 2021; October 19, 2021; March 1, 2023; March 8, 2023; March 12, 2023; March 14, 2023; March 28, 2023; April 20, 2023; and May 15, 2023, and Executive Orders N-10-21 (July 8, 2021), N-7-22 (March 28, 2022), N-3-23 (February 13, 2023), N-4-23 (March 10, 2023), N-6-23 (March 31, 2023), and N-7-23 (May 17, 2023), remain in full force and effect, except as modified by those Proclamations and Orders, Executive Order N-5-23, my Proclamation Terminating the Drought States of Emergency in 19 counties dated today, and this Order. State agencies shall continue to implement all directions from those Proclamations and Orders and accelerate implementation where feasible.
2. The following provisions of my State of Emergency Proclamation dated May 10, 2021, are terminated:
 - a. Paragraph 8; and
 - b. Paragraphs 11–13.
3. The following provisions of my State of Emergency Proclamation dated October 19, 2021, are terminated:
 - a. Paragraphs 6–7;
 - b. Paragraph 9; and
 - c. Paragraph 12.

4. The following provision of Executive Order N-10-21 is terminated:
 - a. Paragraph 2.
5. The following provisions of Executive Order N-7-22 are terminated:
 - a. Paragraph 4;
 - b. Paragraphs 7–8; and
 - c. Paragraph 10.
6. The following provisions of Executive Order N-3-23 are terminated:
 - a. Paragraph 2; and
 - b. Paragraphs 4–5, except to the extent that Paragraph 4 withdraws Paragraph 9 of Executive Order N-7-22.
7. The following provisions of Executive Order N-4-23 are terminated:
 - a. Paragraphs 2–7.
8. The following provisions of Executive Order N-6-23 are terminated:
 - a. Paragraphs 7–10.
9. The following provisions of Executive Order N-7-23 are terminated:
 - a. Paragraphs 2–11, except to the extent that they withdraw provisions of prior Executive Orders.

IT IS FURTHER ORDERED that as soon as hereafter possible, this Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this Order.

This Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 5th day of September 2024.



GAVIN NEWSOM
Governor of California

ATTEST:



SHIRLEY N. WEBER, PH.D.
Secretary of State



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Biden-Harris administration unveils \$7.5 billion boost for water infrastructure projects

Smart Water Magazine | September 9, 2024



United States Environmental Protection Agency. The mission of EPA is to protect human health and the environment.

the U.S. Environmental Protection Agency announced the availability of \$7.5 billion of Water Infrastructure Finance and Innovation Act (WIFIA) funding. The WIFIA program offers long-term loans to help communities implement critical water infrastructure projects, which protect public health, deliver environmental benefits, create over 60,000 good-paying jobs, protect waterways including drinking water sources, and support local economies, at a lower cost.

“Good infrastructure is the foundation for delivering clean, safe water to people across the country,” said EPA Administrator Michael S. Regan. “The Biden-Harris administration has prioritized water infrastructure investment with this \$7.5 billion infrastructure funding through WIFIA, on top of the unprecedented \$50 billion in funding the Biden-Harris Administration secured under the Bipartisan Infrastructure Law. With these resources, communities will keep building on progress to replace lead pipes, cut PFAS pollution, and protect people from climate change.”

The WIFIA program provides its borrowers with creative, affordable financing options. It can fund the planning, design, and construction of a wide range of water infrastructure projects and offers the ability to combine multiple projects into a single loan. By streamlining the funding process, communities can accelerate their infrastructure projects. The WIFIA program offers interest rate resets, debt structuring, and fast disbursements, benefits not traditionally offered with other financing sources. For example, borrowers may defer repayment for up to five years

following construction completion, and then customize their repayment schedule through the 35-year loan term. This flexibility provides borrowers with immediate funding to implement projects while helping to keep rates more affordable.

This is the eighth round of funding available, and it includes \$6.5 billion available through WIFIA and \$1 billion available through the State Water Infrastructure Financing Authority, known as SWIFIA. EPA is accepting letters of interest for WIFIA and SWIFIA loans. To date, EPA's WIFIA program has closed loans totaling more than \$20 billion to help finance \$44 billion in projects across the country. More than 100 borrowers nationwide are utilizing WIFIA loan to finance projects that benefit over 64 million Americans. Completed WIFIA-financed projects show positive health and environmental outcomes, as well as the advantages of financing with WIFIA loans. For example:

- Orange County Water District (California) customers have a more drought-proof drinking water supply and are less reliant on imported water due to the completion of the Groundwater Replenishment System Expansion project. When interest rates lowered in 2020, the district was able to lower its interest rate, saving it an additional \$75 million in financing costs.
- City of Wichita (Kansas) residents benefit from more reliable drinking water because of its new Northwest Water Treatment Facility. Due to WIFIA financing, the project was initiated seven years sooner than originally planned and now delivers clean drinking water to the community.
- City of Tacoma Sewer Utility (Washington) customers have a more reliable, resilient wastewater treatment system because of the completion of the Electrical Distribution System Replacement Project, which modernized the treatment plant's electrical system. By deferring WIFIA loan repayment for four years after construction completion, the city can pay off existing state-revolving fund (SRF) loans prior to repaying their WIFIA loan.

The funding announcement demonstrates EPA's continued commitment to water infrastructure improvements that ensure all communities have access to clean and safe drinking water. For this round of funding, EPA has identified the following priority areas:

- Increasing investment in disadvantaged communities and improving health and livability.
- Making rapid progress on lead service line replacement.
- Addressing PFAS – known as “forever chemicals” – and emerging contaminants.
- Strengthening climate resilience in the water sector.
- Supporting water innovation and resilience.

#

With Dams Removed, Salmon Will Have the Run of a Western River

The nation's largest dam removal project is nearly complete after a lengthy campaign by Native tribes to restore the river at the California-Oregon border.

New York Times | August 27, 2023 | Soumya Karlamangla

The Klamath River was once so flush with fish that local tribes ate salmon at every meal: flame-roasted filets on redwood skewers, stews flavored with fish tails, strips of smoky, dried salmon. In the language of the Yurok, who live on the river among California's towering redwoods, the word for "salmon" translates to "that which we eat."

But when hydropower dams were built on the Klamath, which wends from southern Oregon into far northwest California, the river's ecosystem was upended and salmon were cut off from 420 miles of cooler tributaries and streams where they had once laid their eggs. For decades, there has been little salmon for the tribes to cook, sell or use in religious ceremonies. The Yurok's 60th annual Salmon Festival this summer served none of its namesake fish.

But tribal members hope the situation is about to dramatically change.

Four giant dams on the Klamath are being razed as part of the largest dam removal project in U.S. history, a victory for the tribes who have led a decades-long campaign to restore the river. This week, as the final pieces are demolished, a 240-mile stretch of the Klamath will flow freely for the first time in more than a century — and salmon will get their best shot at long-term survival in the river.

"The salmon are going to their spawning grounds for the first time in 100 years," said Ron Reed, 62, a member of the Karuk tribe who has been fighting for dam removal for half his life. "There's a sense of pride. There's a sense of health and wellness."

Salmon play an outsize role in nourishing and holding together ecosystems, scientists say, and their plight has fueled a growing trend of dam removals nationwide. Of the 150 removals on the West Coast in the past decade — double that of the previous decade, according to data from American Rivers, an environmentalist group — most have benefited salmon. Chinook salmon, or king salmon, in the Klamath are predicted to increase by as much as 80 percent within the next three decades.

The Klamath River begins at the foot of the Cascade Mountains in the deserts of southern Oregon and flows southwest into California through lush redwood forests before emptying into the Pacific Ocean. On a recent morning outside Yreka, a former California mining town near the Oregon border, a gray crane took flight from the banks of the river, which carved a wide path through a landscape of yellowed hills and desiccated shrubs.

The Hupa, Karuk, Klamath and other tribes who have lived for thousands of years along the 263-mile river were secluded enough to largely avoid the Spanish missionaries who pushed Bay Area and Southern California tribal members into forced labor. But outsiders flooded into the remote region decades later, in 1850, after the discovery of glittering flakes in the Klamath and its tributaries. The Gold Rush also brought a government-backed campaign to exterminate Native Americans that killed as many as two-thirds of some Klamath area tribes over 25 years, historians estimate.



