

# Veles Water Weekly Report

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1. **WATERTALK**  
TECHNICAL ANALYSIS BY JOSHUA BELL
2. NQH2O INDEX VS H2O FUTURES PRICE PERFORMANCE
3. NQH2O INDEX HISTORY
4. NQH2O INDEX AND H2O FUTURES VOLATILITY ANALYSIS
5. CENTRAL VALLEY PRECIPITATION REPORT
6. RESERVOIR STORAGE
7. SNOWPACK WATER CONTENT
8. CALIFORNIA DROUGHT MONITOR
9. CLIMATE FORECAST
10. WESTERN WEATHER DISCUSSION
11. **WATER NEWS**
  - I. CA WATER NEWS
  - II. US WATER NEWS
  - III. GLOBAL WATER NEWS

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April 4<sup>th</sup> 2024

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**VelesWater**



## WATER FUTURES MARKET ANALYSIS

Welcome to ***WATERTALK***

by Joshua Bell

**CLICK THE LINK BELOW**

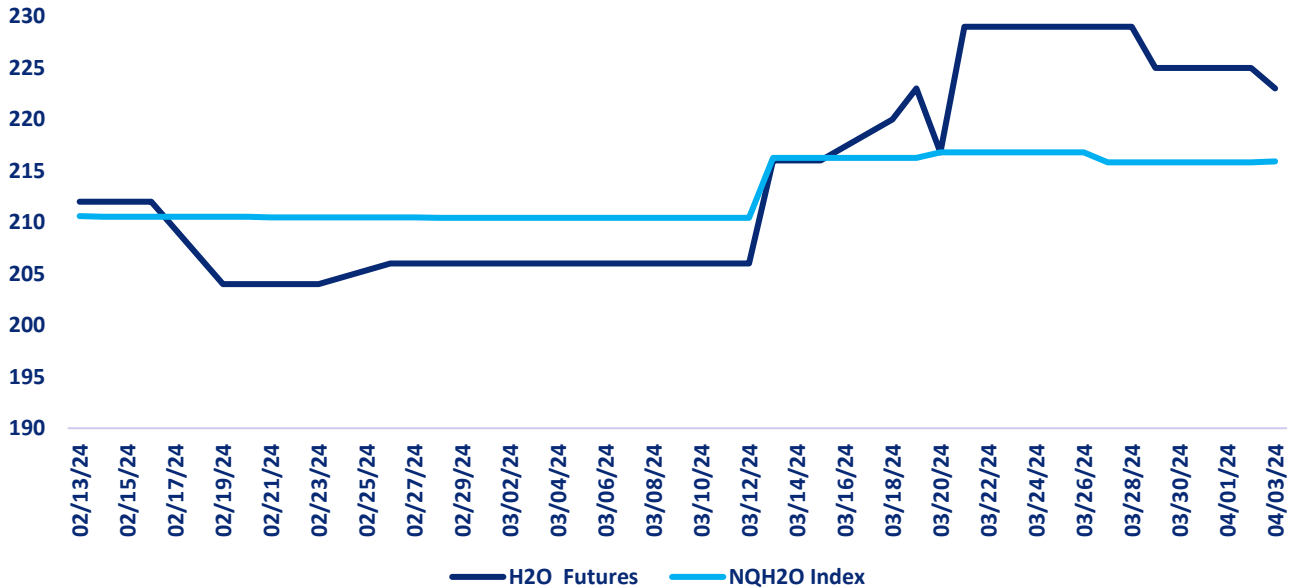
*"A 2 minute technical analysis video of H2O futures"*

<https://vimeo.com/930545499?share=copy>



NQH2O INDEX PRICE vs H2O FUTURES PRICE

1 Month Price Performance NQH2O Index vs H2O Futures



Price Chart Based upon Daily Close

The new NQH2O index level of \$215.92 was published on April 3<sup>rd</sup> up \$0.08 or 0.04% from the previous week. The April contract is considered the front month. The futures have been closing at a premium of \$7.08 to \$9.16 versus the index over the past week.

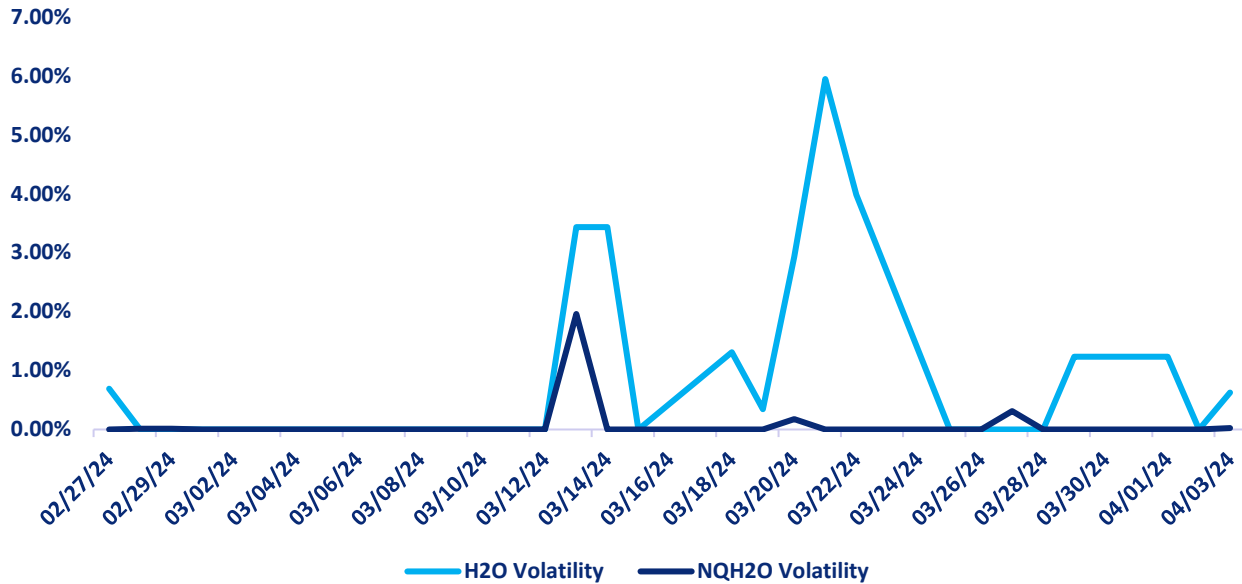
Below are the bid offer prices on different expiries being quoted in the market.

Apr 24	215@223
May 24	225@243
Jun 24	255@275
Jun 25	339@395



## H2O FUTURES AND NQH2O INDEX VOLATILITY ANALYSIS

### Daily H2O Futures Volatility vs Daily NQH2O Index Volatility



#### DAILY VOLATILITY

Over the last week the April contract daily future volatility high has been 1.24%.

ASSET	1 YEAR (%)	2 MONTH (%)	1 MONTH (%)	1 WEEK (%)
NQH2O INDEX	53.86%	3.41%	0.71%	0.48%
H2O FUTURES	N/A	10.29%	8.50%	1.75%

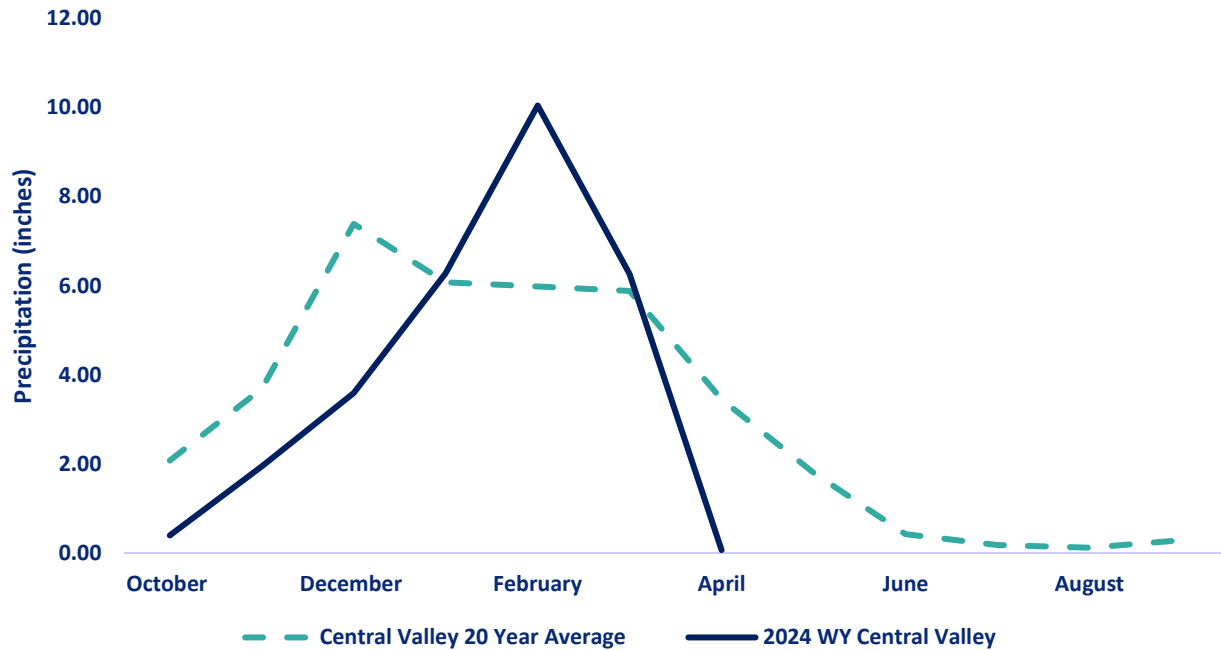
For the week ending on April 3<sup>rd</sup>, the two-month futures volatility is at a premium of 7.51% to the index, down 0.62% from the previous week. The one-month futures volatility is at a premium of 7.80% to the index, up 3.07% The one-week futures volatility is at a premium 1.27% to the index, down 3.67% from the previous week.

