

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

**March 14, 2024**

Correspondence and media coverage of interest between February 26, 2024 and March 13, 2024

**Correspondence**

From: Dave Warner  
To: BAWSCA Board of Directors and Ms. Sandkulla, CEO/General Manager  
Date: March 12, 2024  
Subject: SFPUC Projected Wholesale Water Rates and Forecasting Implications

From: Peter Drekmeier, Tuolumne River Trust Policy Director  
To: Tom Chambers, BAWSCA Chair and Members of the Board  
Date: March 7, 2024  
Subject: SFPUC's FY 2024/25 and FY 2025/26 budget and 10-Year Financial Plan

From: Steve Ritchie, SFPUC Asst. General Manager, Water Enterprise  
To: SFPUC Wholesale Customers  
Date: March 1, 2024  
Subject: Water Supply Availability Update

From: Info@losvaquerosjpa.com  
To: Stakeholders  
Date: February 29, 2024  
Subject: Los Vaqueros Reservoir Joint Powers Authority Update

From: Steve Ritchie, SFPUC Asst. General Manager, Water Enterprise  
To: Nicole Sandkulla, CEO/General Manager  
Date: February 12, 2024  
Subject: Response to BAWSCA's comments on the SFPUC's proposed FY 2025-2034 Water Enterprise and Hetch Hetchy Enterprise 10-Year Capital Plans

**Press Release**

Date: March 12, 2024  
From: State Water Resources Control Board  
Subject: Water Board releases revised proposed conservation regulation draft to simplify compliance, increase flexibility

**Water Supply Conditions:**

Date: March 10, 2024  
Source: San Francisco Chronicle  
Article: California's historic storms continue. Here's how much scientists say it's being Driven by climate change

Date: March 9, 2024  
Source: USA Today  
Article: After another wet winter, is the West still facing a water crisis?

**Water Supply Conditions, cont'd.:**

Date: March 7, 2024  
Source: CBS News  
Article: Climate expert links recent California snowfall to warming planet

Date: March 7, 2024  
Source: The Hill  
Article: Winter storms help 'snow drought' across parts o the US West

Date: March 4, 2024  
Source: Reuters  
Article: California snowpack now above average, but will it last?

Date: March 4, 2024  
Source: Newsweek  
Article: California's Biggest Reservoir Loses 265 Billion Gallons of Water

Date: March 4, 2024  
Source: Forbes  
Article: California could Stave Off Drought Through 2025 – Reversing Years Of 'Megadrought,' Forecasters Say

Date: March 1, 2024  
Source: Scripps News  
Article: California water data shows change for typically drier months ahead

Date: February 29, 2024  
Source: California Department of Water Resources  
Article: March Snow Survey Shows Improvement for Sierra Snowpack

Date: February 28, 2024  
Source: San Francisco Chronicle  
Article: How back-to-back California storms are erasing fears about state's water supply

Date: February 26, 2024  
Source: Yale Climate Connections  
Article: What's behind this winter's U.S. snow drought?

**Water Policy:**

Date: March 13, 2024  
Source: LA Times  
Article: California eases new water saving regulations for local agencies after pushback

Date: March 12, 2024  
Source: San Francisco Chronicle  
Article: California rolls out first-of-a-kind permanent water restrictions for cities and towns

Date: March 12, 2024  
Source: Mercury News  
Article: California relaxes controversial new water conservation rules

**Water Policy, cont'd.:**

Date: March 12, 2024  
Source: CalMatters  
Article: California weakens plan for mandatory cutbacks in urban water use, yielding to criticism

Date: February 29, 2024  
Source: Daily KOS  
Article: Protests Against Delta Tunnel Change in Water Diversion Must Be Filed by April 29

**Water Management:**

Date: February 27, 2024  
Source: Cal Matters Commentary  
Article: Dan Walters: California needs reliable water supply, but climate change brings More uncertainty

**Infrastructure:**

Date: March 7, 2024  
Source: CBS News  
Article: Helicopters map California groundwater basins with electromagnetic technology

Date: March 1, 2024  
Source: CBS San Francisco  
Article: Long-planned Sites Valley reservoir moves toward construction

Date: February 29, 2024  
Source: Pacific Institute  
Article: New Pacific Institute Report Finds Substantial Opportunity for Urban Stormwater Capture to Enhance Water Resilience in Communities Across the United States

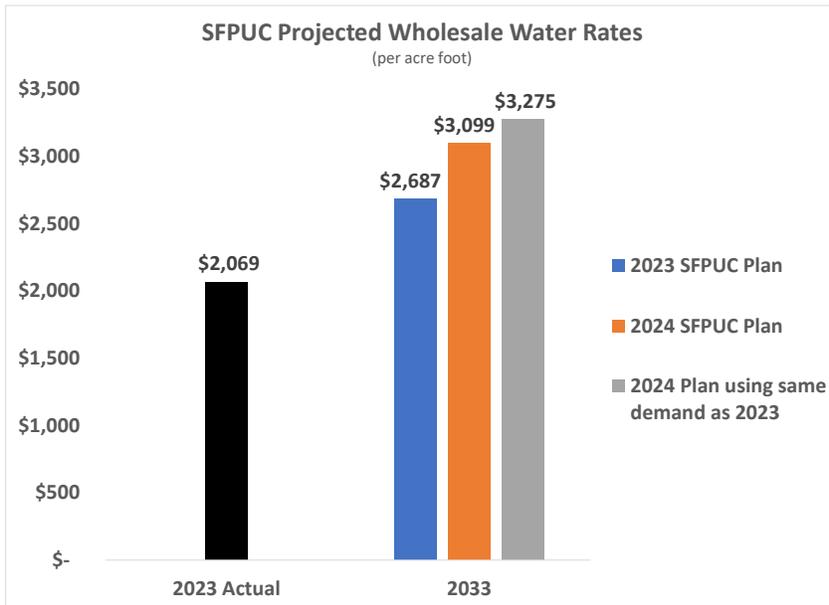
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March 12, 2024

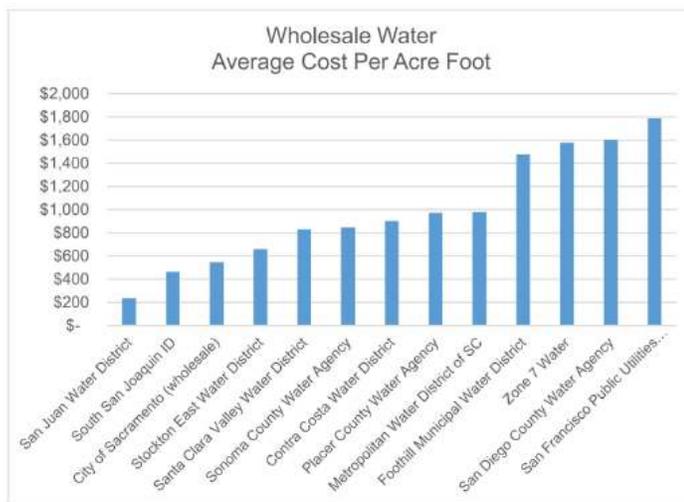
**Re: SFPUC Projected Wholesale Water Rates and Forecasting Implications**

Dear BAWSCA Board Members and CEO Sandkulla,

As you are likely aware SFPUC Commissioners recently approved their latest budget and 10 year capital plan. It has a big increase in spending in large part due to in city sewer system improvements, but it also has significant increases for wholesale customers without including any significant investments in alternative water supplies.



The chart to the left shows projected wholesale rates for 2033. Last year the SFPUC projected the rates to be ~2,700 per acre foot in 2033. This year the projection increased to \$3,100 per acre foot but in making the projection they increased the underlying level of assumed wholesale demand. Had they used the same demand projection as they used last year, the 2033 price per acre foot would have been ~\$3,300. These are big increases over last year.



In 2018 the San Juan Water District did the comparison to the left of wholesale water rates. At the time with a rate of ~\$1,800, we had the highest wholesale rates of any major California water agency. It is likely still the case. From a “fair price” perspective it could be worthwhile repeating San Juan’s analysis.



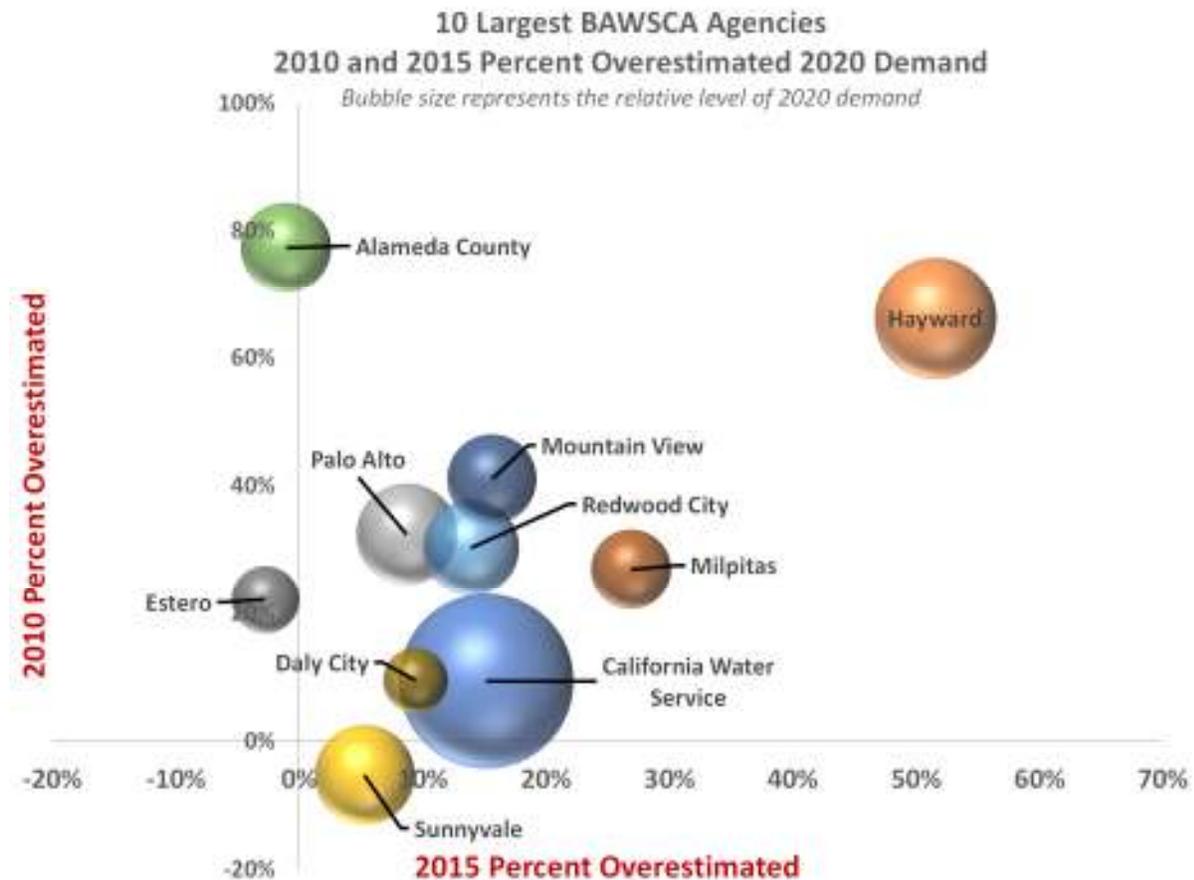
Wholesale Water Rate Comparison  
5/8/2018

### No Significant AWS included in the 10 year plan

The 10 year capital plan has no significant investment in alternative water supplies (AWS). This means rates would need to go higher again if any AWS is needed to meet projected demand. Worse yet, if AWS is developed for demand that doesn't materialize, then rates would need to go higher still.

### Analysis of BAWSCA agency 2010 and 2015 Regional Water System Demand Projections Against 2020

On average, in 2015 BAWSCA agencies over projected 2020 demand by 19%. On average in 2010 BAWSCA agencies over projected 2020 demand by 34%. The chart below shows forecast accuracy for the 10 largest BAWSCA customers reflecting 2020 demand. The larger the bubble, the larger the level of demand. The higher up the bubble is, the larger the 2010 overestimate was. The further to the right the bubble is, the larger the 2015 overestimate was. Using Alameda County as an example, their bubble is the furthest up on the vertical axis because in 2010 they overestimated 2020 demand by 77%. But Alameda County is one of two bubbles furthest to the left because in 2015 they underestimated 2020 demand by 1%.



The table below shows all BAWSCA agencies excluding San Jose and Santa Clara.

	Percent Ovestimated 2020 Demand		2020 Actual demand
	2010	2015	
<b>Alameda County</b>	77%	-1%	7.76
<b>Brisbane</b>	62%	24%	0.63
<b>Burlingame</b>	39%	42%	3.48
<b>California Water Service</b>	9%	15%	29.02
<b>Coastside</b>	148%	93%	0.88
<b>Daly City</b>	9%	9%	3.92
<b>East Palo Alto</b>	58%	28%	1.57
<b>Estero</b>	22%	-3%	4.34
<b>Hayward</b>	66%	52%	14.20
<b>Hillsborough</b>	59%	20%	2.57
<b>Menlo Park</b>	46%	30%	2.82
<b>Mid-Peninsula</b>	43%	20%	2.66
<b>Millbrae</b>	74%	35%	1.90
<b>Milpitas</b>	27%	27%	6.06
<b>Mountain View</b>	41%	16%	7.60
<b>North Coast County</b>	62%	33%	2.28
<b>Palo Alto</b>	32%	9%	9.75
<b>Purissima Hills</b>	2%	4%	1.71
<b>Redwood City</b>	30%	14%	8.75
<b>San Bruno</b>	52%	148%	0.96
<b>Stanford</b>	103%	33%	1.43
<b>Sunnyvale</b>	-5%	5%	9.43
<b>Westborough</b>	1%	-7%	0.87
<b>Average</b>	34%	19%	5.42

### The cost of unused AWS

The cost of AWS varies a lot today. Assuming one acre foot of AWS costs \$3,500 and that 20 mgd of AWS are built but not used, the wholesale price of water would increase another \$400-\$500 per acre foot. Using the 2033 rate of \$3,300 per acre foot as a baseline, that would mean the 2033 price per acre foot would increase to \$3,700 to \$3,800.

The point is, when rates are already high and developing AWS is being considered, forecasting accuracy becomes all the more important.

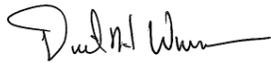
**Accurate Forecasters Pay the Price for Others' Overestimates**

In an environment where AWS is being considered, those who overestimate their demand projections are putting a burden on those who don't (or do so less), as the overestimates drive development of unneeded AWS.

**Consider BAWSCA's Demand Sensitivity Analysis**

Kudos to BAWSCA for the 2020 demand sensitivity analysis. Each agency should consider doing a similar analysis when coming up with their next 25 year demand projection.

Best regards,

A handwritten signature in black ink, appearing to read "Dave Warner". The signature is fluid and cursive, with a long horizontal stroke at the end.

Dave Warner



March 7, 2024

Chair Tom Chambers and Board Members  
BAWSCA

155 Bovet Road, #650  
San Mateo, CA 94402  
*Via Email*

OFFICES  
San Francisco

Modesto

Sonora

Mailing Address  
P.O. Box 3727  
Sonora, CA 95370

Phone  
(415) 882-7252

Website  
www.tuolumne.org

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Dear Chair Chambers and Board Members:

On February 13, the SFPUC approved their FY 2024/25 and FY 2025/26 budget and 10-Year Financial Plan. The budget will now be reviewed by the Mayor and Supervisors, with final approval expected in June.

There are a few issues I thought would be of particular interest to the BAWSCA member agencies. With so much money at stake, I believe these concerns justify a BAWSCA workshop.

**Water Rate Increases**

You’ll see from the table<sup>1</sup> below, wholesale water rates are projected to increase 7.7% next year, and by an average of 3.5% per year over the next ten years. (Last year, wholesale rates were projected to increase by 2.5% per year over ten years.) As you know, rates influence demand, and as demand decreases, rates need to increase further to cover fixed costs.

*Table 9: Adopted (\*) and Projected Water Enterprise Rate Change*

	FYE 2025	FYE 2026	FYE 2027	FYE 2028	FYE 2029	FYE 2030	FYE 2031	FYE 2032	FYE 2033	FYE 2034	Avg. Annual
<b>Retail Rate Change</b>	5.0%*	5.0%*	5.0%	5.0%	4.0%	4.0%	4.0%	3.0%	3.0%	3.0%	<b>4.1%</b>
<b>Wholesale Rate Change</b>	7.7%	4.5%	2.6%	8.2%	3.1%	2.1%	0.3%	0.0%	3.5%	3.4%	<b>3.5%</b>

BAWSCA’s 2022 water demand projections<sup>2</sup> assumed water rates would increase between 0 and 2.3% per year, so it will be important to rework the numbers for the next iteration.

<sup>1</sup> SFPUC 10-Year Financial Plan for FY 2024/25 to FY 2033/34, p. 39, February 2024 – <https://sfpub.sharefile.com/share/view/se20b288c6c5241278bd916075634a8fa>

<sup>2</sup> BAWSCA Regional Water Demand and Conservation Projections Update, see Table 6-6 on p. 71, December 5, 2022 – [https://bawasca.org/uploads/userfiles/files/BAWSCA%202022%20Demand%20Study%20Update%20Final%20Report\(1\).pdf](https://bawasca.org/uploads/userfiles/files/BAWSCA%202022%20Demand%20Study%20Update%20Final%20Report(1).pdf)

*The following information comes from the SFPUC's draft Alternative Water Supply Plan.<sup>3</sup> The capital projects studied in this plan are not included in the current budget, so they would be additional expenses, potentially doubling the SFPUC budget.*

## **San Jose and Santa Clara**

The proposed South Bay Water Purification Project should be of concern to all but two of the BAWSCA member agencies. I was under the impression this project was conceived to meet the current demand of 9 mgd from San Jose and Santa Clara to help make a decision on whether to make them permanent customers a little easier. It turns out this is not the case. The Plan states:

The cities of San Jose and Santa Clara are currently interruptible customers of the SFPUC and have requested permanent status, as discussed in Chapter 2 (Background). The two cities' combined projected demand is **15.5 mgd** for the planning horizon. They have requested a guaranteed supply from the SFPUC of 9 mgd (total). In order for the SFPUC to consider granting San Jose and Santa Clara permanent status and to minimize impacts to the existing permanent Wholesale Customers, the two cities must secure a reliable supply to meet their additional demands beyond the 9 mgd that they have requested as a guarantee. This project would produce 6.5 mgd of purified water to serve the needs of San Jose and Santa Clara beyond the cities' purchases from the SFPUC, while augmenting RWS supplies by 3.5 mgd in dry years. Implementation of this project would support the SFPUC's decision to make San Jose and Santa Clara permanent customers.<sup>4</sup>

Making San Jose and Santa Clara permanent customers would increase BAWSCA's Water Supply Assurance from 184 mgd to 193 mgd. This would mean the SFPUC would need to develop an additional 9 mgd of AWS to meet its contractual obligations.