The Iron

Gate Dam on the Klamath River near Hornbrook, Calif., in February before its removal.

The dams were erected between 1918 and 1962 by the California Oregon Power Company to supply electricity to the growing rural region. By that point, the Klamath had already suffered from overfishing, logging, agricultural development and mining operations that spit sediment and chemicals into the river. The dams choked its flows, ruined water quality and fostered toxic algae blooms that often made the river unsafe for summer recreation.

Salmon hatch from eggs in stream beds and then migrate to the ocean, where they mature and feast on krill, squid and shrimp. Years later, the salmon return to their natal streams to reproduce and die.

Upstream of the Klamath dams, salmon completely disappeared because they were unable to return from the ocean. Below the dams, the salmon population dropped to less than 5 percent of what it had been, with some species fully extinct.

“My grandpa said that there were so many salmon when he was younger that you could walk across their backs to the other side,” said Brook Thompson, 28, who grew up on the Yurok reservation. “It’s just so hard to express to people who are so used to fishing for sport or fun that salmon is really everything for us. The health of the river is literally our health.”

Catalyzed by a huge salmon die-off in 2002, the Klamath area tribes kicked off an aggressive campaign to remove the dams, collaborating with scientists, environmental organizations and commercial fishermen, who together wrote letters, staged rallies and traveled as far away as Scotland to protest outside the headquarters of ScottishPower, which owned the dams at the time.

When salmon return from the ocean, they deliver enriching nutrients, such as carbon and nitrogen, to the Klamath ecosystem. Bears, raccoons, minks and other animals benefit from eating the salmon, and riverside vegetation grows in the soil where fish carcasses decompose. Studies have found that the bigger a salmon run, the more a nearby redwood tree grows that year. (Even the distinctive flavor of California wines may owe something to salmon.)

“We don’t view that as by accident. We view that as by design,” said Keith Parker, senior fisheries biologist for the Yurok Tribe, who said that Indigenous traditions had long reflected the essential role of migratory fish in the ecosystem. “They have this ripple effect, not just biologically — but for our people,” he said.

The Klamath region tribes have had to shut down their commercial salmon fisheries, leaving them among the most impoverished groups in California. And they have suffered high rates of diabetes and heart disease, which one scientific study blamed on the lack of access to fresh salmon — once 50 percent of their daily calories — and called “a clear violation of human rights.”

The local tribes call themselves “salmon people,” and their creation stories explain that their civilizations would disappear without the sacred fish. Tribal members connect that belief to an epidemic of suicides, opioid addiction and other mental health problems that has emerged in recent years.

After more than 20 years of advocacy from the tribes, federal regulators in 2022 approved an agreement to demolish four dams on the Klamath. The dams were providing less than 2 percent of the energy portfolio of their current owner, PacifiCorp — a subsidiary of Warren Buffett’s Berkshire Hathaway Energy — and the company would have had to pay more to upgrade them to modern-day standards than to take them down. The \$500 million cost of the demolition project has been split between California taxpayers and surcharges paid by PacifiCorp customers in Oregon.

Two dams will remain farther upstream on the Klamath to collect and divert water to farmers in Oregon. Between the 1920s and 1940s, the federal government granted homesteads to veterans in the Klamath Basin, and the farmers’ battle for water with the tribes became one of the fiercest water wars in the West. The two remaining dams have fish ladders so that salmon can make it to the other side.

The Klamath dam removal project has long had naysayers, with more than three-quarters of voters in California’s Siskiyou County, home to the three Klamath dams in the state, opposed to removal in a 2010 advisory vote. Local residents were skeptical of large-scale changes to the landscape and reluctant to destroy a renewable energy source that could power 70,000 homes in the area.

And since the project began last year, many have raised concerns. Millions of tons of sediment that had collected behind the Klamath dams were released into the river as the barriers came down, temporarily transforming the river into a brown ribbon of mud. The initial poor water quality killed thousands of fish, and their bodies piled up on the river’s rocky shoreline. Deer were caught in the muddy footprint of the emptied reservoirs and died.

Dam removals also drained Copco Lake, a reservoir about 50 miles east of Yreka around which 100 people had built a community. Today, once lakeside properties in a quiet valley now sit on a grassy

field. On a recent day, a boat rested hundreds of yards from the narrow river that replaced the reservoir.

“It’s devastating — it’s completely devastating,” said Chrissie Reynolds, a longtime Copco resident who said access to drinking water had become spotty in Copco because local wells were connected to the lake. The town’s residents, many of whom spent their retirement savings to settle there, were “paying the price for what happened to our Indigenous people before we were here,” she said.



Construction crews drained Copco Lake, a reservoir about 50 miles east of Yreka around which 100 people had built a community and their homes.

The Klamath River Renewal Corporation, the entity overseeing the project, said that the fish that had died in the Klamath were largely nonnative and that the release of sediment had been timed so that salmon wouldn’t be in the river. Flushing out the sediment will ultimately help the river recover faster and function as it should, experts said.

“It’s sort of like a rip-the-Band-Aid-off moment,” said Shari Witmore, a fish biologist with the National Oceanic and Atmospheric Administration.

No one knows how quickly salmon will rebound in the Klamath. After a dam removal on the Elwha River in Washington State’s Olympic National Park, every migratory fish species in the river swam upstream of the former dam site within three years. But even a decade later, some salmon populations remain critically low.

Mr. Parker, whose ancestors hail from the Yurok, Hupa, Karuk and Tolowa tribes of northwestern California, recently drove his truck along the desolate gravel roads beside the Klamath River until he reached what had once been a stagnant, algae-filled reservoir between two of the dams.

This time, he witnessed a river winding through fields of orange flowers — sprouted from seeds planted by a revegetation effort that was part of the dam demolition. Thousands of bees swarmed around the blooms. Deer tentatively waded into the rippling waters. Mr. Parker began to cry.

“Those birds and all the living things up there haven’t heard running water in over 100 years — it’s a completely different landscape,” Mr. Parker said. “The ecosystem is healing itself.”

#

A correction was made on Aug. 27, 2024: An earlier version of this article misstated the name of the government agency where Shari Witmore, a fish biologist, works. It is the National Oceanic and Atmospheric Administration, not the National Oceanic and Atmospheric Association.

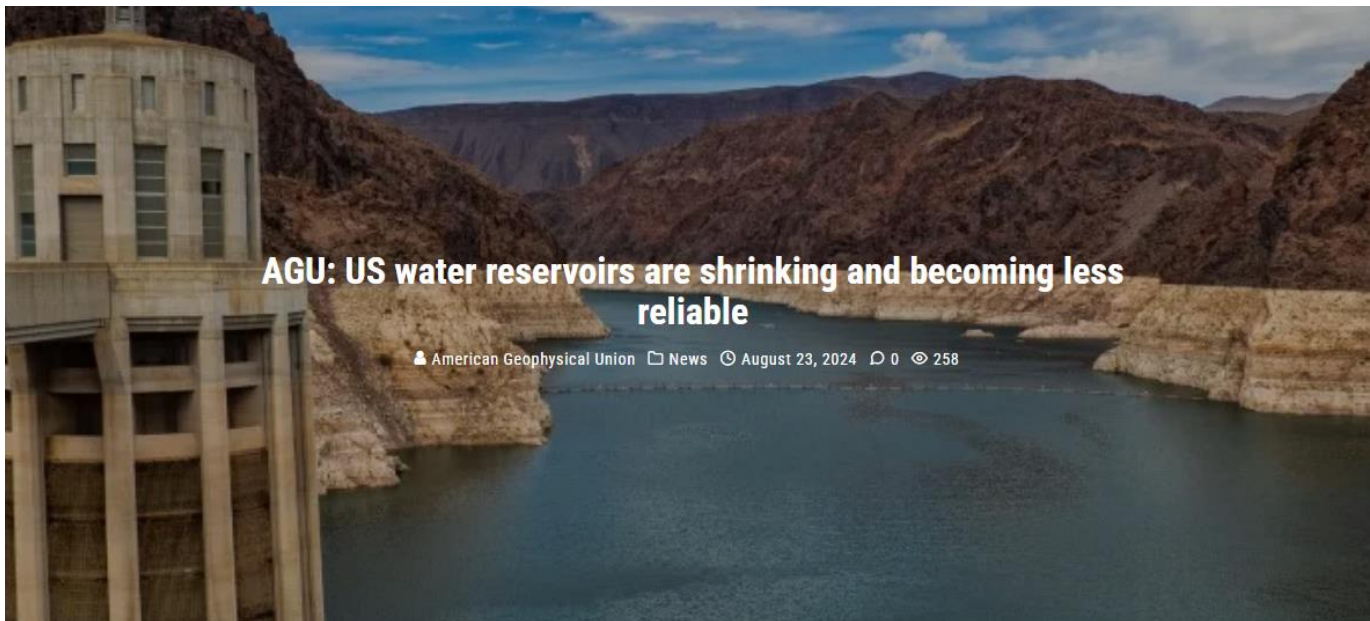
When we learn of a mistake, we acknowledge it with a correction. If you spot an error, please let us know at nytnews@nytimes.com. [Learn more](#)

