Veles Water Weekly Report

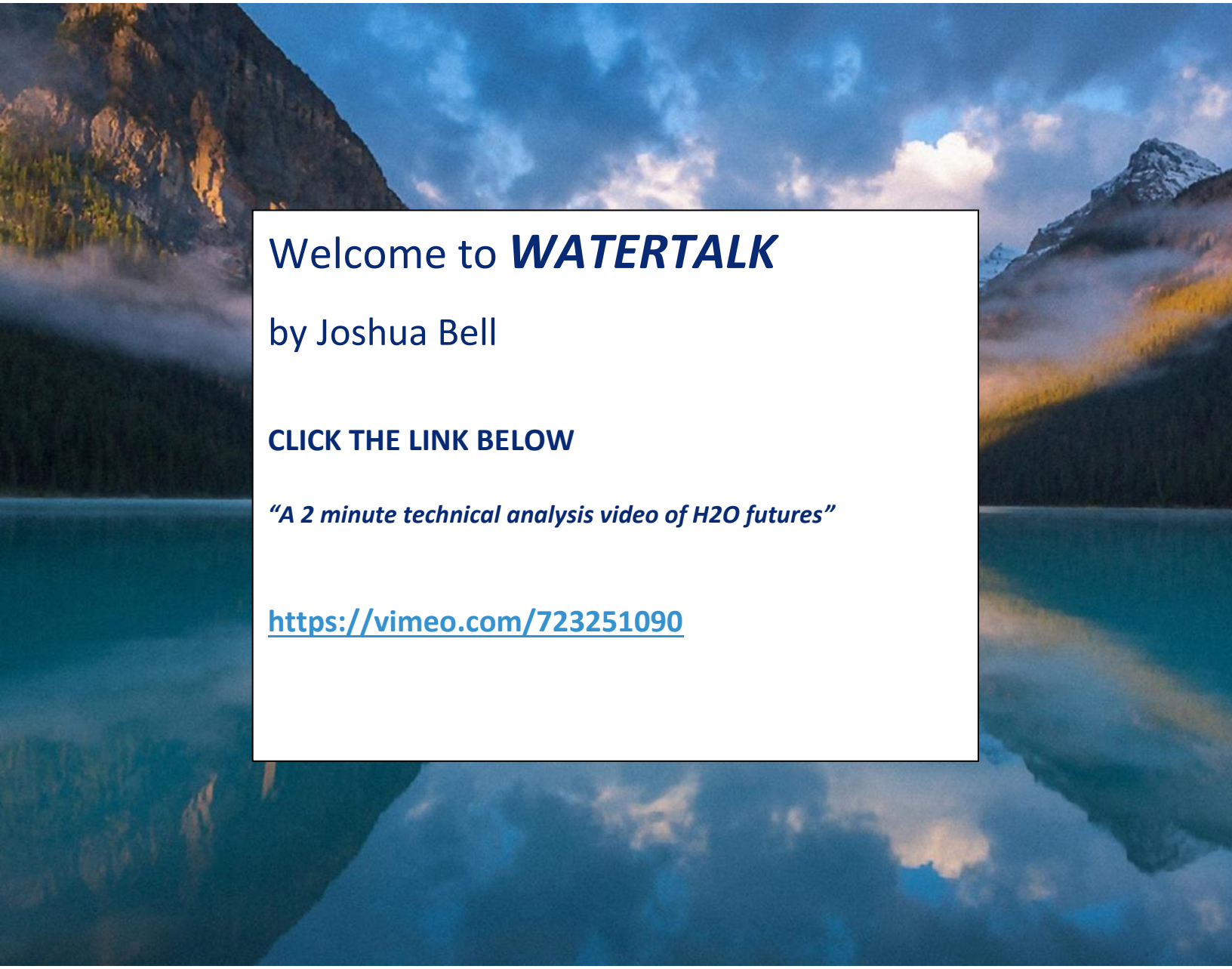
June 23rd 2022

Authors:
Lance Coogan - *CEO*
Joshua Bell - *Research Analyst*

research@veleswater.com
+44 20 7754 0342

VelesWater