What the AWS Plan tells us is that the South Bay Purified Water Project would produce 6.5 mgd to meet the additional requests from San Jose and San Jose in all years. In dry years, the project would produce an additional 3.5 mgd for use by the SFPUC. Assuming the SFPUC were to make San Jose and Santa Clara permanent customers, it would use its 3.5 mgd from the Purified Water Project to help meet the cities' existing demands (9 mgd), and would still have to come up with another 5.5 mgd to meet the new 193 mgd BAWSCA Water Supply Assurance.

Purified water is very expensive. Valley Water is pursuing a similar project at the Regional Water Quality Control Plant in Palo Alto. They project the water will cost \$7,842 per acre foot.<sup>5</sup> The current price of SFPUC water is approximately \$2,000 per acre foot.

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<sup>3</sup> SFPUC draft Alternative Water Supply Plan, June 2023 – <https://sfpuc.org/about-us/policies-plans/alternative-water-supply-plan>

<sup>4</sup> Ibid, Appendix A.

<sup>5</sup> Valley Water Water Supply Master Plan presentation, page 21 of 29 – Preliminary Unit Cost of Major Supply Projects, September 19, 2023.

BAWSCA and its member agencies should understand what their financial responsibility will be for the South Bay Purified Water Project, and how the SFPUC plans to produce the additional 5.5 mgd needed to make San Jose and Santa Clara permanent customers, and who will pay for it.

### **How Much Would the Alternative Water Supply Plan Cost BAWSCA?**

The draft AWS Plan projects the SFPUC will need to develop between 92 mgd and 122 mgd of alternative water supplies. According to the report, developing 22 mgd to 48 mgd of AWS would cost \$4 billion to \$10 billion.<sup>6</sup> Based on these figures, one can project the full AWS Plan would cost between \$19 billion and \$25 billion.

The AWS Plan proposes that the SFPUC budget \$209 million (approximately 1% of the full cost of the Plan) to get things started. It states:

In aggregate, these recommendations would result in a new funding request of up to \$209 million within the 10-year period...Based on this scenario, the AWS recommendations could result in an increase in retail rates by 0.9% and wholesale rates by 7.6% above those projected in the baseline 10- year rate projection without the AWS Projects.<sup>7</sup>

It would be helpful for BAWSCA to know why wholesale rates (BAWSCA) would increase so much more than retail rates (San Francisco). And if wholesale rates would increase 7.6% for just 1% of what the AWS Plan projects might be needed, what would rates be if the full plan were implemented?

Again, we believe these issues deserve thorough review, and we would be happy to participate in a workshop.

Sincerely,



Peter Drekmeier  
Policy Director

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<sup>6</sup> Draft Alternative Water Supply Plan, pp. XIII and 124, June 30, 2023 – [https://sfpuc.org/sites/default/files/about-us/policies-reports/AltWaterSupply\\_DraftPlan\\_6.23.23\\_Web.pdf](https://sfpuc.org/sites/default/files/about-us/policies-reports/AltWaterSupply_DraftPlan_6.23.23_Web.pdf)

<sup>7</sup> Ibid, p. 75.

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TO: SFPUC Wholesale Customers  
 FROM: Steven R. Ritchie, Assistant General Manager, Water  
 DATE: March 1, 2024  
 RE: Water Supply Availability Update

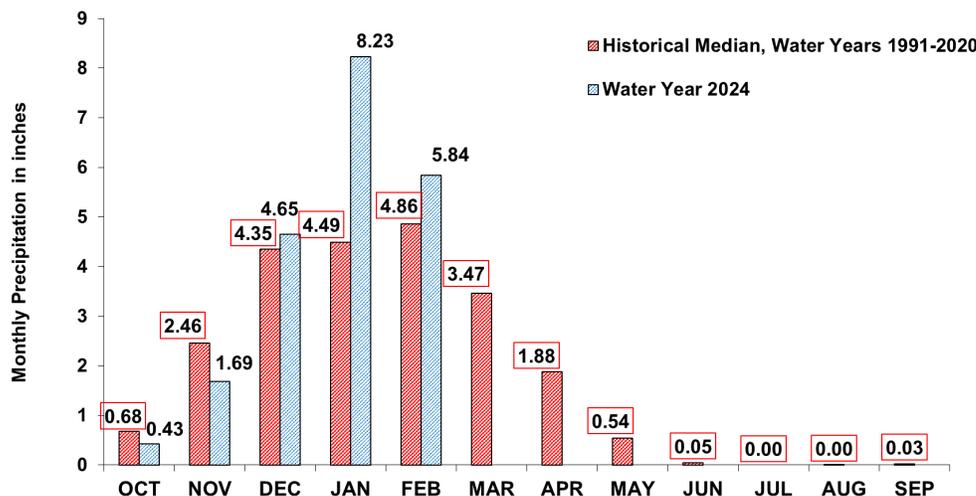
*Steven R. Ritchie*

This memo provides the water supply availability update for Water Year 2024 and the current hydrologic conditions.

While early on the Water Year appeared somewhat dry, precipitation conditions have improved throughout the month of February. As the charts below show, the Hetch Hetchy watershed and the local watersheds show just below median precipitation for November through December with January and February exceeding the median.

The local watersheds have received 91% of normal annual total rainfall of 22.80 inches. The Hetch Hetchy watershed has received 53% of normal annual rainfall of 36.68 inches. While we await the results of the second snow survey, our compiled data is showing an increase in the snowpack to be just below median for this time of year (82% of median condition to date).

**Bay Area 7-station Precipitation Index as of February 25, 2024**



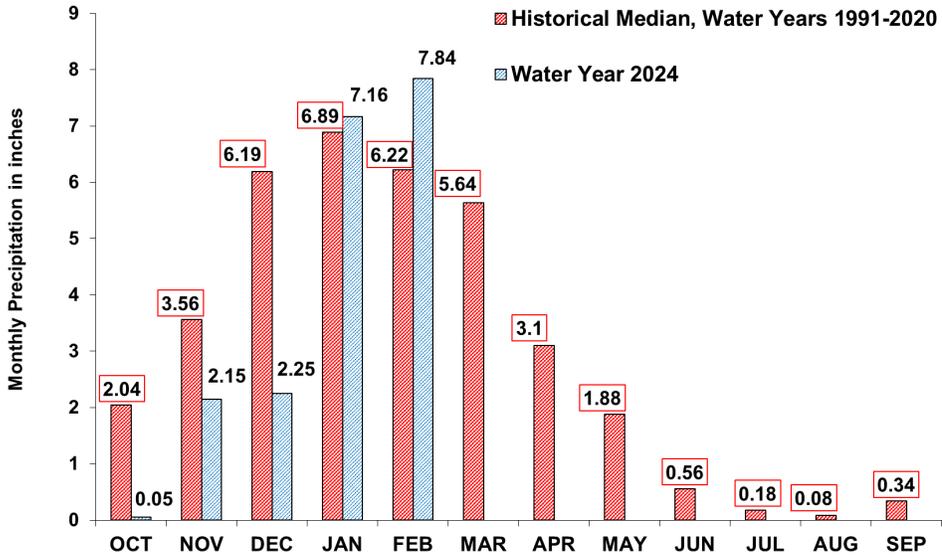
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- Sophie Maxwell**  
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- Dennis J. Herrera**  
General Manager

Services of the San Francisco Public Utilities Commission

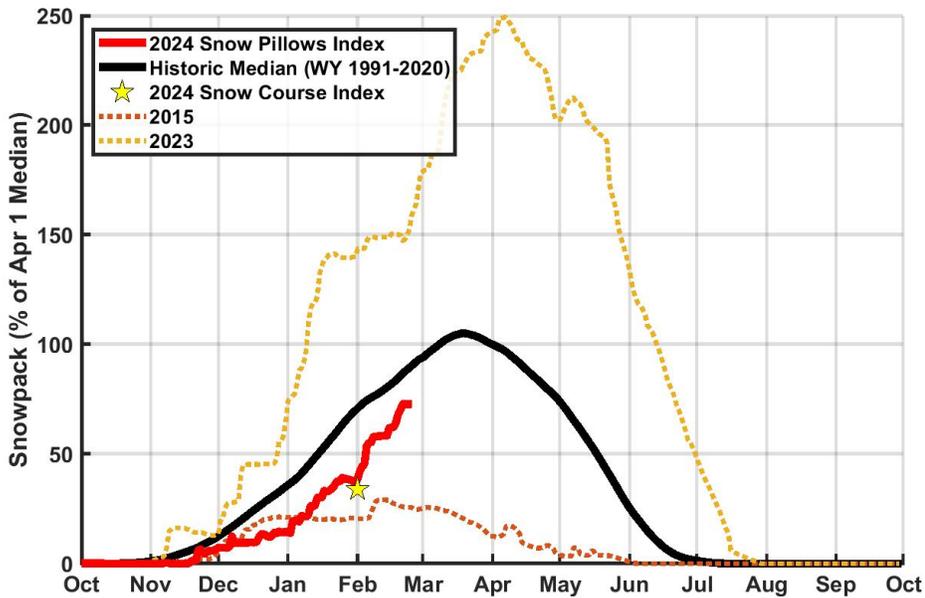
**OUR MISSION:** To provide our customers with high-quality, efficient and reliable water, power and sewer services in a manner that values environmental and community interests and sustains the resources entrusted to our care.



## Upcountry 6-station Precipitation Index as of February 25, 2024



## Upcountry Snowpack as of February 25, 2024



Reservoir storages are above where they typically are this time of year.

Reservoir	Current Storage <sup>1,2,3</sup> (AF)	Maximum Storage <sup>4</sup> (AF)	Available Capacity (AF)	Percent of Maximum Storage	Normal Percent of Maximum Storage <sup>5</sup>
<u>Tuolumne System</u>					
Hetch Hetchy	326,400	360,360	33,960	90.6%	<b>66.2%</b>
Cherry	247,700	273,345	25,645	90.6%	-
Eleanor	23,640	27,100	3,460	87.2%	-
Water Bank	570,000	570,000	0	100.0%	<b>98.7%</b>
<b>Total Tuolumne Storage</b>	<b>1,167,740</b>	<b>1,230,805</b>	<b>63,065</b>	<b>94.9%</b>	-
<u>Local System</u>					
Calaveras	92,656	96,670	4,014	95.8%	-
San Antonio	48,582	53,266	4,684	91.2%	-
Crystal Springs	44,280	68,953	24,673	64.2%	-
San Andreas	15,214	18,675	3,461	81.5%	-
Pilarcitos	2,554	3,125	571	81.7%	-
<b>Total Local Storage</b>	<b>203,286</b>	<b>240,689</b>	<b>37,403</b>	<b>84.5%</b>	-
<b>Total System Storage</b>	<b>1,371,026</b>	<b>1,471,494</b>	<b>100,468</b>	<b>93.2%</b>	<b>80.5%</b>
<b>Total without water bank</b>	<b>801,026</b>	<b>901,494</b>	<b>100,468</b>	<b>88.9%</b>	-

Rainfall, snowpack, and reservoir storages to date, including carryover storage from an extremely wet Water Year 2023, continue to indicate a reasonable probability that the SFPUC will be able to meet full customer demand this year. The SFPUC will continue to monitor water supply conditions and State actions. The final water supply availability memo will be issued in early April following the last snow survey of the year.

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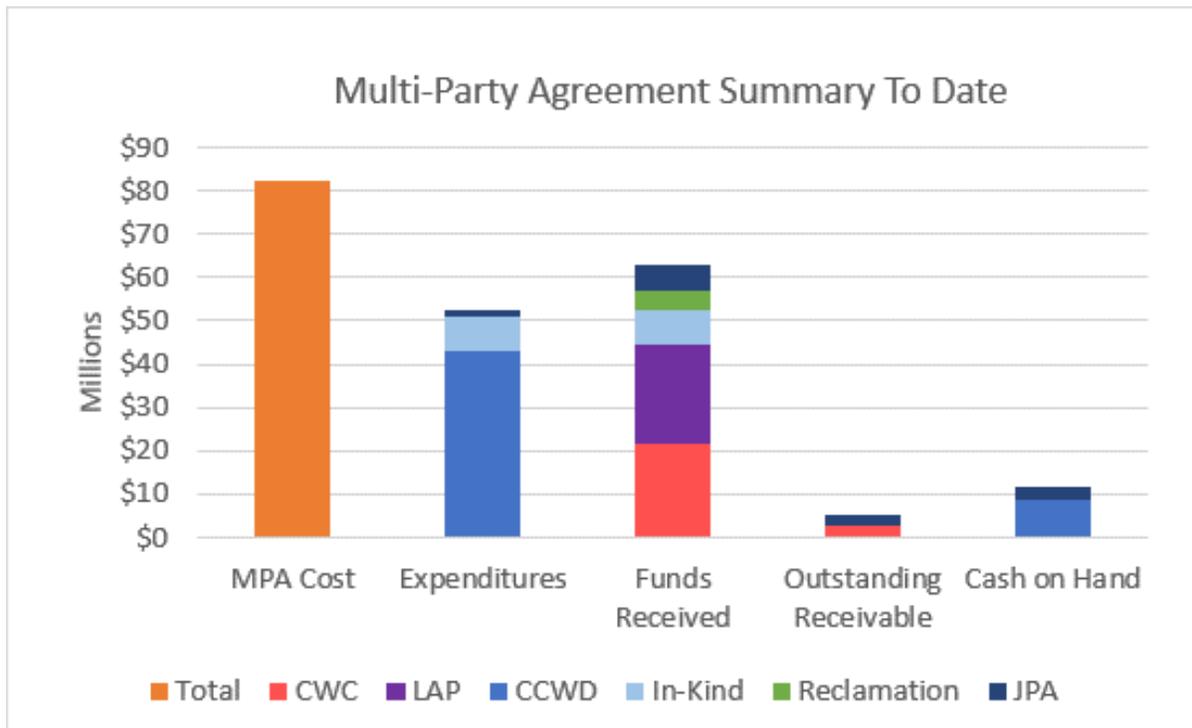
# Los Vaqueros Reservoir Joint Powers Authority Update



## UPDATE ON MULTIPARTY COST SHARE AGREEMENT

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

As a result of the additional time required to enter into project agreements and obtain full funding approval from the California Water Commission, the JPA has developed a draft comprehensive near-term schedule that reflects a delay in project implementation. The schedule is currently being refined through meetings with the Member Agencies, and the JPA continues working to ensure sufficient interim funding for necessary project activities.



## FEBRUARY BOARD OF DIRECTORS MEETING RECAP

On February 14, the JPA Board of Directors met in person at Zone 7 Water Agency. Approved action items included the recommended capital preservation strategy, amended conflict of interest code, and proposed program management contract amendment. The Board also received updates on program management and federal relations activities, and discussed potentially cancelling or rescheduling its May meeting due to the ACWA Spring Conference.

The next JPA Board Meeting is scheduled for March 13 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.

## SUBMISSION AND REVIEW CONTINUE FOR PROJECT PERMITTING

U.S. Fish and Wildlife Service supervisory staff continue reviewing the draft Biological Opinion for construction activities.

Reclamation is working to finalize the Memorandum of Agreement required under Section 106 of the National Historic Preservation Act, with execution anticipated in the coming months. Reclamation also continues to define the timing and path forward for the Record of Decision.

California Department of Fish and Wildlife (CDFW) continues to work on the Incidental Take Permit (ITP) and the Lake and Streambed Alteration Agreement for construction activities. CDFW issued a second administrative draft of the ITP for operations, and Contra Costa Water District (CCWD) has reviewed and provided further comments. CCWD and CDFW will meet in late February to finalize the permit.

The U.S. Army Corps of Engineers continues work on the Section 404 permit and associated Decision Document.

## JPA AND CCWD CONTINUE TO COORDINATE ON DESIGN AND ENGINEERING EFFORTS

The Division of Safety of Dams (DSOD) continues to review the dam design drawings and technical specifications submitted for their approval in December 2023. With the exception of minor comments from DSOD, the dam design is complete.

Design of Pumping Plant No. 1 Replacement continues. The risk register will be updated and following the 90-percent design submittal, further work will be suspended in accordance with the capital preservation plan.

Revisions continue to the draft preliminary design report and drawings for the Transfer-Bethany Pipeline (TBPL). Land acquisition planning and right-of-way planning are ongoing. The draft geotechnical data report for the first phase of geotechnical investigations is also being updated. Once the 30-percent design is completed, further design work will be suspended in accordance with the capital preservation plan.

The California Department of Water Resources (DWR) reviewed the comment letter response, describing how DWR comments on the Turn-In design will be addressed; most of the responses were accepted by DWR, and work continues to address the remaining few comments. Once all comments are resolved, no further Turn-In design work will be required in advance of entering into the Turn-In Agreement. DWR has provided the draft Turn-In Agreement, which is currently under review.

Implementation of the Project Management Information System (PMIS) is underway, with design and system configuration taking place for the various projects, facilities, and budgets. The PMIS will support cost and schedule controls and reporting.

## UPCOMING MEETINGS

**March 13 – 9:30 a.m.**

JPA Board Meeting (Zone 7 Water Agency)

**March 21 – 10 a.m.**

JPA Operations & Engineering Committee Meeting (Virtual)

**March 28 – 1 p.m.**

JPA Finance Committee Meeting (Virtual)



## ADDITIONAL PROJECT INFORMATION

[losvaquerosjpa.com](http://losvaquerosjpa.com)

[ccwater.com/lvstudies](http://ccwater.com/lvstudies)



February 12, 2024

Nicole Sandkulla  
Chief Executive Officer/General Manager  
Bay Area Water Supply and Conservation Agency  
155 Bovet Road, Suite 650  
San Mateo, CA 94402

Dear Nicole,

Thank you for your February 5th letter regarding BAWSCA’s comments on the SFPUC’s proposed FY 2025-2034 Water Enterprise and Hetch Hetchy Enterprise 10-Year Capital Plans. We appreciate BAWSCA focus on our capital planning process, and we welcome the opportunity to respond to questions and comments. Please see our responses below.

**Specific Comments:**

***The team leading the SFPUC’s Capital Planning Improvements Initiative should be tasked with providing, to the Commission, an annual report documenting its work efforts and progress. Documentation should include key metrics that allow the Commission and BAWSCA the ability to track how well (or not) the initiative is achieving its goals (including but not limited to the goals of removing barriers to project deliverability, addressing future staffing challenges, etc.).***

**SFPUC Response:**

The SFPUC provided an update on the *Capital Planning Improvement Initiative* to the Commission in September 2023 and intends to provide another update around the same time in 2024. As the majority of this initiative is focused on process improvements and alignment across enterprises, a narrative description has been most appropriate for expressing progress. We expect to have better metrics as process improvements are implemented in our ongoing capital planning cycle.

Keep in mind that improving capital planning processes requires a long-term commitment. A cross-agency team has been working together on this effort, to not only build greater capacity, but also embed these practices and related competencies deeper into our culture. At an appropriate point, our *Capital Planning Improvement Initiative* that launched this continuous improvement approach will come to an end and the work will be operationalized in our people, processes, and systems for capital planning.