Soumya Karlamangla reports on California news and culture and is based in San Francisco. She writes the California Today newsletter.

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AGU: US water reservoirs are shrinking and becoming less reliable

Maven's Notebook | August 23, 2024 | Caelan Simeone, USGS Oregon Water Science Center



Climate change is decreasing water level extremes in reservoirs across the country. Longer and more severe periods of low storage threaten critical water supplies

Major water reservoirs across the continental United States are experiencing longer, more severe, and more variable periods of low storage than several decades ago, a new study reports. The problems are most severe in the western and central United States, but reservoirs in the eastern and southeastern United States are not immune, the study finds. Overall, reservoirs are less reliable and more vulnerable to climate change than they used to be.

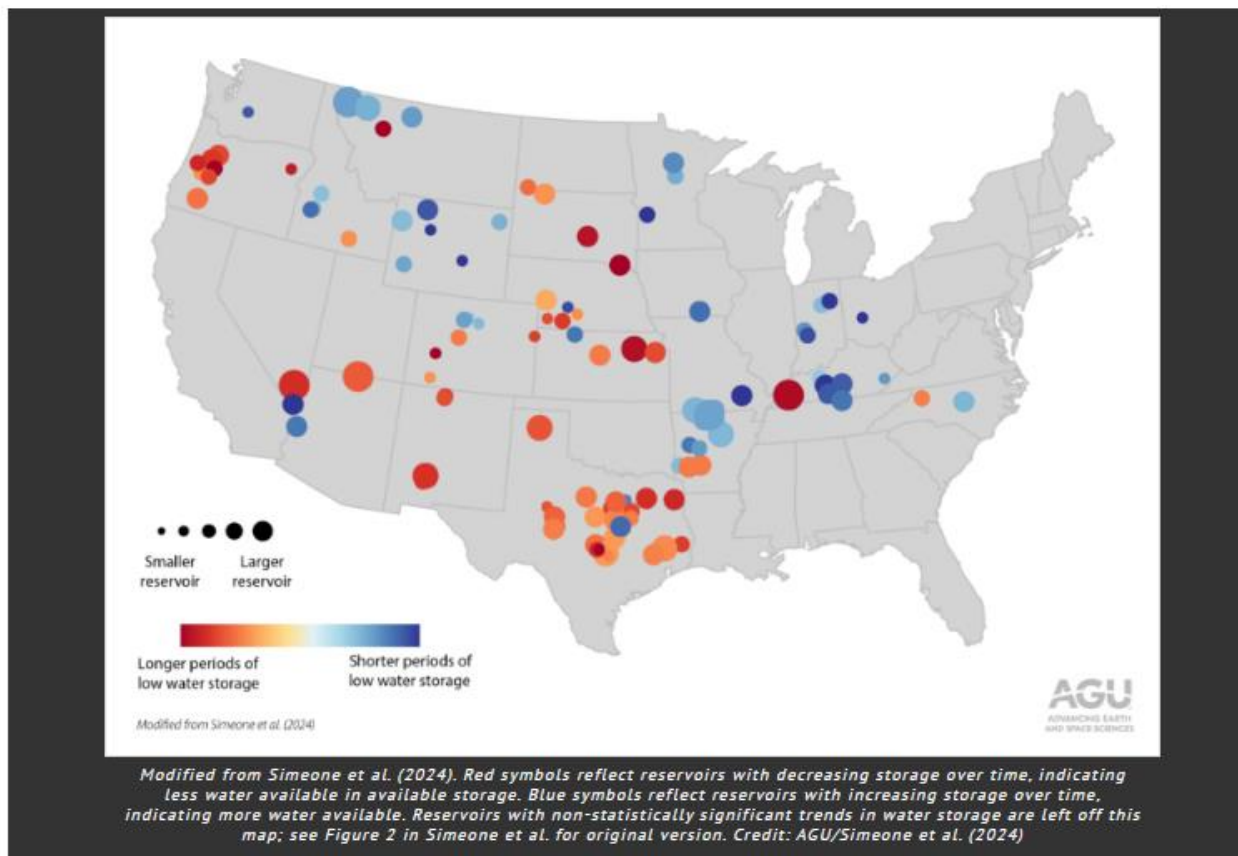
The findings, which update critical information about water storage, should improve water forecasting, helping water managers at national, regional and local levels make more informed decisions about the timing and volume of water release. The study appears in *Geophysical Research Letters*, which publishes high-impact, short-format reports with immediate implications spanning all Earth and space sciences.

Water storage reservoirs are becoming increasingly important as more ephemeral, natural storage grows less reliable: In many regions, snowpack is diminishing, rivers are running low, and humans are pumping away groundwater reserves.

Reservoirs can help limit the downstream propagation of drought, but interruptions to their normal operation can cause widespread water availability problems. Take for example the low storage in Lakes Mead and Powell from 2000 to 2021 — the region's driest 22-year period in 1200 years. That drought triggered widespread water-use restrictions across the southwestern United States.

Drought, water withdrawals, and sediment buildup behind dams determine how much water can be stored in a reservoir. Each of those factors has been changing, in many cases pushing reservoirs away from the conditions under which they were designed to operate.

“Reservoirs are a key component of the modern water cycle, and they’re a part that water managers can influence,” said Caelan Simeone, a hydrologist at the U.S. Geological Survey’s Oregon Water Science Center who led the study. “We know that reservoirs are changing, and that reservoirs were designed for historical water conditions. So now there’s uncertainty about how, or whether, reservoirs will be able to adapt.”



National water snapshot

Much information and research on reservoirs is local or regional, limiting scientists’ understanding of how climate and anthropogenic changes are impacting water storage on a national scale. “Water reservoir managers could benefit from having that knowledge,” Simeone said. “It would enable them to consider larger, national trends in water as well as more local patterns.”

To get a countrywide perspective on how reservoirs are changing, Simeone and colleagues analyzed water levels in 250 large reservoirs from 1981 to 2020, looking for changes in baseline, maximum, and minimum water levels. They compared water levels to management practices and climate, looking for patterns that could explain any changes in water level. Reservoir data for the U.S. Northeast were not available, so that region is excluded from the study.

Reservoirs in more arid western and central United States tended to have longer, more severe, and more variable periods of low storage. That's partially to be expected, as reservoirs in drier regions are expected and designed to handle variable annual runoff and drought conditions. But drought conditions today push low-flow conditions to the extreme.

It's not just a problem for the arid West. Reservoirs in the wetter Southeast and Pacific Northwest, as well as the arid regions, saw a drop in the annual maximum storage. Out of 250 reservoirs studied, 169 had declining maximum storage, and 89 of those saw significant drops. Across all reservoirs, the median decline in maximum water storage relative to the mean was 2.2%; for reservoirs with significant declines, the median decrease was 8.1%.

Simeone did not expect those drops.