*Above prices are all **HISTORIC VOLATILITIES**. All readings refer to closing prices as quoted by CME.*



# CENTRAL VALLEY PRECIPITATION REPORT

## Central Valley Precipitation Index



Central Valley average is calculated using data from 19 weather stations in the Central Valley, California.  
Data as of 03/04/2024

STATION	MTD (INCHES)	WEEK ON WEEK CHANGE (INCHES)	% OF 20 YEAR AVERAGE MTD	2024 WYTD VS 2023 WYTD %	2024 WY VS 20 YEAR AVERAGE TO DATE %
SAN JOAQUIN 5 STATION (5SI)	0.08	0.08	2.25	184	86
TULARE 6 STATION (6SI)	0.08	0.08	3.11	214	85
NORTHERN SIERRA 8 STATION (8SI)	0.04	0.04	0.95	134	100
CENTRAL VALLEY AVERAGE	0.07	0.07	1.93	177	90

## RESERVOIR STORAGE

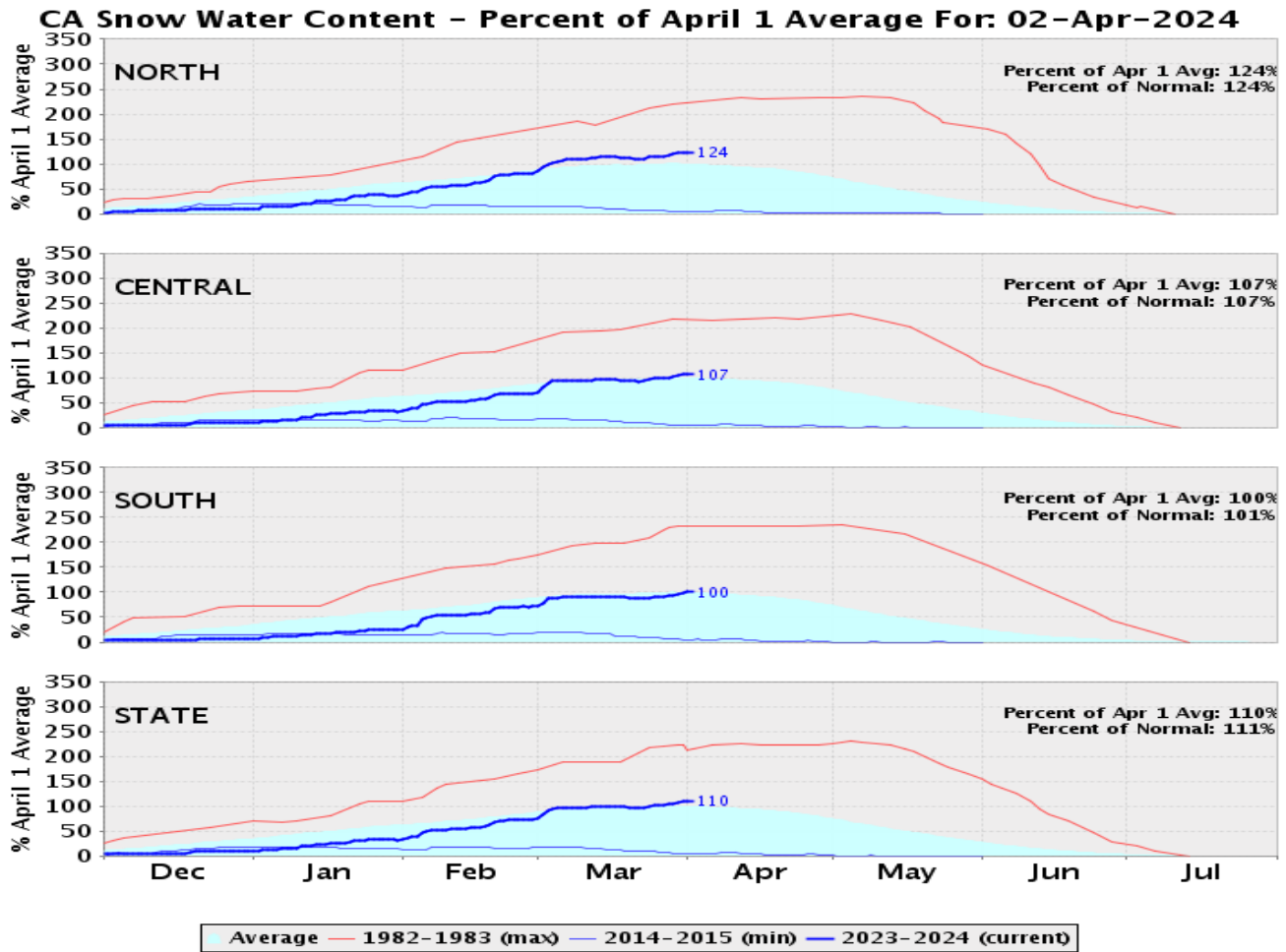
RESERVOIR	STORAGE (AF)	% CAPACITY	LAST YEAR % CAPACITY	*% HISTORICAL AVERAGE
TRINITY LAKE	1,963,662	80	37	109
SHASTA LAKE	4,212,351	93	83	117
LAKE OROVILLE	3,114,949	88	82	124
SAN LUIS RES	1,488,792	73	98	84

\*% Historical Average is based on a daily average that is interpolated from historical monthly averages. The monthly averages are computed using monthly data from water year 1991 to 2020. The monthly averages are updated every 5 years using a sliding 30 year period.

[Reference: California Water Data Exchange](#)



## SNOWPACK WATER CONTENT



REGION	*SNOWPACK WATER EQUIVALENT (INCHES)	WEEK ON WEEK CHANGE (INCHES)	% OF AVERAGE LAST YEAR	% OF 20 YEAR HISTORICAL AVERAGE	% OF HISTORICAL **APRIL 1ST BENCHMARK
NORTHERN SIERRA	35.1	3.1	194	124	124
CENTRAL SIERRA	28.8	2.7	236	107	107
SOUTHERN SIERRA	21.9	1.9	271	101	100
STATEWIDE	28.6	2.7	246	111	110

\*Snow Water Equivalent, or SWE, is a commonly used measurement used by hydrologists and water managers to gauge the amount of liquid water contained within the snowpack. In other words, it is the amount of water that will be released from the snowpack when it melts. SWE has regional variance.

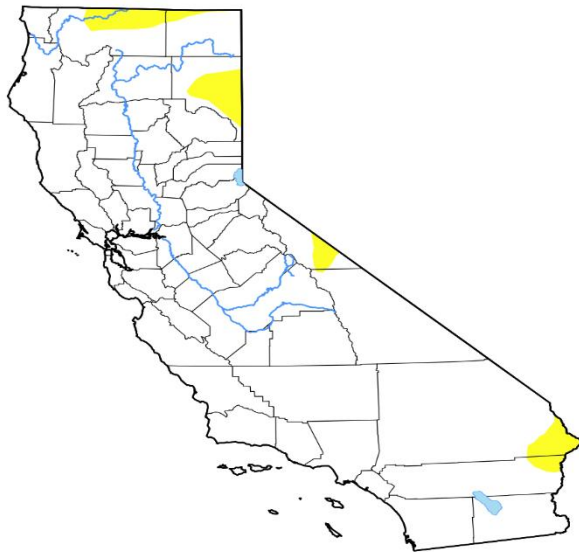
\*\* April 1<sup>st</sup> is used as the benchmark as it when the snowpack in California is generally deepest. It has been used the benchmark date since 1941 by DWR and can be used to predict spring river flow.



# DROUGHT MONITOR

## California

[Home](#) / California



Map released: Thurs. March 28, 2024

Data valid: March 26, 2024 at 8 a.m. EDT

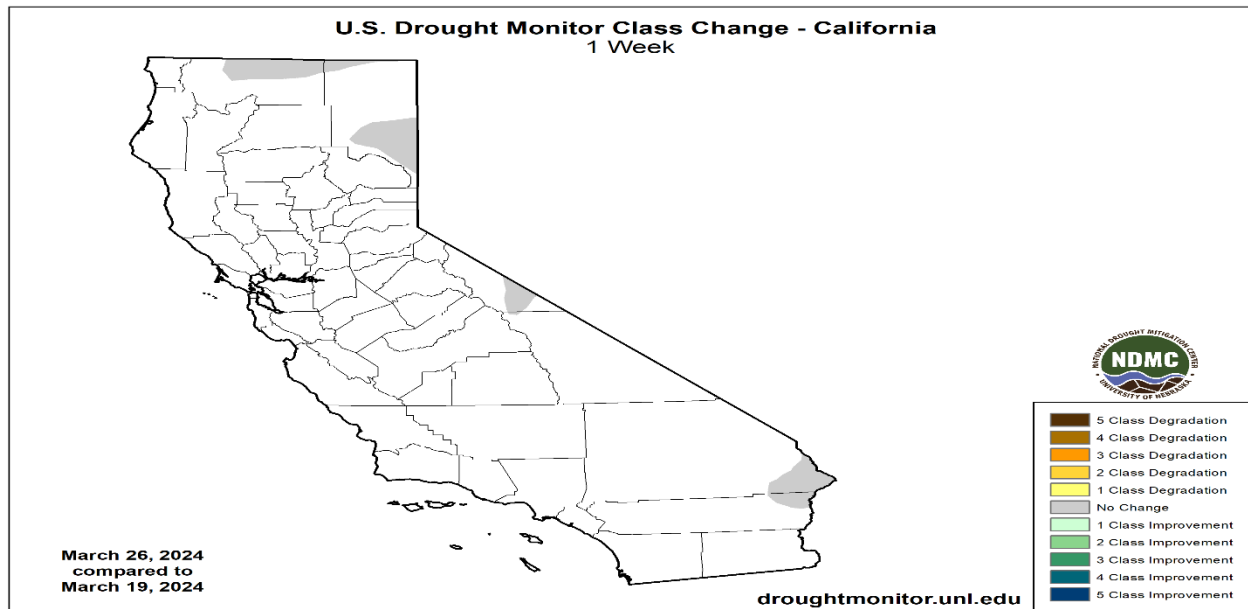
### Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

### Authors

United States and Puerto Rico Author(s):  
[Brad Rippey](#), U.S. Department of Agriculture

Pacific Islands and Virgin Islands Author(s):  
[Richard Heim](#), NOAA/NCEI



Week	Date	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
Current	<a href="#">2024-03-26</a>	95.46	4.54	0.00	0.00	0.00	0.00	5
Last Week to Current	<a href="#">2024-03-19</a>	95.46	4.54	0.00	0.00	0.00	0.00	5
3 Months Ago to Current	<a href="#">2023-12-26</a>	96.65	3.35	0.00	0.00	0.00	0.00	3
Start of Calendar Year to Current	<a href="#">2023-12-26</a>	96.65	3.35	0.00	0.00	0.00	0.00	3
Start of Water Year to Current	<a href="#">2023-09-26</a>	94.01	5.99	0.07	0.00	0.00	0.00	6
One Year Ago to Current	<a href="#">2023-03-28</a>	55.34	44.66	28.11	1.95	0.00	0.00	75

The U.S Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map courtesy of NDMC.



