

Veles Water Weekly Report

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March 3rd 2022

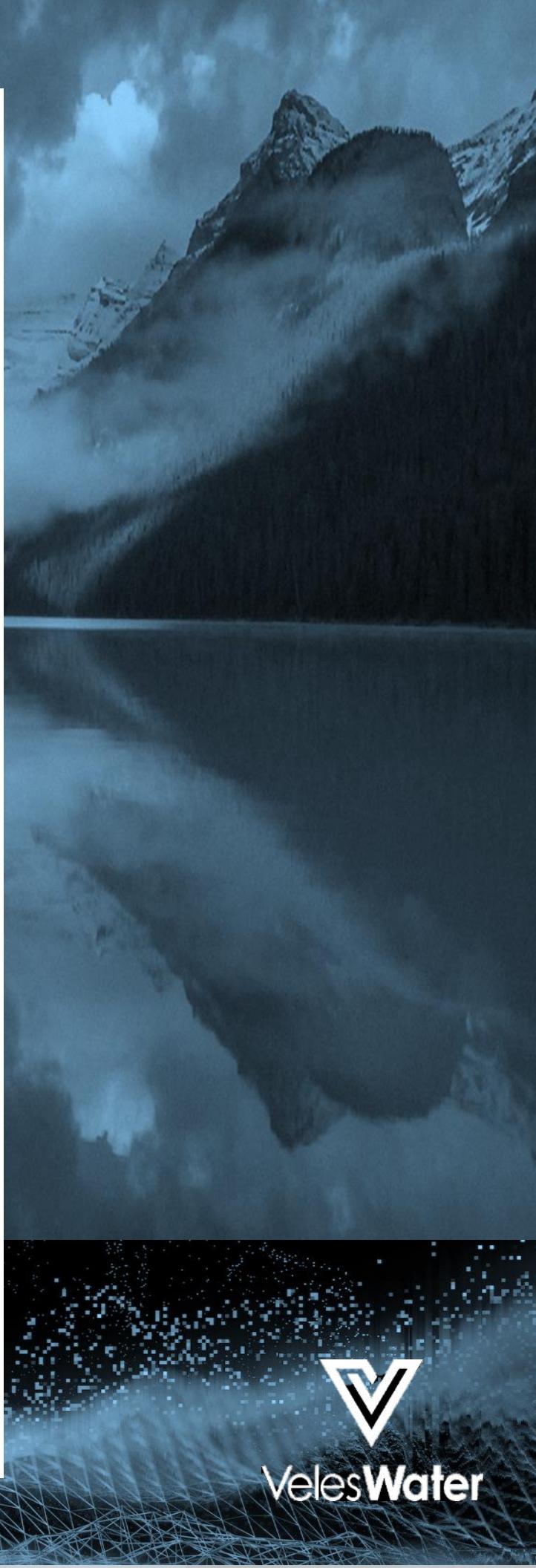
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Veles Water



WATER FUTURES MARKET ANALYSIS

Welcome to **WATERTALK**

by Joshua Bell

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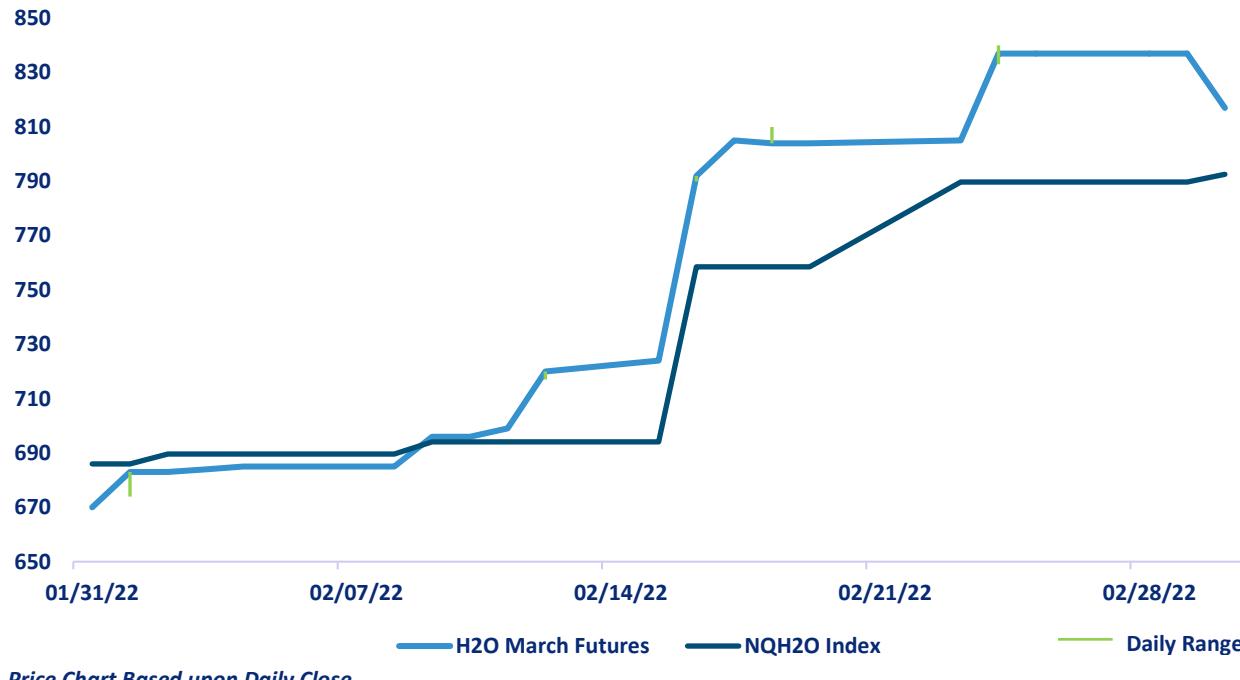
"A 2 minute technical analysis video of H2O futures"

<https://vimeo.com/684142021>



NQH2O INDEX PRICE vs H2O FUTURES PRICE

1 Month Price Performance NQH2O Index vs H2O Futures



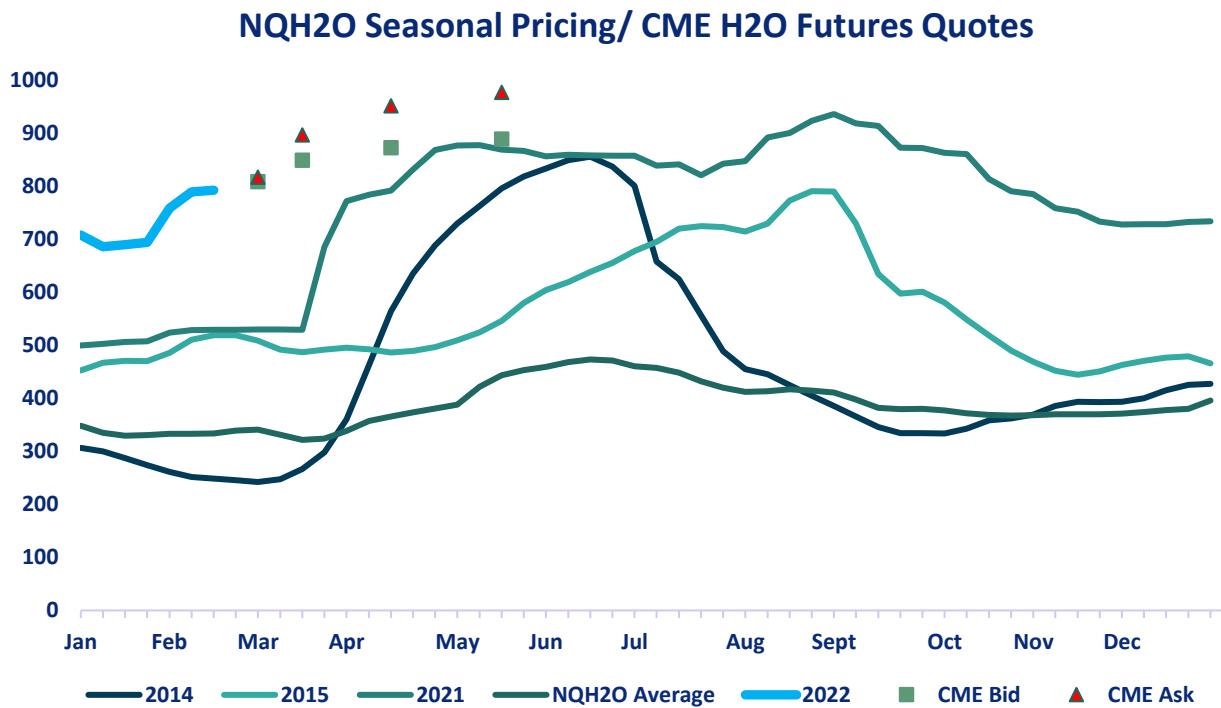
The new NQH2O index level of \$792.56 was published on the 2nd of March, up \$2.87 or 0.36%. The March Contract is now considered the front month and has been trading at a premium ranging from +\$24.44 to +\$47.31 to the index over the past week. We expect a further convergence of the futures and index prices.

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

March 22	810@817
April 22	850@897
May 22	874@952
June 22	890@977



NQH2O INDEX HISTORY



The graph above lays out the Nasdaq Veles water index by year, showing 2013- 2022. In very dry years, prices clearly rise through the spring, peaking in May to July (with the exception of 2015) as demand for water from farmers peaks. Prices then taper off heading into the winter on reduced demand, and the possibility of rain/snow.

The restricted ability to “carry” water, much like one can do with financial contracts, gives this index the same type of seasonal pattern that one sees on some other commodities.

The graph for 2021 is highlighted in red. It shows the same seasonal climb, but at record-high values above each of the last eight years since February.