"The reduction of maximum annual storage was widespread, which really surprised us," Simeone said. "Many reservoirs just aren't filling to the levels they once did. Overall, we're getting this picture of declining maximum water levels across the United States. This was the case even in places that were not seeing more low storage periods."

A combination of increased sediment and changing hydroclimatic conditions are likely driving the observed increase in variability of water storage and overall decreases in water levels, Simeone found.

Reservoir managers try to adapt to those changing conditions, which can be difficult when reservoirs were designed decades ago, under the assumption that climate and society would be relatively similar. (Most reservoirs and dams in the study were built between roughly 1930 and 1970.)

"There was an assumption that conditions would be more or less stationary," Simeone said. "Climate change interrupted that. Now, managers need to try to mitigate the hydrologic shifts we're seeing."

This study is published in the peer-reviewed, open-access journal *Geophysical Research Letters*. [View and download a pdf of the study here.](#)

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Los Vaqueros Reservoir May Expand Storage

The Independent | August 15, 2024 | David Jen



Zone 7 is exploring various options to secure its fresh water supply in the Los Vaqueros Reservoir against threats posed by drought, earthquakes and other hazards. (File Photo — Doug Jorgensen)

Earthquake and drought risks to the Tri-Valley's water supply may be mitigated in coming years by increased water storage at the Los Vaqueros Reservoir. The expansion project would also include obtaining access to a second source of San Francisco Bay Delta water through the Contra Costa Water District (CCWD).

On Aug. 7, the Zone 7 Water Agency Board of Directors, which manages the area's water supply, discussed options for participating in the Los Vaqueros Expansion project ahead of agreement negotiations later this month. The board said more data was needed before deciding what form Zone 7's participation would take.

"The bottom line is we're missing the bottom line," said Director Kathy Narum.

Los Vaqueros, located about seven miles north of Livermore's Springtown neighborhood, can currently store about 160,000 acre-feet of water for Contra Costa customers. The \$1.6 billion expansion project plans to raise the Los Vaqueros Dam and increase the reservoir's capacity by an additional 115,000 acre-feet. A joint powers authority composed of Bay Area water utility and agency partners, which may include Zone 7, would share rights to the reservoir's new capacity.

As the Tri-Valley's water wholesaler and manager, Zone 7 currently relies on the State Water Project (SWP) for about 70% of its water supplies. Rain and snowmelt from the Sierra Nevada mountains collect and flow south in the Sacramento River to the San Francisco Bay Delta, from which the SWP's Harvey O. Banks pumping plant near Mountain House pumps delta water into the Bethany Reservoir. From Bethany, another pump sends water through the South Bay Aqueduct into Zone 7's distribution system.

But Zone 7 staff have described Harvey O. Banks as a possible single point of failure, because it is vulnerable to earthquake risks. Damage to the delta's aging levee system would cause flooding and draw in saltwater from San Francisco Bay, which would render delta water unusable following an earthquake. Other scenarios, such as low river flows during drought years or regulatory restrictions around spawning fish can — and have in the past — temporarily shut down Harvey O. Banks.

"Just because there haven't been major outages, it doesn't mean there won't be," said Zone 7 General Manager Valerie Pryor. "As the system gets older — not just the Banks pumping plant, but the levees and as we have climate change — there are certainly opportunities for outages."

Zone 7 engineer Lillian Xie added that extended outages at Harvey O. Banks could lead to Tri-Valley water-supply disruptions.

"We currently do not have another way to get water across the delta," said Xie.

Because CCWD operates its own set of delta pumps independent from the SWP's, participation in the Los Vaqueros expansion offers a degree of diversification for Zone 7's infrastructure. Regulatory restrictions that apply to Harvey O. Banks do not necessarily apply to CCWD's pumps. Los Vaqueros also sits downstream of the San Francisco Bay Delta, meaning water stored there could remain accessible even if all the delta pumps failed.

The Zone 7 board is considering two options, both of which involve use of a new transfer pipeline between the Los Vaqueros and Bethany reservoirs. That would provide access to the CCWD pumps in case Harvey O. Banks goes offline.

One option to rely on the new pipeline only would come at a cost of \$300,000 per year. A more robust — and expensive — option would earmark 10,000 acre-feet of Los Vaqueros' new storage capacity for Zone 7. That option would cost Zone 7 approximately \$3.1 million per year. Any added Zone 7 capacity would not affect its existing water rights.

In past years, Zone 7 has contributed capital to the reservoir to explore how the Tri-Valley might leverage CCWD facilities. Zone 7 spent \$408,000 in 2014 on a Los Vaqueros pilot storage project and \$400,000 in 2016 as part of the reservoir expansion's environmental analysis.

“If we invest 10,000 (acre-feet) of storage capacity, that’s kind of like just the space to fill,” said Xie. “It’s not 10,000 acre-feet of water. It’s sort of like an empty bucket, and then we can wheel water in and fill it and that would count against our capacity.”

Negotiations later this month will set terms for how local agency partners can use CCWD facilities and how selling water between partners might work, said Pryor. She expected CCWD to retain priority for use of Los Vaqueros water.

Other agency boards that Zone 7 would partner with are expected to consider the agreement through May 2025.

Board President Dennis Gambs said, “Los Vaqueros is in a unique storage position. It’s after the delta, but it’s before our system. ... We need at least some quantitative understanding before we make a final decision on the contract.”

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Head of powerful S.F. commission slams Mayor Breed for not reappointing him

SF Chronicle | September 10, 2024 | Aldo Toledo,



SFPUC President Tim Paulson said Breed called him Monday night to inform him she wouldn't renominate him for another four year term. Paulson is shown in a 2016 file photo.

Leah Millis/The Chronicle

The president of the powerful San Francisco Public Utilities Commission said publicly Tuesday that Mayor London Breed had decided not to reappoint him, calling her decision “a slap in the face to the labor movement.”

At the start of its meeting Tuesday, SFPUC President Tim Paulson said Breed called him Monday night to inform him she wouldn't renominate him for another four year term. He did not say if she gave a reason. He also said another commissioner, Newsha Ajami, wouldn't be reappointed.

Paulson helms the commission that oversees the department responsible for the city's water supply, waste management, power generation and infrastructure maintenance, and doles out billions of dollars in city contracts.

Paulson has deep ties to the city's labor unions. Breed, who is locked in a tight re-election fight, has had a tumultuous relationship with local labor unions recently as she seeks their endorsements for the November election. Paulson was secretary-treasurer for the San

San Francisco Building and Construction Trades Council, which recently endorsed two of Breed's rivals, a rebuke after supporting her in 2018.

The firefighters union recently backed former Supervisor Mark Farrell for mayor, another snub to Breed, who the labor group backed six years ago.

Paulson is also the former executive director of the San Francisco Labor Council, which covers more than 150 unions representing more than 100,000 union members. While the Labor Council is not expected to weigh in on the mayor's race, it is supporting two of Breed's rivals on the Board of Supervisors: Connie Chan and Dean Preston.

Jeff Cretan, Breed's spokesperson, said the mayor's decision wasn't motivated by politics.

"There is a vacancy due to a resignation and two seats up for reappointment," said Cretan. "This is part of her duty as Mayor to make appointments when seats open up."

Breed has won the support of the police officers union, an alliance of construction labor groups led by the Northern California Carpenters Union and other key groups.

"I continue to want to serve as commissioner and it has been an honor," Paulson said. "It's breathtaking that I got that call yesterday."

Asked after the meeting whether he felt it was a political move, Paulson said Breed "sees enemies everywhere."

"I haven't even endorsed for mayor," Paulson said in a text message. "Until today I was just a retired union organizer dedicated to public service."

Breed's office told the Chronicle the mayor named three new nominees for the commission to replace Paulson, Ajami and a third seat left vacant by Sophie Maxwell. The nominees are Josh Arce, head of special projects for the Northern California Laborers; Avni Jamdar, a director at Emerald Cities, an environmental nonprofit; and Steve Leveroni, a longtime insurance industry expert.

Ajami could not immediately be reached for comment.

Breed's move comes as she faces not only Farrell but also Board of Supervisors President Aaron Peskin, Supervisor Ahsha Safai and nonprofit executive and Levi Strauss heir Daniel Lurie as formidable challengers.