WATER FUTURES MARKET ANALYSIS



Welcome to ***WATERTALK***

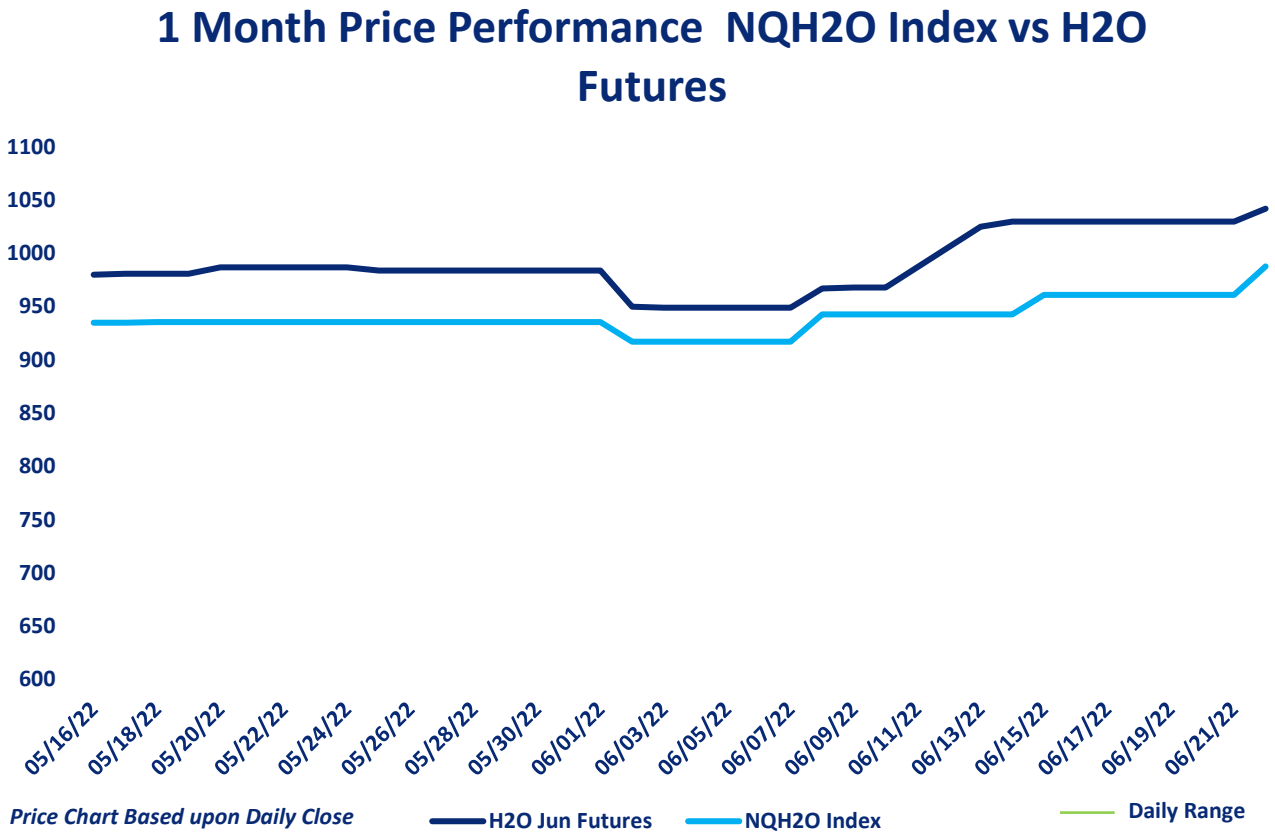
by Joshua Bell

CLICK THE LINK BELOW

"A 2 minute technical analysis video of H2O futures"