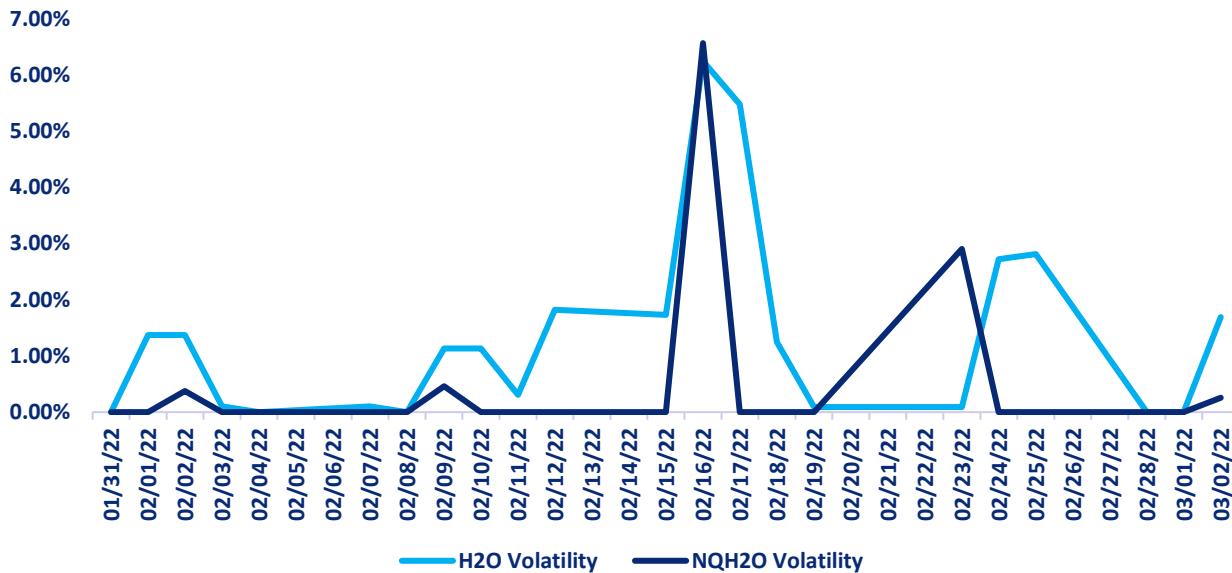
Current bids and offers in the market are still higher than historic prices showing that expectations are that this is an exceptionally dry year and prices may not fall seasonally as much as they have in prior dry years.

(John H Dolan, CME Market Maker)



H2O FUTURES AND NQH2O INDEX VOLATILITY ANALYSIS

Daily H2O Futures Volatility vs Daily NQH2O Index Volatility



DAILY VOLATILITY

Over the last week the March daily future volatility high has been 2.81% on February 24th and a low of 0% on March 1st.

ASSET	1 YEAR (%)	2 MONTH (%)	1 MONTH (%)	1 WEEK (%)
NQH2O INDEX	36.14%	10.35%	8.31%	3.742%
H2O FUTURES	N/A	13.05%	10.64%	5.12%

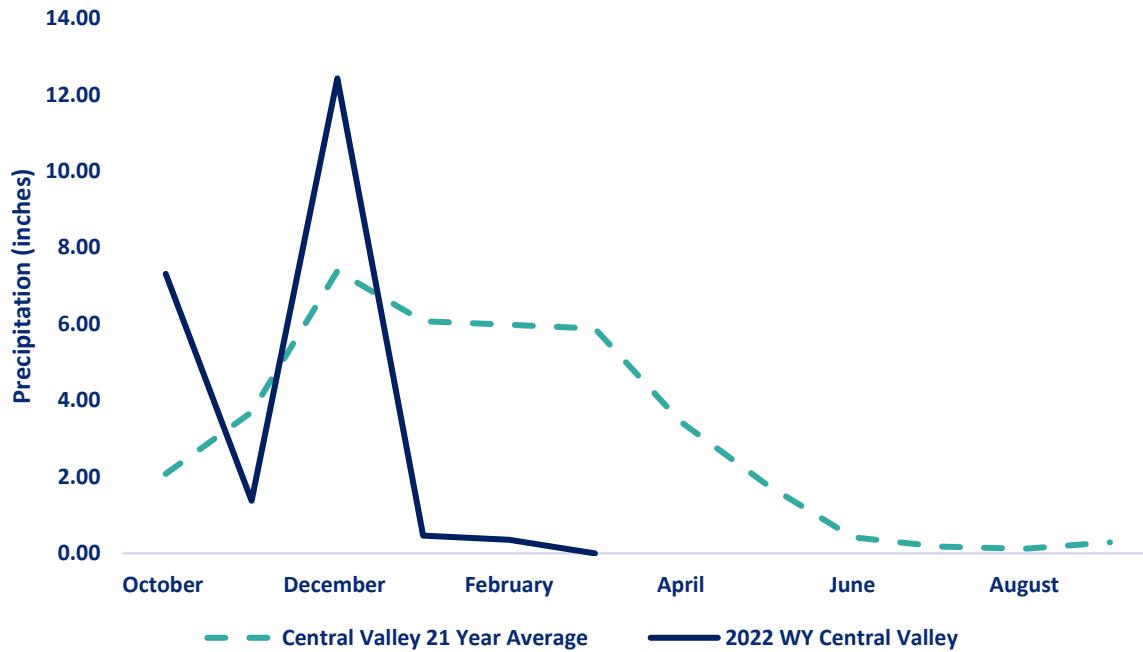
For the week ending on the March 3rd the two-month futures volatility is at a premium of 2.70% to the index, up 0.73% from the previous week. The one-month futures volatility is at a premium of 2.32% to the index, up 0.21% from last week. The one-week futures volatility is at a premium of 1.38% to the index, a reversal of 4.71% from the previous week. This is indicating the futures price has caught up with the underlying index and we can expect further moves from the underlying index in the short term.

*Above prices are all **HISTORIC VOLATILITIES** and **IMPLIED VOLATILITIES** will be introduced once an options market has been established. 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 02/03/2022

STATION	MTD (INCHES)	WEEK ON WEEK CHANGE (INCHES)	% OF 20 YEAR AVERAGE MTD	2022 WYTD VS 2021 WYTD %	2022 WY VS 20 YEAR AVERAGE TO DATE %
SAN JOAQUIN 5 STATION (5SI)	0	0.18	0.00%	53	77
TULARE 6 STATION (6SI)	0	0.43	0.00%	40	72
NORTHERN SIERRA 8 STATION (8SI)	0	0.20	0.00%	50	89
CENTRAL VALLEY TOTAL	0.00	0.27	0.00%	48	79

RESERVOIR STORAGE

RESERVOIR	STORAGE (AF)	% CAPACITY	LAST YEAR % CAPACITY	HISTORIC ANNUAL AVERAGE CAPACITY %
TRINITY LAKE	787,739	32	52	48
SHASTA LAKE	1,689,822	37	50	52
LAKE OROVILLE	1,655,082	47	38	75
SAN LUIS RES	900,217	44	58	55

Reference: California Water Data Exchange

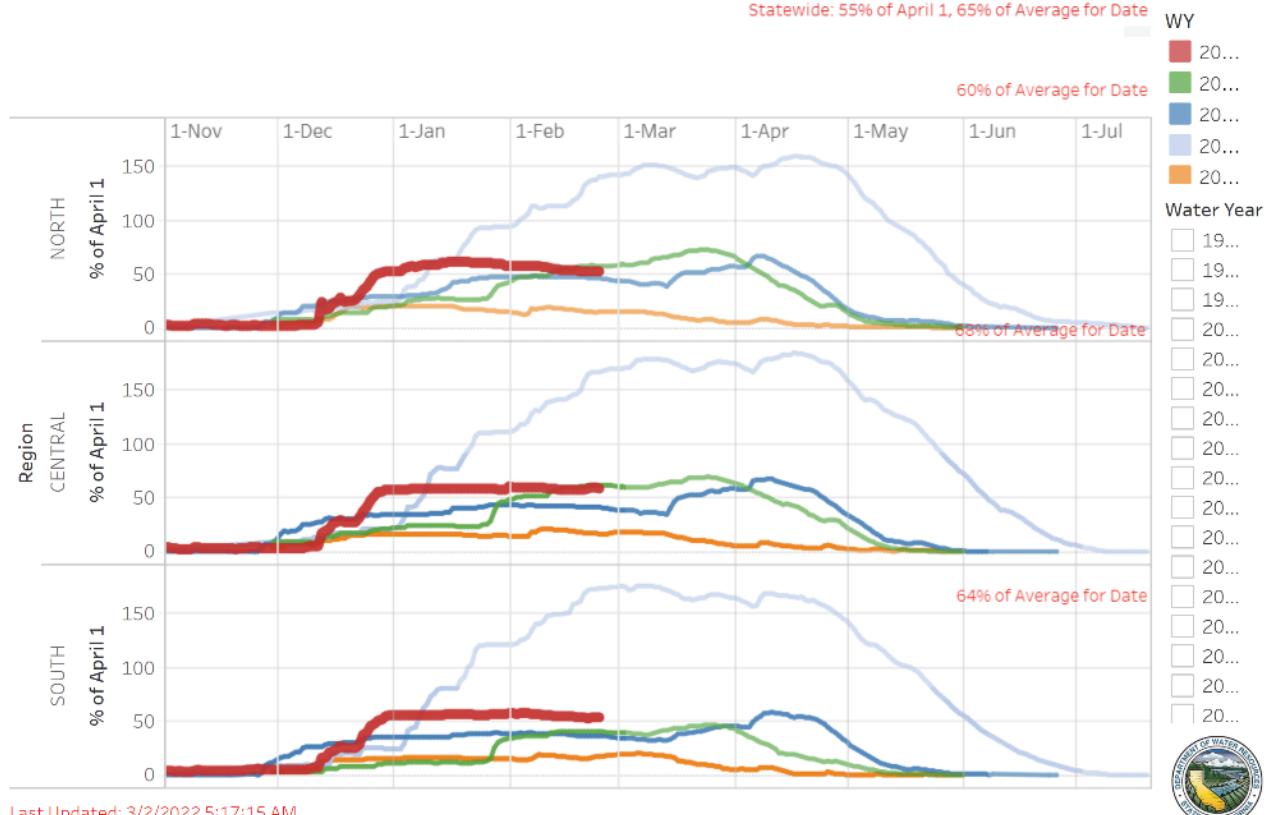
VELES WATER WEEKLY REPORT



SNOWPACK WATER CONTENT

Snow Water Equivalent Dashboard

Statewide: 55% of April 1, 65% of Average for Date



Last Updated: 3/2/2022 5:17:15 AM



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	15.1	0.20%	66	59	53
CENTRAL SIERRA	17	0.20%	68	66	58
SOUTHERN SIERRA	13.6	0.00%	45	63	54
STATEWIDE	15.4	0.10%	61	63	55

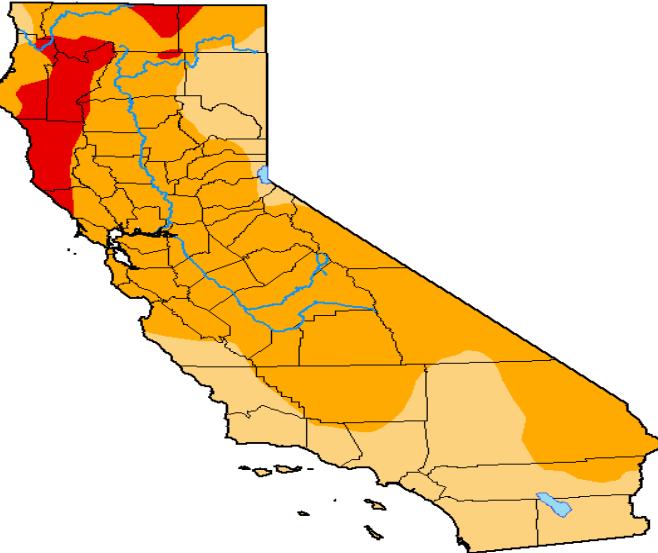
**Snow Water Equivalent, or SWE, is a commonly used measurement used by hydrologists and water managers to gauge the amount of liquid water contained within the snowpack. In other words, it is the amount of water that will be released from the snowpack when it melts. SWE has regional variance.*