***The Commission should require that an annual report documenting the steps taken internally to reduce unspent appropriations be included as part of reporting on the Capital Planning Improvements Initiative. The SFPUC must do more to reduce the level of unspent appropriated funds.***

**London N. Breed**  
Mayor

**Tim Paulson**  
President

**Anthony Rivera**  
Vice President

**Newsha K. Ajami**  
Commissioner

**Sophie Maxwell**  
Commissioner

**Kate H. Stacy**  
Commissioner

**Dennis J. Herrera**  
General Manager



**SFPUC Response:**

The SFPUC budgets as efficiently as possible by ensuring there is a plan to spend down existing budgetary appropriations on projects before requesting new funding for projects. This avoids the need to request more than the enterprise plans to expend, thereby reducing revenue requirements and ratepayer impacts. What is reflected in the Capital Plan and 2-Year Budget represents future additional funding needs for respective projects, and the source for these new needs is new debt proceeds and revenues, not prior appropriations, as shown at the bottom portion of each Capital Plan (“Sources”).

While unspent carryforward appropriations were historically high, facilitating project continuity, the SFPUC is actively addressing these unspent balances. While the increase in the FY22-23 carryforward balance is concerning, it's important to consider the context behind the numbers. In FY22-23, Water (Regional, Local, and Hetch Hetchy Water) expended approximately \$236 million. However, the new appropriation for FY23-24, allocated as of July 1, 2023, was roughly \$376 million. The large new appropriation is the primary factor when considering the increase in the carryover balance. If the new appropriation in FY23-24 was not factored into the unspent balance, total unspent capital appropriations including encumbrances would have shown a decline of roughly 12% from FY21-22 to FY22-23. This demonstrates the SFPUC's success in reducing unspent allocations despite a growing capital budget. Therefore, given the progress made and the Capital Planning Initiative's focus on efficient project delivery, which inherently addresses unspent appropriations, an ongoing report on this specific issue is unnecessary as this work is integrated in all Capital Planning Initiative decisions.

***SFPUC staff should be directed to include a reference (i.e., footnote and/or a discussion) when presenting data on future water sales that differs from the wholesale customer projected purchases from SFPUC that are provided by BAWSCA. While the Commission and SFPUC staff may be aware of that difference between the basis for BAWSCA's projections and those done by the SFPUC finance department, and moreover are aware of the SFPUC finance department's desire to utilize a different approach for estimating future water sales, the public is likely not aware, and therefore, more clarity is appropriate.***

**SFPUC Response:**

The SFPUC recognizes this concern and has an existing note in the volume forecasts section of our Financial Plan report:

“When projecting account and volumetric sales projections, it is typical for utilities to use a conservative growth outlook. This approach is geared to minimize the risk of under-collection of rate revenue requirements – if usage is higher than forecasted, future projected rate increases can be reduced, while “counting on growth” runs the risk of under-representing the cost to customers. It is worth noting that other forecasts developed by the SFPUC, such as the Water Enterprise’s Urban Water Management Plans or Power’s Integrated Resource Plans, may use other projections. The differences between these projections reflect the different risks faced by the different planning

initiatives and are the means to hedge against undesired outcomes for customers of the SFPUC.”

***BAWSCA requests to be engaged during the selection of a preferred alternative for the Moccasin Penstock replacement. Additionally, given the existing documented deteriorated condition of the penstocks and the extended time to implement the selected replacement alternative, BAWSCA also requests the SFPUC to provide plans for interim measures, including identified capital projects and associated funding, that ensure the operation of the existing penstocks until such time as they are replaced.***

**SFPUC Response:**

On January 24<sup>th</sup>, SFPUC and its consultants met with BAWSCA representatives to share status, progress, and future plans for the Moccasin Penstocks project. During this presentation, SFPUC shared that a third-party independent review team was hired to review the alternatives that have been developed to date. This team is still performing their review and they have suggested additional refinements to proposed alignments that are currently under review. The Alternatives Analysis Report (AAR) is anticipated to be completed by June, pending any major changes to the currently proposed alignments and alternatives that were shared with BAWSCA in January. We will share the Final AAR when it is complete.

HHWP is currently evaluating interim measures to facilitate repairs in the event of a failure of the hammer-forged welded steel portions of the Penstocks. This work is just being initiated and will continue through 2024.

We will be happy to provide an updated detailed presentation to BAWSCA in the early Fall when more information is available, and solutions have been more clearly identified. We look forward to continuing to update and receive feedback from BAWSCA to assure the best short-term and long-term solutions for the Penstocks are implemented.

***The Capital Plan should address these projects with \$0 budget, include a discussion as to why such a large number of projects were combined and reorganized, and provide details as to how combining the work improved deliverability or reduced costs.***

*The following projects in the Water Enterprise Capital Plan have budgets of \$0:*

- *SVWTP Polymer Feed Facility;*
- *HTWTP Underdrain Replacement;*
- *Regional PCCP Repair;*
- *Metering Upgrades R&R;*
- *Vault Upgrades R&R;*
- *Sunol Valley Pipelines Seismic Upgrades;*
- *Sunol Yard Improvements R&R;*
- *Millbrae Yard Improvements R&R;*
- *Microwave Backbone System;*
- *Tesla/Thomas Shaft microwave to SVCF & Radio Replacement; and*
- *Sneath Lane Gate/San Andreas.*

The following projects in the Hetch Hetchy Enterprise Capital Plan have budgets of \$0:

- *Early Intake Dam Interim Improvements; and*
- *Mountain Tunnel Inspection.*

**SFPUC Response:**

Several projects in the Water Enterprise and Hetch Hetchy Water Capital Plans are requesting \$0 additional appropriation during the 10-year period of FY24-25 to FY33-34. This is due to reasons detailed below that result in consolidation of projects where appropriate to achieve greater efficiency and coordination, or deferral of construction budgets until greater clarity of project scope, schedule and budget requirements can be determined during the planning phase.

The following projects in the Water Enterprise Capital Plan have appropriations of \$0 in the 10-yr CIP. Individual project reasons for this are included in the Project Data Sheets and further detailed below:

- **SVWTP Polymer Feed Facility** – Because the SVWTP Ozone project will be constructed completing in 2029, it was decided to defer this project (line 15) until after ozone implementation. Ozone addition will significantly impact type, dosage, and performance of polymers for treatment optimization. If polymer addition is still deemed necessary after reviewing treatment performance with ozone, full-scale testing of polymers will be performed with ozone to determine if a future capital project is needed. Current project documents will be finalized this year for future reference and the current project closed out by end of June 2024.
- **HTWTP Filter Underdrain Replacement** – This project (line 16) completed construction in 2023 and will be closed out in 2024, resulting in no additional appropriation request. The Project Total Appropriation matches the Total Project Budget of \$14,404,000.
- **Regional PCCP Repair** – In the last 10-Year CIP, this project held a budget of \$4M for planning evaluations. However, it was determined that planning could be better facilitated and coordinated under either the Pipeline and Tunnel Inspection and Repair R&R project (line 18) or under pipeline-specific projects such as the BDPL 1-4 PCCP Repair project (line 33).
- **Metering Upgrades R&R** – The Metering Upgrades R&R (line 39) and Vault Upgrades R&R (line 40) are being consolidated with the former Valve Replacement R&R project into a single Valves, Meters, and Vaults R&R program (line 20) in order to add flexibility and cost efficiencies since these facilities are typically co-located.
- **Vault Upgrades R&R** – See description above.
- **Sunol Valley Pipelines Seismic Upgrades** – Scope from the Sunol Valley Pipelines Seismic Upgrades project (line 41) has been consolidated into the Pipelines and Tunnels Inspection and Repair R&R project (line 18); these projects are in early planning and including the condition assessment work under the R&R project provides greater flexibility and cost efficiencies.
- **Sunol Yard Improvements R&R** - Scope from the Sunol Yard Improvements R&R (line 52) and the Millbrae Yard Improvements R&R

(line 59) have been consolidated into the Buildings & Grounds All Locations R&R (line 50) in order to provide greater flexibility and cost efficiencies for maintenance and repair of equipment and facilities across the Regional Water system.

- **Millbrae Yard Improvements R&R** – See description above.
- **Microwave Backbone System** – Microwave Backbone System (line 63) and Tesla/Thomas Shaft Microwave to SVCF & Radio Replacement (line 64) are being consolidated with and into Radio Communications (line 60) for greater flexibility and cost efficiencies. Because the Microwave Backbone System is essentially complete, any additional follow-up work can be performed under the Radio Communications project.
- **Tesla/Thomas Shaft Microwave to SVCF & Radio Replacement** – See description above.
- **Sneath Lane Gate/San Andreas** – Construction funding for this project (line 68) has been deferred to 2035 (outside of 10-Year Capital Plan) in order to allow for completion of the planning, environmental, and design phases, and then re-evaluate lessons learned from the current construction of the Southern Skyline Blvd. Ridge Trail Extension (SSBRTE) before performing construction of an additional trail. Construction funding may be requested to be moved forward in future capital plans based on priority and successful implementation of the SSBRTE project.

The following projects in the Hetch Hetchy Enterprise Capital Plan have appropriations of \$0 in the 10yr-CIP:

- **Early Intake Dam Interim Improvements** – The original scope for this project (line 32) was to complete interim repairs to the dam while long-term options were being evaluated. As discussed in the project data sheet, project scope was updated to only provide initial engineering alternative studies for the replacement of the dam, and remaining work would be completed under the Early Intake Dam – Long Term Project. This scope for the interim project has been completed, and project budget has been adjusted to show final costs with no additional funding requests.
- **Mountain Tunnel Inspection** – This project (line 54) was included because the project has not completed project closeout yet but is anticipated to be complete by the end of Fiscal Year 24. The Project Total Appropriation matches the Total Project Budget of \$21,797,495.

We hope these responses address your questions. As always, please let us know if you have further questions.

Sincerely,

*Steven R. Ritchie*

Steven R. Ritchie  
Assistant General Manager, Water

cc:

Tim Paulson, President, San Francisco Public Utilities Commission  
Members of the Commission, SFPUC  
Dennis Herrera, SFPUC, General Manager  
Ron Flynn, SFPUC, Deputy General Manager  
Nancy L. Hom, SFPUC, Chief Financial Officer, Assistant General  
Manager, Business Services  
Stephen Robinson, SFPUC, Assistant General Manager, Infrastructure  
Alison Kastama, SFPUC, BAWSCA Liaison  
BAWSCA Board of Directors  
BAWSCA Water Management Representatives  
Allison Schutte, Hanson Bridgett, LLP, BAWSCA Legal Counsel



## **PRESS RELEASE**

**March 12, 2024**

### **Water Board releases revised proposed conservation regulation draft to simplify compliance, increase flexibility**

Moving to bolster California's water supplies and resilience to climate change, the State Water Resources Control Board today released a revised draft of a proposed regulation that would establish, for the first time, budget-based water conservation targets for the over 400 large water suppliers that supply most Californians with water.

The revised draft reflects substantial public input and engagement with interested parties since the first draft was released in August 2023. Changes include extending timelines for water suppliers to meet efficiency goals, broadening their access to alternative compliance pathways and increasing the overall flexibility for how the proposed regulation can be implemented.

The revised draft regulation would apply to water suppliers and not individuals or households, and was developed to implement 2018 legislation known as "Making Conservation a California Way of Life." Today opens a second opportunity for public comment that runs through March 26. The State Water Board expects to consider adoption of the regulation this summer.

Water conservation is an important component of the state's all-of-the-above Water Supply Strategy to address an anticipated 10% reduction in water supply by 2040, which includes expanding storage, recycling, desalination and stormwater capture projects.

"We are grateful for the extensive public input that informed the revisions in the regulation," said Eric Oppenheimer, executive director for the board. "Conservation is a key tool to help the state better manage our diminishing water supply in a new climate reality. The changes to the draft regulation propose a way to do this that maintains the state's commitment to conservation while making it easier for water suppliers to meet their efficiency goals."

Under the proposed regulation, water suppliers would develop their own budgets for six different urban water needs and then use them to calculate a total water use objective. The six budget categories are: residential indoor water use, residential outdoor water use, water loss (or the amount lost to leakage), and the irrigation of commercial, industrial and institutional landscapes. The regulation requires suppliers to meet their overall objective only, not the budget set for each of the components.

The regulation will save more water over time as water suppliers calculate water budgets based on gradually more efficient water standards. Water suppliers must meet their objectives but may do so how they choose. This includes a wide variety of approaches, such as educating customers about using water wisely, fixing leaks, supporting the planting of more-water-efficient landscapes, and offering rebates or vouchers to replace old and inefficient fixtures and appliances.

“The Legislature recognized that conservation is not one-size-fits-all, so the proposed regulation provides water suppliers with the tools and flexibility to adjust their conservation actions to local conditions and unique circumstances,” added Oppenheimer. “And for some suppliers that still find meeting their objectives challenging, the draft regulation offers alternative, easier ways to do so.”

The revised draft increases the number of suppliers that would qualify for alternative compliance pathways. It also extends the effective date for meeting objectives based on the most efficient outdoor standards by five years. Additionally, the draft delays the board’s assessment of suppliers’ compliance with the regulation until 2027, though they will still be required to report their objectives and water use.

The board will hold a public workshop on the revisions to the draft regulation on March 20 during a regularly scheduled public meeting of the board. More information, including supplier-level data, is available on the board’s website.

The State Water Board’s mission is to preserve, enhance and restore the quality of California’s water resources and drinking water for the protection of the environment, public health and all beneficial uses, and to ensure proper resource allocation and efficient use for the benefit of present and future generations.

###

## California's historic storms continue. Here's how much scientists say it's being driven by climate change

San Francisco Chronicle | March 10, 2024 | Jack Lee, Joseph Howlett



A couple walk under an umbrella at Pier 39 in San Francisco on Feb. 18. Scott Strazzante/The Chronicle  
A powerful winter storm buried the Sierra last weekend, with wet weather continuing for days in the Bay Area and Central Coast. Thunderstorms Wednesday drenched Salinas, dropping an entire inch in just 25 minutes.

After historic weather last year, intense California storms have persisted this winter, with strong downpours causing widespread flooding in San Diego and damaging landslides in places like Los Angeles.

Many ingredients contribute to extreme storm activity, but scientists agree that climate change is already amping up winter rains — and may bring even wilder weather in the future.

### Warmer and wetter atmosphere

A historic storm stalled over Southern California earlier this winter, dropping more than 7 inches of rain on downtown Los Angeles on Feb. 4 and 5, its third-highest two-day total going back to 1877. Some places in the San Gabriel and Santa Monica mountains logged more than a foot of rain over 3 days. Downpours produced widespread flooding and mudslides.

Climate change probably had a hand in the extraordinary storm totals, experts say, because a warmer planet can make for juicier storms.

The atmosphere can hold about 7% more moisture for each degree Celsius — 1.8 degrees Fahrenheit — of warming, said Amir AghaKouchak, professor of civil and environmental engineering at UC Irvine. That means in a warmer climate storms can produce extreme rainfall more often than in the past.

“We have places where average precipitation has remained more or less the same, but we see more and more extreme events,” AghaKouchak said.

In the case of the storm that drenched Los Angeles, climate change likely boosted rainfall, said UCLA climate scientist Daniel Swain during a briefing.

“Probably there was an extra inch or two of rain from this event ... that wouldn’t have occurred had the climate not warmed as much as it has in the past century,” Swain said.

Warmer temperatures also mean elevations accustomed to snow during winter storms are instead receiving rain, as snow is restricted to higher, chillier peaks. That happened much of this winter as storms tracked across the Pacific to California.

But where and when it’s cold enough, extra moisture in the atmosphere can enhance snow totals too. A recent storm that dipped down to California from the Gulf of Alaska, brought epic snow in the Sierra Nevada: Sugar Bowl Resort tallied 10.5 feet of snow over four days.

“In general we should probably expect that the amount of precipitation in some of these really big, individual precipitation events — whether they’re rain or snow events — is probably around 10% or so greater, than it would have been prior to the amount of warming that we’ve seen,” Swain said in a briefing. “Ten percent is not a small number.”

### **Ocean and storm feedback cycles**

Earlier this winter, an atmospheric river-fueled storm made landfall in Southern California, causing dangerous flash flooding and millions of dollars in damage. San Diego tallied 2.73 inches of rain on Jan. 22, the city’s fourth-wettest day since 1850. Nearby locations logged 2 to 3 inches of rain in an hour, rates with a 1-in-100 to 1-in-1,000 chance of happening any given year.

Abnormally warm waters off the coast in January allowed the atmospheric river to absorb more heat and water vapor, said Marty Ralph, director of the Center for Western Weather and Water Extremes at UC San Diego’s Scripps Institution of Oceanography, by email.

This “strengthened the precipitation and contributed to the flooding,” he added.

For the world's oceans, 2023 was the hottest year on record by a long shot. Warmer Pacific water impacts marine life, and may be giving storms like January's an extra injection of energy and moisture just before they make landfall in California.

Scientists are just beginning to study the connection between warming oceans and intensifying storms. For a series of atmospheric rivers during a sweltering marine heat wave in 2014, researchers found the warmer waters evaporated more readily, donating additional moisture to storm clouds overhead.

"Our model simulations suggest that in some areas along the coast of Southern California, at least for that December's storms, you can get up to double the amount of rain due to the presence of the marine heat wave," said Christoph Renkl, an oceanographer at Woods Hole Oceanographic Institution.

"What's going to happen 10, 50 years from now, when we have an even warmer ocean?" said Arthur Miller, Renkl's collaborator at Scripps.

### **Future extremes**

While storms are expected to become stronger in a warmer world, that doesn't mean droughts will become a thing of the past. Instead, wet and dry periods will probably both grow more extreme, resulting in "hydroclimate whiplash" that swings more dramatically than in the past.

More extreme precipitation in the future could impact infrastructure like dams and storm drain systems, which weren't designed for these increasingly severe — and frequent — weather events.

"We need to ... come up with solutions (and) ideas to protect ourselves against future extremes," AghaKouchak said.

###

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## **After another wet winter, is the West still facing a water crisis?**

USA Today | March 9, 2024 | Doyle Rice

Time is running out for the West's wet season, but recent storms have done wonders for the snowpack and the drought across much of the region, especially in California.

"The drought situation across the western U.S. has improved considerably as a result of a very wet winter," Jay Famiglietti, a hydrologist at Arizona State University, told USA TODAY.

In fact, both California and Nevada are "essentially drought-free" at the moment, which is "really unusual," he said.

Elsewhere, the giant reservoirs of the Colorado River Basin, Lakes Mead and Powell, are now about one-third full, said Brad Udall, senior scientist at Colorado State University. This is up from the same time last year, when they were 25% full, but still far from their historic highs of the early 2000s, when they were 95% full.

But the wet winter is not a panacea for the long-term western water crisis, which is "here to stay," Udall said. "I like to say it is a collision of 19th-century water law, 20th-century infrastructure and 21st-century population growth and climate change."

### **A promising drought forecast in California**

The drought forecast looks promising in California: "The combination of the abundance of rain and snow from the winter of 2022-2023, the state of the reservoirs, and what has happened this winter gives a high confidence that drought conditions will remain absent in California well into 2025," AccuWeather California weather expert Ken Clark said, in a statement.