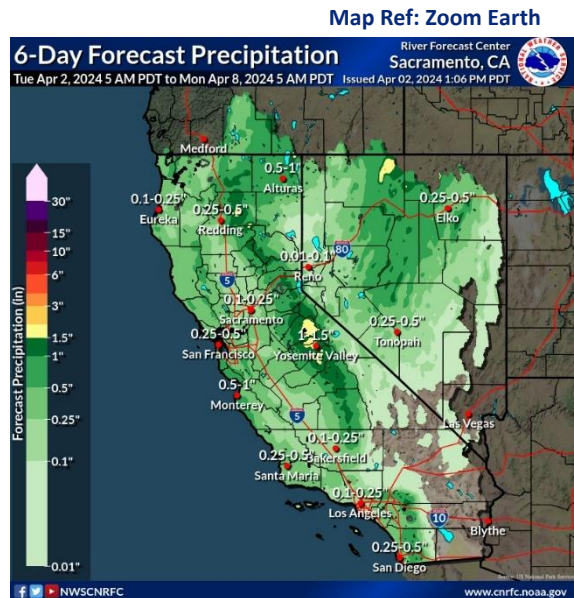
## CURRENT SATELLITE IMAGERY

The satellite picture shows a Pacific frontal system striking land on the Western Canadian and Northwest US coastline moving eastwards bringing precipitation to these areas and into the Rockies. There are 2 bands of moisture and we expect at least one of them to bring precipitation to the Central Valley area over the next few days. The central US is clear and there is a large storm system exiting the east coast moving in a northeasterly direction. There is no monsoon activity at present.



### 10 Day Outlook

No major changes to the afternoon forecast with the largest change to decrease amounts up to a few hundredths over Srn CA on Friday morning. Upper trough/closed low over the region on Friday with the low center near the intersection of NV/OR/ID then shifting east Friday night as another system approaches the Pac NW coast. Showers possible over the region Friday especially over Srn Ca and over NV and along the Sierra. Precipitation amounts generally around 0.1-0.5 over Srn Ca with 0.25-0.75 with local amounts around an inch in the San Gabriel Mtns and into San Bernardino Mtns and South into San



Diego County Mtns and around 0.25-0.5 inches over Srn Sierra and around 0.1-0.4 with local amounts up to .75 inches over Nevada on Friday. Max temperatures around 5 to 20 degrees below normal on Friday with the coldest temps over Srn CA and NV. Record low maximum temperatures are possible over Srn CA on Friday. Precipitation tapers off Saturday morning with weak ridging between systems. The trough off the Pac NW deepens over Nrn CA with a closed low forming by Sunday afternoon and moving South through CA. Showers, mainly along the coast and higher terrain, spread south and east across the region Sunday into Sunday night. There are still differences in the models and





## **VELES WATER WEEKLY REPORT**

ensemble members in the details including the timing and track of these systems. Forecast mainly used a mix of latest WPC with NBM and previous forecast. Precipitation amounts generally around a tenth of an inch or less over Srn OR and Nrn CA and NE NV with local amounts up to a third of an inch over the Smith Basin and Ruby Mtns on Saturday. Precipitation amounts to around a tenth of an inch over Nrn and Central CA and portions of NV on Sunday with a few hundredths into Srn CA Sunday night. Temps warm a little over the weekend with max temps generally near normal to around 15 degrees below normal.

Reference: National Weather Service / California Nevada RFC / Sacramento CA

## **WESTERN WEATHER DISCUSSION**

Drought changes were mostly minor, although a reassessment of season-to-date precipitation and conditions led to some drought improvement being depicted in parts of New Mexico. Approaching the traditional Western peak snowpack date of April 1, snow-water equivalencies were mostly near or above average, except in much of Montana, Washington, northern Idaho, and northeastern Wyoming. Those low snowpack numbers were reflected in ongoing moderate to extreme drought (D1 to D3) in the northern Rockies and environs.

Reference:

Rocky Bilotta, NOAA/NCEI

Ahira Sanchez-Lugo, NOAA/NCEI



### WATER NEWS

#### CALIFORNIA WATER NEWS

##### **‘Way, way, way above normal’ rains could set all-time L.A. record as wet weather continues**

After a comparatively dry fall in Southern California, there was a point last December when it seemed like the fears of a strong, wet El Niño winter may have been overblown. So much for that.

In a matter of weeks, a succession of powerful storms flipped the script, dumping a stream of record-setting, intense rainfall across California, much of it on the state’s southwestern region.

That wet pattern has continued as winter has given way to spring, with this past weekend’s storm dumping up to 4 inches of rain in some areas — pushing Los Angeles to a new two-year rain total not seen since the late 1800s and forestalling any hope for a quick end to the rainy season.

As of Monday morning, downtown Los Angeles had received 52.46 inches of rain in the latest two water years, the second-highest amount in recorded history. The only other two-year October-through-September period — the period for the so-called water year — that saw more rain was from 1888 through 1890, according to the National Weather Service.

“When you consider the records since 1877 in downtown L.A. ... the second [largest total] is hugely significant,” said Joe Sirard, a meteorologist with the National Weather Service in Oxnard. “We’re obviously way, way, way above normal for two years in a row now. For a dry climate like the Los Angeles area, it’s huge.”

And there’s probably more on the way. A low-pressure system is brewing off the California coast, expected to move inland later this week, weather officials said, driving above-average precipitation forecasts for much of the state through April 10.

Nor do forecasters expect that storm to close out the wet season, with the long-range forecast for April favoring slightly-above-average precipitation in Southern California, according to the Climate Prediction Center.

“We don’t think it’s the end of the rainy season yet,” said Anthony Artusa, meteorologist with the National Weather Service’s Climate Prediction Center. He said a wetter pattern should linger through April and maybe into early May, fueled by the last vestiges of an El Niño-Southern Oscillation — the climate pattern in the tropical Pacific that tends to drive wetter weather in California.

The current El Niño is transitioning to a more neutral pattern, and a La Niña is expected to take over by the summer, bringing typically cooler and drier weather. But because the atmosphere tends to lag behind the changes to the Pacific’s surface temperatures,



## VELES WATER WEEKLY REPORT

Artusa said, “we’re seeing an extension of these [El Niño] effects even later on into April.”

Indeed, this year’s soggy winter was in many ways a “canonical” El Niño event — particularly because most of the storms arrived in late winter and are continuing through spring, according to Alexander Gershunov, a research meteorologist at the Scripps Institution of Oceanography at UC San Diego.

How climate change is disrupting California's storms

Here’s a look at how humanity’s heating of the planet affects California’s storms, snowpack and more.

“El Niño and La Niña signals typically kick in — when they do kick in, because it’s not always the case — in January, February, March, and that’s exactly the part of the year that was anomalously wet this year,” he said.

However, not all of the wet weather can be attributed to El Niño. Last year’s soaking storms occurred during a La Niña event, and Gershunov noted that some of the state’s wettest years this century have occurred during La Niña years, which also included 2011 and 2017.

“In all of these cases, atmospheric river activity was extremely strong,” he said. “What we are finding out is that atmospheric rivers don’t always dance to the tune of [El Niño], and they can make or break” the textbook El Niño pattern.

This latest Easter weekend storm caused some freeway flooding, brought brief hail and dropped 2 to 4 inches of rain across the region, with some mountain areas hitting totals closer to 5 inches, according to the weather service. It was far from the strongest storm this rainy season, but it still brought impressive rain totals: 2.1 inches in downtown L.A., 4.67 inches in Lytle Creek, 4.09 near Lynwood, 3.92 in Compton and 3.54 in Stunt Ranch. The heaviest and most widespread rain fell from late Friday into early Saturday, setting several daily rainfall records for March 30, including in downtown L.A. with 1.73 inches, Long Beach with 1.86 inches and Palmdale with 1.12 inches. Snowfall totals hit 22 inches in Green Valley Lake, 14 inches in Snow Valley and 10 inches in Big Bear City, according to the National Weather Service.

Last month, though, daily rainfall totals more than doubled the March 30 records when a deadly atmospheric river storm walloped the Southland and much of the Golden State, triggering hundreds of mudslides, significant flooding and destruction. That system dumped 4.1 inches of rain on downtown L.A. in one day, making Feb. 4 the wettest day in February history.

That system followed a string of strong storms that brought significant rains and severe flash flooding in some areas. Most notably, in late December, a month’s worth of rain fell in less than an hour and inundated Oxnard. Then in January in San Diego, historic rainfall filled one-story homes, turned roads into rivers and forced rooftop rescues.

“We’ve had a number of very heavy, high-intensity rainfall events,” Sirard said.



## VELES WATER WEEKLY REPORT

With more rain on the horizon for Southern California, Sirard said he wouldn't be surprised if this two-year period ends up the wettest in City of Angels history, as the current count is less than 2 inches short of the all-time record, 54.1 inches, which fell from 1888 to 1890.

"We actually have a very decent chance of setting the all-time record," Sirard said.

Last year became the seventh-wettest water year in L.A.'s history with 31.07 inches falling from Oct. 1, 2022, through Sept. 30, 2023. National Weather Service meteorologists consider 14.25 inches the area's normal annual rainfall, making last year's total more than 200% of average. With six months left to go, this water year has recorded 21.39 inches, currently the 22nd wettest in recorded history.

This year's wet winter may also have broader climate impacts, Gershunov said, including potential effects on the coming wildfire season. Mountain and forest ecosystems will probably see less fire activity because late winter and spring snowpack tends to melt gradually, promoting wetter soils and less combustible vegetation in the summertime.

On the other hand, anomalous precipitation in coastal ecosystems — such as the strong storms that fell this winter and spring in Los Angeles and San Diego — are promoting the growth of new grasses and other light plants that could potentially feed flames.