Peskin told the Chronicle Breed's move was "vindictive" though he said he wasn't sure what was behind it, but he added that it displayed "insecurity." He said he's fielded numerous "disturbing" phone calls since yesterday about the mayor's sudden decision.

“The Mayor is spinning out of control,” Peskin said. “The PUC is a multi-billion dollar department, and she is replacing respected commissioners — in the wake of her former general manager going to prison — with a bunch of hand-picked cronies.”

Peskin was referring to former General Manager Harlan Kelly who is serving four years after federal investigations into corruption, fraud and his involvement in bribery and kickback schemes related to SFPUC contracts. Breed replaced Kelly with former City Attorney Dennis Herrera.

Safai also criticized Breed, saying she was practicing “petty politics.”

“If someone doesn’t support her blindly, she’s not going to support them,” he said. “Both of them have significant experience, both have accomplished a tremendous amount and given to this city and they’ve been good commissioners, so you’d have to ask the mayor for her justifications.”

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California judge issues first-of-its-kind ruling to rein in groundwater pumping

San Francisco Chronicle | August 23, 2024 | Kurtis Alexander



Vineyards are seen next to the Russian River in Healdsburg in 2023. In the Russian River basin, agricultural wells sometimes pull water not just from the ground but ultimately from adjacent rivers and creeks, where water seeps into the soil. Brontë Wittpenn/The Chronicle

As Californians pump increasing amounts of water from the ground, sometimes siphoning flows from the rivers above and hurting fish, wildlife and other water users, an old state law is proving to be a new and successful means of reining in excessive pumping.

A Superior Court judge ruled this week that Sonoma County must do more to ensure responsible groundwater pumping under the state's Public Trust Doctrine. The historical doctrine holds that rivers, creeks and other waterways must be protected for the public.

Groundwater has only recently been considered part of the Public Trust Doctrine, as the hydrological connection between waterways and below-ground water supplies has become clear. The new court decision is likely the first to enforce this.

The ruling will not only require Sonoma County to revisit and perhaps rewrite its ordinance for permitting groundwater wells, but it could set the stage for other counties to similarly step up regulation for groundwater pumping. With aquifers being overdrawn across the state as above-ground supplies get squeezed, environmentalists are optimistic that this will be the case.

"This ruling is particularly welcome given steadily growing groundwater pumping, declining natural resources and a changing climate that is making droughts deeper and longer," said Barry Nelson,

founder of the consulting company Western Water Strategies. “We hope this decision will be followed by counties statewide so that they start considering impacts on surface flows more seriously when permitting groundwater pumping.”

The case was brought to Sonoma County Superior Court last year by the environmental groups California Coastkeeper Alliance and Russian Riverkeeper.

The organizations claimed that Sonoma County’s well ordinance did not adequately consider the impacts of new wells on rivers and creeks, which were running low and threatening salmon and steelhead runs, according to the groups. Their lawsuit said the county had a public trust obligation to protect the waterways.

The challenge followed litigation two years earlier, which prompted the county to establish its well ordinance. The environmental groups, however, said the ordinance fell short.

The main concern has been the Russian River basin. Wells on vineyards that drive the county’s booming wine industry pull water not just from the ground but sometimes from adjacent rivers and creeks, where water seeps into the soil.

“Pumpers could just pump as much as they wanted,” said Sean Bothwell, executive director of California Coastkeeper Alliance. “There was nothing to make sure they were pumping sustainably. We felt like this (lawsuit) was a way to bring things into balance.”

A statewide groundwater law, called the Sustainable Groundwater Management Act, was passed in 2014 to help shore up diminishing aquifers across California, but the law doesn’t fully take effect until the early 2040s. Bothwell said this was too long to wait.

“We hope counties will heed this decision, and proactively do the right — and legally required — step of evaluating groundwater pumping to ensure pumpers are not taking excessive water to the detriment of our rivers and the aquatic life,” he said.

While Sonoma County, and potentially other counties, will have to better evaluate and mitigate the impacts of new wells per the new ruling, the Public Trust Doctrine does not detail when a county must approve or deny a well proposal. This remains subject to local discretion.

The Sonoma County Administrator’s Office said Friday it was still reviewing the court decision and wasn’t prepared to comment.

But County Supervisor David Rabbitt, who was involved in the adoption of the well ordinance, criticized the ruling, saying the county’s current rules were sufficient to protect waterways. Asking more of the county, he said, was burdensome and would likely prevent needed wells from being put in.

“Are we going to require conditional use permits and environmental impact reports for every well that is drilled?” he said.

The county is likely to put a moratorium on new wells until it addresses the ruling, Rabbitt said.

California's Office of Administrative Law approves direct potable reuse regulations

Smart Water Magazine | August 12, 2024



The Office of Administrative Law has approved the direct potable reuse regulations that were adopted by the State Water Resources Control Board on Dec. 19, 2023, a major milestone in diversifying California's water supply while maintaining its safety, quality and reliability.

As approved, the regulations address a number of issues identified in a September comment letter from a coalition led by WateReuse California that includes ACWA. The regulations establish criteria for the introduction of recycled water either directly into a public water system or into a raw water supply immediately upstream of a water treatment plant.

In December, State Water Board members voted unanimously to adopt the regulations, also directing staff to provide an update on implementation of the regulations in approximately a year.

For ACWA member agencies, the regulations will facilitate the ability to expand their water recycling capabilities, a vital part of strengthening water resilience against climate change impacts. This will provide a consistent framework for water suppliers to plan ahead, know expectations, and build projects to be more drought resilient, creating certainty for water agencies to make essential local investments.

The State Water Board's Dec. 19 decision caps a 13-year legislative and regulatory process that included extensive advocacy from California's water and wastewater community. WateReuse

California's leadership throughout this process was critical in getting these landmark regulations adopted and approved.

ACWA recognizes water reuse as an important source of water supply for long-term water resilience and supports Gov. Gavin Newsom's Water Supply Strategy goal of recycling and reusing 800,000 acre-feet of water per year by 2030.

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Where does California's water come from?

Maven's Notebook | September 3, 2024



EXPLAINER: Where does California's water come from?

Dos Amigos Pumping Plant is located on the California Aqueduct San Luis Canal in Merced County, California. The State Water Project facility lifts water over 100 feet from the aqueduct as it flows south from O'Neill Forebay and just east of Interstate 5. Photo taken May 12, 2023. California Department of Water Resources



A windy stretch of the East Branch California Aqueduct in Los Angeles County. Photo: DWR

Most of us remember learning about the water cycle, so we can understand easily enough that rain and snow are the ultimate sources of most of our water supply. But what most Californians might not realize is how vast the state's water infrastructure is that irrigates the farmland and delivers the water to our faucets and how profoundly that infrastructure has remade the state as we know it today.

California has built a water delivery infrastructure that is likely the most extensive anywhere on earth, capable of moving a drop of water that originates near the northern border all the way down south to the Mexican border. Through the development of this infrastructure, man has rearranged California's natural assets to meet societal needs, making the state unrecognizable from its pre-settlement history in the process.

Today, large urban centers exist where there are scant local resources to support their residents. There is cropland where once was a swampy marsh, manmade lakes where there once was desert, and even desert where there once was cropland. Some rivers have been completely dried up, some flow through

mountains into other rivers' beds, and some even flow backward at times. California, arguably, is the most hydrologically-altered landmass on the planet.

So while California's water comes from precipitation and groundwater, where one's water comes from depends on where they are in the state. In some places, water is drawn from local creeks and waterways; in others, the water comes from hundreds of miles away. Many communities depend on groundwater. Sometimes it's a mix of all three.

So why did we do all this?



An aerial view looking south shows the California Aqueduct (right) and the Delta-Mendota Canal (Left) south of San Luis Reservoir near Los Banos in Merced County, California. Photo Taken April 14, 2023. Ken James / DWR

California's highly variable climate

California's climate has always been and will continue to be highly variable. In an average year, the total amount of precipitation is about 200 million acre-feet; however, the actual precipitation can vary anywhere from 100 million acre-feet to 300 million acre-feet, depending on whether it is a wet year, a dry year, or something in between.