This is good news for both the short-term drought concerns and the long-term battle against widespread drought, AccuWeather said. "Years of drought took their toll on the state's water table, so back-to-back winters with blockbuster storms have replenished water reservoirs and quenched the parched landscape," said AccuWeather meteorologist Brian Lada.

### **Lakes Mead and Powell remain at 'dangerously low levels'**

"Although both reservoirs have experienced wet winters over the past few years, they both remain at dangerously low levels after a couple of decades of megadrought," Famiglietti said. The two reservoirs, fed by the Colorado River, provide the water 40 million Americans depend on.

Specifically, Lake Mead has risen over 3.5 feet since its summer low because of the current wet winter. Lake Powell, however, has actually dropped about 23 feet since its summer 2023 high, which was a result of the wet winter of 2022-23.

And additionally, a pair of wet winters doesn't solve the long-term problem: The Colorado River has been in crisis because of a multidecade drought in the West intensified by climate change, rising demand and overuse. The river also serves Mexico and more than two dozen Native American tribes, produces hydropower, and supplies water to farms that grow most of the nation's winter vegetables.

### **What about California's current snowpack and reservoir levels? Have the recent storms helped?**

The recent blizzard across California lifted its snowpack levels considerably, Famiglietti said. "Snowpack levels are now 'normal' across the state for this time of year, and nearly all of the state's major reservoirs are above historic averages for this time of year," he said. "These higher reservoir levels will alleviate pressure on the state's perennially overtaxed groundwater reserves."

On Tuesday, NOAA on X said there's been a "HUGE improvement in the Sierra Nevada snowpack since January 1st ... thanks to several atmospheric rivers and the record setting winter storm event this past weekend."

In a statement, California Department of Water Resources Director Karla Nemeth last week said, "We are now in the last month of the traditional snow season and while conditions have dramatically improved since the beginning of the year, March will be critical in determining if we finish above or below average."

### **What is the overall drought situation in the West at the moment?**

When it comes to drought, the West looks "pretty good right now," Udall said. Specifically, only about 25% of the western U.S. is currently in drought conditions, according to the latest U.S. Drought Monitor, which is down from 51% this time last year.

### **What does all this mean for the wildfire season in California and the West in general?**

The additional rainfall so far this winter bodes well for decreasing fire severity later in the year, especially in California, Famiglietti said.

However, he said Arizona and New Mexico have not had the benefit of the additional rain like much of the western U.S., and so will likely remain at high risk for wildfires.

In addition, Udall told USA TODAY that the next six weeks are especially crucial for the fire season in the West. If it stays wet and cool, that could help reduce the fire season's severity. If it suddenly turns hot and dry, he said that would potentially dry out the fuels that can produce wildfires.

###

## **Climate expert links recent California snowfall to warming planet**

CBS News | March 7, 2024 | Molly McCrea

SAN FRANCISCO -- In just four days at the beginning of March, an epic blizzard dropped more than 100 inches of snow in parts of California.

Any concern over California's snowpack may have, for the moment, evaporated. The Golden State's reservoirs and drinking water supplies are in good shape.

Experts told CBS News Bay Area that we have not dug ourselves out of the much bigger problem: the impacts of our slowly warming planet. In fact, the blockbuster blizzard that dropped six to 10 feet of snow likely has links to climate change.

"Climate change is really affecting the underlying possibility -- set of possibilities -- for what a weather system is capable of doing," said Dr. Andrew Jones.

Jones is a climate scientist at the Lawrence Berkeley National Laboratory. His research involves hydroclimate extremes and snow dynamics. This blizzard, in particular, caught his attention.

"This was a very interesting storm to me," he said.

One would think that a warming planet should mean less snow and climate scientists predict that, in California, we'll see diminishing snowfall. But this recent blizzard was a lollapalooza. That too is linked to warming temperatures.

"It really does highlight this conundrum that we see climate change kind of causing two counteracting forces at the same time," Jones explained.

With this blizzard, cold arctic air out of the Bering Strait made a beeline at California. On the way, it traveled over the Pacific Ocean which is warming in part because of climate change.

Higher temperatures -- in the ocean and the air -- allow the atmosphere to hold more water.

"So, this cold mass of air that moved down from the Bering Strait has picked up heat and picked up moisture as it was moving across the Pacific," Jones said.

That created a warmer, wetter storm that was still below freezing. Jones is now keeping his eye on the snowpack -- with good reason.

February was the ninth month straight to be the warmest on record globally.

"Because overall conditions are warmer, that snow might melt faster than usual," Jones warned.

Overall, Jones said he remains hopeful for new strategies that aim to capture excess runoff to recharge California's aquifers. He also said it's not too late to slow down climate change.

"We do have to be aware of the changes that are happening and start to prepare for them," Jones said.

# # #

## Winter storms help end 'snow drought' across parts of the US West

The Hill | March 7, 2024 | Sharon Udasin



Cars travel along U.S. 50 near Pollock Pines, Calif., Saturday, March 2, 2024. (Lezlie Sterling/The Sacramento Bee via AP)

Recent bouts of heavy mountain snowfall in parts of the U.S. West have helped quell a “snow drought” that was threatening to further desiccate an already arid region, federal meteorologists announced Thursday.

A major, four-day blizzard earlier this month brought considerable improvements to the Sierra Nevada, freeing the entire region from the so-called “snow drought” — a period in which there are abnormally low levels of snowpack, which serves as a water reservoir for much of the West.

“The Sierra Nevada has been making a slow and steady snow drought recovery since early winter,” meteorologists stated in a March snow drought update, issued by the National Oceanic and Atmospheric Administration (NOAA) and the National Integrated Drought Information System (NIDIS).

Snowpack levels, they continued, are greatest in the northern Sierra Nevada, where snow-water equivalent — the amount of water contained in snow — is 111 percent of the norm for this date.

Accumulations were slightly lower, but still much improved, in the southern Sierra Nevada, at 94 percent of the typical snow-water equivalent for this time.

Conditions in the Great Basin — a hydrologic zone that includes most of Nevada, much of Utah and parts of California, Idaho, Oregon and Wyoming — remained “well above normal,” according to the update.

Many locations reported snow-water equivalent levels that were greater than 150 percent of the norm for this time of year.

Despite these positive developments, however, NOAA/NIDIS meteorologists had words of warning for other parts of the U.S. West.

“Snow drought lingers in the Northern Rockies and parts of the Northwest,” they stated.

Specifically, parts of Washington state, northern Wyoming, western Montana and northern Idaho were still enduring snow drought conditions due to snowfall deficits.

###

## California snowpack now above average, but will it last?

Reuters | March 4, 2024 | Daniel Trotta

A blizzard that dumped up to 10 feet (3 meters) of snow on the California mountains in recent days has pushed snowpack levels above average for the first time this year, a welcome bounty before hot and dry weather inevitably returns.

But experts warn much of the excess could be washed away by a warm rainstorm, and that snow levels measuring just a few points above average will fail to solve long-term problems.

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California, home to nearly 40 million people and a \$50 billion agricultural industry, keeps a close watch on snowpack in the Sierra Nevada as a reserve for future water supplies.

After suffering historic drought for much of this century, the state is on track for a second wet year in a row.

The precipitation will help recharge aquifers and reservoirs, improve fish habitat and ease constraints on farmers. While the moisture may stave off fire conditions for now, rain also promotes vegetation growth that will fuel future wildfires.

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An aerial drone view of the Sierra Nevada Mountain peaks near Phillips Station meadow, shortly before the California Department of Water Resources' third media snow survey of the 2024 season, California, U.S., February 29, 2024. Fred Greaves/California Department of Water Resources/Handout via... Purchase Licensing Rights, opens new tab Read more

"It's a pretty stark contrast to where we were in January, when we had very little snow on the mountains," said Heather Cooley, director of research at the Pacific Institute, a think tank focused on water. "But there's still a long way to go to erase the overextraction that we saw during the dry years."

With droughts becoming more frequent and intense as a result of climate change, policy-makers must press forward with projects such as water recycling, stormwater capture and floodplain restoration to ensure long-term supplies, Cooley said.

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"We can't be distracted by one year, even two good years," Cooley said.

Statewide, snow levels were at 104% of average, [opens new tab for March 4](#), according to the California Department of Water Resources, with northern region at 111% of normal and the south at 94%. But water managers place more importance on snowpack measurements as of April 1, the traditional peak, and the current level statewide is only 94% of the April 1 average.

Moreover, the recent blizzard was an outlier from this year's warm, rainy weather. Another warm rainstorm would wash away much of the reserve and increase flood risk.

"The last thing we need is a really warm, wet storm that rolls through and causes a lot of flooding and leads to all the snow melt all at once," said Justin Collins, meteorologist with the National Weather Service office in Reno.

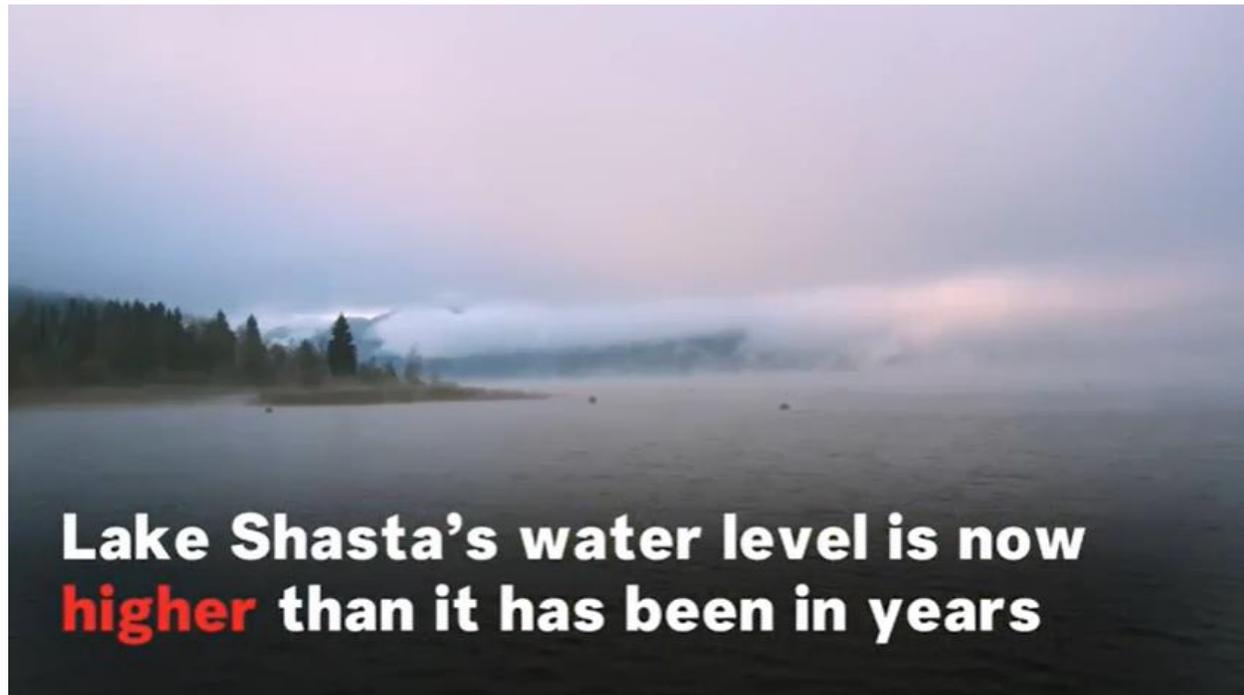
Reporting by Daniel Trotta; Editing by Stephen Coates

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## California's Biggest Reservoir Loses 265 Billion Gallons of Water

Newsweek | March 4, 2024 | Anna Skinner



Lake Shasta has lost over 265 billion gallons of water in one month.

After years of drought, several reservoirs in California reached concerningly low water levels in the summer of 2022. However, an abnormally wet winter last year alleviated much of the state's drought and replenished the lakes. Lake Shasta, the state's largest reservoir, neared capacity last year.

The lake has dropped eight feet over the past week, but officials aren't concerned. In fact, they're voluntarily releasing the water through Shasta Dam because the lake's levels were too high for February.

Releases from the dam, also known as "flood operations," started January 31. Officials began the releases after a series of atmospheric rivers brought excessive precipitation to the Golden State throughout January and February. Another moisture-laden storm hit California over the weekend.

The last time officials had to conduct flood operations at the lake was in 2019, Dan Bader, U.S. Bureau of Reclamation area manager in Northern California, told Newsweek.

In the month since the releases began this year, more than 265 billion gallons of water have been released from the reservoir. Before the flood operations, water officials were releasing slightly over 3 million gallons per day for normal wintertime releases, Bader said.

Since flood operations began, enough water has been released from the lake to fill 540,000 Olympic-sized swimming pools.

"Last winter, we stored everything that came in," Bader said, adding that typically flood operations occur at Lake Shasta once every five years.

Release flows were reduced last week, he said.



The Pit River Bridge stretches over a drying section of Lake Shasta in Lakehead, California, on October 16, 2022. The lake's water levels have since recovered, and water officials are releasing excess water from Shasta. GETTY

However, there's a chance that flood operations could resume if more storms hit California this month. The most recent storm pummeled California with heavy snow and was expected to vastly improve California's snowpack levels, which were below normal before the storm. California relies on snowmelt through the spring to supplement as much as a third of the state's water supply.

Despite the releases, Lake Shasta is still in a much-improved state compared with last year. As of Monday morning, its water levels were at 1,038 feet—where it has remained since last Friday. This time last year, the lake was at 997 feet, and in February 2022 it was at 938 feet.

Water officials have conducted flood operations at other reservoirs throughout the state as well.

In February, the California Department of Water Resources opened the spillway at Oroville Dam at Lake Oroville to release water ahead of moisture-laden winter storms. The water was recaptured downstream, and the release provided flood mitigation for downstream communities.

###

## California Could Stave Off Drought Through 2025—Reversing Years Of ‘Megadrought,’ Forecasters Say

Forbes | March 4, 2024 | Brian Bushard

After years of drought plagued California with parched soil, forecasters from AccuWeather said on Monday they expect the sunshine state to remain drought-free through 2025, after two straight years of epic winter storms, reversing what had been a daunting “megadrought.”



Nearly 93% of California is completely out of a drought, and only 7% is considered abnormally dry. GETTY IMAGES

### KEY FACTS

- Forecasters have “high confidence” California will stay out of its years-long drought through at least 2025, “and potentially beyond,” due to “the combination of the abundance of rain and snow” last winter and several major storms this winter,” according to AccuWeather meteorologist Ken Clark.
- California has already made progress toward ending the drought, with nearly 93% of the state completely drought-free as of Monday, and the remainder in only an “abnormally dry” state, according to the National Oceanic and Atmospheric Administration’s Drought Monitor.
- At this time last year, less than 17% of the state was out of a drought, with more than 49% in a “moderate” drought, including nearly a quarter of the state in a “severe” one— at this point two years ago, 100% of the state was in a drought, including nearly 87% in a “severe” drought.
- California has been pounded with torrential rain and major snowfall this winter, including a blizzard last week that dropped up to 10 feet of snow in the Sierra Nevada mountains, and a series of storms leaving behind widespread floods and enough rain in southern

California to supply more than 65,000 residents with a year's worth of water, according to Los Angeles County Public Works.

- Those storms have helped replenish the state's parched reservoirs: Six major reservoirs across the state are at or near their historical average water level, with high-elevation snowpack providing more water as warmer weather starts melting the feet of snow accumulated in the mountains, Accuweather meteorologists said.

## **KEY BACKGROUND**

California has been gradually emerging from its drought over the past year, with roughly half of the state coming out of it at this point last year. The state was gripped with what forecasters dubbed a "relentless parade" of atmospheric rivers—long, intense bands of heavy rain—and near-record snowfall in early 2023, leaving behind days-long floods and mudslides, and resurrecting historic rivers and lake beds that had for decades gone dry. Those storms also prompted lawmakers to attempt to capture rainfall for the state's major agriculture business and for residents in areas with nearly dried-out water supplies. California's Democratic Gov. Gavin Newsom even pitched a \$16 billion project to transport water from the San Joaquin River delta to central and southern California, a project that was met with some criticism over displacing water that Newsom has continued to advocate.

## **CONTRA**

The American Southwest has been caught in a years-long drought accelerated by relentless heat waves and long dry stretches, dwindling the water levels in the region's two largest reservoirs—Lake Mead and Lake Powell—and sparking concern the Colorado River could be depleted. In August 2022, the Biden administration called for unprecedented water cuts in several states that rely on the river, and while six of those states came up with a draft proposal for a reduction, California rejected the plan, countering with another plan that would force Arizona to shoulder a larger cut. Last May, officials in California, Arizona and Nevada came up with another plan to cut back water usage from the river in a \$1.2 billion proposal aimed at conserving water through 2026. Federal officials said in October they believe that plan will be enough to protect the river, with the "immediate possibility" of Lake Mead and Lake Powell reaching a critically low water level having been staved off.

###

## California water data shows change for typically drier months ahead

*The state has dealt with recent years of drought conditions, but multiple atmospheric rivers have caused higher-than-normal water levels.*

Scripps News | March 1, 2024 | Staff



Jackson Family vineyards are submerged in the Russian River near Trenton Road and River Road in Sonoma County, Calif. Chad Surmick/The Press Democrat via AP

California and other parts of the U.S. West have suffered through dry drought conditions in recent years, wreaking havoc on farming and causing concern for the future among officials. Now, after data on water levels released by California's Department of Water Resources shows strong water levels across the state, reservoirs may be able to get typically drier parts of the country through what has been a difficult season historically.

California's warm and dry summers mimic the Mediterranean's climate in some areas more than the climate found in much of the United States — and of course California's northern and southern halves have their own distinctions when it comes to climate in that large state.

Water reclamation officials in California routinely deal with an environment where a large portion of the state's precipitation — an average of 75% each year — falls in the weeks and months between November and March. That precipitation is made up of rain, snow and hail.

As the winter begins to end, time will tell if weather forecasts show more support for keeping the state's reservoir levels elevated as they are now, according to data released on Feb. 29.

State officials with the California Data Exchange Center released level charts for at least 18 reservoir localities across the state, including for McClure, Castaic, Casitas, Cachuma, Don Pedro, New

Melones, Sonoma, Trinity, Camanche, Folsom, New Bullards Bar, Oroville, San Luis and Shasta. All of those localities appeared to have water levels which had improved.

The news is good for groves in wine country between Napa and Sacramento in the state's north.

It's a promising sign that the aquifer system — which is divided into the Sacramento Valley, the Sacramento San Joaquin Delta and the San Joaquin Valley regions — will have healthy surface-water basins.

Water is vital for California's Central Valley, known as one of the most important agricultural areas globally.

California's aqueduct is critical to the state's agriculture and life. Fourteen pumps pull or lift water to an altitude of almost 2,000 feet over mountains, after which the water is split into two aqueducts that hydrate Southern California.

The West Branch Aqueduct water is held in storage in Castaic Lake and Pyramid Lake, from which it is distributed to the Los Angeles metro area.

The East Branch Aqueduct runs through Lancaster and Palmdale, and water from it is stored in Silverwood Lake and Lake Perris, from which it is distributed to Inland Empire cities that include San Bernardino and Riverside.