"All of that is going to be dry when the coastal fall wildfire season rolls around with the onset of Santa Ana winds next October," Gershunov said.

And while this year seemed to follow the El Niño playbook, he noted that the climate pattern doesn't always live up to the hype, such as the El Niño of 2015-16, which was billed as a monster event that ultimately produced average precipitation in California. In fact, when measured on a statewide basis, precipitation is hovering just around average this year, with 20.9 inches since the start of the water year on Oct. 1, or about 107% of average for the date, state data show.

With more than 30 million acre-feet of water in storage, the state's reservoirs are at 116% of their historical average. Meanwhile, snowpack is at 105% of its average for April 1, the date when it is typically at its peak.

Original Article: [The LA Times by Grace Toohey and Hayley Smith](#)

### **IID granted \$7 million to construct the largest reservoir in district history**

The Imperial Irrigation District announced in a recent press report that it has been awarded \$7 million in grant funds from the Department of the Interior in support of the district's proposed Upstream Operational Reservoir Project, which would be the largest reservoir ever constructed in the Imperial Valley during IID's 113-year history as an irrigation district.

The announcement was recently made by the Interior Department, with funds coming from the Bipartisan Infrastructure Law to increase water supply reliability. This latest grant award to IID is in addition to a \$9.5 million grant previously awarded to the district



## VELES WATER WEEKLY REPORT

for a total of \$16.5 million in federal funding for the Upstream Operational Reservoir Project.

“We all have been working very hard for a long time to maximize water management efficiency in the Imperial Valley and this will help us do that on a large scale,” said IID Board President Alex Cardenas, who congratulated the district’s Water Department for their grant writing skill and cooperation with federal officials. “These funds will help us get one step closer to getting this very important project completed,” he added.

IID Director Karin Eugenio, whose Division 5 includes eastern Imperial County, saluted the federal government’s continued cooperation with IID, offering a “shoutout” to U.S. Bureau of Reclamation Commissioner Camille Touton for her support and unwavering commitment to recognize the importance of these projects.

“We very much appreciate the ongoing collaboration with our federal partners, particularly Commissioner Touton,” said Director Eugenio. “She continues to work with IID and its water users to make important projects like this reservoir happen.”

The district has been working on the Upstream Operational Reservoir Project for about eight years, and several tasks remain to be completed, including design, engineering, site and inlet structure locations, etc. “As part of the process, staff is working on the environmental process,” said IID General Manager Jamie Asbury, “and we appreciate the community’s help and engagement to help see this project through.”

The new reservoir would have a 2,100 acre-feet capacity, which is twice as large as the district’s off-line storage system and four times larger than the biggest in-Valley reservoir with a goal of accommodating short water orders downstream in the eastern Imperial Valley, managing up to 365,000-acre feet of water annually and conserving up to 15,000 acre-feet of water per year.

With the intent to maximize the district’s water management efficiency, plans are for the new reservoir, which would be IID’s 12th, to be located upstream in the southeastern region of the Imperial Valley near the All-American and East Highline Canals. It’s proposed basin area would cover up to 440 acres.

IID constructed its latest reservoir in 2023 – the Lloyd Allen Water Conservation Operational Reservoir, located east of Calipatria, which works to conserve up to 400 acre-feet per year as part of the district’s system conservation program.

IID operates 11 main canal scheduling areas supported by 11 raw water, operational storage reservoirs with a combined capacity of 4,623 acre-feet. The main canal reservoirs vary in size from 200 acre-feet to 1,251 acre-feet in capacity. The Lloyd Allen Reservoir was the first of a series of smaller mid-lateral reservoirs prioritized to be constructed by IID and has an approximate 42 acre-feet capacity.

IID’s existing operational reservoirs manage and regulate approximately 15 to 25 percent of IID’s total annual flow. The reservoirs allow increased delivery flexibility, improved system efficiency and provide for conservation opportunities within the IID water service area. Efficient and timely operational coordination together with use of



## VELES WATER WEEKLY REPORT

IID's various regulating reservoirs allow IID to provide delivery flexibility to farmers and minimize operational discharge even though Colorado River diversions at Imperial Dam remain fixed for 24-hour periods.

Original Article: [The Desert Review](#)

### **Two dams are coming down on California's Eel River. Will it threaten water supplies?**

Nearly 120 years ago, when the West still hummed with gas lighting and horse-drawn wagons, a San Francisco man named W.W. Van Arsdale, once described by a local newspaper as uncharacteristically enterprising, set out to help rural Mendocino County find a bridge to the young 20th century.

The entrepreneur, in a move that would forever change Northern California, bored a mile-long tunnel in a mountain near the county seat of Ukiah and piped water from the Eel River through to power a new hydroelectric plant.

The Potter Valley Project, as promised, delivered "cheap" energy and "immense possibilities," as chronicled by Ukiah's Dispatch Democrat newspaper at the time. But it wasn't the electricity that turned out to be the windfall. It was the water.

Outflow from the power plant, which takes the bounty of the Eel River and puts it in the East Fork Russian River, gave new life to communities in the Russian River basin, from Ukiah to Sonoma County. Orchards and cattle ranches around the powerhouse boomed. Downstream cities like Cloverdale and Healdsburg could grow with fewer water worries. Wine Country flourished.

This welcomed excess, however, may soon be no more, and the daily water supplies of potentially hundreds of thousands of people are at risk of shrinking.

Over the next several years, Pacific Gas and Electric Co., the current owner of the Potter Valley Project, is planning to retire the hydroelectric plant and remove two dams on the Eel River that provide water for the facility. With power production shut down, tunneling water into the Russian River won't be necessary.

"I can't get away from my concern about what happens if the water supply goes away," said grower Dan Todd, before taking a walk on a recent afternoon past rows of pear trees irrigated with project water in Potter Valley, where the plant operates. "I think about water every day."

The project's closure is prompted by its age and unprofitability, PG&E officials say. The shutdown, though, has long been the goal of many living in the Eel River watershed who see the darker side of what was billed as progress a century ago.

Like on other Western waterways, the dams and water diversions have taken a toll on the federally designated "wild and scenic" Eel, most visibly by lowering flows and choking off access for salmon and other fish to hundreds of miles of cold, perennial waters. Some view the long-ago development of the river as a greedy and unjust power



## VELES WATER WEEKLY REPORT

grab. Should dam removal proceed, the 200-mile-long Eel would become the longest free-flowing river in California.

“We see this as a really big opportunity to create a salmon stronghold,” said Charlie Schneider, a project manager for the conservation group California Trout. “We really feel an urgency for the fish to get these dams out.”

But for Todd and others in the Russian River basin, the prospect of losing water is unthinkable. The Potter Valley Project provides a portion of the water supply for large swaths of Mendocino and Sonoma counties. In Potter Valley, about 15 miles northeast of Ukiah, it’s almost everything.

Residents of the town of about 500, living amid sprawling vineyards with a market, saloon, high school and smattering of businesses, are acutely aware that things here are about to change dramatically.

Todd’s oldest son Andy Todd, who had moved to Santa Rosa, returned to Potter Valley several years ago with his wife and twin children to reconnect with his hometown — and to help run the farm.

“We saw this as building something not only for our family but for my kids to take over in the future,” Andy said. “Now that’s all up in the air.”

Residents of Potter Valley are among those counting on a newly created water authority that’s working to keep Eel River water flowing through Van Arsdale’s tunnel once PG&E is gone.

The success of the Eel-Russian Project Authority, though, is far from certain. Not only must the agency figure out how to finance, acquire and run a piece of PG&E infrastructure, it has to navigate concerns about pulling too much water out of the Eel. Even if the authority succeeds in taking over the tunnel, less water is expected to be imported to the Russian River basin and at a much greater cost.

The agency is not interested in continuing power production.

“We’re trying to come away with a consensus project that will have enough support to carry forward,” Grant Davis, general manager of the Sonoma County Water Agency, one of the founding members of the Eel-Russian Project Authority, told the Chronicle. “We have to find an outcome that will be restorative of both river systems.”

Original Article: [San Francisco Chronicle by Kurtis Alexander](#)

## **Sierra Nevada snowpack ‘unusually normal’ and reservoirs are brimming as winter season winds down**

As winter conditions wind down, the beginning of April is always the most important time for California’s water managers to take stock of how much snow has fallen in the Sierra Nevada.



## VELES WATER WEEKLY REPORT

This year, something unusual happened. After years of extreme drought and several very wet flood years, the Sierra snowpack, the source of one-third of the state's water supply, is shockingly average this year: 104% of normal on Friday.

And more is on the way. The National Weather Service on Friday declared a winter storm warning for the Sierra, predicting 1 to 2 feet of new snow through Sunday. Chain controls went into effect on Interstate 80 Friday afternoon.

For a state where 11 of the past 17 years have been in severe drought, where massive, punishing storms last year brought the biggest snowpack since 1983 and waves of destruction along the coast, and storms in 2017 caused \$100 million in flood damage to downtown San Jose and nearly collapsed Oroville Dam, an ordinary winter is a godsend, experts said Friday.

"It's about as normal as you can get," said Jeffrey Wood, a meteorologist with the National Weather Service in Sacramento. "It's what we hoped for. In recent years we've had extremes. This year is definitely an outlier, but in a good way. Enjoy the normal."

The last time California had a winter this close to the historical average was more than a decade ago, in 2010, when the Sierra snowpack on April 1 was at 104%. By comparison, last year on April 1 it was 232%. The year before, just 35%.

Two years of ample snow and rain have wiped away drought conditions. Most of California's big reservoirs are brimming.

They were already full from last year's bounty and have been topped with storms this year. The largest reservoirs in California on Friday were a combined 116% of their average capacity for the end of March, with the two largest, Shasta, near Redding, and Oroville, in Butte County, at 91% and 87% full.

The conditions mean that cities will not impose water restrictions this summer.

"This is a usefully boring year," said Jay Lund, a professor of civil and environmental engineering at UC Davis. "It will be useful if people use the lack of urgency to work on long-term preparations for both floods and droughts. That would be time well spent."

The snowy February and March, along with healthy rain levels across the state, mean that California's fire season this year could end up being another mild one.