**** April 1st 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

U.S. Drought Monitor
California



February 22, 2022
(Released Thursday, Feb. 24, 2022)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	68.77	6.70	0.00
Last Week 02-15-2022	0.00	100.00	99.57	66.39	1.39	0.00
3 Months Ago 11-23-2021	0.00	100.00	100.00	92.43	80.28	28.27
Start of Calendar Year 01-04-2022	0.00	100.00	99.30	67.62	16.60	0.84
Start of Water Year 09-28-2021	0.00	100.00	100.00	93.93	87.88	45.66
One Year Ago 02-23-2021	0.70	99.30	84.88	56.98	29.54	3.75

Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

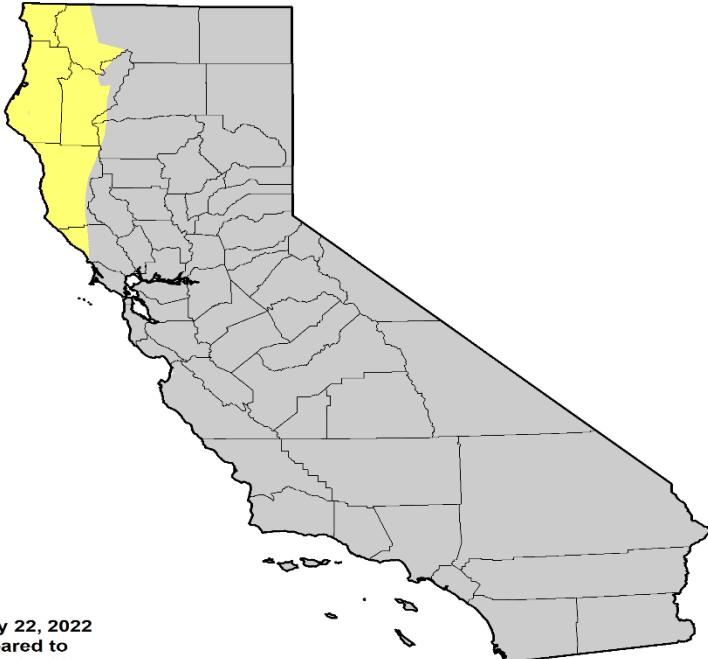
Author:

Brad Pugh
CPC/NOAA



droughtmonitor.unl.edu

U.S. Drought Monitor Class Change - California
1 Week



February 22, 2022
compared to
February 15, 2022

droughtmonitor.unl.edu



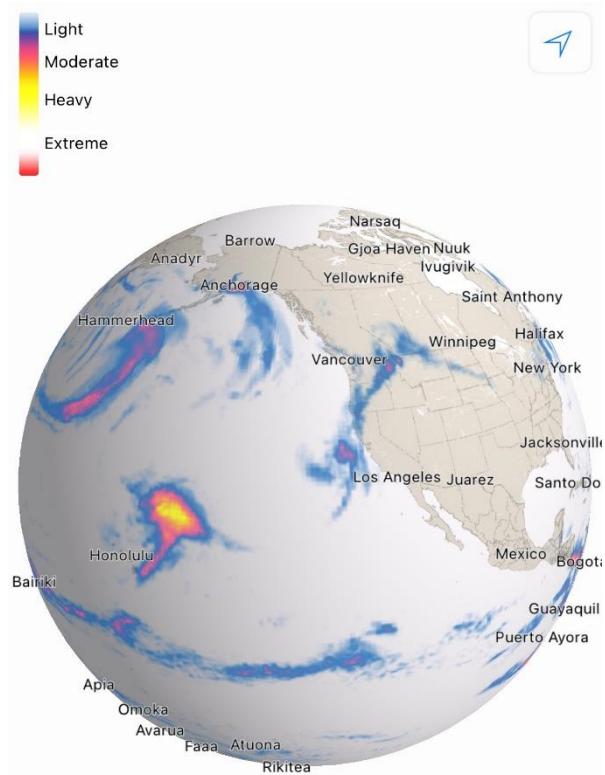
5 Class Degradation
4 Class Degradation
3 Class Degradation
2 Class Degradation
1 Class Degradation
No Change
1 Class Improvement
2 Class Improvement
3 Class Improvement
4 Class Improvement
5 Class Improvement

The US Drought Monitor release their statistics with a 1-week lag to this report. Over the past week the has been 0.43% 1 class degradation in D1 drought conditions on the CA/OR boarder. D2 Drought conditions have degraded by 2.38%. D3 drought conditions have degraded by 5.31%.

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



Map Reference: Dark Sky

The current satellite picture is showing a frontal system over the NW of the US and sitting offshore from Southern California.

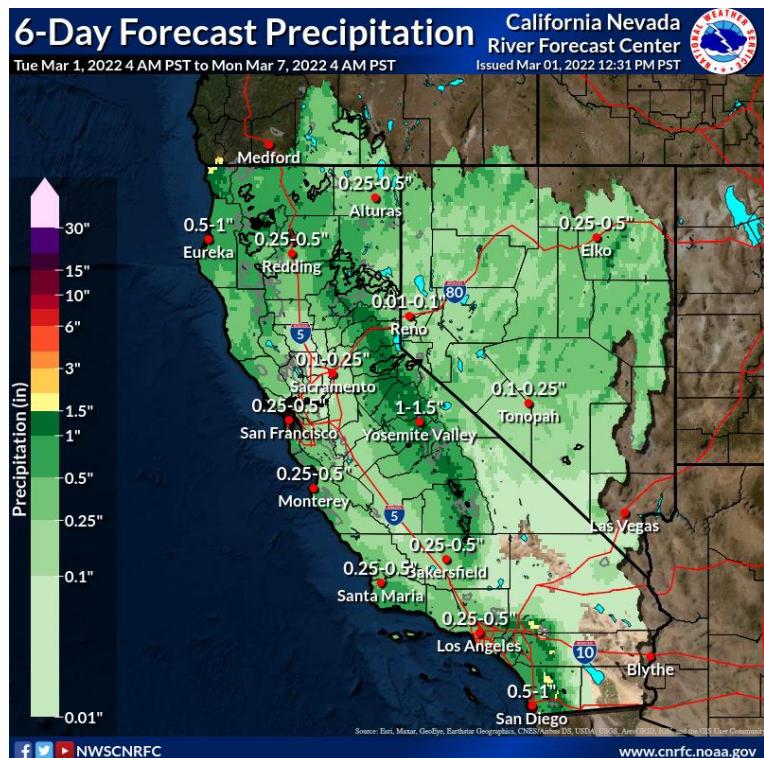
This frontal system is expected to bring precipitation to the Southern Californian region on Friday and Saturday of this week, including the Central Valley region.

The high-pressure system which is sitting over the SW US has weakened and the frontal system will move eastwards bringing precipitation to the Sierra Mountains.

There is no Monsoonal effect at this time of the year as the current weather systems dominate. Our models are still showing that there is a possibility for some precipitation over the next month but while this is still probable the likelihood is slowly decreasing.

10 Day Outlook

While the system for Thursday into Friday takes a slightly more offshore track, expect lower QPF over northern areas early Friday but with similar amounts over the Central and Southern portion of the state. The second wave rotating through the parent trough on Saturday does look a little more robust, especially for coastal CA and the Central Valley. Increased amounts a little, which makes the 00Z Sat to 00Z Sun the wettest period in the long term. Only moderate confidence in amounts and focus, as models have clearly been shifting the track of the upper low such that the focus of precipitation



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shifts. Forecast mostly relies on WPC, which is a good reflection of the current model tracks and intensity. Still expect QPF for days 4-6 to be highest along the length of the Sierra, with 0.75-1.25" forecast.

The trend continues to be one of cooling as the parent trough digs into the region Friday into the weekend. Freezing levels should lower to 2500-3500-ft over the North Coast, and 4500-5500-ft over the Sierra and SoCal on Friday. Further cooling on Saturday, with freezing levels reaching 3000-4000-ft over the entirety of the region, including SoCal.

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

WESTERN WEATHER DISCUSSION

Following the wet December 2021 for much of the West, a dry pattern persisted since early January. 2022 year-to-date precipitation averages less than 25 percent of normal throughout much of California and the Great Basin. Snow water equivalent (SWE) continues to decline due to the dry pattern during January and February with SWE falling below 75 percent of normal for much of the southern Cascades, Sierra Nevada Mountains, and Great Basin. Due to the persistently dry pattern since early January, a 1-category degradation was made to parts of northern California and southwest Oregon which reflects the extreme (D3) levels of drought according to the 24-month and 2022 year-to-date SPI, soil moisture indicators, and 28-day average streamflows. Without a major pattern change during March, additional degradations may be needed for California and the Great Basin in the weeks ahead.

A slight expansion of D3 was made to northern Wyoming to be consistent with 12 to 24-month SPIs. Recent snowfall with SWE currently running near to above average prompted a 1-category improvement to the north of Denver, Colorado. Based on a favorable snowpack across the Clearwater and Salmon basins of central Idaho, severe (D2) was improved to moderate (D1) drought for that part of Idaho. Moderate drought (D1) was degraded to severe drought (D2) across the Upper Snake River basin of Idaho as SWE for the headwaters or this basin are nearing the 10th percentile. 7-day precipitation amounts of more than 1 inch, liquid equivalent, prompted a 1-category improvement from extreme (D3) to severe (D2) drought across parts of south-central Montana. Periods of above-normal temperatures coupled with enhanced surface winds support an expansion of severe (D2) to extreme (D3) drought across southern and eastern New Mexico. These worsening conditions are also consistent with SPEI at various time scales and the depiction for western Texas.

Reference:

Brad Pugh, NOAA/CPC

Ahira Sanchez-Lugo, NOAA/NCEI



WATER NEWS

CALIFORNIA WATER NEWS

Statewide Snowpack Falls Well Below Average Following Consecutive Dry Months

The Department of Water Resources (DWR) today conducted the third snow survey of the season at Phillips Station. Following a January and February that will enter records as the driest documented in state history, the manual survey recorded 35 inches of snow depth and a snow water equivalent of 16 inches, which is 68 percent of average for this location for March. The snow water equivalent measures the amount of water contained in the snowpack and is a key component of DWR's water supply forecast. Statewide, the snowpack is 63 percent of average for this date.