The healthy water levels aren't all good news, though. There is a chance that as the spring and summer approach and snow melts in the mountains, partly unforeseen weather conditions ahead could cause flooding — say, for example, if storms hit the state in March.

That's why California authorities have opened spillways at various dams multiple times this year, to release water which is then recaptured downstream in flood-mitigation operations.

In early February, eight California counties were put under a state of emergency as an atmospheric river caused flooding throughout heavily populated areas of Southern California. The storm system also brought heavy rain and damaging winds to the Bay Area.

Then later in the same month, nearly all of California was up against more adverse weather as another storm brought heavy rain to much of the state, with heavy snowfall in higher elevations. Forecasters have already warned of possible flooding, hail and tornadoes in parts of the state as storms hit in just about every quarter of the month of February.

In late 2023, motorists became stranded in vehicles on flooded roadways in what is normally an idyllic Santa Barbara, while nearby Oxnard got a month's worth of rain in a single hour in a storm that pummeled Southern California while Christmas travel was underway.

And last spring, just as a drought in the state was improving, flooding then brought more issues, devastating farming communities.

###

## March Snow Survey Shows Improvement for Sierra Snowpack

Ca. Department of Water Resources | February 29, 2024



DWR staff conduct the third snow survey of the season at Phillips Station on Feb. 29, 2024.

### As California enters the last month of the traditional snow season, snowpack is near average in most regions

SACRAMENTO, Calif. – The Department of Water Resources (DWR) today conducted the third snow survey of the season at Phillips Station. The manual survey recorded 47.5 inches of snow depth and a snow water equivalent of 18 inches, which is 77 percent of average for this location. The snow water equivalent measures the amount of water contained in the snowpack and is a key component of DWR’s water supply forecast.

Today’s results reflect continued improvement in the snowpack since the slow and dry start to the water year. DWR’s electronic readings from 130 stations placed throughout the state indicate that the statewide snowpack’s snow water equivalent is 18.7 inches, or 80 percent of average for this date, an improvement from just 28% of average on January 1. The snowpack is currently only 70 percent of the critical April 1 average, when the snowpack is typically at its peak. An incoming storm is expected to bring several feet of snow to the Sierra Nevada this weekend.

“We are now in the last month of the traditional snow season and while conditions have dramatically improved since the beginning of the year, March will be critical in determining if we finish above or below average,” said DWR Director Karla Nemeth. “No matter how the season ends, we are ready to take advantage of the water we do have to benefit communities, agriculture, and the environment, and continue storing stormwater in our groundwater basins for future use.”

While California saw a number of storms in January and February that caused flooding in many areas of the state, the storms were warmer than average, dropping more precipitation as rain rather than snow, especially in Southern California. Overall statewide precipitation is 103 percent of average for this date, running well ahead of the snowpack. While surface water storage in California’s major reservoirs is currently 119 percent above average and the state continues to benefit from efforts to capture and store as much water as possible, the latest forecasts from DWR project snow runoff could be below average this spring due to the unusually dry start to the water year. DWR recently increased projected allocations from the State Water Project, and the forecasted allocation is expected to be revised again next month based on recent storms.

“California has seen several extreme climate events so far this water year, including record rainfall in Southern California,” said Dr. Michael Anderson, State Climatologist with DWR. “While this pushed statewide precipitation above average, the snowpack still has not caught up from the dry conditions earlier this winter and local conditions still vary significantly from region to region. The upcoming storm

will deliver more snow, but the critical month of March will have to deliver enough snowpack to make up for the dry fall and slow start to the year.”

On average, the Sierra snowpack supplies about 30 percent of California’s water needs. Its natural ability to store water is why the Sierra snowpack is often referred to as California’s “frozen reservoir.” Data from these snow surveys and forecasts produced by DWR’s Snow Surveys and Water Supply Forecasting Unit are important factors in determining how DWR manages the state’s water resources.

DWR conducts five snow surveys at Phillips Station each winter near the first of each month, January through April and, if necessary, May. The next and possibly final survey is tentatively scheduled for April 2.

# # #

For California’s current hydrological conditions, visit <https://cww.water.ca.gov>

For more information on finding your flood risk, visit <https://myhazards.caloes.ca.gov/>

For information on obtaining flood insurance, visit <https://www.floodsmart.gov/>

For information on how you can prepare your household for flood emergencies, visit <https://www.ready.gov/kit>

## How back-to-back California storms are erasing fears about state's water supply

San Francisco Chronicle | February 28, 2024 | Kurtis Alexander



Vehicles make their way on I-80 as wet snow falls in Baxter (Placer County) in January. The snowpack in the Sierra Nevada mountains has been bolstered by recent storms.

Max Whittaker/Special to The Chronicle

Even before the major storm forecast for this weekend, a wet February has eased fears that California would end the rainy season with too little water. In fact, many parts of the state are now likely to wrap up with average or above-average rain and snow totals.

The state's March snow survey, taking place Thursday, will show that snowpack in California's mountains is around 80% of average for the date, a substantial leap from the end of January when it hovered around 50%. Rainfall, meanwhile, stood at 103% of average statewide Wednesday, up from about 80% last month.

While the numbers are not exceptional, they mark enough of an improvement since the start of the year — when some water managers began to talk about drought — that reservoirs are sufficiently primed with precipitation to avoid major water shortages in 2024, even if the rest of the rainy season disappoints. Part of the reason is that a lot of water remains in storage after last year's historically wet weather.

The powerful winter storm arriving late Thursday will only improve this year's water prospects. Notably, warnings of blizzard conditions in the Sierra promise to move snowpack closer to average just as the last big month of the wet season kicks in.

"If this was 2022 or 2023 and we are coming out of drought, slightly below average (for the season) would not be enough," said Chris Potter, a senior civil engineer at the East Bay Municipal Utility District, who helps manage water supplies for the district's 1.4 million people. "Since we're following last year's big snowpack and runoff, slightly below average will be sufficient."

"Of course, higher than slightly below average would be better," Potter said.

The situation for EBMUD mirrors that of many other water agencies in California.

The district's big reservoirs in the Sierra, in this case along the Mokelumne River, contain significantly more water than they normally do. Systemwide, the agency's storage stood at 84% of capacity at the beginning of the week, or 111% of what is typical for the date.

Meanwhile, snowpack in the mountains above EBMUD's big reservoirs was about 80% of average. The snow signals how much water will flow into the reservoirs come spring and summer when it melts.

For San Francisco's water agency, which serves not just the city but residents in Alameda, Santa Clara and San Mateo counties, the picture is similar.

Total water storage for the San Francisco Public Utilities Commission, most of which comes from the Hetch Hetchy system in and around Yosemite, stood at 94% of capacity this week, or 116% of average for the date. Snowpack fueling the system was about 82% of average.

California's far north, where the state's biggest reservoirs are located, has fared best in terms of snow this season. State snow surveyors this week will report about 90% of average snowpack across the northern Sierra, southern Cascades and Trinity Mountains.

Meanwhile, Shasta Lake and Lake Oroville, the large reservoirs in the north that anchor the federal and state water projects, held 117% and 134% of the water typical for the date, respectively.

The state's monthly snow report culls from hundreds of manual snow measurements and automated sensors to help provide perspective on future water supplies. Nearly a third of the state's total water comes from snow. Because much of the data is available in real time, the figures reported by the California Department of Water Resources at the beginning of each month serve largely for public awareness.

The March numbers announced this week will be buoyed by the series of storms that pounded the state in February, the biggest of which hit during the first week of the month. Flooding, landslides and power outages were common along the coast while heavy snow fell on the Sierra.

Los Angeles saw the brunt of the wet weather, recording more than a foot of rain so far this month, just shy of the city's record.

High levels of precipitation in Southern California are a hallmark of El Niño, which developed this winter. The pattern is marked by an unusual warming of ocean waters in the equatorial Pacific that can alter the trajectory of storms from the sea.

For the rest of the state, the wetter-than-average February was not close to record-setting.

"This is going to be a good February," said Jan Null, meteorologist at Golden Gate Weather Services. "But it's not going to make anyone's top 10 list if we're looking at long-term numbers."

The forecast from the National Weather Service calls for the coming storm, from the Gulf of Alaska, to drop up to 10 feet of snow on the Sierra between Thursday and Sunday. Snow levels could be as low as 2,000 feet. The front will be less impactful along the coast, where 1 to 3 inches of rain is expected.

Null said the system is helping put the wet season on track to be "pretty close to normal."

# # #

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## What's behind this winter's U.S. snow drought?

*Rain-soaked, packed into skinny bands, or simply sparse: U.S. snow has been hammered by El Niño atop longer-term warming.*

Yale Climate Connections | February 26, 2024 | Bob Henson



An aerial view shows waves rolling ashore along a snow- and ice-free beach along Lake Michigan at Whiting, Indiana, on February 18, 2024. This winter's warm weather has led to the lowest ice cover over the lakes system since record keeping began in 1973, part of a decades-long trend exacerbated this winter by El Niño. Snowfall across the Great Lakes region this winter has also been at or near record-low extent. (Photo by Scott Olson/Getty Images) Credit: Getty Images

It's not that the United States has been entirely bereft of snow during what's likely to end up as the nation's warmest winter on record. But for most of the traditionally snowy swaths from the northern Great Plains to the Northeast, there's been a startling lack of winter storms in 2023-24. The result: widespread bare ground in midwinter and what could end up being some all-time lows for seasonal snowfall.

On top of that, there have been a couple of bizarre cases of extremely dry or wet snows, both of which threw monkey wrenches into the forecast and left many snow lovers crestfallen.

At [weather.com](https://www.weather.com), Jonathan Erdman pulled together some of the noteworthy seasonal stats for a February 23 writeup. Erdman noted that the average snow extent across the contiguous U.S. on that date was a paltry 17%. That's well short of the average to date of 37%, and the lowest for any February 23 in satellite-derived data going back to 2004.

Throughout much of this winter, U.S. snow cover has hovered at or near record-low extents in the 21-year satellite database. The biggest exception came after a mid-January pair of fast-moving storms

that left a picture-perfect winter landscape from the Upper South (Nashville picked up 7.6 inches of snow, more than 150% of a typical winter’s entire snowfall) to the mid-Atlantic (Washington, D.C., recorded 7.8 inches, including the city’s first inch-plus snow on a calendar day in two years).

Meanwhile, the Upper Midwest and Great Lakes states — typically plastered with snow — are seeing major deficits for the winter to date. As of February 24, some of the biggest losers (counting only those years since consistent snow measurement began at each site) included:

Location	Observed thru Feb. 25 (in.)	Average thru Feb. 25 (in.)	% of average	Deficit (in.)
Fargo, North Dakota	8.5 (2nd-lowest in 131 years)	37.1	23%	28.6
Minneapolis, Minnesota	14.2 (7th-lowest in 140 years)	38.4	37%	24.2
Duluth, Minnesota	18.5 (lowest in 76 years)	65.7	28%	47.2
Syracuse, New York	34.5 (lowest in 77 years)	101.8	34%	67.3

Ice extent across the Great Lakes has also dipped to record lows for much of January and February, as discussed by Jeff Masters in a post on February 16.

### **El Niño turns up the burners, with an assist from global warming**

El Niño is clearly a big driver behind this winter’s dearth of Snow Belt snow. A periodic warming of the eastern tropical Pacific, El Niño torques winter weather across much of the Western Hemisphere, especially during strong El Niño events such as the one we’ve had in 2023-24.

The classic playbook for El Niño winters is milder and drier than average across the northern U.S. and relatively cool and wet toward the Sun Belt. This winter, it’s easy to see how the playbook has gotten skewed in a way entirely consistent with human-caused warming. Nearly all of the contiguous U.S. has been milder than average, with the most exceptional warmth following the El Niño mold across the Midwest and Northeast and into southern Canada.

Globally, we’ve just had the warmest average surface temperatures for both December and January in records dating back to 1880, and February may follow suit. As global temperatures rise, the biggest spikes atop that trend usually occur during El Niño years.

Based on forecasts extending through the last few days of February, a number of U.S. states and cities — and perhaps the contiguous U.S. as a whole — will wrap up their warmest meteorological

winter, defined as December through February, in more than 125 years of recordkeeping. We'll have a full report when NOAA releases the final numbers on March 8.

### Two extreme modes of snow that gave forecasters fits

Not only has this winter's U.S. snowfall been sparse; at times, it's been just plain odd. Consider what happened along Colorado's populous Front Range (including Denver, Boulder, and Fort Collins) on February 3. As a strong jet stream dove into the central U.S., wrapping moisture toward the Rockies, it was clear that the Front Range might get a major winter storm. But there were also failure modes in sight, including mild temperatures more akin to March or April than midwinter.

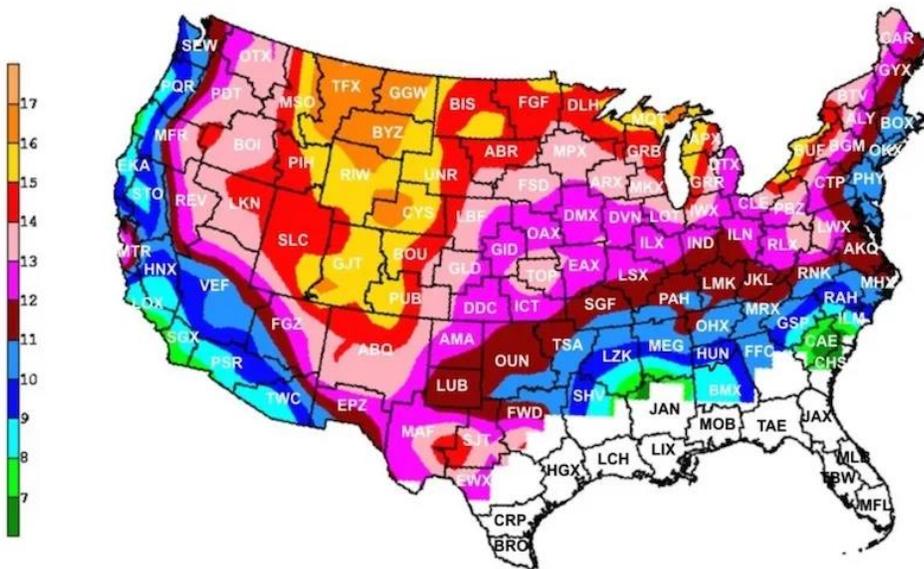
For days, computer models vacillated on whether the storm's focus might be just east of the Front Range cities or atop them, and whether the storm would transition quickly to snow or instead kick off with an extended round of cold rain — something that's virtually unheard of along the Front Range in early February.

At the National Weather Service in Denver, forecasters bemoaned the situation, including in one technical discussion issued less than two days before the event:

*...this is easily one of the more difficult forecast scenarios for the Denver metro (and northeast Colorado as a whole) in quite some time ... The past few model cycles have left our forecast "clear as mud" at this point.*

The storm's complex dynamics ended up favoring the big Front Range cities after all, and there was enough rain at the outset to astound many long-time weather watchers. The storm also featured snow-to-liquid-water ratios on the order of 5:1 – meaning five inches of snow containing an inch of moisture – compared to a more typical Colorado ratio of around 15:1. (See Figure 1 below, as well as the interactive website at Saint Louis University.)

Snow-to-Liquid Ratio Climatology Stratified by NWS Forecast Zone



Map of the snow-to-liquid ratio climatology stratified by NWS Forecast Zone, showing that interior and northern areas of the U.S. typically have drier snow than coastal and southern areas.

Figure 1. Typical ratios of snow-to-liquid-water in various parts of the United States. The numbers on the left axis correspond to the ratios; for example, "15" means a 15:1 ratio, or 15 inches of snow for every inch of liquid. (Image credit: Saint Louis University/CIPS)

In Fort Collins, where the storm was mostly a bizarre midwinter rain with a mere one inch of sodden snow, the total precipitation of 1.66 inches on February 3 was not only the most for any February day in 131 years of recordkeeping (far exceeding 1.02 inches from Feb. 27, 1918), it was also the most for any entire February, just above the 1.65 inches in Feb. 1912. Also reported:

**Boulder:** 1.58 inches of precipitation and 6.9 inches of snow. Wettest February day on record (topping Feb. 3, 2012, which had 1.41 inches of liquid and 22.7 inches of snow)

**Denver:** 0.72 inch of precipitation and 5.5 inches of snow. Third-wettest February day on record (tie) Wet snow in Boulder, 2/3/24



Figure 2. An unusually wet snow for midwinter plasters Boulder, Colorado, on February 3, 2024. (Image credit: Bob Henson)

Along with leaving cement-like slabs of snow that challenged shovelers, the storm also served as a reminder of the complexities of predicting snowfall in a warming climate. If temperatures had been just a touch colder, the same storm might have produced two feet of snow and little or no rain.

It's been widely noted that even in a warming climate, some winter storms may produce more rather than less snow, as large, cold mid-latitude cyclones gather more moisture. And some storms may be abetted by warming-induced deviations in the polar jet stream, a topic still being actively researched.

At the same time, other winter storms will get pushed into the too-warm-for-snow range.

Diagram showing enhanced moisture and its impact on snow and rain production.

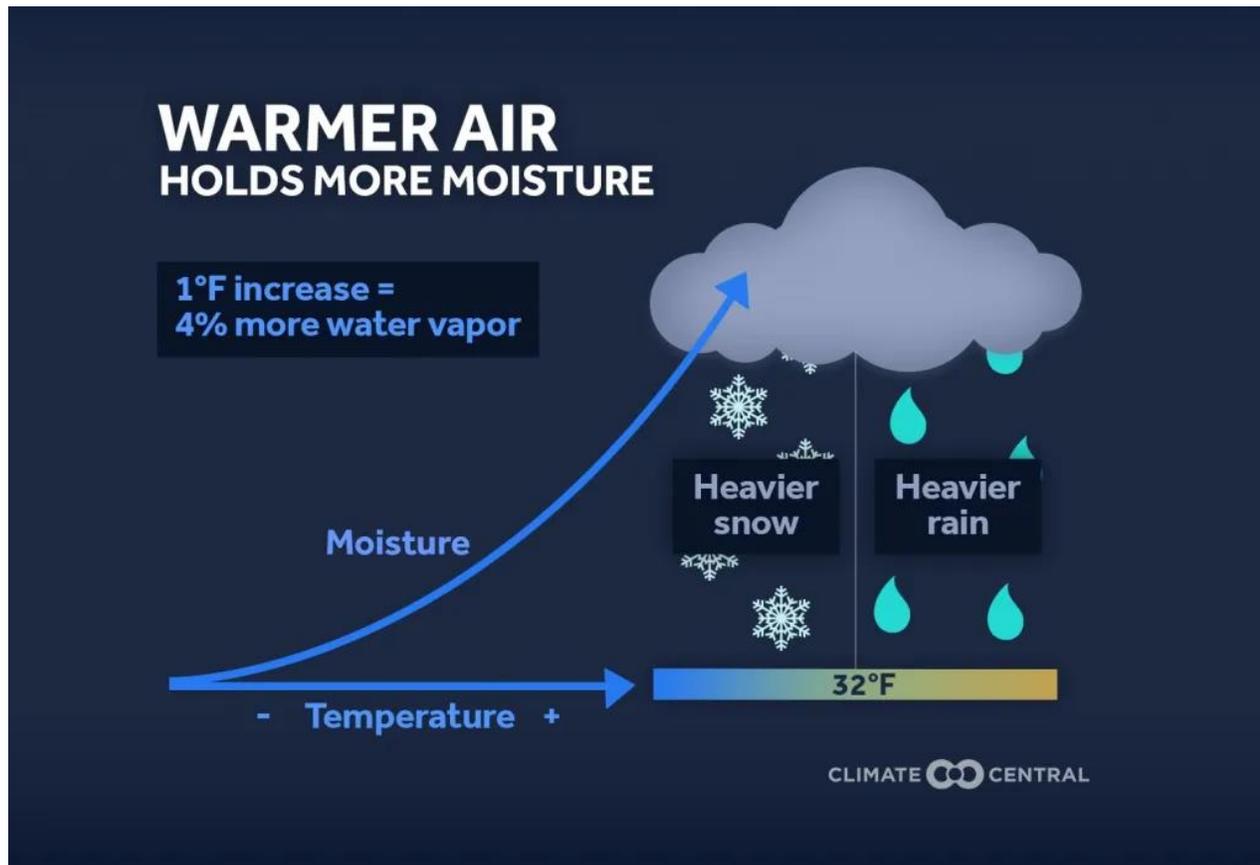


Figure 3. Peak evaporation from lakes and oceans increases as the climate warms, allowing winter storms to potentially entrain more water vapor and produce more snow — but only up to a point, beyond which they become heavier rainstorms rather than snowstorms. (Image credit: Climate Central)

Overall, according to Climate Central, an independent group of scientists and communicators, most of the United States has seen a decrease in spring and fall snow since 1970. Winter snowfall has generally increased in the north-central states and decreased toward the south. Almost two-thirds of U.S. stations have seen a decrease in full-season snow but with many local variations (see Fig. 4 below).