"We might expect something similar to last year," said Craig Clements, director of the San Jose State University Fire Weather Research Lab. "Below normal in terms of acres burned. More snow. More moisture. Higher soil moisture. And higher fuel moisture levels. Things can change if we get a big heat wave in August. But for now all the rain and snow have helped a lot."

Last year, following the wet winter, 324,917 acres burned statewide, according to Cal Fire, well below the state average for the previous five years of 1.7 million acres and more than 90% less than the horrific fire year of 2020 when 4.2 million acres burned statewide.

The shifting risk levels don't mean that climate change isn't happening, experts say. The Earth continues to warm, which makes droughts more severe. And that warming can





## VELES WATER WEEKLY REPORT

cause winter storms to carry higher levels of moisture because more water evaporates from the ocean into them during hotter conditions.

But this year and last serve as a reminder that every year isn't a wildfire Armageddon, Clements said.

"You are going to have some normal seasons," he said. "You are going to have wet seasons."

Few barometers of the state's changing water fortunes are as dramatic as the weekly reports from the U.S. Drought Monitor, put out by the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and the University of Nebraska-Lincoln.

At the end of March 2022, 100% of California was in a drought, according to the monitor. Water shortages were prevalent around the state. A year later, just 28% of California was in a drought — mostly near the Oregon state line and in the southeastern corner of the state. This week? None of the state is in drought.

Early on it wasn't clear what this winter would bring. On Jan. 1, the statewide Sierra snowpack was just 21% of normal. But steady storms through February, and particularly in the first week of March, brought the turnaround as the Sierra was blasted with 8 to 10 feet of new snow in blizzards that closed ski resorts and blocked I-80 and Highway 50.

Lund, the UC Davis professor, who described this winter as "unusually normal, said California still has significant water challenges, particularly in agriculture. State officials and farmers need to do a better job capturing water from storms and diverting it to recharge groundwater, he said.

In other areas, such as the Tulare Basin in the San Joaquin Valley, groundwater has been so heavily over pumped for decades that some acres will need to be taken out of production, he said.

Gov. Gavin Newsom has pushed hard for construction of the largest new reservoir in California in 50 years, Sites Reservoir, a \$4.5 billion off-stream project proposed for Colusa County that would divert water from the Sacramento River in wet years for use in dry years. This month, the project received \$205 million from the Biden administration and now has more than 90% of its funding. Whether it can break ground depends largely on if it can secure water rights later this year from the State Water Resources Control Board and overcome lawsuits from several environmental groups that say the water diversions could harm fish species in the Delta.

On Tuesday, state officials are expected to take a manual snow survey near Sierra-at-Tahoe ski resort. Friday's statewide totals are expected to increase from this weekend's storms.



## VELES WATER WEEKLY REPORT

“Winter is not over,” said Wood, the meteorologist. “It’s not abnormal to have an early spring system like this, and it’s definitely not the end of potential wet weather for the area. We will get some significant snowfall out of this one.”

Original Article: [The Mercury News by Paul Rodgers](#)

### **Court ruling against bond financing for controversial delta tunnel won’t impede project, state says**

A recent court ruling may have thrown a wrench in the state’s funding plans for the controversial and expensive Delta Conveyance Project – a tunnel to move Sacramento River water 45 miles beneath the ecologically sensitive Sacramento-San Joaquin Delta. In January, the Sacramento Superior Court denied the state Department of Water Resources’ (DWR) request to finance the project through bonds.

Tunnel opponents hailed the ruling as a blow to the project.

But state staff say the ruling will not impede funding. DWR has appealed the case and is still planning on using bonds to pay for the project if it comes to fruition.

The Delta Conveyance Project relies on the end users – cities and agricultural districts that buy water from the state – footing the bill. DWR typically funds major projects up front through bonds, which are repaid by the participating state water contractors.

Though it’s becoming less clear how many state water contractors are still willing to pay for the tunnel, as reported by SJV Water in February.

The most recent estimate of the project’s cost is \$16 billion. Tunnel opponents say that number is closer to \$40 or \$50 billion when inflation and interest are factored in over the 20-year construction period.

The state approved the project’s final environmental impact report in December of 2023.

“Bonds would allow the participating state water contractors to pay that debt over time, as opposed to needing to upfront fund that project,” said Carrie Buckman, DWR’s environmental program manager for the Delta Conveyance Project.

Investors want certainty that the bonds will be repaid, said Buckman. The higher the certainty, the lower the interest rate.

The bond ruling stems from a 2020 “validation case.”

“The idea is to get the court to confirm that we have the authority to issue bonds, which will help lead to more certainty and a lower lower interest rate,” said Buckman.

The resolution was filed in 2020 and challenged by environmental nonprofit Sierra Club. That was before the current iteration of the delta project was conceptualized. Staff didn’t know what the project would look like, said Buckman. Because of that, the court found the project wasn’t specific enough to determine whether DWR had the authority to use bonds, she said.



## VELES WATER WEEKLY REPORT

“We don’t see this as a block,” said Buckman. “I think this is a process that we need to work through, and we’re still in it. But we don’t see it as a block and the legal case did not indicate that we don’t have the authority.”

Staff are going to be more specific through the appeals process now that the project is fully formed, added Buckman.

Tunnel opponents see it differently.

“I think it’s a major impediment,” said Bob Wright, counsel for the Sierra Club. “They have appealed the court’s ruling so I can only conclude that they think it is a serious impediment. And that’s why they’re going to try to get the Court of Appeal to reverse what the trial court rules.”

The state has yet to do a cost-benefit analysis on the project, said Wright.

“It’s amazing, frankly, they’ll give final approval to a project. And meanwhile, they said a long time ago they would do a cost-benefit study later,” said Wright.

The lack of true costs and how much water the project would bring in are two of the biggest challenges for a number of water contractors, many of which are watching closely for new cost estimates.

“This is really a complete outrage that DWR is trying to inflict, not only on the environment, and the already very troubled Delta, but also on ratepayers,” said Wright. The appeals process could take some time. If it’s not expedited, it could take more than a year, said Wright.

Original Article: [SJV Water by Jesse Vad](#)

## **Kings County farmers suffer sticker shock over proposed fees even as state takeover looms**

Kings County growers are organizing to stop a set of groundwater and land fees they say will wipe out small farmers, even as the drumbeat of a looming state takeover grows louder.

Managers of the Mid-Kings River Groundwater Sustainability Agency (GSA), which covers the northern tip of Kings County, have been holding a flurry of meetings asking farmers to approve the fees – a combination of \$95-per-acre-foot of water pumped and \$25-per-acre of land – at its April 23 meeting.

That is after April 16, when the state Water Resources Control Board will hold a hearing to decide whether to put all of Kings County, known as the Tulare Lake groundwater subbasin, into probation for failing to come up with an adequate plan to stop over pumping.

The Water Board is the enforcement arm of the Sustainable Groundwater Management Act (SGMA), which mandates areas with critically overdrafted aquifers bring them into balance by 2040. A plan to do that in the Tulare Lake subbasin was rejected twice by the state so now the region faces probation.



## VELES WATER WEEKLY REPORT

If it does go into probation, the state would issue its own pumping allotments, fees and fines.

### Last ditch effort

The situation has growers scratching their heads, questioning what they feel is Mid-Kings' rush to fund an \$11 million budget and wondering why these details weren't ironed out before the threat of a state takeover.

"If we get stuck with those fees they're proposing, with less water, that's a no brainer. I'm out of business," said Joaquin Contente, who grows silage for dairies.

Some growers consider Mid-Kings' attempt to assess growers \$25-per-acre a last ditch effort to show the Water Board that the GSA can deliver on promises made in its groundwater plan — promises made without input from those asked to pay for it.

"They're building the plane as they're flying it," said grower Garrett Gilcrease. "The entire grower community was under the guise that the GSAs had this handled and now we are about to be kicked into probation."

Growers are now organizing to protest the fees.

### \$11 million "unfathomable"

Two organizations — Kings County Farm Bureau and Delta View Water Association — are urging landowners to vote down Mid-Kings's proposed fees, citing lack of stakeholder input.

"A budget of over \$11 million per year is unfathomable," Farm Bureau Executive Director Dusty Ference wrote in a letter to the Mid-Kings board, calling the expenses unjustified. "Additionally, the GSA has operated in a silo while creating its GSP, refusing to develop stakeholder advisory committees or receive input from landowners in the GSA."

GSAs have limited options for raising funds. Increased land assessments are the most common and must be approved through a Proposition 218 election. Neighboring Southwest Kings GSA landowners approved a \$9.80 assessment in February.

Mid-Kings GSA held three public workshops through March, where landowners filled rooms to capacity.

Mid-Kings General Manager Dennis Mills gave an overview of the last five years, including the formation of the GSA, SGMA requirements, proposed fees and how all this plays into the April 16 probationary hearing.

"This is not what I wanted," Mills said. "But we believe we need to do this on your behalf. If not, the state will do it for us. The proof is in the financials, to enact policies and to show the state we can pay for those efforts."

Those policies center on reduced pumping and paying to fix domestic wells damaged by over pumping. In 2022, 60 wells went dry in Mid-Kings. Fixing or drilling domestic wells would cost at least \$6 million a year at \$100,000 per well, Mills said.

### Severe pumping limits

The Tulare Lake subbasin stretches across 500,000 acres and has three aquifers known as A, B and C zones. Most domestic wells are in the shallow A or B zones.



## VELES WATER WEEKLY REPORT

A-zone wells are limited to pumping just one half acre foot per acre per year, an allocation that some growers say is a death sentence for their operations.

B-zone limits are three acre-feet-per acre.

And pumping from the C-zone is limited to two acre-feet-per acre. Pumping at this depth can create more subsidence, or land sinking.

Mills said approving the proposed fees will at least show the state board that local control is important to landowners, whether during probation or after.

“This is your decision. The agency did this based on my recommendation to the board to get away from state control. You may think it’s a stupid plan but if we don’t do it, we absolutely know where we’re going,” Mills told the sometimes rowdy crowd during a March 19 meeting about the fees. “The other option is the state takes over. I predict they’ll cut your allocation in half. They won’t build recharge projects, they’ll just stop you from pumping.”

Landowners voiced frustration that the GSA’s groundwater plan is still being finalized with consultant Geosyntec. That plan must be coordinated with the four other GSA’s that cover the subbasin and that has been difficult, Mills said.