"With only one month left in California's wet season and no major storms in the forecast, Californians should plan for a third year of drought conditions," said DWR Director Karla Nemeth. "A significantly below-average snowpack combined with already low reservoir levels make it critical that all Californians step up and conserve water every day to help the state meet the challenges of severe drought."

Although early season storms helped alleviate some drought impacts, a lack of storms in January and February heightens the need for conservation. The Governor has asked all Californians to cut back water use at least 15 percent compared to 2020 levels. Regionally, the Northern, Central, and Southern Sierra snowpacks are all standing just above 59 percent to 66 percent of average for this date, impacting watersheds across the state.

DWR has increased its efforts to improve climate and runoff forecasting by strengthening its collaborations with partner agencies investing in proven technologies to improve data collection and hydrologic modeling. This includes efforts at the Central Sierra Snow Lab where DWR and its partners regularly test new equipment and sensors to maximize performance when measuring the state's snowpack. Forecast improvements and monitoring enhancements increase the reliability of data used to inform water managers about flood risks, allowing opportunities to create more storage in reservoirs ahead of big storms while also ensuring water supply reliability in periods of dry or drought conditions.

"As the world continues to warm, precipitation is pushing toward extremes. Even when we see large storms producing a lot of snow early in the season, all it takes is a few dry weeks to put us below average," said Jeremy Hill, Manager of DWR's Hydrology and Flood Operations Branch. "This new pattern challenges forecasting efforts that have relied on historical patterns, so DWR has led the charge to adopt new technologies and

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utilize the best available science to manage water in real time and use forecasts that give us time to make decisions to get the most benefits and minimize the hazards.”

Current water conditions are now available in real time at California Water Watch, a new website launched by DWR. This website will help Californians see their local hydrological conditions, forecasts, and water conditions down to their address or their local watershed. The site presents data from a variety of sources and allows the public to obtain a quick snapshot of local and statewide water conditions.

“With below average precipitation and snowpack up until this point, our latest statewide snowmelt forecasts are only 66 percent of average,” said Sean de Guzman, Manager of DWR’s Snow Surveys and Water Supply Forecasting Unit. “That is not enough to fill up our reservoirs. Without any significant storms on the horizon, it’s safe to say we’ll end this year dry and extend this drought a third year.”

Original Article: [CA DWR](#)

Reforming Water Rights in California

Water rights reform has long been the third rail in California politics—that is to say, untouchable. But that may be changing. Recently, the Planning and Conservation League Foundation convened a group of water rights experts to make recommendations to improve the system, and their work is receiving a lot of attention. We spoke with two members of the group—Richard Frank, professor of environmental practice and director of the California Law & Environmental Policy Center at the University of California, Davis, and Jennifer Harder, professor of law at University of the Pacific—about the proposals.

What are the most important changes to California law recommended by the group? Was there unanimous support within the group for all of the recommendations?

Jennifer Harder: All recommendations were unanimous within the group—we didn’t rank or prioritize them. We focused on practical changes to accomplish three goals: to implement the human right to water; to address climate change; and to address fish extinctions.

Richard Frank: The State Water Resources Control Board, which has been charged with overseeing and enforcing California’s water rights system, doesn’t have all the legal tools it needs to effectively carry out its public trustee responsibilities. That’s a key focus of our recommendations: to give the Water Board tools and technology to monitor and conduct real-time reporting of water diversions. Many other western states have already implemented this: it’s not rocket science. It’s ironic that California, which prides itself on innovation, has such an antiquated water rights system. It’s out of touch with changes in California’s water supply and environment, which are occurring at warp speed.

JH: There’s a lot that’s good in our water rights system. We have the state constitutional standard for reasonable use, the public trust doctrine, and the priority system, which in



some ways works very well. But in other areas we don't do well: for example, as Rick explains, we need to have a much better understanding of who diverts and stores how much water, and when. We need to better protect drinking water and instream flow.

Which stakeholders would benefit and which would suffer negative consequences if your proposals went forward?

JH: We felt the need to get away from "winners" and "losers." Water stakeholders are all-inclusive: communities, tribes, environment, suppliers, farmers, etc. Water law is required to account for the diverse needs of all water users.

For example, our report recommends giving the State Water Board clarified tools for verifying the validity of water rights. That's a win for everyone who is lawfully using water.

What are the next steps? Do you expect that the legislature and governor will generally support your recommendations? Will any likely be enacted into law?

RF: Our recommendations have been provided to senior staff at the California legislature and the governor's office. We hope this work will trigger a necessary discussion about what can and should be done to reform and update California's water rights system. Most of the recommendations will require legislative changes. Given the scope of our current water crisis, these are quite reasonable and incremental steps to modernize our system and make it work better for everyone.

We're in the midst of a megadrought—the worst in the last 1,200 years, according to scientists. We don't know whether the current water year will be wet, dry, or somewhere in between. If you listen to and believe climate scientists, this is the new normal. California's population is growing, and there will be increased fighting over a shrinking supply of water. This will challenge all three branches of the state government. We're past the time for open-ended conversations: we're in crisis stage. We need leadership from the state government to reform the water rights system in timely way and not allow business as usual to continue. We don't have the luxury of delay.

JH: A lot is good in our water rights system, but our report recognizes that some targeted changes are needed. If we were starting from scratch, we'd set aside water for the environment from the beginning. Today, we're trying to carve out instream flow from water already being used, and that creates discord. Speaking for myself, I think there needs to be a mechanism to identify supplies for the environment clearly, give them priority, and manage them to the best effect, so that the rest of the water rights holders—municipal, hydropower, agriculture, etc.—can use water with increased certainty.

Additional thoughts?

JH: When it starts raining, political attention on water starts to fade. That's an enormous mistake. California is a state of precipitation extremes, and those extremes are



intensifying due to climate change. If we find ourselves in a lull, that's a critical time to be talking about reform.

RF: In California, we're dealing with 21st-century water supply issues using 20th-century water infrastructure and 19th-century water law. California has shown it can take bold, effective action on climate, energy, and any number of other policy areas. We have the tools and solutions in our hands—we just need the political will and wisdom to use them before it's too late.

Original Article: [PPIC by Sarah Bardeen](#)

Climate crisis: Will small California farms survive soaring heat?

Last summer was the hottest that Kayode Kadara can remember since the late 1970s, when he began visiting the San Joaquin Valley, the vast farming region between the Sierra Nevadas and the California coast.

The co-owner of TAC Farm, a small farm in Allensworth, said temperatures soared to at least 40 degrees Celsius for several days. He could work outside only for a short time before rushing back into his air-conditioned house.

The San Joaquin Valley – the most profitable agricultural region in the United States, with eight million acres of farmland and 200,000 workers who provide food to people in the US, Europe, Canada, China and other countries – faces a possible rise in annual average maximum temperatures of 2.7 degrees Celsius by mid-century, and up to 4.4 degrees Celsius by the end of the century, according to a new state-commissioned climate report released in January.

From 1950 to 2020, the valley's temperature has increased by 0.6 degrees Celsius, the report noted. It found the climate crisis has already created water scarcity and over-reliance on groundwater, hitting small-scale farmers especially hard, including many Hmong, Latinx and African American farmers.

Droughts and earlier snowmelt runoff will increase water scarcity during the summer, especially in regions with irrigated agriculture, leading to economic losses and increased pressure on groundwater, a new report (PDF) released on Monday from the International Panel on Climate Change also predicted.

Kadara runs TAC Farm with his business partner and brother-in-law Dennis Hutson. The two dreamed of creating a sustainable farm as an economic engine in Allensworth, a once-thriving African American community founded in 1908 by an escaped slave and army colonel. Through regenerative practices, they transformed a depleted piece of sandy land into a nutrient-rich plot that produces wheat, oats, kale, alfalfa, watermelons and cantaloupes.

But the farm's lifeblood is a 720-foot well that pumps water to the crops, and they must compete for water against nearby agricultural giants with the resources to drill down much deeper. Nine years ago, their well ran dry. In nearby Porterville, hundreds of wells have dried up in recent years.

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“The studies to me are true. The forecast is basically what we’re seeing right now,” Kadara told Al Jazeera. “As it gets hotter, I don’t know what the heck we will do.”

Longer dry seasons

Hutson and Kadara are an odd pair: Hutson is an optimistic minister who preaches at two nearby churches, while Kadara is a pragmatist focused on innovation and science. In Allensworth, a low-income community of mostly farmworkers, Hutson envisioned the farm as a way to generate revenue so the county would “no longer view us as a community always with its hand out”. The farm is giving people “a sense of pride in their community”, he told Al Jazeera.

Kadara is proud of the farm’s sustainable practises; the wind used to blow chemical-filled dust from nearby farms onto the land, but they planted trees and shrubs as windbreaks. They use compost, resist tilling and grow cover crops to improve soil health, and they plan to install owl boxes to invite the natural predators to feast on gophers that chew on the water lines.

One of the main sources of water for the San Joaquin Valley is the snowpack in the Sierra Nevadas, which melts in spring and fills reservoirs. But as the region heats up, the amount of snow is decreasing, and it is melting earlier in the year. The rainy season is projected to grow shorter, with longer dry seasons in the summer, meaning surface water will be less available to farmers when they need it, forcing them to increasingly rely on groundwater.

Hutson and Kadara have water on their farm – for now. But they may have to drill deeper in future, at a cost of hundreds of thousands of dollars they do not have.

“We can talk about all the strategies to address climate change – stop using fossil fuels, switch to electricity and stuff like that – but what will it do now that the impacts are here?” Kadara said. “That’s the concern and the scary part for me. It’s here.”

Vulnerable communities

According to the climate report, more than 4.3 million people live in the San Joaquin Valley, and more than half are in disadvantaged communities.

The report’s lead authors, Jose Pablo Ortiz-Partida and Angel Santiago Fernandez-Bou, told Al Jazeera that small-scale farms are most at risk from climate change because their shallow wells are the first to dry up when groundwater is depleted. They have few resources to adapt and less political representation than large farms, and language barriers can also make things harder for Hmong and Latinx farmers.

Increasingly, farm workers are suffering from heat stroke, both in the field and at home, as many cannot afford air conditioning, Ortiz-Partida added.

“People think of climate change as something of the future, but we see its effects here in California, but especially the San Joaquin Valley, every day,” Fernandez-Bou said.

Hundreds of thousands of people in this region do not have reliable access to clean drinking water. As groundwater is depleted by climate change and over-extraction, the levels of sediments and pollutants in the well water increase. In the city of San Joaquin,



in Fresno County, the tap water has run black due to high levels of manganese. Other communities have dangerous amounts of arsenic, pathogens such as E. coli, and cancer-causing chemicals such as chromium VI.