Globally, an analysis led by climatologist Brian Brettschneider found that total snowfall has decreased by almost 3% since 1973.



Figure 4. Since 1970, snowfall has increased at 36% of U.S. stations (left) but decreased at 64% of stations (right). (Image credit: Climate Central)

### A fluffy but flaky storm

A few days after the cold Colorado rain, it was the Northeast's turn for a weird winter storm, this time on the dry end of the spectrum. Forecasters had originally projected a fairly broad zone with several inches of snow that would extend from northern Virginia into New Jersey and lighter amounts into the New York City area and southern New England.

By the day of the storm's onset, February 16, high-resolution short-term models predicted that the snow would end up focused in narrow east-west bands, leading to sharp contrasts between "winners" and "losers". That's basically what happened, but the results were even more dramatic than expected.

Along these narrow bands, conditions were ideal for building the type of fluffy snowflakes called dendrites, which tend to produce the largest accumulations. At some locations, the snow-to-liquid-water ratio exceeded 20:1, yielding more than twice as much snow for a given amount of moisture compared to the norm along the Northeast's I-95 corridor (see Figure 1 above).

The main northeastern snow band extended from southeast Pennsylvania across New Jersey into the New York City area, leading to some remarkable contrasts. Some sites near Allentown, Pennsylvania, notched more than a foot of snow, and eight- to 10-inch amounts stretched across northeast New Jersey, while locations just 20 miles away as the crow flies picked up four inches or less.

In and around New York City, amounts ranged from 3.2 inches at Central Park and 4.2 inches at JFK Airport to eight to 10 inches across southernmost Brooklyn and parts of Staten Island. While forecasters correctly pegged the heavier-to-the-south citywide gradient, there was some grumbling over the higher-end totals, including a Twitter/X post from the city's sanitation department.

After expecting one to five inches, long-suffering Washington, D.C., ended up with less than two inches across most of the metro area. A mere 0.1 inch fell at Reagan Washington National Airport, the city's official observing site.

Veteran meteorologist Jason Samenow, who writes for Capital Weather Gang at the Washington Post, wrote a striking apology, “Snow forecast for D.C. area was a bust. Here’s why.” Samenow asserted it was a tough forecast for the D.C. area, one that could have been delivered with more emphasis on uncertainty but also one that highlights the limits that still plague snow prediction:

The National Weather Service and television meteorologists predicted comparable amounts or even more than we did. But, once in a while, despite all of our best efforts, we’re just going to miss the mark because the tools we have aren’t quite good enough.

As a whole, the public is much less forgiving of busted snow forecasts than busted rain forecasts. It’s easy to see why. Most people wouldn’t notice if a rainy day produced a half inch versus an inch of steady rain. But with a 10:1 ratio, that would be the difference between five inches and 10 inches of snow — which is noticeable indeed.

### **Snow season plays catch-up in California**

Out West, the snow season has hewed closely to the El Niño playbook: dry to the north, wet to the south. Much of the Pacific Northwest and Northern Rockies had less than 70% of average snow water equivalent (the amount of water held in snowpack) as of February 24.

Farther south, a bountiful January and February have pushed California’s crucial Sierra watershed toward the 80% range for the date, with another cold storm expected this week.

And most of the Southwest U.S. is running near- to well-above-average in snowpack moisture — always a good sign in a region that’s been dominated by megadrought for almost 25 years.

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## California eases new water saving regulations for local agencies after pushback

LA Times | March 13, 2024 | Ian James, Sean Greene



A residential street in Woodland Hills has green lawns and some native plants. (Myung J. Chun / Los Angeles Times)

After facing criticism, California water regulators have proposed new conservation rules that would ease requirements for urban suppliers and lead to smaller statewide water savings than originally planned.

An initial proposal from the State Water Resources Control Board ran into strong opposition last year, with managers of water agencies arguing that the large proposed cuts in water use between 2025 and 2035 would be costly and difficult to implement. Those criticisms were echoed in a scathing review by the nonpartisan Legislative Analyst's Office.

In response, the state water board's staff rewrote its blueprint for regulations, proposing less stringent water-saving standards while reducing the number of suppliers that would be required to achieve large cuts of more than 20% and extending the timeline for water reductions an additional five years to 2040.

If approved by the state board later this year, the proposed regulations, dubbed "Making Conservation a California Way of Life," would apply to about 400 urban water suppliers, requiring them to adopt water-use budgets and meet locally tailored conservation goals. The latest changes would bring smaller mandatory reductions for many water agencies than had been expected, and would give them more time to take steps to decrease water usage.

“We’ve provided additional flexibility that adds to the overall budgets of many of the suppliers,” said Eric Oppenheimer, the state water board’s executive director. The new proposal, he said, “maintains the state’s commitment to conservation while making it easier for water suppliers to meet their efficiency goals.”

The changes were praised by representatives of local water agencies as a more reasonable approach. But conservation advocates criticized the revisions as a major watering down of rules that are supposed to help California adapt to the worsening effects of climate change.

“The revised regulation makes our communities less resilient to climate change and allows water suppliers to continue a business-as-usual path,” said Tracy Quinn, president and chief executive of the group Heal the Bay. “This approach is shocking considering what we know about changing precipitation patterns and California’s lip service about preparing for climate change.”

Quinn said the rules as proposed would fall far short of the steps California needs to take to adapt to more intense droughts and less reliable water supplies. She said the state water board “caved to unreasonable water agency complaints” by allowing weak standards with “semi-truck sized loopholes that make it too easy for water suppliers to shirk their obligation to use water more efficiently.”

State officials said their revisions were based on extensive input from managers of water agencies and the public.

Many local water suppliers “raised a lot of concerns with the first draft of the regulation,” Oppenheimer said. “We really took stock in those comments that we received, and really took the concerns that were raised to heart.”

In November, state officials formed a group of water managers and conservation experts to discuss options for revising the regulations and held a series of meetings, where Oppenheimer said officials heard “a lot of really useful and meaningful input.”

State regulators also considered the critique by the legislative analysts, who warned that the original proposal would be expensive, overly complicated and difficult to implement.

“Generally what we did was push out all of the dates about five years to provide more flexibility,” Oppenheimer said. “This provides additional time for the suppliers to meet those increasingly more efficient water use objectives.”

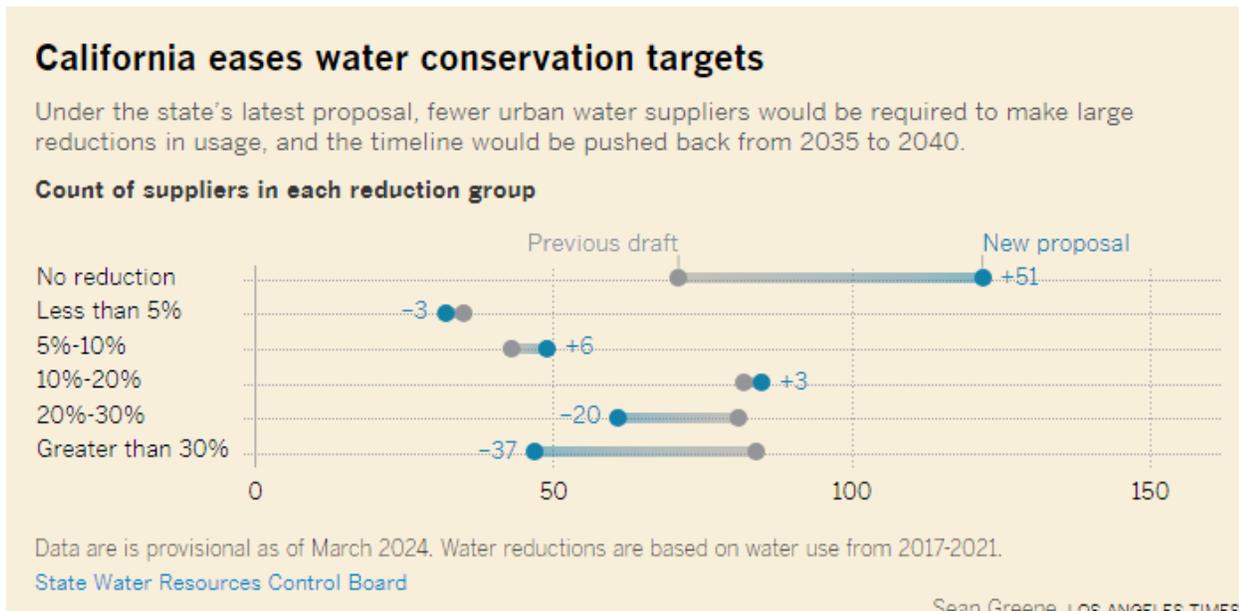
The regulations, which were required under 2018 legislation, are expected to take effect in January 2025, and the state would begin to assess whether suppliers are complying in 2027. The targets for reductions in water use would be phased in until 2040.

State officials had estimated that their original proposal would have slashed California’s urban water use 12% by 2035. With the changes, the state estimates the revised rules could reduce water use by 7% by 2035, and 9% by 2040.

The state board's staff calculated those estimates using a baseline period of 2017 to 2021 for comparison, and found that the 2040 reduction goals would mean a statewide reduction of about 500,000 acre-feet of water per year, roughly equivalent to the annual water use of Los Angeles.

State officials acknowledged that some of these reductions would be expected to occur even without the regulations in place. They also said their estimates don't account for measures in the proposal that would give some suppliers additional time to meet water-saving targets.

The number of water suppliers required to achieve reductions of more than 20% would decrease from 165 under the initial proposal to 108 under the new proposal. Of those, the number of agencies required to cut water use more than 30% would shrink from 84 to 47.



The rules would bring vastly different requirements for cities in Southern California.

On the high end of reductions, Arcadia would be required to cut water use 37.6% by 2040, while Beverly Hills would need a 34.6% reduction and Burbank would be tasked with a 32.4% reduction.

Elsewhere, the 2040 reductions would be 29.1% for Covina, 17.8% for Redlands, 15.7% for Thousand Oaks and 9.3% for the L.A. Department of Water and Power.

In all, 274 water suppliers statewide would be required to reduce water consumption by some amount by 2040.

## Water use reductions needed to meet conservation goals

The state's revised water conservation goals would require 274 suppliers to reduce consumption by 2040.

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Agency	2030	2035	2040
City of Adelanto	-13%	-20%	-23%
Alameda County Water District	0%	-2%	-6%
Alco Water Service	-21%	-26%	-28%
City of Alhambra	-12%	-18%	-21%
Amador Water Agency	0%	0%	0%
City of American Canyon	0%	0%	-1%
City of Anaheim	0%	-5%	-8%
City of Anderson	0%	-10%	-15%
City of Antioch	0%	-8%	-12%
Apple Valley Ranchos Water Co.	0%	0%	0%

Your supplier is the utility that bills you for water. Data are provisional as of March 2024. Water reductions are based on water use from 2017-2021.

State Water Resources Control Board

Sean Greene LOS ANGELES TIMES

In some areas, water purveyors are already meeting their long-term conservation targets. The rules would require no reduction in usage for 122 water agencies — an increase from 71 agencies under the initial plan — representing nearly a third of the state's urban suppliers.

Among the cities that would not see any mandatory reductions in water use through 2040, according to state data, are Santa Ana and Compton.

The proposed changes address concerns raised by the Assn. of California Water Agencies, which represents public agencies that supply most of the state's cities and farms.

Chelsea Haines, the association's regulatory relations manager, said the state has now offered a "more reasonable yet strong regulation that will continue to push Californians to advance long-term water use efficiency."

The new urban water efficiency rules are intended to drive permanent reductions to adapt to climate change — part of Gov. Gavin Newsom's strategy to prepare for an estimated 10% decrease in California's water supply by 2040.

"Urban retail water suppliers see water use efficiency as an important tool in the state's strategy for adapting to climate change," Haines said. "Our focus has been just making sure that the regulation that's ultimately adopted puts us on a path of success that is cost effective, that is feasible, that provides adequate time for Californians to make the shifts that would be required."

The state's updated proposal, Haines said, will "provide more flexibility on how to achieve those goals, and recognizes that increasing long-term water use efficiency will require time."

The proposed regulations won't apply to individual households or businesses, only to cities and water districts. The rules also don't apply to agriculture.

Under the regulations, each water supplier will be tasked with working toward a locally tailored water use budget, which accounts for indoor and outdoor residential water use, water lost to leakage, and landscape irrigation at businesses and institutional properties. Each city or water district can choose how to meet its overall water use goal.

There are special allowances for communities where residents have livestock, or where many homes have swamp coolers that consume more water.

The rules also include bonuses that would increase water budgets for suppliers that use recycled water, or for those that are struggling to meet targets and have non-irrigated areas that could be irrigated in the future.

In addition, the state's proposal would allow some suppliers that are facing large reductions in water use to apply for "alternative compliance." Based on current data, this would allow as many as 63 suppliers serving lower-income areas to reduce water use at the slower pace of 1% each year while working toward reduction goals. An additional 19 suppliers in higher-income areas would also qualify and could reduce water use 2% each year.

The state water board has the authority to issue orders if suppliers fail to comply, and to impose fines if necessary — up to \$1,000 a day in a non-drought year, and \$10,000 a day in a drought year. State officials say, however, that fines would be a last resort and they plan to work with local agencies to help them meet their targets.

Quinn, of Heal the Bay, said the expanded loopholes, delayed timeline and less stringent standards in the state's proposal would be irresponsible and "reckless."

"The proposed delay means the majority of water suppliers don't have to save a single new drop of water until at least 2035," Quinn said.

Quinn said she is concerned that the regulations as written would allow for "backsliding" and that some suppliers could increase water use. The 2018 legislation that laid the groundwork for the rules included a provision aimed at ensuring a previous goal of reducing water use 20% by 2020 would remain the minimum goal for all local agencies.

"Unfortunately, the State Board has decided not to enforce the no backsliding provision until 2040, meaning water suppliers can use more water than their 2020 goals for the next 16 years," Quinn said.

Quinn said the "alternative compliance" measure, which was originally intended to help disadvantaged communities catch up on saving water, shouldn't be used to ease the requirements for any supplier that hasn't adequately invested in conservation.

“We need to be adapting our communities to climate change, and we needed to start yesterday — or a decade ago,” Quinn said. “Water agencies should be leaning into conservation and efficiency instead of fighting for the right to waste more water.”

Quinn pointed out that during the drought in 2022, parts of Southern California were under severe water restrictions, which were lifted only after the wet winter of 2023 ended the emergency.

“Our climate amnesia is almost as devastating as climate whiplash,” Quinn said. “The recent rain and snow seems to have faded our memories that just two years ago parts of Los Angeles were dangerously close to running out of water. Now is not the time to take our foot off the pedal.”

She and other advocates say conservation is the fastest and cheapest way of securing water supplies for cities, and that moving to change landscapes from thirsty lawns to native plants can help California not only become more resilient but also reduce energy use by pumping and treating less water.

A study in 2022 by researchers at the Pacific Institute, a water think tank in Oakland, found that California could reduce urban water use by 30% to 48% by investing in measures to use water more efficiently, such as fixing leaks in pipes, replacing inefficient appliances and replacing lawns with low-water-use plants. And experts say that from now until 2026, water districts have an opportunity to take advantage of federal funds from the Bipartisan Infrastructure Law to support investments in conservation efforts.

“California has a tremendous untapped potential to reduce urban water use,” said Heather Cooley, the Pacific Institute’s research director. “Now is exactly the time for the water board to push to ensure urban water conservation remains a priority.”

The state water board will hold a workshop on the proposed draft regulation March 20 and will accept comments until March 27.

Meanwhile, some water districts that are facing significant reductions — including Walnut Valley Water District, Rowland Water District and Bellflower-Somerset Mutual Water Co. — announced that they are supporting SB 1330, a bill introduced by state Sen. Bob Archuleta (D-Pico Rivera) that they say would make it easier to meet conservation goals. The districts’ managers said they are supporting the legislation to extend timelines for compliance, simplify procedures and ensure water remains affordable while they promote conservation.

The Assn. of California Water Agencies has not taken a position on the legislation.

Californians have dramatically reduced water use over the last decade. According to the state water board, per-capita urban water use decreased by more than 20% between 2013 and 2022.

Oppenheimer said the new rules would secure a significant amount of additional water savings.

“The state is facing major water supply challenges in the face of climate change,” he said. “And conservation is an important tool to help mitigate that reduction in water supply.”

###

## California rolls out first-of-a-kind permanent water restrictions for cities and towns. Here are the details

San Francisco Chronicle | March 12, 2024 | Kurtis Alexander



Neighboring lawns feature a drought-resistant landscaping model and a traditional grass landscaping model in the Danville area in 2016. A new water plan from the state spells out permanent water restrictions for cities across California. Leah Millis/The Chronicle

Drought or no drought, California water regulators are pushing ahead with a new conservation policy that could force some communities to cut water use upward of 30% permanently — though on more lenient terms than originally proposed.

The first-of-its-kind regulation is intended to help the state confront chronic water shortages as climate change makes for hotter, drier weather. The initial draft of the regulation, released last year, was widely criticized for asking roughly 400 cities and water agencies to cut back too much too quickly. The cost of compliance was also a concern.