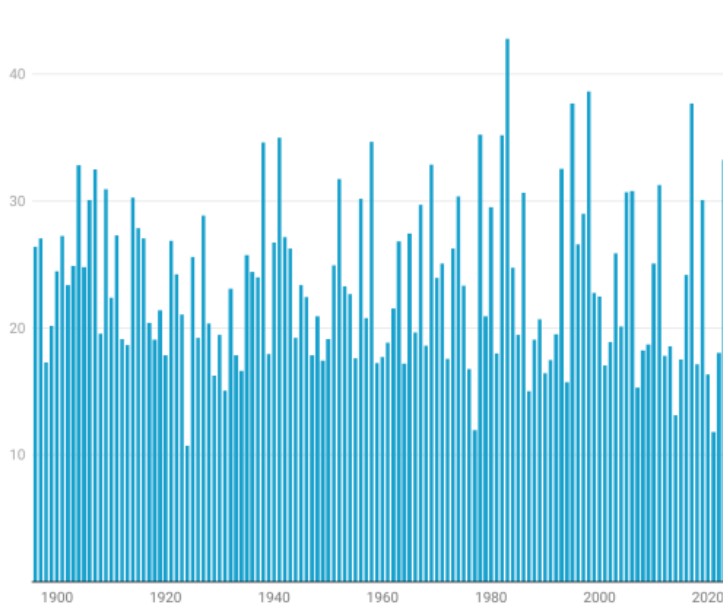


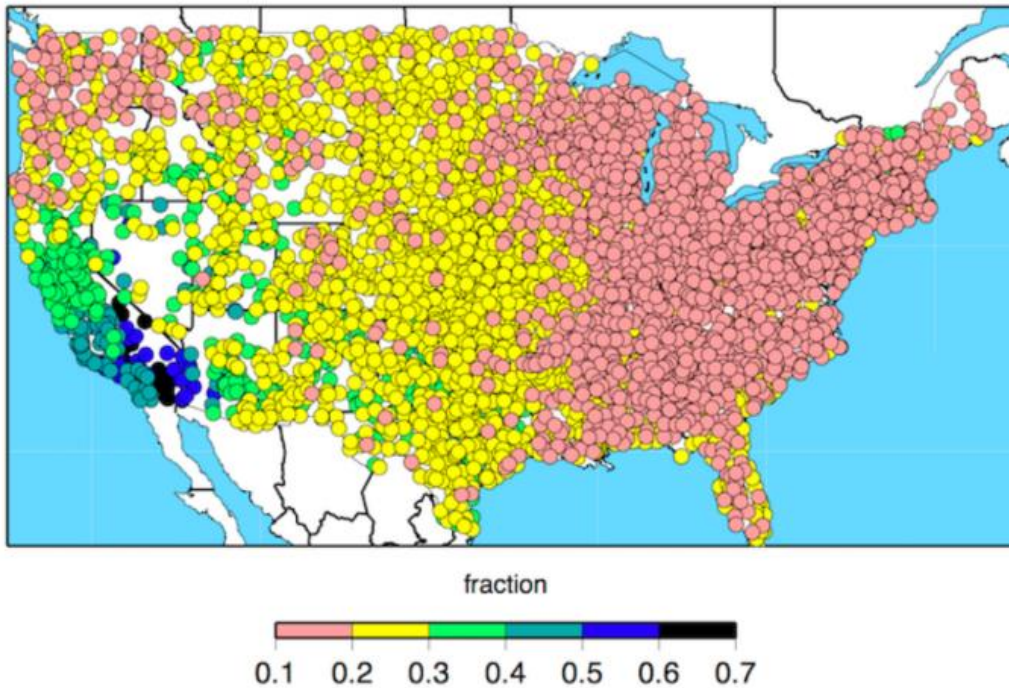
Chart: OEHHA Indicators of Climate Change in California (2024 update) • Source: WRCC • Created with Datawrapper

About half of the precipitation will evaporate, be used by vegetation, or sink into the subsurface, salt sinks, or flow to the ocean; the remaining half, known as 'dedicated water' is what is available for use in cities, on farms, for the environment, or to be put in storage.

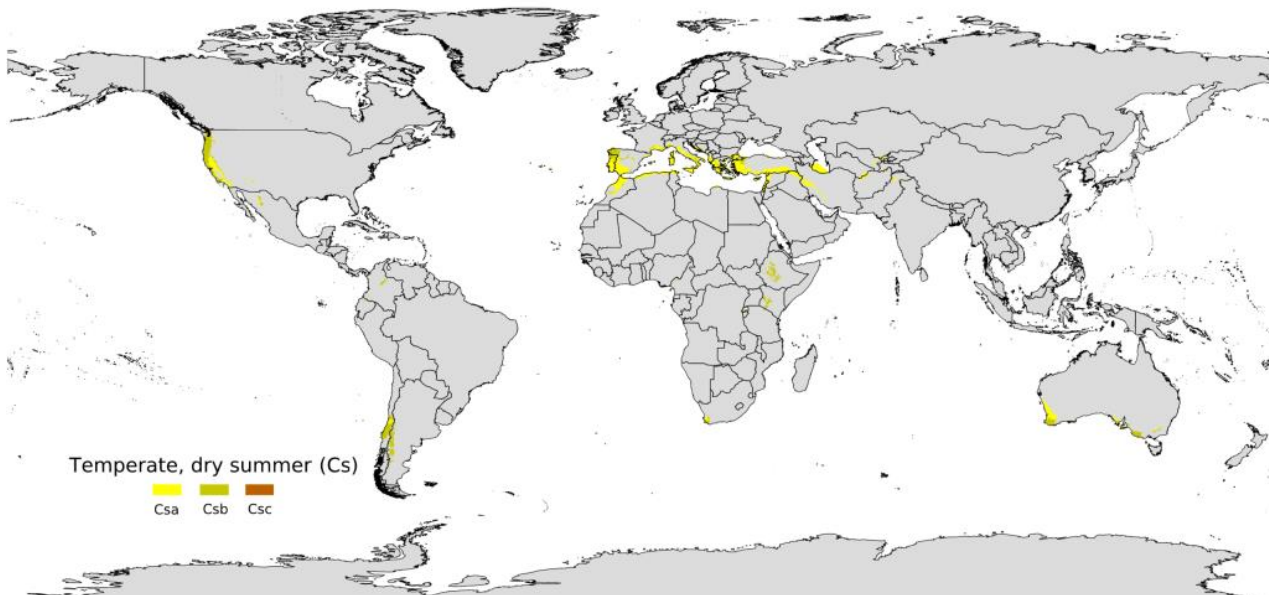
In fact, California's precipitation is by far the most variable in the country. The chart below illustrates this with a color-coded system that measures how much rainfall and snowfall vary each year. Areas shaded in pink experience consistent weather patterns, receiving roughly the same amount of precipitation annually. However, as the colors transition from yellow to green to blue, the variability increases.

California, shown in greens and blues, has the highest level of variability; simply put, California has more floods and more droughts than any other state in the nation.

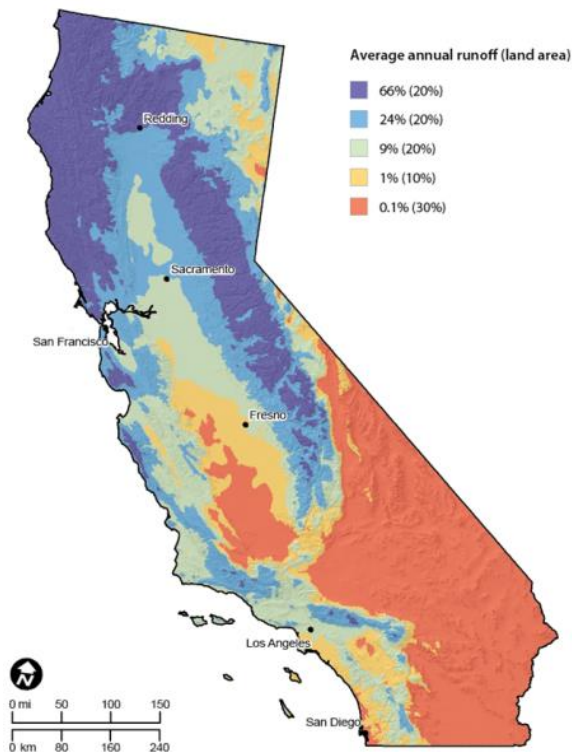
COEFFICIENTS OF VARIATION OF TOTAL PRECIPITATION, WY 1951-2008



California is also unique in that it has a Mediterranean climate, one of only a handful around the globe. Mediterranean climates are characterized by mild wet winters and warm to hot, dry summers. This is unlike much of the rest of the nation that receive some precipitation year round.