Climate change is exacerbating all these issues, while the lack of investment in critical infrastructure, including water and sewage systems, make these communities “some of the most vulnerable to climate change in the United States”, the report noted.

Original Article: [Aljazeera by Hilary Beaumont](#)

California agriculture takes \$1.2-billion hit during drought, losing 8,700 farm jobs, researchers find

Severe drought last year caused the California agriculture industry to shrink by an estimated 8,745 jobs and shoulder \$1.2 billion in direct costs as water cutbacks forced growers to fallow farmland and pump more groundwater from wells, according to new research.

In a report prepared for the California Department of Food and Agriculture, researchers calculated that reduced water deliveries resulted in 395,000 acres of cropland left dry and unplanted — an area larger than Los Angeles. In estimating the costs, they factored in losses in crop revenue and higher costs for pumping more groundwater.

California’s agriculture industry is the largest in the country, averaging \$50 billion in annual revenue and employing more than 400,000 people. The researchers’ analysis shows that the past year of drought had significant economic impacts, and these costs are likely to accumulate as climate change intensifies drought, and as California implements regulations to curb the chronic overpumping of groundwater.

The report, part of a larger three-year study, did not examine how the elimination of some full-time and part-time jobs is playing out for farmworkers. The authors said some workers have turned to taking other jobs, driving longer distances or moving.

“These farmworkers belong to the lowest-income group in the state, particularly in the Central Valley,” said Josué Medellín-Azuara, a water resources economist and associate professor of civil and environmental engineering at UC Merced. “So when climate hits, these communities are hit harder.”

Medellín-Azuara and colleagues from UC Merced, UC Davis and the Public Policy Institute of California estimated changes in the acreage of irrigated farmlands last year as compared to 2018. They surveyed irrigation districts, analyzed water data and reviewed satellite data to track changes in croplands.

In addition to considering the direct effects on farming businesses, the researchers estimated the “spillover effects” in the broader economy and found that analysis pushed the total impacts to more than 14,600 lost jobs, both full-time and part-time, and \$1.7 billion in gross revenue losses.

The state is now entering a third year of drought. Many reservoirs remain at low levels and the snowpack in the Sierra Nevada stands at 67% of average for this time of year.

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Federal water managers announced this week that many farmers should prepare to receive no water from the Central Valley Project.

If the state doesn't get more precipitation in March, Medellín-Azuara said, "we are likely to see more severe cutbacks from water agencies to agriculture this year, and then the impacts can intensify."

The past year was one of the driest and hottest on record in California, and comes during a larger 22-year megadrought in the West that research shows is being worsened by global warming.

The researchers found the economic effects on California agriculture last year were comparable to the impacts in 2014, in the middle of the last major drought, which ended in 2016.

But they also found that this time the drought has been more severe in the Sacramento Valley and North Coast regions, leading to an increase in dry farmlands and revenue losses in those areas.

For example, the Russian River Basin has suffered from drier conditions over the past year, Medellín-Azuara said, "so the map of the dry areas changed a little bit."

His team found that the croplands left fallow included rice fields in the Sacramento Valley, cotton fields in the San Joaquin Valley, as well as farmlands that had been producing grains and other field crops.

These shifts are occurring alongside other long-term changes in crops driven by the global market and other factors. Over the past decade, the acreage planted with wheat, cotton and alfalfa has decreased, while new orchards with high-value pistachios and almonds have expanded across vast stretches of farmland.

The report's authors cited statistics showing milk remained the state's top agricultural commodity in 2020, followed by almonds and grapes.

The research shows a substantial economic toll on agriculture, especially in the Central Valley, where the economy depends heavily on farming, said Alvar Escriva-Bou, a coauthor and senior research fellow with the Public Policy Institute of California.

"It's a lot of money, a lot of jobs," Escriva-Bou said.

The study focused on revenue losses and pumping costs but didn't estimate profits in the agriculture industry.

Farming operations in the Central Valley have long turned to pumping more groundwater during droughts, and water levels have been dropping for decades. State lawmakers in 2014 passed the Sustainable Groundwater Management Act, which established a framework for managing groundwater and required local agencies to develop plans to eliminate problems of chronic overpumping.

Local groundwater agencies have been developing plans to begin implementing the law between now and 2040, with state officials overseeing the process and reviewing plans. In the meantime, declining water levels in farming areas have continued to leave more rural homeowners, including many farmworkers, struggling with dry wells. The state



received reports of 975 household wells that ran dry in 2021, many in farming areas in the Central Valley.

Original Article: [The Los Angeles Times by Ian James](#)

As drought persists in California, minimal water deliveries announced for the Central Valley Project

With California entering a third year of drought and its reservoirs at low levels, the federal government has announced plans to deliver minimal amounts of water through the Central Valley Project, putting many farmers on notice that they should prepare to receive no water from the system this year.

The federal Bureau of Reclamation, which manages the project's dams and canals, announced a zero-water allocation for irrigation districts that supply many farmers across the Central Valley. Cities that receive water from the project in the Central Valley and parts of the Bay Area were allocated 25% of their historical water use.

"Conditions are very dry. And as a result, we have to be very cautious with these allocations," said Ernest Conant, the bureau's regional director.

After a wet start to the rainy season in October and December, the state has gone through an extremely dry stretch in January and much of February. Conant pointed out that January and February are on pace to be the driest on record.

Without those critical months of snow and rain, the state has less to count on to boost major reservoirs, which were already low after two dry years.

Last February, the Bureau of Reclamation started with a 5% allocation for many agricultural water users and a 55% allocation for cities. But the hot, dry conditions last spring shrank inflows from rain and snowmelt much more than projected, Conant said, and the agency decided to reduce allocations to 0% for the irrigation districts and 25% for cities—the same reductions the agency is starting with this year.

"We're getting a certain amount of criticism from the agricultural community for these low allocations, but we have to be prudent and cautious with these very dry conditions," Conant said. "If it doesn't rain in March, it's possible it could get worse."

The Central Valley Project stretches about 400 miles from the Redding area to the southern end of the San Joaquin Valley, with 20 dams and about 500 miles of main canals. One of California's two main north-south water conduits, the project pumps water from the Sacramento-San Joaquin River Delta near the intakes of the other major system, the State Water Project.

The federal government has more than 270 water contracts on the Central Valley Project to supply entities including large irrigation districts, individual farmers and cities.

The project also supplies agricultural water users with senior rights predating the project's construction, called settlement and exchange contractors, which during critically dry years are still able to receive up to 75% allocations under their contracts.

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"There'll be certain areas in the Central Valley that have some water, and there'll be other areas that really have no supplemental water," Conant said. "Those farmers are going to have to rely upon groundwater if it's available."

Some areas may be able to obtain water transferred from other sources, Conant said. But given how diminished the state's water supplies are, he said, "we'll just simply have to fallow a number of acres" and leave some farmland dry.

The reduced water allocations will affect cities in the Central Valley and parts of the Bay Area served by the Santa Clara Valley Water Agency, Contra Costa Water District and East Bay Municipal Utility District.

Water suppliers in Southern California, meanwhile, have been told to expect 15% of their full water allocations this year from the State Water Project.

The Bureau of Reclamation said its initial allocations for the Central Valley Project, which could still change, are based on estimates of how much water will be available from rain, snow and reservoirs. The total amount of water stored in project's largest reservoirs has dropped significantly over the last year.

"Our reservoirs are at about 27% of capacity, about 52% of the 15-year average," Conant said.

December storms brought heavy snow to the Sierra Nevada, but the snowpack has since dwindled to 67% of average for this time of year.

And this winter's biggest storms have brought relatively less precipitation to the watershed that feeds Shasta Lake, the state's largest reservoir.

Water releases from Shasta Dam provide critical cold water for endangered winter-run Chinook salmon. But last summer, with the reservoir at low levels, the water flowing from the dam got so warm that it was lethal for salmon eggs.

State biologists estimated only 2.56% of the winter-run eggs hatched and survived to swim downriver past Red Bluff, one of the lowest rates of "egg-to-fry" survival in years. Advocates for the commercial and recreational salmon fishing industries, which depend on the more numerous fall-run Chinook, criticized how officials have managed water releases from Shasta Dam over the last two years.

"We're likely looking at another year of decimated natural salmon runs due to water decisions that favor a small group of agricultural landowners over the interests of the rest of California," said John McManus, president of the Golden State Salmon Assn.

McManus and others have criticized what they say have been excessive water releases from Shasta Dam during the drought, which they say left the reservoir too low last year to continue supplying water cool enough for the fish.

"This highlights the need for more responsible drought planning," McManus said.

Officials with the Bureau of Reclamation have defended their handling of water releases, pointing out that the amount of runoff flowing into Shasta Lake last year shrank to a record low that went beyond their projections.

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State water officials have said they are taking steps to improve water-supply forecasting to account for the effects of climate change on watersheds.

Warmer temperatures have worsened the dry conditions across the West in recent years, increasing evaporation, drying soils and shrinking river flows from the Colorado to the Rio Grande.

"Soil moisture was really low, and as a result a lot of the runoff just sunk into the ground, rather than running off into reservoirs," Conant said.

He said water managers focus on keeping the water cold enough for endangered salmon downstream from Shasta Dam, but "last year was just very difficult because there simply was not enough cold water."

"And so we had poor survival, which was expected, and the same could occur this year," Conant said.

Conant said the dam managers are working with other state and federal officials to ensure cold-water flows for the endangered fish.

"But in a very dry year like this year or last year, the mortality is going to be high, just because there's simply not enough cold water," Conant said.

Shasta Lake now stands at 37% of capacity, or 53% of average for this time of year. The agency is aiming to conserve water in the reservoir as much as possible in preparation for late summer, Conant said, when salmon eggs in the Sacramento River will need the cold water.

"Our releases from Shasta are the absolute minimum that's required," Conant said. "We're doing everything we can to hold water in Shasta in order to have the maximum supply available there."

The Bureau of Reclamation cited worsening runoff projections in a new water supply forecast released by the California Department of Water Resources. The bureau noted that this latest forecast update, between Feb. 1 and Feb. 15, showed a total decrease of 1.2 million acre-feet in the projected annual inflow to four large reservoirs—Shasta, Oroville, Folsom and New Melones.

"Losing over a million acre-feet of projected inflow in two weeks' time is concerning," Conant said in a statement. "We've got our work cut out for us this year."

He said the situation calls for "strengthened collaboration and coordination" among different agencies as well as among water users.

In California, agriculture uses nearly 80% of the water that is diverted and pumped for human use in an average year, according to state data. When water is available, the Central Valley Project represents a key source for the agriculture industry.