Acknowledging the burden, the State Water Resources Control Board on Tuesday unveiled a revised set of rules that would allow some communities to use more water than originally planned as well as extend deadlines for meeting the conservation mandates. For example, required cuts, which go into effect gradually, would be spread out through 2040 instead of 2035, and wouldn't begin until 2027 instead of next year.

“More (water savings) is always better,” said Eric Oppenheimer, executive director of the State Water Board, at a briefing for reporters. “But that needs to be balanced against providing enough flexibility to water suppliers in meeting the standards, and that’s what we’ve tried to do here.”

In the Bay Area, nearly every water agency faces no initial reduction under the proposed rules. Consumption in the region is already relatively low. Some suppliers, though, would have to make significant cutbacks in the future as the rules become increasingly stringent.

By 2040, for example, state estimates show that the city of Martinez would have to cut back 17% over its recent use. The California Water Service Company’s Bear Gulch District, serving Atherton, Portola Valley, Woodside and parts of Menlo Park and unincorporated Redwood City, would have to cut back 14% by 2040, and the city of Pittsburg would have to cut back 12% by 2040. These projections are preliminary and could change as the policy rolls out.

Statewide, about a third of the roughly 400 water retailers, including many in the Bay Area, would face no water restrictions at all. San Francisco is among them.

Whether the revised rules offer enough latitude and financial reprieve to appease cities and water agencies remains to be seen. The State Water Board is taking public comment on the proposal through March 26, and the agency’s governing board is scheduled to make a final decision on the rules this summer.

The policy, dubbed Making Water Conservation a California Way of Life, is the product of legislation signed by former Gov. Jerry Brown in 2018 after last decade’s five-year drought. The regulation represents a different approach to conservation than past programs not only because it seeks permanent water reductions but because it sets water-use targets for individual water retailers instead of imposing a uniform across-the-board cut.

The customized targets are based on such factors as climate and land use. The amount of water allocated is the sum of several considerations, including indoor and outdoor water consumption.

Under the proposal, water retailers are responsible for figuring out how to meet their target use. Some agencies are likely to request water savings from their customers, and others are likely to mandate it. Those that don’t meet their specified allocation would be subject to fines as high as \$10,000 per day. The new draft of the regulation allows suppliers who face difficulty meeting their targets to seek “alternative pathways,” essentially applying for leeway.

Compliance is likely to be most challenging for retailers in the Central Valley, where summers are warm and water use has historically been high. Also, many communities in the region are poorer than coastal cities, making it harder to pursue conservation strategies such as giving customers rebates for water-efficient appliances and investing in sometimes costly water recycling and groundwater storage.

Under the revised regulation, by 2040, Atwater in Merced County would have to cut water use by 58%, Kingsburg in Fresno County would have to cut back 50%, and the community of Mountain House in San Joaquin County would have to cut back 41%, according to state projections.

In the Bay Area, where the weather is more moderate and conservation has long been at the fore of public planning, the new regulation is less daunting. The required cuts through 2040 would seldom exceed 10%.

The East Bay Municipal Utility District, serving 1.4 million people, would face a 3% cut in 2040. The Alameda County Water District, serving around 350,000 people, would face a 6% reduction in 2040. The city of San Jose's Evergreen-Edenvale-Coyote area, where 128,000 people live, would face a 9% cut by 2040.

The new policy was still being reviewed by water agencies on Tuesday, but even before its much anticipated release, water managers were expressing cautious optimism.

"We're hopeful this new version is reasonable, cost-effective and supportive of local agencies' ability to make long-term investments for climate resilience," said Heather Engel, a spokesperson for the Association of California Water Agencies, a trade association that was critical of last year's draft.

Many of the concerns with the regulation were highlighted in a blistering report by the state Legislative Analyst's Office in January. The nonpartisan watchdog described the policy as too complex, too ambitious and too costly, particularly for low-income communities.

The report concluded that the amount of water saved with the new rules may not be enough to justify the program. It noted that the "modest" savings was but a blip in the state's total water consumption, which is dominated by agriculture. The farm sector accounts for about 80% of the water used.

The new regulation, according to state officials, would reduce urban water use 7% statewide by 2035, about 5 percentage points less than the original proposal. By 2040, when the reductions are fully rolled out, cumulative savings would be about 500,000-acre feet a year, enough water to supply more than 1 million households.

State water officials have not yet estimated how much the revised proposal would cost water agencies and their customers, though they said there would ultimately be savings because less water would have to be sourced. The initial proposal cited an added expense of \$13.5 billion through 2040 and benefits of at least \$15 billion.

The water board has long maintained that conservation is the least expensive way to ensure the state has enough water. Developing new sources of water is generally a lot more expensive.

The state has projected a 10% decrease in water supply by 2040 due to the warming and drying climate.

“Conservation is a key tool to help the state better manage our diminishing water supply in a new climate reality,” Oppenheimer said.

# # #

## California relaxes controversial new water conservation rules

*Regulations will require cities to use water more efficiently, whether or not a drought is occurring*

Mercury News | March 12, 2024 | Paul Rogers



Sprinklers water the lawn and sidewalk of a house in Alameda, Calif., on Tuesday, May 4, 2021. (Ray Chavez/Bay Area News Group)

In response to critics who said that proposed new statewide water conservation rules — aimed at cutting urban water use even in years when California is not in a drought — were too complicated and costly, California water regulators on Tuesday unveiled new, more relaxed standards.

Many of the largest Bay Area water agencies, which have been leaders in water efficiency for years, will not be required to make further cuts through 2035, and will face cuts of less than 5% by 2040.

## BAY AREA WATER CONSERVATION

A law signed in 2018 will set water reduction targets for the state's urban water agencies for 2025, 2030, 2035 and 2040. Many of the Bay Area's largest water providers are on track to meet them.

Agency	Average service area population (2017-21)	Average use in millions of gallons (2017-21)	Reductions needed to meet standards by:			
			2025	2030	2035	2040
Estero Muni. Improve. Dist.	37,055	1,532	-0.68%	-5.84%	-5.84%	-11.72%
S.J. - Evergreen Edenvale Coyote	128,085	6,798	0%	-1.76%	-1.76%	-9.13%
Pittsburg, City of	67,986	2,803	0%	-0.91%	-0.91%	-11.64%
Calif. Water Service Co. - Bear Gulch	59,855	3,946	0%	0%	0%	-13.73%
Livermore, City of	30,646	2,172	0%	0%	0%	-12.04%
Solano Irr. Dist. - Suisun-Solano	29,547	1,107	0%	0%	0%	-5.78%
Alameda County Water Dist.	355,529	14,296	0%	0%	0%	-5.61%
Great Oaks Water Company Inc.	104,734	3,421	0%	0%	0%	-5.58%
Calif. Water Service Co. - Los Altos	70,058	4,029	0%	0%	0%	-8.92%
Redwood City	88,528	3,275	0%	0%	0%	-5.28%
Sunnyvale, City of	154,359	6,232	0%	0%	0%	-4.60%
Martinez, City of	28,185	1,546	0%	0%	0%	-17.25%
Pleasanton, City of	81,031	4,780	0%	0%	0%	-5.81%
Milpitas, City of	76,723	3,115	0%	0%	0%	-2.63%
Golden State Water Co. - Bay Point	22,368	590	0%	0%	0%	-2.96%
Hillsborough, Town of	10,910	907	0%	0%	0%	-8.87%
Contra Costa Water Dist.	198,000	10,104	0%	0%	0%	-3.87%
Santa Clara, City of	128,180	7,136	0%	0%	0%	-2.94%
East Bay Municipal Utility District	1,422,200	61,019	0%	0%	0%	-2.72%
Sonoma, City of	11,815	669	0%	0%	0%	-2.47%
Calif. Water Service Co. - San Mateo	137,531	4,580	0%	0%	0%	-2.40%
Palo Alto, City of	67,680	3,645	0%	0%	0%	-1.36%
American Canyon, City of	20,720	944	0%	0%	0%	-0.71%
Dublin San Ramon Services Dist.	91,846	4,158	0%	0%	0%	-0.15%
San Jose Water Co.	994,201	37,233	0%	0%	0%	0%

Source: California State Water Resources Control Board estimates

BAY AREA NEWS GROUP

Other agencies in the Central Valley and Southern California, which have not used water as efficiently, would be required by 2040 to make cuts of 30% or more from their overall use.

The rules, from the State Water Resources Control Board, are expected to be finalized in July and go into effect next year.

Last winter was very wet across California, with flooding and the biggest Sierra snowpack in 40 years. This winter, rain and snow totals are running about average so far, with reservoirs mostly full from last year, and few if any summer water restrictions expected.

But California has been in a severe drought in eight of the past 13 years back to 2012. State officials said Tuesday that hotter, drier weather from climate change means that cities and water agencies need to do more to make urban water use at homes, businesses, and government sites more efficient.

“The state is facing major water supply challenges in the face of climate change,” said Eric Oppenheimer, executive director of the state water board. “Conservation is an important tool to help mitigate the reduction in water supply.”

The landmark rules are required by two laws that former Gov. Jerry Brown signed in 2018 after a severe five-year drought. Environmentalists and some water districts have supported them. But some water agencies have been strongly opposed, saying Sacramento is beginning a new era of micro-managing how local communities use water.

Under the law, roughly 400 of the California’s largest cities and water districts are required to come up with a water-use budget every year beginning Jan. 1, 2025. They could eventually face fines of up to \$1,000 a day — and \$10,000 a day during drought emergencies — for failing to set and meet appropriate targets.

The targets will vary by community. They are based on a formula made up of three main factors: a standard of 47 gallons per person per day for indoor water use, dropping to 42 gallons by 2030; an amount for outdoor residential use that varies by community depending on regional climates; and a standard for water loss due to rates of leaks in water system pipes.

Last August, the state water board released the draft rules.

But they came under sustained criticism. A report from the non-partisan state Legislative Analyst’s Office in January concluded that the rules could further increase water rates for low-income people, and cause confusion for the public and water agencies. The LAO report noted that cities only use about 20% of the water that people in California consume, while agriculture uses 80%.

“Whether the benefits of the new rules ultimately will outweigh the costs is unclear,” the report says. “These doubts are particularly worrisome given we find that suppliers will face notable challenges complying with these requirements.”

On Tuesday, the revised rules granted cities and water agencies more time to meet their targets.

Under the old rules, 168 agencies that serve 42% of California’s population would have had to cut water use 20% or more by 2035. Under the new rules, just 46 agencies, representing 10% of the population, will have to cut water use that much.

Now, communities that are required to cut use by 20% or more, but where the median household income is below the state average, can stay in compliance if they reduce by 1% a year. Regulators also delayed tougher outdoor watering standards from 2030 to 2035.

Overall, Oppenheimer said, the new rules will cut urban water use 7% instead of 12%. That will mean savings of about 500,000 acre feet a year by 2040, instead of 690,000 acre feet a year by 2035 under the old rules.

Environmentalists said they were disappointed.

“It’s disheartening,” said Tracy Quinn, CEO of Heal the Bay, a Los Angeles group. “I think they caved to pressure from the water suppliers. We know that water conservation is the fastest and cheapest way to get to water reliability.”

Water agencies, however, said the new draft rules are more reasonable and attainable than last fall’s. Water use in most California cities is lower today than it was in 1990, due to low-flush toilets, more efficient washing machines and dishwashers, incentives that pay homeowners to remove lawns and other programs, they added.

“We support the goals of long-term water-use efficiency,” said Chelsea Haines, regulatory relations manager with the Association of California Water Agencies, a trade group. “It’s a really important tool in the tool kit to adapting to the challenges of climate change. But we want a regulation that finds a balance with continuing to advance water use efficiency, and which is feasible and cost effective.”

###

## California weakens plan for mandatory cutbacks in urban water use, yielding to criticism

CalMatters | March 12, 2024 | Rachel Becker



Sprinklers water a lawn in Los Angeles on June 5, 2022. Under new proposed rules, water agencies in California's urban areas will have to meet mandatory water conservation cuts. Photo by Pablo Unzueta, CalMatters

Facing criticism over their ambitious plan to curb urban water use, California's regulators today weakened the proposed rules — giving water providers more years and flexibility to comply.

Cities and urban water districts welcome the changes to the state's draft conservation rules, which they said would have been too costly for ratepayers, estimated at \$13.5 billion, and too difficult to achieve.

But environmentalists are dismayed by the revisions, which they said won't save enough water to weather shortages as climate change continues to squeeze supplies.

"It's really looking like this is a 'do nothing' regulation," said Tracy Quinn, CEO and president of Heal the Bay, a Los Angeles County environmental group. "The updated standards are weak, and the regulation includes semi-truck sized loopholes that make it too easy for water suppliers to shirk their obligation to use water more efficiently."

Mandated by a package of laws enacted in 2018, the rules from the State Water Resources Control Board aim to make "water conservation a California way of life" by mandating cuts in

water use among more than 400 cities and water agencies that supply the vast majority of Californians.

The regulation won't set mandatory conservation targets for individuals. Instead, it creates water budgets for cities and districts, which would meet them through rebates, new rate structures and other efforts to cut their customers' use.

The Legislative Analyst's Office, in a January report, heavily criticized the original rules, saying they would set "such stringent standards for outdoor use that suppliers will not have much 'wiggle room' in complying."

Warning that the costs may outweigh the benefits, the analysts recommended relaxing several of the requirements, such as the residential outdoor standard, and extending deadlines.

The board's new revisions delay the start date for enforcing compliance with the water budgets by two years, until 2027 — largely because the water board is behind schedule in adopting the regulation, its executive director, Eric Oppenheimer, said. Water suppliers also are granted an extra five years, until 2035, to meet targets ramping down outdoor water use, and are given until 2040 for reductions originally planned for 2035.

The latest version would conserve about 520,000 acre-feet of water a year starting in 2040, according to the water board's estimates. That's 170,000 acre-feet less than the previous version, enough to serve more than half a million households for a year.

California Gov. Gavin Newsom has called for at least 500,000 acre-feet in annual conservation by 2030.

When the rules are finalized, each water supplier must meet individualized conservation goals, calculated from a complex formula based on standards for indoor and outdoor residential water use and certain commercial landscapes, as well as losses like leaks. Other variables such as the presence of livestock in a region or availability of recycled water can factor into the calculation.

*"You still have to meet your objective, whatever that may be. But you get more time to get there — in some cases, substantially more time."* ERIC OPPENHEIMER, STATE WATER RESOURCES CONTROL BOARD

The water board said it would vote on the updated plan in July, following public comment, and it would take effect at the beginning of next year.

Statewide, 63 water suppliers, serving about 9% of the population where household incomes are below the state median, will be required to cut water use by more than 20%. Under the revisions, they could cut use by only 1% per year and still be deemed in compliance provided

they meet other requirements. Another 19 suppliers in wealthier regions facing cuts of 30% or more could cut use by only 2% per year and still comply.

“You still have to meet your objective, whatever that may be. But you get more time to get there — in some cases, substantially more time,” Oppenheimer said.

“That would mean that if your ultimate compliance target was 30%, you’d have 30 years to get there,” compared to approximately 15 years under the old version, Oppenheimer said.

Water suppliers welcomed the extended deadlines because they would have more time to coax customers with rebates and other programs into making lasting changes to irrigated landscapes without harming shade trees and disadvantaged communities.

The changes will allow “urban retail water suppliers to thoughtfully and cost effectively implement programs,” said Chelsea Haines of the Association of California Water Agencies, which represents more than 450 public agencies. “I hope that we see this additional time not as a delay, but as an opportunity.”

The water board does not have an updated cost estimate for the revised rules to compare to the \$13.5 billion estimate for the old version. The costs come largely because cities and agencies would offer rebates and rate cuts to those who conserve. The benefits were estimated to reach about \$15.6 billion, in large part because suppliers and customers will buy less water.

*The changes will allow “urban retail water suppliers to thoughtfully and cost effectively implement programs. I hope that we see this additional time not as a delay, but as an opportunity.”* CHELSEA HAINES, ASSOCIATION OF CALIFORNIA WATER AGENCIES

Environmentalists say the delays belie the urgency of preparing for the next, inevitable drought and will force more drastic changes to landscapes when emergency conservation measures are needed once again.

“The fact that we aren’t taking steps as quickly as possible to invest in more climate resilient landscapes that will be able to survive those future droughts is unthinkable. Quite frankly, it’s reckless,” Quinn said.

Heather Cooley, director of research for the Pacific Institute, said conservation is cheaper than developing new supplies by, for instance, desalination or recycling — a burden that customers would eventually bear.

“By weakening the standard, we’re making water more expensive,” Cooley said.

Under a previous version of the rules, about 18% percent of suppliers — serving about a quarter of the state’s population — wouldn’t have to reduce their customers’ use to meet the 2035 standards, according to the board’s estimates last September. Now, under the new version,

37% of suppliers — serving 42% of the state’s population — wouldn’t have to change their water use by 2035. And by 2040, 31% could still maintain their status quo, according to water board data.

Asked if they were concerned about the reduced savings under the latest version, Oppenheimer said flexibility and feasibility are important.

“We think 500,000 acre feet of saved project savings is a substantial amount,” he said. “More is always better, but that needs to be balanced against providing enough flexibility to the water suppliers, and the feasibility of meeting those standards.”

# # #

## Protests Against Delta Tunnel Change in Water Diversion Must Be Filed by April 29

Daily KOS | February 29, 2024 | Dan Bacher



As salmon and Delta fish populations continue to crash due to massive water diversions to corporate agribusiness, the State Water Resources Control Board just issued a public notice regarding the Delta Conveyance Project Change in Point of Diversion (CPOD) Petition that was submitted by the Department of Water Resources (DWR) to the State Water Board on February 22, 2024.

This notice acknowledges receipt of the change petition and details the process to submit a protest against the petition.

You can expect a wave of formal protests against the change petition by fishing groups, Tribes, environmental justice organizations, conservation groups and Delta region cities and counties.

Protests against the change petition must be filed by April 29th, 2024, with a copy provided to the petition, according to the Water Board. Details regarding how to submit a protest can be found in the full-length version of the notice available on the State Water Board's Delta Conveyance Project website at: [https://waterboards.ca.gov/bay\\_delta/delta\\_conveyance.html](https://waterboards.ca.gov/bay_delta/delta_conveyance.html).

Questions concerning this notice and non-controversial procedural questions regarding the Board's proceeding related to this petition may be directed to the Board's project team at DCP-WR-Petition@waterboards.ca.gov.

For additional information on the CPOD petition, view this Q&A prepared by DWR.

The Delta Tunnel is considered by Tribes, fishermen, Delta residents, environmental justice advocates to be an environmentally destructive boondoggle that would hasten the extinction of Sacramento River winter-run Chinook salmon, Sacramento River spring-run Chinook salmon, Central Valley steelhead, Delta and Longfin Smelt, green sturgeon and a host of other imperiled species.

The Delta Tunnel is based on the unscientific and untenable concept that taking more water out of the Sacramento River before it flows through the Delta would somehow help to bolster water supply reliability and restore the ecosystem when it would do neither. I'm not aware of any example in U.S. or world history where a project that takes more water out of a river has helped to restore an ecosystem.

I will post more information regarding this notice as it comes in.

Delta Smelt is functionally extinct in the wild, salmon runs collapse

The notice was issued by the State Water Board as the San Francisco Bay-Delta Ecosystem suffers from its worst-ever ecological crisis.