https://vimeo.com/723251090

NQH2O INDEX PRICE vs H2O FUTURES PRICE



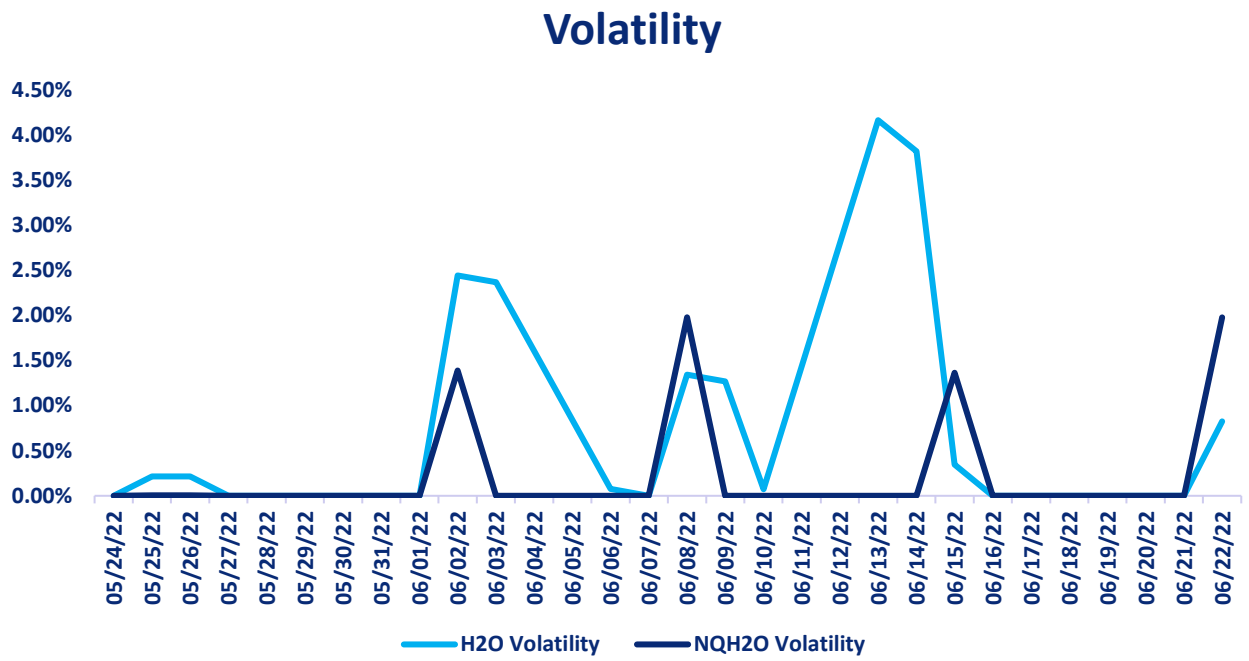
The new NQH2O index level of $987.81 was published on the 22nd of June, up $26.88 or 2.80%, which sets another new all-time high for third week in a row. The July contract has been trading at premium of $54.19 - $69.07 over the past week.

NQH2O is up 39.84% Year to Date.

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

July 22	1042@1085
Aug 22	1043@1090
Dec 22	875@965
Jun 23	1030@1080

H2O FUTURES AND NQH2O INDEX VOLATILITY ANALYSIS



DAILY VOLATILITY

Over the last week the June daily future volatility high has been 0.82% on June 22nd and a low of 0 % for the rest of the week..