Westlands Water District, the largest agricultural irrigation district in the county, said the 0% allocation points to a need for California to invest more in water infrastructure, including projects to store surface water and groundwater, and to transport water.

The district said in a statement that it is "disappointed with the allocation" but that dry conditions and the federal government's obligation to meet state-established outflow



and water-quality standards in the Delta prevent the Bureau of Reclamation from making water available to the district.

Westlands said the drought last year resulted in more than 200,000 acres being left fallow and dry in the district. This year is the fourth in the last decade that Westlands and other irrigators south of the Delta have received a 0% allocation.

Original Article: [Phys.Org by Ian James](https://phys.org/news/2023-02-massive-dollars-needed-tainted-groundwater.html)

“Massive dollars” needed to clean tainted groundwater from Kern County’s banking projects

Southern California’s reliance on Kern County’s prolific groundwater banks for drought insurance could be jeopardized by a chemical known as 1,2,3-trichloropropane (TCP).

The cancer-causing agent has been found in several large groundwater banking operations in Kern and a first look at how much it may cost to clean up is a doozy.

Up to \$465 million, according to a recent feasibility study of the Arvin-Edison Water Storage District banking operation.

And that’s just one of Kern’s water banks used by urban partners to store, or “bank,” water in flush years and retrieve it during drought.

Banks operated by the Kern Delta Water District, Semitropic Water Storage District and jointly by the Rosedale-Rio Bravo Water Storage District and Irvine Ranch Water District have also found TCP in their wells.

Together, those banks have stored and returned hundreds of thousands of acre feet to urban customers for drinking water. Kern has far more groundwater banks, but most are used for aquifer recharge or irrigation water, which doesn’t have a standard for TCP.

“The big picture here is that the (clean up) dollars are massive because we’re talking about such massive volumes of water,” said Attorney Todd Robins, who represents Arvin-Edison.

The district is suing Dow Chemical and Shell Oil over the TCP, which it alleges is a byproduct of a nematode fumigant made by the companies and that was widely used on the valley’s farmland from the 1950s to the 1980s.

Robins also represents Semitropic and co-plaintiffs Rosedale-Rio Bravo and Irvine Ranch in separate lawsuits against Dow and Shell. Kern Delta is represented by another firm and has not sued.

Shell did not respond to a request for comment.

A Dow representative disputed whether TCP currently detected in water bank wells is from its fumigant.

“Dow’s soil fumigant products were continuously evaluated and approved for use by federal and state regulators,” wrote J.D. Sterba, head of Dow communications in an email. “The plaintiffs’ claims in these cases are based on a California water quality standard that went into effect in 2018, several decades after the product formulations in question were discontinued.

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"To the extent TCP was present in past product formulations, it would have been at levels so low as to pose insignificant environmental risk."

Dow and Shell have settled dozens of TCP contamination cases brought by drinking water purveyors from Ceres down to Bakersfield. The suits began pouring in after the state Drinking Water Division set the TCP standard at five parts per trillion – the equivalent of five grains of sand in an olympic sized swimming pool.

Attorney Robins said the groundwater banking contamination cases aren't much different.

"At the end of the day, you're trying to pump groundwater and instead of putting it into a drinking water system, you're putting it into the California Aqueduct where it still has to comply with maximum contaminant levels set by state law," he said. "The only real difference is scale."

Original Article: [SJV Water by Lois Henry](#)

US WATER NEWS

Tribes to get \$1.7B for water rights settlements

The U.S. Department of the Interior will allocate nearly \$2 billion to fulfill tribal water rights claims, the agency said last week.

The Biden administration will draw \$1.7 billion from a bipartisan infrastructure law, which includes \$2.5 billion to implement the Indian Water Rights Settlement Completion Fund.

Sixteen tribes and settlements will receive funding this year.

"Water is a sacred resource, and water rights are crucial to ensuring the health, safety and empowerment of Tribal communities," Interior Secretary Deb Haaland said in a statement.

"With this crucial funding from President Biden's Bipartisan Infrastructure Law, the Interior Department will be able to uphold our trust responsibilities and ensure that Tribal communities receive the water resources they have long been promised," she added.

There were 34 congressionally enacted Indian Water Rights settlements as of Nov. 2021. Tribes receiving settlements this year include: Aamodt Litigation Settlement (Pueblos of San Ildefonso, Nambe, Pojoaque, and Tesuque), Blackfeet Nation, Confederated Salish and Kootenai Tribes, Crow Nation, Gila River Indian Community, Navajo-Utah Water Rights Settlement and Navajo-Gallup Water Supply Project, San Carlos Apache Nation, Tohono O'odham Nation and White Mountain Apache Tribe.



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“Settlement of Indian water rights disputes breaks down barriers and helps create conditions that improve water resources management by providing certainty as to the rights of all water users who are parties to the disputes,” the agency added in a statement.

Original Article: [The Hill by Adam Barnes](#)

Floridians overwhelmingly support state — not federal — control of water

As the Legislature considers the future of the state’s water rights in Senate Bill 2508, a new poll shows a sizable majority of Floridians want Florida, not Washington, to be in charge.

St. Pete Polls surveyed Floridians statewide between Feb. 24 and 25, finding 87% of respondents felt it essential for the state control to remain in control of water supply. When given a choice between the state or federal government controlling water supply to avoid water shortages, nearly 79% sided with the state compared to 21% in favor of the federal government.

In February, Wauchula Republican Sen. Ben Albritton introduced SB 2508, which among other things, institutes accountability measures for the South Florida Water Management District, the agency overseeing the Lake Okeechobee watershed. The bill provides additional certainty for the state to deliver promises of water to permitted users, including cities such as West Palm Beach, Native American tribes such as the Seminoles, South Florida’s farming community, as well as environmental uses, such as the Florida Everglades.

An initial version of the bill drew fire from Florida environmental lobbying groups such as the Everglades Foundation and Captains for Clean Water over concerns that it would negatively impact Everglades projects such as the Everglades Agricultural Area Reservoir.

In response, Albritton filed an amendment to clarify provisions that the bill’s provisions don’t affect a 2017 law on water resources. While the amendment was not a “deal” with the Governor’s Office, Senators hope the measure will address Ron DeSantis’ concerns.

Cities relying on water from Lake Okeechobee, such as Okeechobee and West Palm Beach, have called upon members of the Legislature to support the bill. In a tweet earlier in Feb., the city of West Palm Beach thanked Sens. Lauren Book, Kathleen Passidomo, Ben Albritton, Bobby Powell, Tina Polsky and Lori Berman for supporting the legislation.

“Thanks to bipartisan support for #SB2508, protecting the safe water supply for nearly 130,000 WPB residents, the Town of Palm Beach and Palm Beach County,” the city’s tweet said.

Original Article: [Florida Politics by Peter Schorsch](#)

**Gov. Doug Ducey proposes Arizona Water Authority, an agency to boost water supplies**

Arizona Gov. Doug Ducey and a top leader in the state Legislature on Friday filled in a key part of a developing plan to boost the desert state's increasingly strained water supply.

They plan to create a state agency to acquire new supplies and develop and fund projects, with deep pockets and the authority to go out and find sources that can secure the state's water future. One potential project is a multibillion-dollar desalination plant in Mexico, but many others are also being eyed along with efforts to conserve existing supplies.

The proposed new Arizona Water Authority would be funded with an initial \$1 billion investment and have the authority to borrow money and issue bonds to fund larger projects. Some of the money will be set aside for cities and towns and even private water companies for smaller local projects.

The western United States is in the midst of a prolonged drought, and Arizona has already absorbed cutbacks in the allocation of Colorado River water that have forced some farmers to let their fields go fallow. More cuts are likely absent a major weather turnaround.

The Republican governor has been working on the plan with House Speaker Rusty Bowers and Senate President Karen Fann, both also Republicans. Bowers has for years been sounding the alarm about the state's water supplies and trying to come up with a comprehensive plan to address the issue for the long term.

Bowers said in an interview that the specific details of what projects were on the table were sparse on purpose.

"This is not meant to be comprehensive," Bowers said. "We don't have a specific project because ...we're not trying to catch up to a project that's being proposed, and we're not trying to limit the scope per se of what projects might be available."

Instead, the agency is designed to look at multiple solutions, including local projects like treating brackish groundwater. Larger projects like developing supplies in three remote desert valleys that have been earmarked for decades as potential sources for metro Phoenix and negotiating for out-of-state water will fall directly under the purview of the new water authority.

Bowers said draft legislation was distributed to majority Republican lawmakers on Friday and meetings would start Monday to take feedback and firm up the plan.

"We want the comments. We want to see where weaknesses are," Bowers said. "And if it works out that it has too many, then we don't do it that way."

The state already has major water agencies, including the Department of Water Resources and an agency that stores groundwater in the central part of the state. In addition, the Central Arizona Project runs a massive canal and reservoir system that

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brings in Colorado River water to Phoenix and Tucson, the state's two major metropolitan areas.

The new agency will be different. Its role will be to shop for water around the West, partner with private companies to develop, store and transport those supplies and use the state's financial heft to get those projects done.

The public agency will be overseen by a bipartisan board, with the majority appointed by the governor from people well-versed in water issues and have strong conflict-of-interest rules. Any expenditure over \$100 million will need approval by a special legislative committee.

Original Article: [Fox 10 Phoenix by Bob Christie](#)

Smart water management integral to New Mexico's future

As our state goes through a relatively dry winter, many New Mexicans are worried about what the warm summer months will mean for our water resources. I share their concerns, because New Mexico and the Western United States have experienced severe droughts for over a decade and we are still not fully prepared for it.

Unless we take swift action, drought will continue to have negative effects on our communities, causing losses in crop yields and forcing ranchers to sell off cattle herds due to lack of water. Jobs could dry up along with the water that supports them.

We found ourselves in a very similar position last year, but New Mexicans were blessed with a healthy monsoon season that benefitted our agricultural producers and made our state the greenest it had been in recent memory. Without the monsoon season, Elephant Butte Reservoir, one of the state's largest tourist destinations and an essential source of water for agricultural irrigation, was projected to nearly dry up. We cannot count on that to be a yearly occurrence; we must take steps to prepare ourselves for a dry year without a strong monsoon season, which 2022 could very well be.

Every option should be on the table to better prepare ourselves, including creation of minimum pools at our reservoirs, investments in water storage and desalination, removal of invasive species, and preventative river maintenance. These tasks will not happen overnight, but I am committed to ensuring that Southern New Mexico will get its fair share of these investments.