Mediterranean climates are distinguished by warm, wet winters under prevailing westerly winds and calm, hot, dry summers, as is characteristic of the Mediterranean region and parts of California, Chile, South Africa, and southwestern Australia.



Additionally, most precipitation falls in the mountains in the middle to northern half of the state, far from major urban and agricultural centers.

The map on the left shows that about two-thirds of all the runoff in the state comes off about 20% of the surface area, and about 90% of the runoff in the state comes off about 40% of the state's surface area.

The areas shown in red represent 30% of the surface area of California and produce point .1% of the runoff.

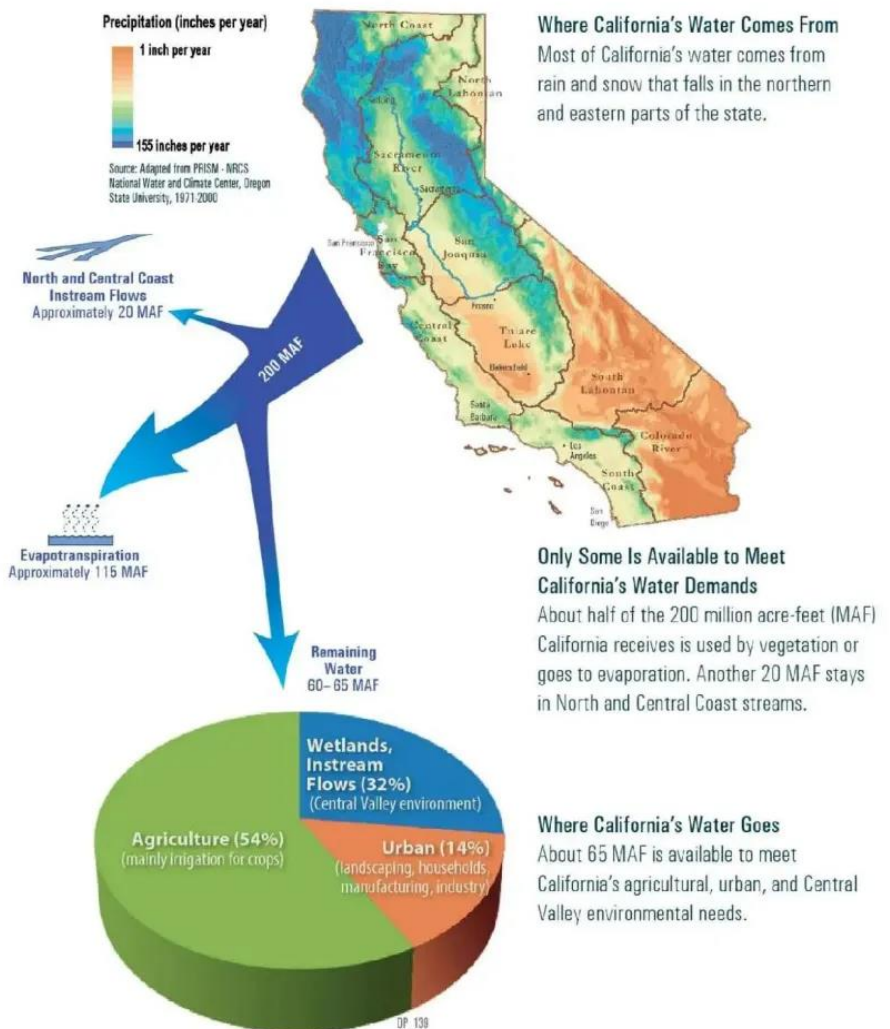
California's water use

The amount of water available to meet agricultural, urban, and ecosystem water demands starts with the state's annual precipitation. On average, the state receives 200 MAF. Of that, more than half will evaporate, be used by vegetation, or flow to subsurface areas, saline sinks, or the ocean. The remainder, called dedicated water, totals approximately 80 to 85 MAF in an average water year.

Fig. 3-1 from the Delta Stewardship Council's Delta Plan.

However, not all of the dedicated water is available for human uses. Legislation enacted in the late 1970s precludes diversions from parts of the Trinity, Scott, Salmon, Eel, and Klamath rivers. Water from these rivers is now mandated mainly to the environment by law.

What is left is about 60 to 65 MAF in an average year, which is used to supply cities, industry, agricultural irrigation, and environmental uses, and stored in reservoirs and aquifers. In an average year, irrigated agriculture uses approximately 34 MAF or 54%; cities use about 9 MAF or 14%; and 20 MAF or 32% is mandated to meet instream flow requirements and wildlife refuge commitments.



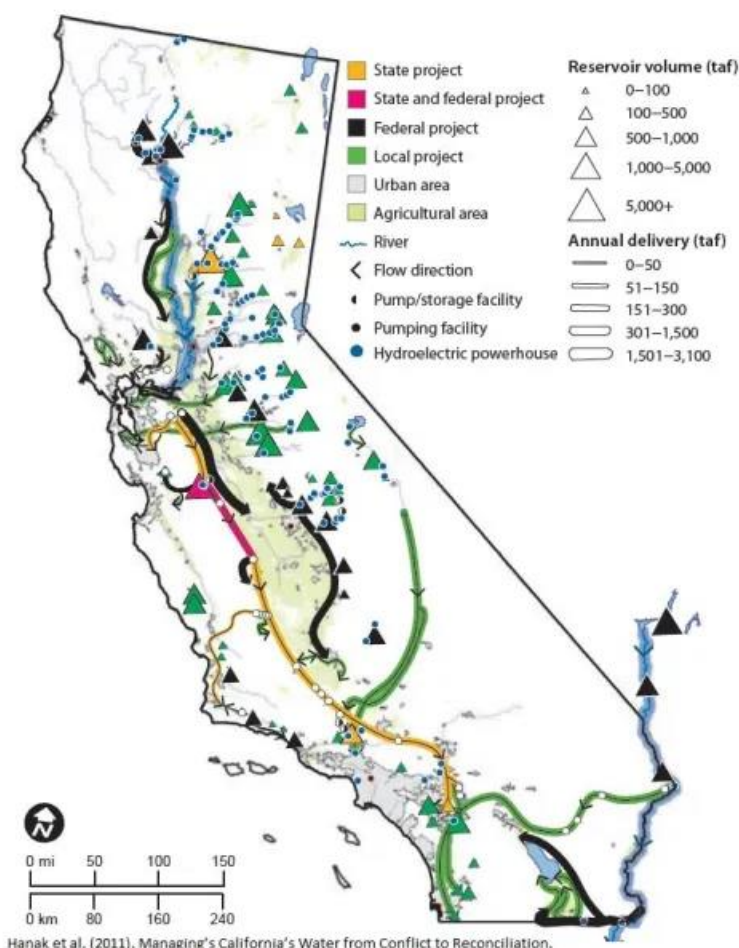
Note: The data and graphic for this section were taken from the Chapter 3 of the Delta Stewardship Council's Delta Plan.



California's vast water infrastructure

To manage the state's water resources, California has built a vast network of dams and reservoirs along with thousands of miles of canals and aqueducts to move water from where it is to where it is needed. A patchwork of federal, state, and hundreds of local agencies owns and operates the numerous surface water systems around the state, which range from large to small. These water systems are operated to provide water supplies for cities and farms, provide flood protection for downstream areas, protect fish and wildlife, and generate hydropower.