The goal is to submit a revised groundwater plan to the Water Board April 1, just two weeks before the probation hearing.

There is no indication Water Board staff will consider a new groundwater plan within such a short timeframe.

Tricky dance

“This is an extremely tricky proposition because we’re trying to get all five (GSAs) to agree to the same thing,” Mills said at Mid-Kings’ March 26 board meeting. “Whenever anybody pushes real hard, it causes others to adjust or push back. It’s an interesting dance we’re doing right now.”

Mills said three of the GSAs are trying to use the “good guy clause,” a clause in the Water Code that states: “The board shall exclude from probationary status any portion of a basin for which a groundwater sustainability agency demonstrates compliance with the sustainability goal.”

But Mills predicts this won’t fly with the Water Board come April 16.

“We will sink or swim together,” he said.

Original Article: [SJV Water by Lisa McEwen](#)



## US WATER NEWS

### **Sinking cities: How land subsidence is affecting Arizona**

The Grand Canyon State's cities may not have any of George Strait's prized "ocean front property in Arizona," but they do have one thing in common with coastal cities around the world: The cities are sinking. In fact, the whole state is.

A recent study published in the journal *Nature* has shown that the world's coastal cities are falling prey to subsidence in addition to the already-documented rising sea levels.

Land subsidence is a geological term for the sinking or settling of the Earth's surface. Subsidence can be caused by a variety of factors, but in most cases it's accelerated by the extraction of groundwater.

Arizona, of course, doesn't have rising sea levels to contend with — but that doesn't mean land subsidence is a non-issue.

According to the Arizona Geological Survey, over 3,000 square miles of the state are affected by subsidence, and it's increasing in urban areas.

The land sinking isn't the only problem — subsidence is often the cause of fissures, which can lead to cracked and collapsing roads, broken pipes and utility lines, and in extreme cases, human injury or death.

Edward Kavazanjian, a professor of geotechnical engineering at Arizona State University, says that subsidence can be stopped or slowed, but not reversed.

The "settlement" of the soil means the ground itself will no longer be able to absorb water the same way it did before groundwater was extracted.

"When they have surplus water and sometimes with treated wastewater, they pump it back into the ground to try and restore the aquifer," Kavazanjian said. "That'll halt settlement, but it won't erase it."

The best way to halt subsidence or at least slow it down is to stop pumping groundwater, Kavazanjian said, but that would lead to Arizonans needing to find a new source of water. One would be recycling it for direct reuse, a process some local breweries are already doing due to a partnership with Scottsdale Water. It's the only water utility in the state currently authorized for direct potable reuse.

Another way, said Kavazanjian, is to more effectively regulate groundwater management areas.

"There are large parts of the state that are not considered groundwater management areas, where there are very few restrictions on pumping," he said. He hopes that groundwater management areas will expand in the coming years.

Original Article: [Fronteras Desk by Nate Engle](#)



## **This new proposal for Colorado River sharing prioritizes the environment**

A coalition of environmental groups is proposing a new set of rules for managing the Colorado River after 2026, when the current guidelines expire. Their proposal, which aims to weave environmental protections into river management policy, comes amid heated negotiations about how the shrinking river should be shared in the future. In March, the seven states that use the river found themselves divided into two camps, each faction publishing its own proposal for managing water. The two groups have promised to work towards consensus and are aiming to agree on a singular plan before 2026. The authors of the new environmental-focused proposal — a group of seven conservation nonprofits — say they don't expect their own plan will be adopted in full but hope to encourage state and federal water managers to consider plants, animals, and ecosystems while drawing up their own Colorado River policies.

"If you integrate these ideas into those annual operations, you can have your water security — which the states want — but then you also get these environmental benefits that make sure that you do have a healthy flowing river that is the foundation for the entire system," said John Berggren, a water policy expert at Western Resource Advocates, one of the conservation groups that co-signed the proposal.

All seven of the organizations that crafted the river management proposal receive funding from the Walton Family Foundation, which also supports KUNC's Colorado River coverage.

Current negotiations about how to share the Colorado River are driven by one defining fact: The water supply for 40 million people across the Southwest is shrinking due to climate change. Talks about how to rein in demand accordingly have been contentious since states are reluctant to cut into the water supply for the cities, farms, and ranches within their borders.

The "Cooperative Conservation Alternative," as dubbed by the environmental proposal's authors, offers a series of ideas on how to make sure decisions about the water supply for people and businesses don't leave the environment behind.

The first idea outlined in the proposal is the implementation of a new way of measuring how much water is stored in reservoirs along the Colorado River, with water releases adjusted accordingly. Among other tweaks to measuring reservoir storage, the proposal suggests adjusting reservoir releases according to recent trends in climate conditions. For example, the new method would take into account snowmelt lost to dry, thirsty soils when determining release levels following particularly dry years.

The environmental groups also want to see fish habitats considered as a factor when determining how much water is released from major reservoirs. The proposal cites the health of aquatic ecosystems in the Grand Canyon, where native fish are threatened by



## VELES WATER WEEKLY REPORT

predatory invasive species that have been able to travel downstream due to dropping water levels in Lake Powell – the nation’s second-largest reservoir.

The proposal also suggests the creation of a “Conservation Reserve,” a program that would allow water users to store some of their supply in major reservoirs. That stored water would be used to help avoid low reservoir levels that could damage infrastructure – including hydropower generators – but would not be counted when determining how much water is released from major reservoirs in a given year. The “Conservation Reserve” would replace the existing “Intentionally Created Surplus” program.

The conservation groups say the ideas in their proposal are designed to benefit the environment but shouldn’t be seen as objectionable by the water users along the Colorado River or the states that ultimately have the most say in the river’s fate.

“That water supply is available to all of us because of the function of the river as an ecosystem itself,” said Jennifer Pitt, Colorado River program director at the National Audubon Society. “If we ignore that entirely, and the system that sustains that functioning waterway erodes and breaks down, we may lose some of its ability to deliver us water in the first place.”

Original Article: [KUNC by Alex Hager](#)

### **Most of the Colorado River’s diverted water goes to agricultural uses, study finds**

Agriculture is the dominant user of water from the overextended Colorado River, but a recent study out in the scientific journal *Communications Earth & Environment* shows how much water goes to agriculture compared to use by cities.

The agricultural sector is the main target for cuts in water use, as the federal government, seven southwestern states and 30 tribal nations search for ways to adapt to climate change.

Nearly three quarters of the water diverted from the Colorado River is being used for irrigation, according to the study.

“So this is not water that’s used for living in the desert, it’s for generating money,” said Andrew Curley, a professor of geography at the University of Arizona.

Farmers in the basin have over 100 years of legal and physical water infrastructure on their side, he said. “It’s been a longstanding project of both the federal government and state governments to use Colorado River for irrigation, for agriculture.”

But they’ve been allocating water based on faulty science, Curley noted. Now, overuse is catching up with the basin and drier days are coming.

Farms and ranches will have to make painful cuts to their water use, according to Sarah Porter with the Kyl Center for Water Policy.

“You’re talking about farmers not being able to grow as much, potentially really impacting rural economies,” she said.





## VELES WATER WEEKLY REPORT

Officials in the basin are looking for ways to leave water in the system without putting farmers out of business, Porter added.

Original Article: [Marketplace by Savannah Maher](#)

### **New Mexico to invest \$500M in first-of-its-kind strategic water supply build-out**

New Mexico will invest \$500 million in securing a first-of-its-kind strategic water supply to bolster drought resilience and clean energy production, Gov. Michelle Lujan Grisham (D) announced on Tuesday.

To build up this reserve, the state intends to purchase treated brackish water — naturally occurring, somewhat salty water — and produced water, generated as a byproduct of fossil fuel extraction.

The supply will help expedite the national power sector's shift to renewables by providing resources for water-intensive processes, according to the announcement, which the governor issued on the sidelines of the U.N. climate summit in Dubai.

Among these potential uses are the creation of green hydrogen, storage of energy produced by wind and solar, and the manufacture of electric vehicles' microchips, solar panels and wind turbines, state officials noted.

"In arid states like ours, every drop counts," Lujan Grisham said in a statement, after announcing the initiative at a U.S. Chamber of Commerce event.

"A warming climate throws that fact into sharper relief every day," the governor added. The New Mexico Environment Department in early 2024 will begin requesting proposals from companies interested in pursuing a contract through what's known as an "advanced market commitment," the governor's office explained.

Such commitments — used in other industries like health care for vaccine manufacture — decrease the risk of private sector investment and encourage early stakeholders to back expensive infrastructure, per the announcement.

Companies awarded these contracts can secure private capital to construct and operate water treatment facilities with the guarantee that New Mexico will purchase the resultant water.

From there, the state will make that water available for a variety of water-intensive renewable energy projects, the announcement said.

New Mexico has a robust brackish water supply, as the state sits on top of substantial aquifers filled with salty water that is unsuitable for human or agricultural consumption without treatment, the governor's office explained.

More than 2 billion barrels of produced water were generated by oil and gas operations in 2022, of which 1.2 billion barrels were injected into deep wells for permanent disposal.



## VELES WATER WEEKLY REPORT

Diverting just 3 percent of that quantity of water to generate hydrogen could produce enough energy to power more than 2 million households each year, per the governor's office.

"While New Mexico is doing everything we can to reduce climate warming emissions, it is equally important to focus on water resiliency," New Mexico Environment Secretary James Kenney said in a statement.

"Water reuse safeguards freshwater for communities while offering opportunities for clean energy expansion and green manufacturing," Kenny added.

To fund this initiative, the governor's office said Lujan Grisham will be seeking \$500 million in non-general fund dollars — \$250 million in this upcoming legislative session in the same in 2025.

"This is innovation in action," Lujan Grisham said. "We're leveraging the private sector to strengthen our climate resiliency and protect our precious freshwater resources."

Original Article: [Yahoo by Sharon Udasin](#)

## GLOBAL WATER NEWS

### Climate Change Is Driving a Global Water Trade You Can't See

Every manifestation of the dangerous weather wreaking havoc around the world has one thing in common: water. As the Earth's climate changes, the lack of water, or its sudden abundance, is reshaping the global economy and international trade. From prolonged drought slowing down ships in the Panama Canal to deluges halting industrial production in Japan, it's one of the most obvious ways that rising temperatures are affecting businesses.