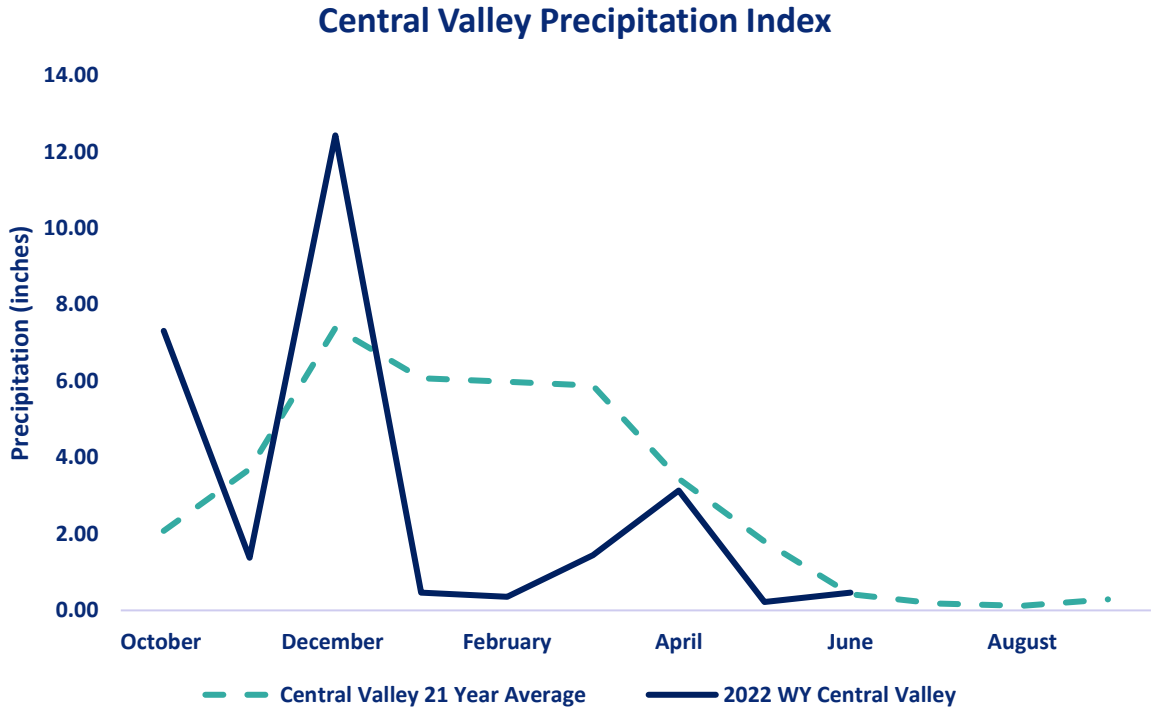
ASSET	1 YEAR (%)	2 MONTH (%)	1 MONTH (%)	1 WEEK (%)
NQH2O INDEX	22.02%	12.33%	4.55%	0.868%
H2O FUTURES	N/A	7.75%	7.28%	1.17%

Once again, mixed signals for the week ending on the June 22nd the two-month futures volatility is at a discount of 4.57% to the index, up 3.86% from the previous week. The one-month futures volatility is at a premium of 2.73% to the index, down 0.26% from last week. The one-week futures volatility is at a premium of 0.30% to the index, down 4.36% from the previous week. We expect futures volatilities to converge to the index volatilities.

*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.*

VELES WATER WEEKLY REPORT

CENTRAL VALLEY PRECIPITATION REPORT



Central Valley average is calculated using data from 19 weather stations in the Central Valley, California.
Data as of 22/06/2022

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)	0.06	0.00	18.72%	47	62
TULARE 6 STATION (6SI)	0	0.00	0.00%	35	58
NORTHERN SIERRA 8 STATION (8SI)	1.34	0.11	173.28%	44	79
CENTRAL VALLEY AVERAGE	0.47	0.04	64.00%	42	66