For the sixth year in a row, no Delta Smelt were collected in the California Department of Fish and Wildlife's Fall Midwater Trawl (FMWT) Survey in the Sacramento-San Joaquin River Delta from September through December 2023.

Once the most abundant species in the entire estuary, the Delta Smelt has declined to the point that it has become functionally extinct in the wild. The 2 to 3 inch fish, found only in the Delta, is an "indicator species" that shows the relative health of the San Francisco Bay/Delta ecosystem.

"No Delta Smelt were collected at any stations from September through December," reported Taylor Rohlin, Environmental Scientist for the CDFW Bay Delta Region, in a memo published on Jan. 25. "The 2023 September-December index (0) is tied with 2018-2022 as the lowest index in FMWT history."

Meanwhile, the other pelagic species collected in the survey — striped bass, Longfin Smelt, Sacramento Splittail and thread fin shad — continued their dramatic decline since 1967 when the State Water Project went into effect. Only the American shad shows a less precipitous decline. The graphs in the CDFW memo graphically illustrate how dramatic the declines in fish populations have been over the years: [nrm.dfg.ca.gov/...](http://nrm.dfg.ca.gov/)

Between 1967 and 2020, the state's Fall Midwater Trawl abundance indices for striped bass, Delta smelt, longfin smelt, American shad, splittail and threadfin shad have declined by 99.7, 100, 99.96, 67.9, 100, and 95%, respectively, according to the California Sportfishing Protection Alliance.

Salmon fishing season was closed last year on the ocean waters of California and in all of the state's rivers, due to the low numbers of returning fall-run Chinook salmon in the Sacramento and Klamath Rivers.

Endangered Sacramento River spring and winter-run Chinook continue their march towards extinction. The spawning escapement of Sacramento River Spring Chinooks (SRSC) in 2023 totaled 1,479 fish (jacks and adults), with an estimated return of 106 to upper Sacramento River tributaries and the remaining 1,391 fish returning to the Feather River Hatchery.

The return to Butte Creek of just 100 fish was the lowest ever. In 2021, an estimated 19,773 out of the more than 21,580 fish total that returned to spawn in the Butte County stream perished before spawning

Nor did the winter run, listed under the state and federal Endangered Species Act, do well. Spawner escapement of endangered Sacramento River Winter Chinook (SRWC) in 2023 was estimated to be 2,447 adults and 54 jacks, according to the Review.

A group of us, including the late conservationist and Fish Sniffer magazine publisher Hal Bonslett, successfully pushed the state and federal governments to list the winter run under the state and federal Endangered Species Acts starting in 1990-91 because we were so alarmed that the fish population had crashed to 2,000 fish.

Then in 1992 the run declined to less than 200 fish. Even after Shasta Dam was built, the winter run escapement to the Sacramento River was 117,000 in 1969!

Now we are back to approximately the same low number of winter-run Chinooks that spurred us to push for the listing of the fish as endangered under state and federal law over 30 years ago.

This demonstrates why the Winnemem Wintu Tribe's plan to build a fishway to enable the winter run Chinooks to again spawn in the McCloud River above Shasta Reservoir is so important! For the past two years, the Winnemem and the U.S. and state governments have worked together in a program reintroducing winter Chinooks to their native habitat in the McCloud River above Shasta Reservoir.

Forecasted Sacramento River Chinook salmon number is only 213,622

The forecasted adult Sacramento Valley fall-run Chinook salmon population number is only 213,622, according to page 59 of a presentation to be done in Oregon by the state and federal governments today.

This foreshadows the California salmon information webinar coordinated by the California Department of Fish and Wildlife on Friday, March 1. The presentation power point is available at: [https://www.dfw.state.or.us/mrp/salmon/docs/OSIG\\_Combined\\_Presentations\\_2024.pdf](https://www.dfw.state.or.us/mrp/salmon/docs/OSIG_Combined_Presentations_2024.pdf)

The original 2023 projection for Sacramento River fall Chinook, the most predominant stock harvested in California's fisheries, was estimated at 169,767 adults, one of the lowest forecasts since 2008 when the current assessment method began.

The 213,622 number is surprisingly low, considering that all ocean recreational and commercial salmon fishing in the ocean and all recreational salmon fishing in California rivers was closed last year. Imagine how low the 2024 projection would be if the recreational and commercial fishermen hadn't pressured the federal and state governments to close salmon fishing in 2023!

"The salmon population would have been much higher if 2024's salmon hadn't been hit by hot water from dams that likely killed millions of incubating #salmon eggs in the upper Sacramento Valley in 2021 and inadequate reservoir releases to safely deliver the juvenile survivors to the ocean in the spring of 2022," according to the Golden State Salmon Association (GSSA).

###

## **DAN WALTERS: California needs reliable water supply, but climate change brings more uncertainty**

*As California's precipitation becomes more erratic due to climate change, the state needs more tools, including more storage capacity, to make the water supply reliable.*

Cal Matters Commentary | February 27, 2024 | Dan Walters

There's no issue more important to California than having a reliable supply of water, but the situation is increasingly uncertain from both immediate and long-term perspectives.

Last week, federal and state water regulators told the state's municipal water agencies and San Joaquin Valley farmers that they could count on getting just 15% of their contracted allocations this year because precipitation this winter in Northern California has fallen short of normal, despite storms that caused serious flooding in Southern California.

"Many expected the initial allocation to be higher," Federico Barajas, executive director of the San Luis & Delta-Mendota Water Authority, which represents dozens of agencies that receive Central Valley Project water, told the San Francisco Chronicle. "This low initial allocation is particularly challenging for agricultural producers, who are reliant on these projections for planning crops to grow during the year and for acquiring the financing necessary to support food production."

However, as reservoir managers were issuing that grim projection, they were also drawing down reservoir levels, which had soared from last winter's heavy storms, to create space for anticipated runoffs later in the spring.

On Monday, the Sacramento River was running high and fast, nearly 70,000 cubic feet a second, thanks to elevated releases from Shasta and Oroville reservoirs, both of which still contain well over 100% of their usual amounts of water at this time of year.

The anomaly of sending so much water downstream while warning municipal and agricultural users of low allocations frames the ever-increasing difficulty – bordering on impossibility – of water management in an era of climatic volatility.

California has historically received most of its precipitation during a few winter months while the remainder of the year is dry. It's why federal, state local agencies have constructed dozens of dams and reservoirs to collect water when it is available for delivery to users during drier periods.

However, the peaks of precipitation appear to be getting higher – witness this year's near-hurricanes in Southern California – and the periods of drought seem to be becoming longer due to climate change. They upset the models that water managers have traditionally used to decide when to boost reservoir storage and when to increase releases.

Another big storm is expected later this week, and it could dump enough snow in the Sierra to bring the snowpack up to normal levels and eventually increase allocations to water users, but that's speculation. Meanwhile, with the spring planting season approaching, farmers must guess how much water they will have to irrigate their crops.

As precipitation becomes more erratic – and is likely to be more rain and less snow – California should be increasing its water storage capacity to regain control, and there are some steps in that direction. One is speeding up construction of the Sites reservoir on the west side of the Sacramento Valley, which would absorb some high flows on the Sacramento River for later release during dry periods.

However, we need more storage options, both surface and underground, and we need to resolve some knotty issues, such as the decades-long controversy over a tunnel or some other conveyance to bypass the Sacramento-San Joaquin Delta so that more Sacramento River water can be sent southward for use or storage.

That project, meanwhile, is politically tied to efforts by the state to either persuade farmers on the San Joaquin River to reduce their diversions so that more water can flow through the Delta to enhance wildlife habitat, or force reductions by issuing new water quality standards for the Delta.

As the supply picture becomes less certain, California cannot afford more decades of gridlock and squabbling.

###

## Helicopters map California groundwater basins with electromagnetic technology

CBS News | March 7, 2024 | Kayla Moeller

SACRAMENTO — The California Department of Water Resources (DWR) has mapped out the state over the last few years to gain a better understanding of its groundwater basins.

The department has been using new technology combined with helicopters to create a database about what lies below.

Out of sight, out of mind, many people might not think about the water that could lie below our feet, but the DWR knows groundwater is critical to California. The state has 515 basins that can hold up to five times more groundwater than all surface water combined.

However, state officials need to learn more about these basins. With phase one of their airborne electromagnetic survey project done, they're one step closer.

"There's water down there but what's it doing?" said Ken Mitchell, owner of Mitchell Farms.

The DWR is tapping into all the untapped potential stored underground. Data from the first phase of the airborne electromagnetic survey project is ready to be shared.

"The helicopter is towing a large hoop that sends signals into the ground that bounce off different materials, sand, silt and gravels below the ground," said the DWR's Steven Springhorn.

The signals penetrate 1,000 feet below the ground. It's like an MRI for the earth, and from December 2021 to November 2023, they've been able to map 16,000 line miles of data across 100 groundwater basins.

Mitchell said that having a mapping system of real-time data is a game-changer.

"We've got a water-moving problem, a storage problem," he said. "We haven't built anything storage-wise in California since the mid-60s."

Springhorn said the project was structured to benefit and help local agencies.

The data shows what the basins are made of, how water moves underground through different earth materials, and which areas might be best for storage using natural infrastructure.

"Future droughts, future floods, long-term climate. It really is preparing California and local water managers and communities to face the future for what we know is coming," Springhorn said.

The mapping also helps water agencies understand the amount of groundwater available at a given time and makes things more efficient for using groundwater when we're short on surface water.

The project's next phase involves combining the data from subsurface mapping with local water agencies' data to create more localized solutions.

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## Long-planned Sites Valley reservoir moves toward construction

CBS San Francisco | March 1, 2024 | Wilson Walker



As California enjoys a second robust winter in a row, calls for additional water storage may soon be getting an answer.

A new reservoir is something voters approved funding for years ago, and while progress has been slow, there are hopes that it may finally be moving ahead.

"Nothing has been built like this in California for more than 30 years," said Executive Director of the Sites Reservoir Authority Jerry Brown.

It's been nearly 70 years since California took a look at the Sites Valley, and saw the potential for a reservoir that could have been as large as Shasta. The plan now is for something not quite that large, but still massive.

"The peak that we see to the north," Brown explained. "That's not even the northernmost location of the reservoir. The peaks you see to the south to the end of those do represent pretty much close to the end of the southern portion. And that's about 6 miles for a total of 13 miles overall."

Brown insists the long, slow push to create new water storage is moving ahead, and the payoffs, he says, will be as large as the new lake. It will not dam a river, which is good for fish. Instead, water will be pumped up out of the valley.

"We're basically bringing water in off of the river during high flow," he said. "And storing it here in this valley and then releasing it back out to be used or flow back into the river during dry periods."

The natural bowl of limestone creating the valley does most of the work, so only two relatively small dams will be required. And of all the 180 miles of conveyance required to move water up to the reservoir, only 15 miles of it will have to be new.

"The Sites Reservoir will be the eighth largest surface water storage reservoir in the state of California," Brown said. "That can serve the needs of about 4 1/2 million people for a year."

So what happens to what's here? The community of Sites, and the valley, where some members of the Sites family still live, this would all be submerged.

"This location would be underwater about 300 feet," Brown said, driving through town.

The Authority is negotiating with landowners, and most are said to be on board with the project. Most are reluctant to talk, as this discussion has dragged on for generations now.

"60 years," Brown said of the time elapsed. "And it's never happened. So you can imagine the fatigue that you might feel with people telling you you've got a move, and then no, you don't. But I think, but I think they're getting to the place, and they're older, where they understand the importance of this to the community. "

The state, with a push from the Governor, is trying to get things moving. A project design has been submitted, and now a water right must be obtained. That critical hurdle is expected to be cleared in the next year.

"After after that, we will then start construction in 2026," Brown projected. "And we figure it's about a seven year construction. So about the end of 2032."

###

## **New Pacific Institute Report Finds Substantial Opportunity for Urban Stormwater Capture to Enhance Water Resilience in Communities Across the United States**

*National assessment quantifies vast potential to capture urban stormwater, volume equivalent to more than 90% of annual municipal and industrial water withdrawals*

Pacific Institute | February 29, 2024

OAKLAND, CALIFORNIA, Feb. 29, 2024 –The Pacific Institute, a US-based global water think tank, in partnership with 2NDNATURE today released a [new national assessment](#) finding substantial opportunities for expanded stormwater capture and use approaches to improve water resilience in urban areas across the United States. The pivotal study quantifies the volumetric potential of stormwater runoff in urban areas, finding 59.5 million acre-feet per year (AFY) of urban stormwater runoff is generated, exceeding earlier estimates. This is equivalent to an annual average of more than 53 billion gallons per day.

The report, entitled “Untapped Potential: An Assessment of Urban Stormwater Runoff in the United States,” was developed using a spatially distributed modeling approach from 2NDNATURE to fill a gap in comprehensive national data. The analysis concludes that urban stormwater capture is currently underutilized. It also finds that greater uptake of this strategy could improve water resilience by mitigating impacts on communities from intensifying flooding and drought driven by climate change, diversifying water supplies to address water scarcity risks, and reducing water pollution. While the findings are specific to the United States, insights from the assessment can inform water resilience strategies globally.

“The numbers are clear. It’s time to elevate the role of stormwater capture in the national water conversation,” said Dr. Bruk Berhanu, Senior Researcher at the Pacific Institute and lead author of the report. “Urban communities across the country are grappling with water scarcity risks, more severe and frequent flooding and drought due to climate change, and constraints on traditional water supplies. There is vast opportunity for stormwater capture strategies to help solve many of these challenges, enhancing overall water resilience.”

The Pacific Institute will host a webinar to discuss the report’s results and recommendations on March 19, 2024. [Register here.](#)

### **Key findings of the analysis include:**

- **National volumetric potential:** Urban areas in the United States generate approximately 59.5 million AFY of stormwater on average. This is equivalent to 93% of total municipal and industrial water withdrawals in 2015, the most recent year with available data.
- **Outsized coastal opportunities:** Coastal subbasins present an outsized opportunity for increased stormwater capture. While coastal subbasins constitute just 12% of urban land area, they generate 37% (21.9 million AFY) of the national stormwater runoff potential. The authors note it is not feasible, legal, or desirable to capture all urban stormwater runoff. In some areas, for example, downstream users, including ecosystems, rely on those flows to meet their water needs. However, capturing runoff in coastal subbasins could have fewer adverse impacts on downstream users and can also improve water quality in coastal waterways.

- **Top states:** The states with the greatest urban area stormwater runoff potential include **Texas** (7.80 million AFY), **Florida** (4.12 million AFY), **Georgia** (2.77 million AFY), **Louisiana** (2.61 million AFY), **Ohio** (2.50 million AFY), **Illinois** (2.47 million AFY), **North Carolina** (2.38 million AFY), **Pennsylvania** (2.35 million AFY), **California** (2.27 million AFY), and **Tennessee** (2.17 million AFY). While these states show the greatest volumetric potential, the authors note there may still be a compelling case for greater adoption of stormwater capture in urban areas with lesser potential. Even in these areas, stormwater capture can make a meaningful contribution to augmenting and diversifying supplies, especially important with climate change, and can offer other benefits such as mitigating urban heat island effect and increasing community greenspace.

Stormwater capture strategies include a diverse range of approaches that can be pursued at a variety of scales. Applications include traditional grey infrastructure, such as storm sewers that route stormwater to treatment plants for reuse and storage ponds for groundwater infiltration; green infrastructure, such as raingardens and bioswales that use plants and soils to slow, filter, and store stormwater in underground aquifers; and a mix of green-grey infrastructure. Green infrastructure in particular offers a range of co-benefits, including urban greening and cooling.

“This study reveals that stormwater capture presents a significant yet unrealized opportunity for enhancing urban water management across the United States,” says Dr. Nicole Beck, CEO of 2NDNATURE. “Realizing its full potential demands concerted efforts from all stakeholders involved—from researchers to policymakers and regulatory bodies, and from utilities to local communities.”

#### **Key recommendations of the report include:**

- **Elevate stormwater capture on the national water planning agenda:** Aligning with the US Environmental Protection Agency’s Water Reuse Action Plan, the report recommends a national effort to recognize stormwater capture and use as a vital water supply strategy. It calls for the establishment of comprehensive national guidelines by federal entities to foster consistency and clarity in stormwater capture projects.
- **Expand funding and financing opportunities for stormwater capture:** The report points out the limited allocation of federal funds to stormwater projects and suggests enhancing accessibility to financial support for stormwater initiatives through state and federal mechanisms. Removing barriers to access of federal funds for stormwater capture can help ensure an equal playing field for alternative water strategies. Greater funding is also needed to address research gaps and support regional scale assessments that account for local context.
- **Expand applications and support green infrastructure:** The report encourages the treatment of stormwater for a broader range of applications, including potable and indoor uses, to maximize its integration into urban water supplies. It also recommends increased adoption of green infrastructure to support other community benefits, such as urban cooling and greenspace enhancement.

- **Break down governance silos via regional approaches and interagency coordination:** Emphasizing the economic challenges of individual stormwater projects and the multiple benefits of stormwater capture, the report calls for greater inter-agency collaboration and regional approaches.

The report is part of the Pacific Institute's ongoing research advancing water efficiency and reuse strategies to build water resilience in the United States and globally. It follows the Pacific Institute's 2022 groundbreaking report, "The Untapped Potential of California's Urban Water Supply: Water Efficiency, Water Reuse, and Stormwater Capture," which revealed California could reduce urban water use by 30%-48% through investments in water efficiency measures, more than triple municipal water reuse, and significantly increase stormwater capture across the state. The Pacific Institute will release additional national assessments quantifying the potential for water efficiency and reuse across the United States starting later in 2024.

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*Founded in 1987, the Pacific Institute is a global water think tank that combines science-based thought leadership with active outreach to influence local, national, and international efforts in developing sustainable water policies. From working with Fortune 500 companies to frontline communities, our mission is to create and advance solutions to the world's most pressing water challenges. Since 2009, the Pacific Institute has also acted as co-secretariat for the CEO Water Mandate, a global commitment platform that mobilizes a critical mass of business leaders to address global water challenges through corporate water stewardship. For more information, visit [pacinst.org](http://pacinst.org).*

*Founded in 2005, 2NDNATURE. is a pioneering force in applied geospatial science, dedicated to crafting innovative solutions that empower municipalities, institutions, and corporate landowners to revolutionize their approach to stormwater management. Our mission is to bring peer-reviewed science in accessible map-based formats to inform more resilient land management decisions. With a widespread clientele across the United States, 2NDNATURE goes beyond conventional solutions, providing users with a comprehensive toolkit to understand their stormwater challenges, uncover opportunities, and transform stormwater into a valuable resource. We not only equip our clients to manage stormwater effectively but also enable them to communicate the substantial benefits of their investments with impact. For more information, visit [2ndnaturewater.com](http://2ndnaturewater.com).*

Pacific Institute | [media@pacint.org](mailto:media@pacint.org) | +1-510-251-1600

2NDNATURE | [christopher.travers@2ndnaturewater.com](mailto:christopher.travers@2ndnaturewater.com) | +1-831-426-9119

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