Increasingly acute scarcity has forced cities, countries and companies to purchase much more water from farther-away places than before. Water deliveries are a growing



## VELES WATER WEEKLY REPORT

industry, and not just in places with unreliable freshwater supplies. Tanker trucks loaded with the life-giving liquid have become necessary even in developed nations enduring multiyear droughts. At the same time, marketplaces where water rights are bought and sold have become more volatile in parts of Australia, Chile, Spain and the US.

But that trade of H<sub>2</sub>O pales in comparison to another, invisible way that water moves around the globe. Because it's needed to make almost every raw material and product that humans consume, the trillions of dollars in commodities and goods exchanged every year also ultimately represent an exchange of water.

Tony Allan, a British geographer, coined the term “virtual water” in the 1990s to describe the unseen trade that happens every day — as opposed to the “physical water” that's bought and sold through pipelines, bottles and contracts. Food imports, he argued, served as an indicator of the scale of an economy's water deficit. High levels of food imports showed that a nation didn't have enough water to grow its own food; low levels suggested the opposite. It was a good thing that such a market developed organically, as it helped mitigate shortages and tensions over scarcity.

“Everywhere there are examples of conflict over water being avoided,” Allan wrote in his first paper on the issue in 1993. “The tendency is to make adjustments which are conflict-avoiding through economic and policy substitutions for water.”

The initial awareness of the virtual water trade came at a time when there was more to go around and fewer mouths to feed. Trading of water through goods doubled from 1986 to 2007 as the global population rose and international shipping became more sophisticated. These trends — together with an increase of gross domestic product in some of the world's largest economies — will continue through the century, according to a September paper on the future of virtual water trading by scientists at the University of Maryland.

The researchers project that today's virtual water market will expand as much as five times by 2100. More efficient trading could help reduce water needs, with potential savings of 6 trillion cubic meters of water through the end of the century, the equivalent of almost 2 billion Olympic swimming pools or more than the volume of Lake Michigan. It took nearly three decades for scientists to figure out how to map the virtual water trade. Researchers at the Polytechnic University of Turin in Italy did so by analyzing millions of data points on agricultural exchanges through 2016, which were recorded by the United Nations' Food and Agriculture Organization.

“Virtual water has become a way for us to understand how countries connect to each other from a geopolitical point of view,” says Marta Tuninetti, a co-author of the Turin research. “We use these indicators to understand what are the repercussions over the trade network if a climatic or a geopolitical crisis hits a producer country.”

There are plenty of recent examples. Russia's invasion of Ukraine sent shock waves through the grain market. Each ton of wheat requires about 1,500 cubic meters of water



## VELES WATER WEEKLY REPORT

on average globally, according to CWASI, a database managed by the Turin researchers that shows how much water is embedded in goods. Flooding in California has washed out fields of almonds (5,356 cubic meters of water per ton) while drought in the Colorado River basin has upended the production of broccoli (224 cubic meters of water per ton).

Being a large importer or exporter doesn't necessarily make a country a winner or loser in the water game. "Having water doesn't make you rich if you're giving it away for free to grow food, or if you're letting others pollute it," says Pedro Arrojo-Agudo, an expert who advises the UN on water and sanitation. When that happens, "it becomes a case of economic exploitation from companies that export products to semiarid countries that capture the water and the wealth that comes with it."

A key question is how much of a country's natural water resources are left for local communities and ecologies. A country-by-country ranking of the amount of water available per person, compared with how much is exported — physically and virtually — sheds light on how it's really being traded around the world.

Original Article: [Bloomberg by Jin Wu, Laura Millan, Chris Udemans and Jack Wittels](#)

### **Irrigation-driven groundwater depletion in the Ganges-Brahmaputra basin decreases the streamflow in the Bay of Bengal**

Ganges and Brahmaputra, two of Asia's most prominent rivers, have a crucial role in Southeast Asia's geopolitics and economy and are home to one of the world's biggest marine ecosystems. Irrigation-driven groundwater depletion and climate change affect the Ganges-Brahmaputra's hydrology, threatening the stability of the Bay of Bengal. Here, we quantify, using results from a land reanalysis, the impacts of a changing climate and intensive irrigation on the surface water flowing into the Bay of Bengal. The effects of such activities mostly occurring in the Ganges basin, either intensified or lessened depending on the area by the climatic conditions, decrease freshwater flow into the bay by up to 1200 m<sup>3</sup>/s/year. While the increase in precipitation in the Ganges basin reduces the effects of groundwater depletion on the streamflow, the decrease in precipitation and the snowmelt decline in the Brahmaputra basin exacerbate streamflow reduction due to groundwater depletion at the delta.

Original Article: [Maina, F.Z., Getirana, A., Kumar, S.V. et al. Irrigation-driven groundwater depletion in the Ganges-Brahmaputra basin decreases the streamflow in the Bay of Bengal. Commun Earth Environ 5, 169 \(2024\). <https://doi.org/10.1038/s43247-024-01348-0>](#)

### **India's most innovative cities are running out of water**

At the time Egypt's pyramids were being constructed, one of the cradles of global civilization grew up in the Indus Valley around the borders of what are today Pakistan



## VELES WATER WEEKLY REPORT

and India. Its grid-planned cities produced sewage networks, delicate artworks and a yet undeciphered writing system. Then a 900-year drought emptied its urban areas and sent its population back to a simpler, poorer village life on the plains of the Ganges.

Something grimly similar is happening now.

Tech professionals are leaving India's IT hub of Bengaluru amid an intensifying drought that has gripped the city as it sweats through another torrid pre-monsoon season, the Deccan Herald reported last month. More than half of the wells the city depends on for groundwater have dried up after failed rains last year, leaving businesses and citizens dependent on trucked-in water tankers.

In the neighboring state of Kerala, which catches much of the monsoon rainfall before it reaches the inland stretches of Bengaluru's Karnataka state, a minister has even written to Bengaluru's companies suggesting they relocate because "water is not an issue at all" in Kerala, the Times of India reported.

That seems in poor taste in southern India, where fights over the distribution of river flows between parched states have gone on for decades. The minister is not wrong, though. Indeed, these pressures are only going to grow as populations rise and climate change makes the cycles of drought and monsoon more pronounced.

That is not just a regional problem, but an issue for the country as a whole — and the world at large. The southern states of Karnataka, Kerala, Telangana and Tamil Nadu account for barely more than 15% of India's population, but they generate about a quarter of gross domestic product thanks to the strong performance of their technology and manufacturing sectors. The global economy is counting on that engine of growth to take over in the years ahead, as China slows toward stagnation.

Southern India lacks the huge reserves provided by the Himalayan snowpack in the north of the country, making water shortages a fact of life. The city of Chennai in Tamil Nadu went through a comparable emergency in 2019, while the current drought is also biting in Telangana's tech capital, Hyderabad.

Existing policies are not helping, and fixing the problem will require making hard compromises with two of India's most politically sensitive industries: agriculture and power generation.

The households struggling with water restrictions right now only consume about 7% of India's water. The overwhelming majority, 85% or so, goes to farming.

While rainfall cannot simply be transferred from a rice paddy to a tech worker's kitchen tap, the groundwater that is running out in Bengaluru ultimately shares its aquifers with rural water tables.

Karnataka and Tamil Nadu are two of the most important states where sugarcane, a notoriously thirsty crop, is grown. Far from seeking to rein in this trade, the government is encouraging planting with mandated prices and export subsidies that have landed New Delhi in years of disputes at the World Trade Organization.



## VELES WATER WEEKLY REPORT

India now produces enough sugar to meet its population's needs twice over and production will remain higher than demand well into the 2040s, according to a recent report by government think tank NITI Aayog. Meanwhile, the increased cane production required by the central government's ethanol-blending policy could consume an additional 348 billion cubic meters of water, according to one 2020 study — around twice what is used by every city in the country.

Coal-fired electricity is another water hog. Thermal generators need to suck gigaliters from rivers to cool down turbine circuits. The power sector may account for more than a quarter of Karnataka's urban water consumption by 2030, according to a 2014 study. Much of that electricity goes back into agriculture: As well as sucking up groundwater, India's millions of grid-connected electric pumps put further stress on the power system, accounting for about a fifth of electricity consumption.

It is unlikely that, with general elections just weeks away, these persistent problems will be tackled any time soon. But they cannot be ignored.

Bengaluru and Hyderabad have prospered by earning a reputation as some of India's best cities for upwardly-mobile professionals, blessed with relatively clean air and a milder climate. Should institutional failures turn urban clean water into a privilege rather than a right, their attraction will diminish, dissipating the development benefits of urban growth and agglomeration.

India is determined to escape the fate of its Indus Valley forebears and prosper through this coming era of climate change. To do so, it will need to put the needs of its thirsty cities first.

Original Article: [The Japan Times by David Fickling](#)

### **3M gets final court approval for \$12.5 billion 'forever chemicals' settlement**

3M will start paying out its \$12.5 billion "forever chemicals" settlement with public water systems later this year after a federal judge gave final approval to the deal last week.

The settlement, announced last summer, will pay drinking water providers around the country for PFAS remediation over the next 12 years.

3M pioneered the use of per- and polyfluoroalkyl substances 70 years ago, but is now reckoning with their environmental and health costs.

CEO Mike Roman, using an oft-repeated phrase, said the settlement will "reduce risk and uncertainty" when announcing the court's approval on Monday.

"This is yet another important step forward for 3M as we continue to deliver on our priorities," Roman said in a statement.

3M is also discontinuing its PFAS production and sales by the end of 2025. The water systems settlement does not end all pending PFAS litigation against the company, and analysts have floated billions more in potential payouts in the coming years.



## VELES WATER WEEKLY REPORT

Payments are expected to begin this fall and will continue through 2036. The bulk of the payments will be made by 2028, according to 3M.

Original Article: [AOL by Brooks Johnson, Star Tribune](#)

### **Australia On Track For unprecedented, Decades-Long Megadroughts**

Australia could soon see megadroughts that last for more than 20 years, according to new modelling from The Australian National University (ANU) and the ARC Centre of Excellence for Climate Extremes.