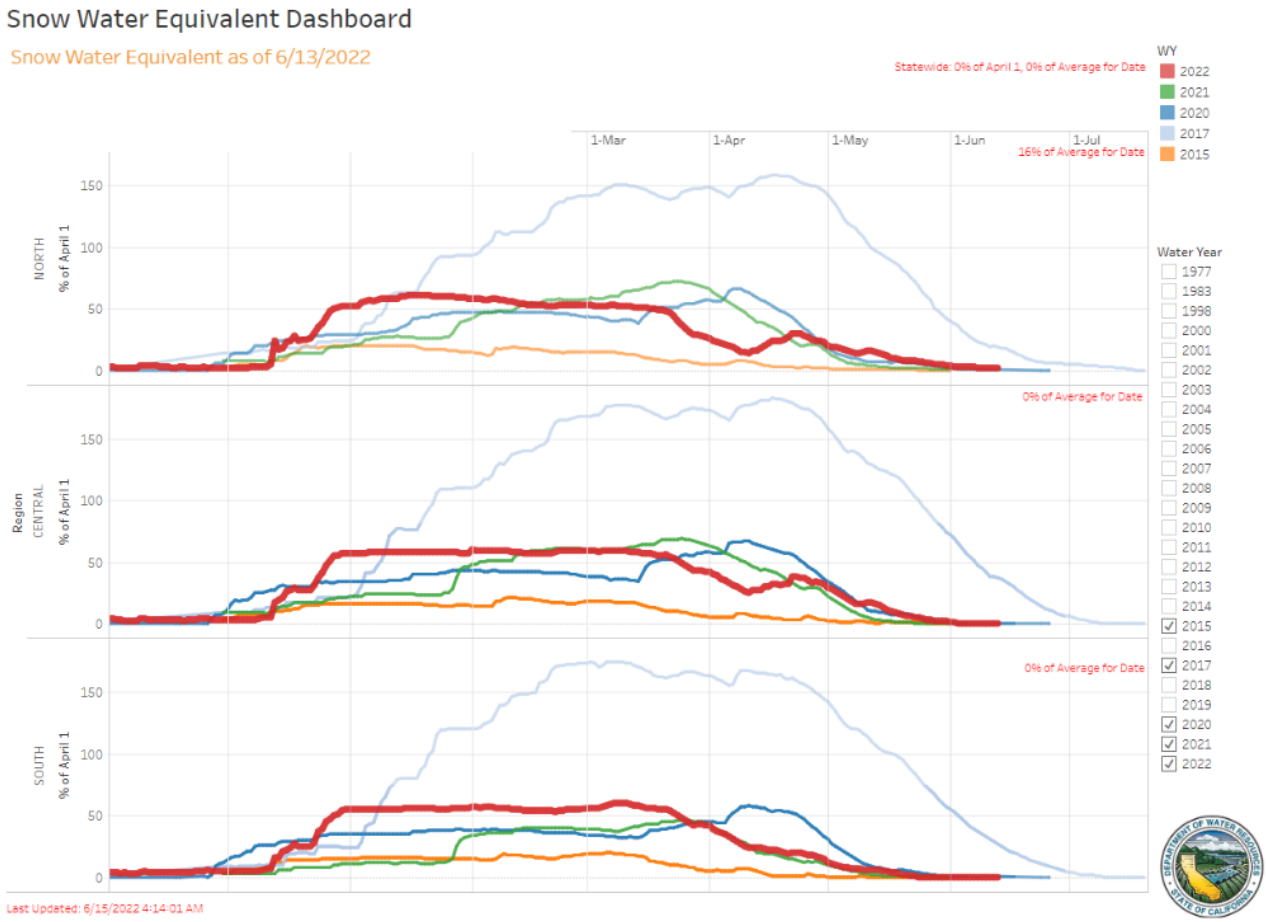
RESERVOIR STORAGE

RESERVOIR	STORAGE (AF)	% CAPACITY	LAST YEAR % CAPACITY	HISTORIC ANNUAL AVERAGE CAPACITY %
TRINITY LAKE	726,234	30	49	38
SHASTA LAKE	1,797,966	39	40	50
LAKE OROVILLE	1,808,902	51	34	66
SAN LUIS RES	834,953	41	37	69

Reference: California Water Data Exchange

VELES WATER WEEKLY REPORT

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	0.4	0.00%	0	16	2
CENTRAL SIERRA	0	0.00%	0	0	0
SOUTHERN SIERRA	0	0.00%	0	0	0
STATEWIDE	0.1	0.00%	0	0	0

***Snow Water Equivalent*, or SWE, is a commonly used measurement used by hydrologists and water managers to guage 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.**

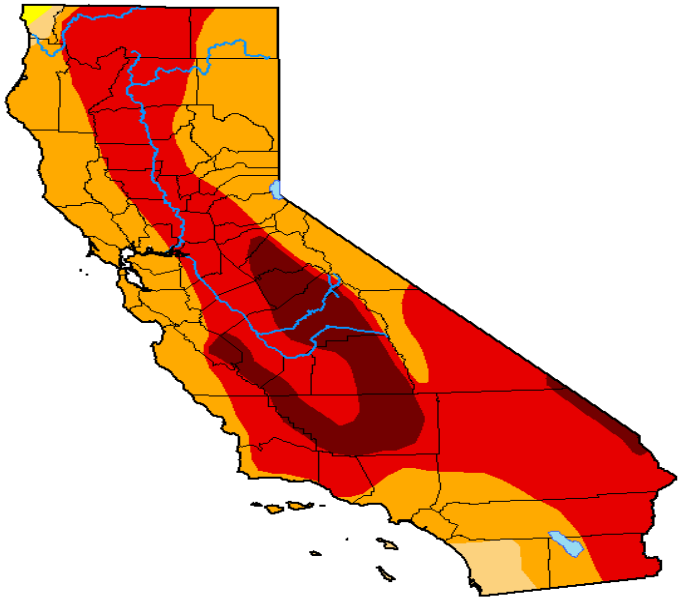
**** April 1st is used as the benchmark as it when the snowpack in California is generally deepest. It has been used the benchmark date since 1941 by DWR and can be used to predict spring river flow.**