An important first step for federal and state water managers is to tackle the invasive species crisis that currently afflicts the Rio Grande. Invasive species, like the salt cedar, have hurt water quality and contributed to the decline of many native species. The salt cedar also absorbs much more water than the native species it has supplanted, consuming up to 200 gallons of water per day. This contributes to the declining river flow and harms downriver communities and water users. Unfortunately, government regulations like the Endangered Species Act and National Environmental Policy Act make removal of these invasive species very difficult for water managers. I am working to

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reform regulations and cooperating with water managers to ensure they have the tools they need to address the invasive species crisis.

A necessary long-term step is rehabilitating and building new water storage infrastructure. The Bureau of Reclamation, the federal agency tasked with managing western water supplies, is using water storage infrastructure that in some cases is six decades old. In early 2020, Reclamation estimated its five-year extraordinary maintenance and rehabilitation needs were \$3.8 billion. The scope and scale of these challenges speaks volumes to the unreliability of our water systems throughout the West. Not all these costs would – or should – be incurred at the federal level, and collaborative tools like water title transfers with tribes, cities, and surrounding states can help address cost and management needs. Resilient water systems are the lifeblood of our rural communities, farms, and ranches.

We must also acknowledge the integral importance of our water resources to the economy of our state. Water means jobs for New Mexico.

The New Mexico chile, our most iconic agricultural commodity, provides 4,500 jobs and \$450 million to the state's economy and relies on water from the Rio Grande. This industry is currently under attack from rising costs and excessive government regulations. These increased costs are passed onto the consumer and causing some to look to cheaper chile from Mexico. Add the effect of water shortages to this mix and you have our state's most iconic industry fighting to survive. This underscores the importance of making solid investments in our water resources.

Original Article: [Las Cruces Sun news by Yvette Herrell](#)

More Than \$422M Awarded to Reinforce Water and Sewer Infrastructure in Communities Across Georgia

Governor Brian Kemp, along with members of the Water and Sewer Infrastructure Committee and state leaders, announced this week more than \$422 million in preliminary awards which will ensure communities in high-need areas have reliable and safe drinking water and wastewater systems.

“Because we remained focused on protecting lives and livelihoods throughout the pandemic, Georgia is now in a position to make strategic, transformational investments in our state’s water and sewer infrastructure,” said Governor Brian Kemp. “I want to thank the committee members for dedicating their time and expertise to help us make these awards as well as the grants team at the Office of Planning and Budget. I am proud to know that we have worked hard to prioritize projects which address pressing public health and environmental issues, support economic development, and enhance our ability to be good stewards of our water resources for generations to come.”

Extend drinking water service to high-need areas; *Improve drinking water infrastructure including interconnections and additional sources to ensure water system

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resiliency; high-tech meters and asset management systems to improve drinking water system responsiveness to issues such as leaks or line breaks; upsizing or replacing pipes to reduce leaks and water loss; and lead pipe inventory development and replacement.

Original Article: [All on Georgia](#)

Division of Water Resources publishes a water management plan

Utah's Division of Water Resources just published a Water Resource Plan that explains how they want to manage one of the state's most valuable resources. The organization sends out a monthly drought update giving the facts and figures to inform the public just how dire the water situation is in Utah.

The latest drought update from Water Resources came on February 10.

"With 95% of Utah's water supply coming from snowpack, we need above-average snowstorms to help refill reservoirs Utah still has 54 days until the snowpack typically peaks," Michael Sanchez of Utah Division of Water Resources said.

With a growing population and shrinking water supply the Beehive State's water specialists got together with other coordinating state and private agencies to draw up their plan. They took years of data, including public input, to identify when and where water will be needed most throughout the state from now and into the future.

Candice Hasenyager, director of the Division of Water Resources, said a safe, reliable water supply is critical to Utah's prosperity and quality of life.

"This plan provides a comprehensive look at Utah's current water use and supply conditions and future demand scenarios," she said. "It's a long-range planning document that looks 50 years into the future and has been years in the making."

The plan focuses on three water management principles:

- Reliable data is needed to make informed water management decisions.
- Supply security requires a comprehensive approach.
- Healthy watersheds are necessary to ensure the viability of the state's precious water resources.

The plan also prioritizes actions the Utah Division of Water Resources will undertake in the coming years to emphasize the importance of water planning as the cornerstone to successful water management. Using scientific data helps the organization make informed decisions and set the state and water systems up for success.

"The Division utilizes data to evaluate water conservation progress, track population projections, compare water supply and demand projections, and help identify what actions, if taken now, will benefit current and future generations," the plan states. "The Division focuses heavily on water planning because, without it, families and communities wouldn't be able to grow and prosper. The Division's water planning efforts help Utah communities to thrive."

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The document shows rural Utah decreasing in population and the metropolitan areas increasing in population in the coming years.

Management of Utah's water involves the coordination of several state agencies, the Department of Agriculture and Food, Department of Environmental Quality as well as local suppliers that have already begun a collaborative effort to produce a more holistic plan.

The Governor's Office of Planning and Budget, Division of Drinking Water, Quality (divisions of Drinking Water and Water Quality), and Department of Natural Resources (divisions of Water Resources, Water Rights, Wildlife and Forestry, Fire and State Lands) all contributed to Utah's Coordinated Water Action Plan.

This plan includes a comprehensive implementation strategy as the state continues to plan for rapid growth, climate change and sound management of an uncertain natural resource.

"The rollercoaster ride continues," said Brian Steed, executive director of the Department of Natural Resources. "Dry weather isn't what we want. We need consistent snowstorms. These next two months will really determine what kind of spring runoff we will have."

Original Article: [Cache Valley Daily by Rod Boam](#)

GLOBAL WATER NEWS

Cascading Climate Calamities Target West's Water, Legal System

A dire United Nations climate change report confirms what water lawyers in the West have known for a long time—that drought is becoming the norm in the region, and adaptation is essential.

"Every time we see it written down, it gets a little more real," said William Caile, a water lawyer who is of counsel at Holland & Hart LLP in Denver, referring to the report's forecasts of water scarcity.

The report, released Monday by the Intergovernmental Panel on Climate Change (IPCC), is a 3,675-page deep-dive into what the latest scientific research says about what's at risk as fossil fuels continue to warm the planet. Water scarcity amid rising air and streamwater temperatures will afflict much of North America, exacerbating biological diversity losses, agricultural productivity decline, and wildfire, the report found.

The Southwest is among the regions that the IPCC says will soon be profoundly different. The Colorado River, which provides water to 40 million people from Denver to Los Angeles, courses through the increasingly arid Southwest, which is approaching a



“tipping point” at which long-term water scarcity conflict with high water use and farming, the report concludes.

Just last year, the Bureau of Reclamation declared a first-ever water shortage on the Colorado River. That region has been baking in extreme heat and drought for 20 years, with signs pointing only to even more dire water scarcity.

The IPCC report is a “wake-up call,” and “climate change is killing humanity,” tweeted Rep. Jared Huffman (D-Calif.), who chairs a House Natural Resources Committee panel on water.

Legal Challenges

The Southwest’s ability to adapt to climate change may be limited by complex legal and administrative battles over the Colorado River and ultimately by the depletion of groundwater and river flows throughout the Southwest, the report says.

“The report shows how clearly how our western U.S. water management institutions, developed in the 19th and 20th centuries, are ill-suited to the challenges posed by climate change,” said John Fleck, director of the University of New Mexico’s Water Resources Program.

“Laws, for example, that presume we can pump groundwater to make up for short term surface water shortfalls no longer work when the surface water shortfall is permanent,” Fleck said. “You can already see that struggle playing out now with California’s efforts to rein in overpumping of groundwater.”

Farmers in California’s Central Valley have been relying too heavily on groundwater amid streamwater scarcity, leading to the land sinking beneath the farm fields and increasing the threat of arsenic contamination in the water.

The report shows that the ravages of climate change are foreseeable and people should be preparing for a be preparing for a “profoundly different” world, said Michael Gerrard, founder of the Sabin Center for Climate Change Law at Columbia University.

“The challenges to the legal system (and every other system) are profound, and we are not on a trajectory to meet them. Very far from it,” Gerrard said in an email.

Reusing wastewater is among the measures many Western cities are considering to adapt to long-term water scarcity—something that water lawyers and attorneys across the country are fitting within an existing legal framework.

Caile said he’s bullish on the ability of existing legal structures, such as the Colorado River Compact, to handle the crisis. The compact, which was written nearly a century ago in a time of water abundance and determines how the river’s water is allocated among Western states, could be poised for a revamp, he said.

In the West, the competing pressures of increased drought, which leads to dry-year water shortages, and explosive growth act “like a vise,” Caile said.

Water Protection Battles

The report’s vision of an arid future for the West is likely to fuel the Biden administration’s efforts to include a wide array of waters and wetlands under the Clean



Water Act protections as waters of the U.S., or WOTUS, said Kevin Desharnais, a water lawyer at Dickinson Wright PLLC in Chicago.

Many of the West's streams that the Clean Water Act protects are ephemeral, or only run part of the year because they're in a desert. A Trump-era definition of federally-protected waters, which a court tossed out last year, excluded these waterways, effectively lifting safeguards on numerous streams in arid states such as New Mexico.

"This issue is particularly important in the Southwest, where a significant portion of the waters may be ephemeral or intermittent waters that may not be within the scope of WOTUS," Desharnais said.

The U.S. Supreme Court will hear a case later this year about WOTUS and the scope of the Clean Water Act at the same time the Biden administration is considering two different rules defining that scope.

"The IPCC report may be cited as supporting the need for a broad interpretation of WOTUS" due to water shortages, Desharnias said.

Original Article: [Bloomberg Law by Bobby Magill](#)

Iran to launch major water transfer project from Sea of Oman

The Iranian parliament has authorized the start of construction works on a major water transfer project from the Sea of Oman in southeastern Iran.

In a Monday letter addressed to Iranian President Ebrahim Raeisi, the parliament enacted the Legislation on Transfer of Water from Sea of Oman to Sistan and Baluchestan Province.

The letter, signed by Iranian Parliament Speaker Mohammad Bagher Ghalibaf, gives the administrative government five days to start implementing the legislation.

The legislation was ratified in the parliament on Saturday when 210 lawmakers in the 290-member chamber voted for it. The project is aimed at responding to an acute water shortage in Sistan and Baluchestan, Iran's largest province by area which is located along the border with Afghanistan and Pakistan.

The project comes amid Iran's renewed push to obtain its water rights from the Helmand River in Afghanistan.

Iranian authorities say they are not happy with the amount of water released by a new government in Afghanistan from a dam on Helmand.

The water transfer project from the Sea of Oman has its own critics inside Iran as some have expressed concerns about the environmental ramifications of the projects as well as its huge financial costs.

Others, however, believe the project will fix economic and social problems in the region while it will allow water transfer pipelines to spread to the the economically more prosperous region of Khorasan in eastern Iran.



In November 2020, Iran started pumping desalinated water from the Persian Gulf to the southern province of Kerman. An extension of the project financed by steel and iron manufacturers in central Iran was opened in March 2021.