The researchers' bleak findings are before factoring in human impact on the climate since the Industrial Revolution. The ANU-led team also found that 20th century droughts in southwestern and eastern Australia, including the Murray-Darling Basin, were longer on average compared to pre-industrial times.

According to the scientists, the findings paint a worrying picture of future droughts in Australia that are far worse than anything in recent experience.

Megadroughts are exceptionally severe, long-lasting and widespread. They can last multiple decades or even centuries. An example of this is the megadrought in the United States' southwestern region that started in the year 2000 and has continued for more than two decades.

Co-lead author Dr Georgy Falster, from the ANU Research School of Earth Sciences, said that if a megadrought occurred in Australia today, the consequences would be made even worse because of climate change, as any drought would occur against a backdrop of hotter weather.

"The combination of climate change on top of naturally occurring megadroughts that could last for 20 years means that in the future Australia could see droughts that are worse than anything in recent historical experience," Dr Falster said.

"We must consider, and prepare for, the possibility that one of these multi-decade megadroughts could occur in the near future.

"One of the problems with understanding protracted droughts in Australia is that our climate observations since the 1900s give us only a handful of examples to work with. This isn't representative of the worst-case scenarios that are possible just through natural climate variations.

"Thinking about when we might expect to see a 20-year-long drought in the Murray-Darling Basin in southeastern Australia, this varies a lot. We could see a megadrought occur every 150 years or 1,000 years.

"In this study, we paid particular attention to the Murray-Darling Basin. As the largest agricultural region of Australia, it's important to know how bad droughts in this region could be."

The ANU-led team looked at the full spectrum of droughts Australia could experience, including length and intensity, even without the effects of climate change. They also



## VELES WATER WEEKLY REPORT

wanted to find out how human-caused climate change is now altering the characteristics of Australian droughts.

The researchers used multiple climate models to simulate droughts that occurred during the past millennium – from the year 850 to 2000 – to determine how they might change in the future.

This includes predicting how long Australian droughts could last for, and how dry they could be.

“One of the confronting findings of our work is that it is possible for droughts in Australia to be much longer than any of the droughts that we’ve experienced in recent times. Droughts that continue for 20 years or more are something that we should expect to happen,” Dr Falster said.

“Megadroughts are part of the natural variations in Australia’s climate. But worryingly we are now also adding human-caused climate change into the mix, and that is probably increasing the chances of the next megadrought here.

“We compared simulated droughts in the 20th century, from the year 1900 to 2000, with those from the pre-industrial period, before the year 1850, to see if human-caused climate change has impacted how Australians experience droughts today.”

Co-author Professor Nerilie Abram, also from ANU, said human-caused climate change is contributing to longer droughts in southwestern and eastern Australia, including the Murray-Darling Basin.

She said these are also the regions where we can expect future rainfall declines due to climate change, thereby increasing the risk of droughts.

“It is likely that changes to drought intensity could still arise as climate change continues to worsen,” Professor Abram said.

“One example of this is the 21st century ‘Tinderbox Drought’, which was only three years long but was exceptionally intense and set the conditions for the Black Summer bushfires. The Tinderbox Drought was likely made more severe by climate change.

“The only thing we can do to lessen the potential severity and length of future droughts is to rapidly reduce greenhouse gas emissions. For example, by rapidly transitioning to renewable energy sources.

“We can also reduce the impacts of future droughts by being prepared with water storage and management plans, and community support networks.”

Original Article: [Eurasia Review](#)

## Thames Water Seeks Its Next Move With No Easy Options in View

The future of the UK’s largest water and sewage company, Thames Water Utilities Ltd., was thrown in doubt on Thursday after shareholders declared the company is “uninvestable” under the current regulatory regime.





## VELES WATER WEEKLY REPORT

Shareholders refused to inject a long-awaited £500 million (\$632 million) of equity after the regulator indicated there was no leeway on the terms for the company's investment plan.

At stake is the operations of a company that supplies 25% of England with water, including London. The money was supposed to be the first tranche of £750 million promised by this time next year. In total Thames needs £2.5 billion in equity to deliver on its plans out to the end of the decade.

The lack of fresh funds raises troubling questions, from how Thames will invest in much needed repairs and infrastructure to ultimately, whether it may need to be temporarily nationalized. The government in an election year will likely seek to keep it at arms length, while key shareholders are losing money and may be reluctant to throw in more, no matter how adverse the circumstances. It's a situation fraught with uncertainty, but here are some potential scenarios of what's likely to come next:

### Special Administration

Nobody wants it but temporary nationalization is firmly on the horizon. If Thames can't find additional equity on the private market, the government may be forced to apply to the courts to trigger insolvency proceedings, bringing Thames into special administration.

The government already considered this option last year and officials have recently updated water company insolvency laws. Neither political party want to see this option as it would require them to invest billions of pounds in Thames Water that they'd like to spend elsewhere.

On Thursday, Weston said special administration is some way off. The question is whether it would be a problem for this government, or the next.

"Like any company needing to secure new investment there are a wide range of options available to water companies, including the injection of new equity from any prospective investors," a government spokesperson said. "Ofwat, as the financial regulator of the water sector, continues to engage with Thames Water to improve its financial resilience."

### A Sale of Thames Water

Parent company Kemble Water Holdings Ltd. says the lack of funding means it will now be unable to refinance or repay a £190 million loan which matures on April 30 unless an extension is granted by lenders. This could potentially make Kemble insolvent and leave Thames without an owner.

A white knight may decide to pledge some new investment or, if it's up for sale, buy Thames Water cheaply. But an investor would have to stump up the billions needed to improve the company's performance.

This may be an unappealing option given that Kemble's nine investors have already declared Thames Water an uninvestable proposition under current regulatory requirements.



## VELES WATER WEEKLY REPORT

An Existing Shareholder Wipes Out Others

The nine current investors are a mixed bag, including a Canadian pension fund, the Universities Superannuation Scheme Ltd, China Investment Corp. and a subsidiary of the Abu Dhabi sovereign wealth fund.

It's possible that one of the larger shareholders could decide to go it alone and inject the equity needed. That would give full control of Thames, buying out other investors.

This may be a more attractive proposition for some of the later investors such as Ontario Municipal Employees Retirement System, Omers, or USS, that need a turnaround in the company to see any return on their investment.

But in this scenario, the shareholder would still be lumbered with Kemble's own debt, which is over £1 billion. To leapfrog the creditors, the shareholder could invest directly into the regulated utility Thames Water instead of into Kemble. But this would be a riskier option as they would be brought into the regulated asset and could be vulnerable to nationalization through the government's special administration regime.

IPO

Thames chief executive Chris Weston on Thursday said the company is now exploring all possible options to raise the cash needed to fund its investment plans.

The next significant date will be June 12, when regulator Ofwat is due to provide its first public draft determination on all water companies investment plans for the five years to 2030. So far all feedback from Ofwat to shareholders has been given privately.

Weston said Thames could "go to the market" once it has the Ofwat document. That could include listing the company on the stock market. While the IPO might be a struggle, having Thames publicly listed could be a better option in the long run. Industry observers have long maintained that publicly listed water companies, Severn Trent and United Utilities, perform better than their privately-held peers.

Original Article: [Bloomberg UK by Jess Shankleman](#)

## UK's summer 2022 drought provides warning for future years, say scientists

The UK will be increasingly tested by more droughts like 2022, emphasizing the importance of being prepared for similar extreme weather in future, say scientists who have analyzed that summer's events.

The study by the UK Center for Ecology & Hydrology (UKCEH) outlines how the drought evolved and its impacts on water resources, wildlife and people, comparing the situation with previous droughts and looks at whether it is an indication of future events. The study is published in the journal *Weather*.

Summer 2022 was the joint hottest (with 2018) and fifth driest since the 1890s. The drought affected large parts of the country and was the worst in some areas since 1976. It was part of wider European drought, believed to be the worst on the continent in 500 years.



## VELES WATER WEEKLY REPORT

The prolonged and extensive exceptional heat, dry soils and low river flows had impacts across much of the UK including water restrictions—with six companies introducing hosepipe bans affecting around 20 million people—and restrictions on waterways navigation.

Extensive challenges for agriculture included low crop and milk yields, as well as dying grass in grazing fields that forced farmers to use winter food stores. During the summer, there were nearly 25,000 wildfires; they spread easily across dry fields and also affected urban areas. Environmental impacts included algal blooms and fish kills.

A Level 4 heat health alert was issued for the first time since its introduction in 2004, and an estimated 2,800 excess deaths of over 65s due to heat between June and August. That summer's events underline our continuing vulnerability to intense droughts associated with low spring/summer rainfall alongside very high temperatures—especially given it followed shortly another intense summer drought in 2018.

UKCEH hydrologist Jamie Hannaford, one of the authors of the study, said, "The 2022 drought posed significant challenges to water management and communication with the public given the speed of onset of drought conditions and impacts. It has provided water managers with an important stress test, enabling them to assess our resilience to the kind of extreme event that we will see much more of in future."

Hydrologists classify 2022 as a summer drought, which developed relatively quickly, as opposed to a multi-year drought driven by successive dry winters. While there is significant uncertainty about how multi-year droughts may evolve in future, scientists are highly confident, based on modeling, that we will be increasingly tested by more droughts like 2022. Human-driven climate warming increases the risk of droughts like 2018 and 2022, associated with drier summers and higher temperatures.

The authors of the study say the impacts on water supply were relatively modest in terms of duration and areas affected. Like 2018, this was largely due to wetter winters before and after the drought.

They say droughts like 2022 emphasize the need for improved real-time monitoring and forecasting systems. This would give an indication of the likely impacts that may lie ahead, to help apply mitigation measures—such as restrictions on abstractions or efforts to safeguard the environment like fish rescues—at an early stage.

UKCEH oversees COSMOS-UK, a long-term network of soil moisture monitoring sites, producing live data, which was used for the 2022 drought study.

It is also leading the development of a Floods and Droughts Research Infrastructure (FDRI). The new instruments will produce an extensive range of new measurements across several UK catchments.

The data will enable researchers to improve computer models to predict when and where droughts and floods will happen, and how severe they will be.

Original Article: [Phys.org](https://www.phys.org) by [UK Centre for Ecology & Hydrology](https://www.ukceh.ac.uk)



***Note the attachment is not an inducement to trade and Veles Water does not give advice on investments.***