Yet, the management of California's water system is no simple task. It's a delicate balancing act, juggling numerous competing demands. For instance, the most effective flood protection strategy involves keeping reservoirs empty to capture runoff from winter and spring storms. However, water supply managers have the opposite goal during this period-to fill these reservoirs to ensure a steady supply for the summer months. This is just one example of the complex interplay of needs, including those of fish and wildlife, hydropower, and recreation, which often conflict with water supply and flood control efforts. The real challenge for water managers is to find balance in this intricate web of conflicting objectives.



Hanak et al. (2011). Managing California's Water from Conflict to Reconciliation.

Here is a closer look at the California's largest water systems:

- [Central Valley Project](#)
- [State Water Project](#)
- [Los Angeles Aqueduct](#)
- [Hetch Hetchy Water and Power System](#)
- [Mokelumne Aqueduct](#)
- [Colorado River Systems](#)



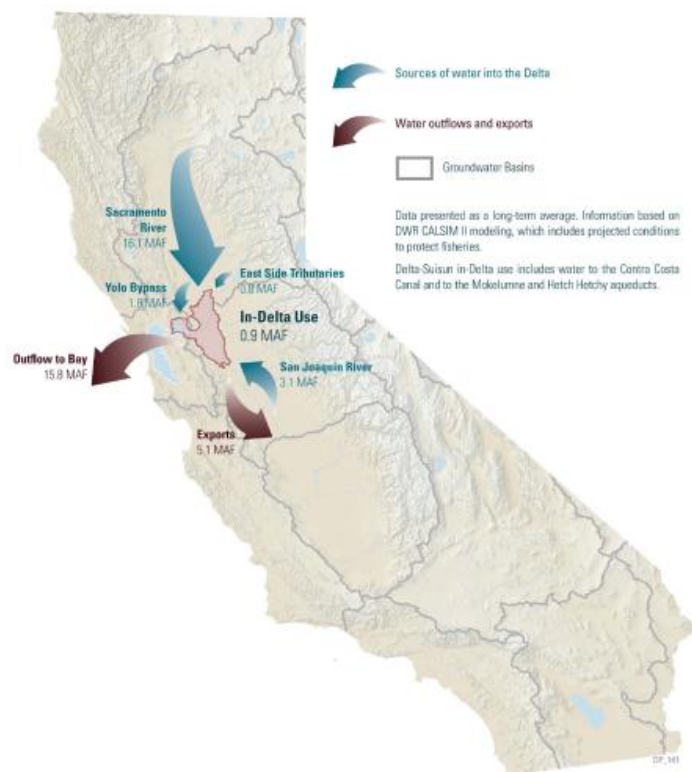
The Delta: Critical water hub for the state

Fig. 3-4a from the Delta Stewardship Council's Delta Plan.

And in the center of it all is the California Bay-Delta, a critical water hub for the state, which presents a range of environmental and management challenges.

The Sacramento-San Joaquin Delta watershed covers more than 75,000 square miles, extending nearly 500 miles from the Cascade Range in the north to the Tehachapi Mountains in the south, bounded by the Sierra Nevada Mountains to the east and the Coast Range to the west. Nearly half of the water flowing in the state's rivers and streams starts as rain or snow that falls within the watershed and flows downstream through the Delta. The Delta watershed is home to the largest estuary on the west coasts of the Americas, as well as the providing the primary source of drinking water for 25 million Californians and irrigation for millions of acres of farmland.

Where Delta Water Comes From and Goes



However, the Delta faces severe water supply conflicts, as demands from farmers, cities, and environmental mandates frequently clash. The ecological health of the Bay-Delta is also in jeopardy due to pollution, invasive species, and habitat destruction, leading to significant degradation of water quality. These issues severely impact local wildlife, including endangered species like the Delta smelt and Chinook salmon, whose populations have dwindled due to altered water flows and degraded habitats.

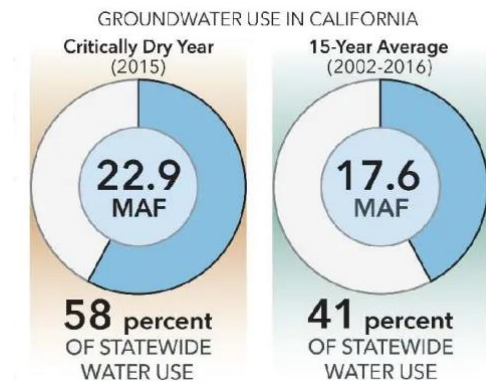
Balancing the needs for water supply, flood control, and environmental preservation in the Bay-Delta remains a formidable task for water managers, who must navigate a complex web of competing interests and pressing ecological concerns.

To learn more about the Delta, [click here](#).

Groundwater is also a critical part of California's water supplies

Groundwater is also an important part of the state's water supplies, comprising about 40% of water used in an average year, and 60% or more in a drought year. But groundwater is very much location dependent: some communities have no groundwater and rely solely on surface water while other communities may have only groundwater; other communities rely on a mix of imported water and groundwater, and even some rely solely on imported water.

To learn more about groundwater, [click here](#).



Water development has fueled California's economic growth but it's a mixed bag ...

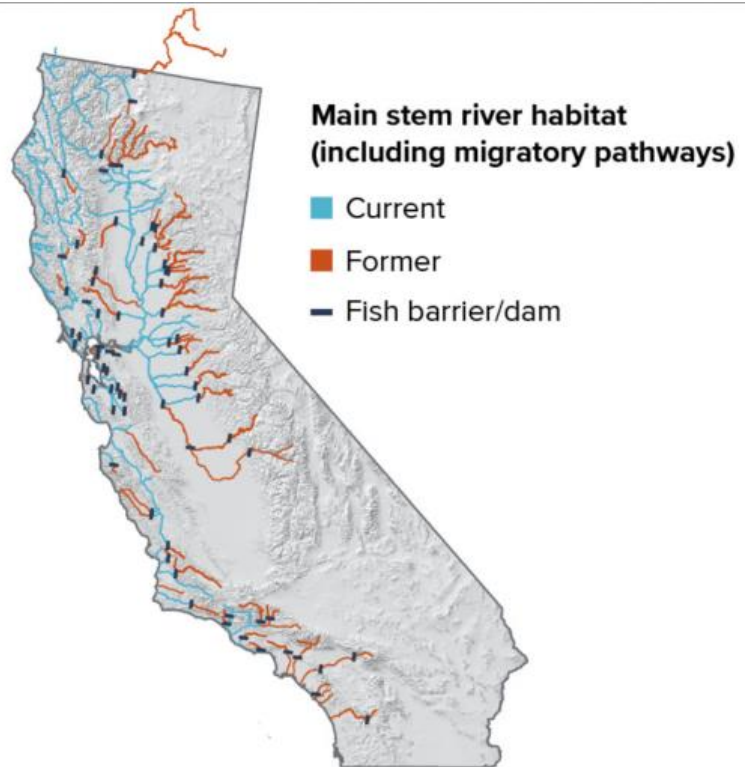
The construction of California's extensive water infrastructure in the twentieth century has transformed the state into one of the world's leading agricultural producers, the most populated state in the country, and the fifth-largest economy in the world. The state's largest urban centers depend on multiple water systems to support their populations, and California's vast agricultural industry is also dependent on water projects, both large and small.

Graphic: PPIC

However, this intensive development has not been without its consequences: dams have blocked access to habitat for native species and altered the natural flow of water, wetlands have been drained, and invasive species have moved in, altering habitat. Populations of native fish and wildlife species have plummeted; some have gone extinct, and many more are threatened. Most of the state's waterways are impaired by pollutants from agricultural, urban, and legacy mining sources.

Most of California's water infrastructure projects were designed and constructed at a time when delivering cheap water to feed economic development was a goal, and ecosystem and species concerns were rarely considered.

Changing societal values have meant increased restrictions and regulations to protect endangered species have reduced the amount that can be withdrawn from our waterways and fueled political wars that have stretched on for decades as demands for water from agriculture, cities, and industry must be constantly balanced against the need for maintaining water quality and protecting fisheries and wildlife.



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