Original Article: [Press TV](#)

Record flooding in Australia driven by La Niña and climate change

Record-breaking rain on the east coast of Australia over the past week has caused severe flooding that has claimed eight lives and damaged thousands of properties. The same region was hit by devastating floods last year and wildfires the year before, suggesting that predictions of more extreme weather due to climate change are coming true.

The city of Brisbane in Queensland is one of the worst-affected areas, having been pounded by a record 790 millimetres of rain in the week up to 28 February. In comparison, London records 690 millimetres in an average year.

“This rain bomb is just really, you know, it’s unrelenting... It’s just coming down in buckets,” state premier Anastacia Palaszczuk told media on 27 February.

About 18,000 homes in Brisbane and surrounding areas have been flooded and more than 50,000 are without power.

Queensland Fire and Emergency Services said on 27 February it was receiving 100 requests for help every hour. An emergency services officer whose vehicle was swept away on the way to rescue a trapped family was among those who have lost their lives. Many others are missing.

The deluge is now edging south into northern New South Wales. The city of Lismore is experiencing its worst flooding ever after its river rose to 14.4 metres on 28 February, 2 metres higher than its previous record from 1954.

Videos from Lismore posted on social media show homes and shops underwater and people waiting to be rescued from their roofs.

The intense rainfall is due to a very slow-moving low-pressure system dragging moist air from the Coral Sea onto the east coast, says Nina Ridder at the University of New South Wales in Sydney. “Because it’s so slow-moving – it’s basically stationary – it’s dumping all the water that it has on the same area,” she says.

The east coast was already experiencing more rainfall than usual due to La Niña, a weather cycle that brings wetter conditions every few years, says Ridder. “And now on top of that there’s the additional moisture from the Coral Sea,” she says.

Climate change is probably also a factor because as the atmosphere gets warmer, it can hold more moisture, says Ridder. “For each degree that the atmosphere is warmed, it can hold 7 per cent more water and that’s 7 per cent more water that can fall to the surface,” she says.

Original Article: [New Scientist by Alice Klein](#)



NWRB assures ample water allocation for Metro Manila during hot dry months

Metro Manila's water allocation during the coming hot dry season will not change even if Angat Dam's water levels are "relatively low."

This was the assurance of National Water Resources Board (NWRB) Executive Director Sevillo David Jr., who said during a press briefing on Monday that water allocation for Metro Manila would still be around 48 cubic meters per second. He even cited that water is a key component in fighting the COVID-19 pandemic.

According to David, the water level in Angat Dam was at 196.28 meters — at least 15.72 meters below its normal high water level of 212 meters. Angat Dam is the main source of water supply in Metro Manila.

"So for March, considering that we are still in the period of pandemic, and water is very important [...] against the spread of COVID-19, the NWRB has decided to maintain the allocation of water supply for Metro Manila, at around 48 cubic meters per second," he said.

"So magpapatuloy po 'yan because of this continuing threat of COVID-19. And with that, we have been implementing measures to manage the supply para po magkaroon tayo ng efficient and reliable water supply for summer, and of course, pati po siguro paglagpas pa ng summer," he added.

David also admitted that the water level in Angat Dam is lower than the previous years' records during the same period.

But he said the NWRB is closely coordinating with other agencies such as the National Irrigation Administration (NIA), Metropolitan Waterworks and Sewerage System (MWSS), National Power Corp., and Philippine Atmospheric, Geophysical and Astronomical Services Administration, as well as water concessionaires, to address the limited water supply.

"Masasabi natin na medyo mababa ito compared sa mga previous years," David said.

"NWRB, in collaboration with the government authorities in charge in managing the supply from Angat Dam, particularly NIA, MWSS, Napocor, Pagasa, saka 'yong nasa (and also the) concessionaires are implementing measures to manage the limited supply caused by the relatively low level of Angat Dam," he added.

Apart from Metro Manila, Angat Dam also serves as the primary water source of Rizal, Bulacan, and Cavite.

Water from Angat flows to La Mesa Dam in Quezon City and is then shared by two water concessionaires: Manila Water, which services the eastern part of Metro Manila, and Maynilad, which services the western part.

Original Article: [Inquirer.Net by Gabriel Pabico Lalu](#)

**New IPCC Report Doubles Down on Water Crisis**

The IPCC report released today is yet another urgent alarm bell, urging us to wake up to the real dangers of climate change that communities across the globe are already experiencing. Climate change is bringing severe consequences – from increasing floods and failing dams that endanger entire communities, to droughts and tapped-out water supplies that put people, industries, economies and ecosystems at risk.

What is clear is that the climate crisis is a water crisis. Failing dams, flooded homes and dried up rivers will be our future unless we take action now. Just, equitable adaptation for communities, rivers and clean water are achievable and are essential to our collective health, safety, and future.

The threats are real. To address them we must commit to climate adaptation now for communities and ecosystems to thrive in an era of climate change.

Here's a breakdown:

Threats

Climate change is already wreaking havoc on communities and their rivers and water supplies

- Methane-Producing Dams: More than 90,000 dams turn free-flowing rivers across the U.S. into stagnant impoundments that release methane, a greenhouse gas 80 times more potent than carbon dioxide.
- Failing infrastructure: Major flooding and hurricanes have caused dozens of dams to fail in the Carolinas, and Michigan's Edenville Dam failed catastrophically in 2020. Climate change is bringing more frequent and severe flooding at a time when U.S. dams are aging and outdated.
- Rivers running dry: The Colorado River – which supports a \$1.4 trillion economy and drinking water for 40 million people – is in crisis due to climate change and decades of overallocation. The river is so over-burdened it no longer reaches the sea.
- Disastrous flooding: Record flooding along the Mississippi River in 2019 caused \$20 billion in damage to people's homes, farms and businesses in the floodplain. As flood risk grows with climate change, so does the risk to anyone living in harm's way.

Solutions

Protecting and restoring our rivers and freshwater creates stronger communities and is key to climate resilience

- Safeguard clean water through green, natural infrastructure: To manage its increasingly intense rainstorms and related polluted stormwater and sewage spills, the City of Atlanta committed to investing in natural or “green” infrastructure to slow, store and filter the water, protect intown communities from flooding and improve quality of life.



- Reconnect rivers through floodplain restoration: In California's Central Valley, restoring the floodplain gives the San Joaquin River room to move, increasing capacity to hold floodwaters while creating wildlife habitat and recharging groundwater supplies.
- Protect healthy, free-flowing rivers: On South Carolina's Waccamaw River, protecting land from development and establishing a blue trail has improved flood protection and increased access to nearby nature for community recreation.
- Remove harmful and unnecessary dams: More than 1,900 dams have been removed nationwide. Demolition of four dams on Oregon and California's Klamath River is set to begin in 2023 to restore endangered salmon runs, thanks to leadership from the Yurok, Karuk, Klamath and other tribes. The Klamath is a prime example of how dismantling dams, reducing reservoir methane emissions, addressing historic injustices against Tribal Nations and building climate resilient rivers go hand-in-hand.

Original Article: [American Rivers by Jenny Hoffner](#)

Severe lack of water drives farmers to migrate to the cities

In Douar Azbane Lagrinate, a small village located 47 kilometres north of Marrakech, this farmer is growing alfalfa herbs.

Rachid Ait El Jadida owns six hectares of crops and looks after them just like his parents and grandparents did before him.

But over the last few years, his job has become more difficult because of a lack of rainfall. "We've always only worked in agriculture and we'll always want to continue this work, we'll always want to stay here, but if the lack of rain continues, we'll have to leave. It will be very difficult for us to make this decision. We are really sad when we see our lands suffer from drought in addition to lack of water, but then there is no other option but to emigrate," says Ait El Jadida.

According to Ait El Jadida, it hasn't rained at all since the beginning of the year.

He and his fellow farmers are concerned about this situation, since agriculture is their only source of income.

Ait El Jadida is noticing a sharp colour contrast of his fields compared to previous years: what used to be a large and uniform crop of green plants is now a small green patch surrounded by dry soil and stones.

That's because there's only so much water to irrigate, and the farmer could only save a small part of his field.

To do so, the farmers in the village are using wells.

Ait El Jadida dug one nine years ago.

But even 130 metres down, water is not available in sufficient quantities.

So much so that the drip irrigation system didn't have a water flow strong enough to work -- so he had to remove the pipes.

VELES WATER WEEKLY REPORT



Water and the plants growing here are not only important for residents but for their animals too.

The village also has traditional wells, but all of them are now completely dry -- it's why they're now covered by metal plates and rocks.

"This well is traditional, we used to use it for irrigation, but now it has become dry we had to dig other wells that work thanks to an electric pump. But despite that we did not find water in all the wells we dug. So many people left Douar Azbane Lagrinate because of the lack of water," says Ait El Jadida.

According to the Town Hall of Nzalet Laadem, more and more residents are leaving the village because of droughts -- but no statistics can confirm this statement.

"The phenomenon of rural migration is a direct consequence of the drought that afflicted the region, which has become a structural phenomenon due to the successive years of drought, and this is despite the tremendous efforts made by the state to stabilise the population through the provisions of drinking water, electricity and supportive agricultural programs, for example, insurance on agricultural crops in the drought period. Despite all this, the phenomenon of rural migration to the cities remains," says Abdelilah Mehdi, Head of services at the Town Hall of Nzalet Laadem.

The Groundswell report of the World Bank estimates that in 2050, 5.4% of the total Moroccan population -- about 1.9 million people -- will migrate within the country if no measures are taken to tackle climate change.

So what's happening in these villages is just the start of a trend predicted by researchers.

"As we know, agriculture is the main economic sector in the village, so without agriculture, conditions (required) for staying in the villages will be absent, and this is what pushes the residents of the villages to think about migration, whether internal or external. And certainly this migration has negative repercussions on the migrants, whether on the psychological or social level," says Rachid Salim, a sociologist.

And the situation is not on track to improve.

Morocco is attempting to mitigate the impact of climate change by building wastewater stations, water desalination plants and dams -- over 140 are present in the country to cope with water scarcity.

In Nzalet Laadem, a wastewater plant is helping with the irrigation effort at its limited scale.

"The objective of this station is to use treated wastewater for the purpose of irrigating the agricultural lands, but due to the poor water flow, the station cannot meet the needs of the farmers, especially during the period of drought years, the water flow is very weak," says Mbirqate Abdeljalil, head of the wastewater plant of Nzalet Laadem.

According to the ministry of transport, logistics and water, the volume of natural water resources in the country is currently estimated at about 22 billion cubic metres, equivalent to 620 cubic metres per person per year.

Original Article: [Africa News by Redaction AfricaNews with AP](#)



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