VELES WATER WEEKLY REPORT

DROUGHT MONITOR

U.S. Drought Monitor

California



June 14, 2022

(Released Thursday, Jun. 16, 2022)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	99.79	97.48	59.81	11.59
Last Week 06-07-2022	0.00	100.00	99.79	97.48	59.81	11.59
3 Months Ago 03-15-2022	0.00	100.00	100.00	93.23	35.22	0.00
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 06-15-2021	0.00	100.00	100.00	94.75	85.44	33.32

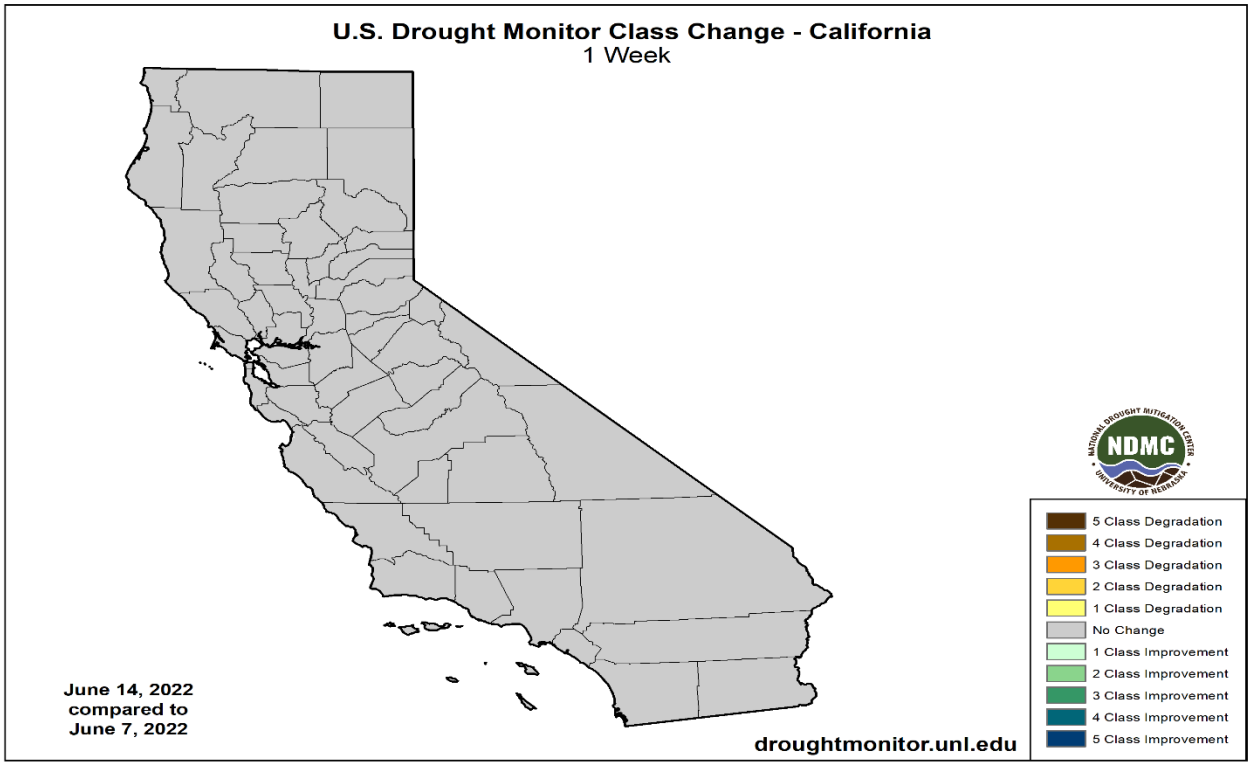
Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme 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:
Adam Hartman
NOAA/NWS/NCEP/CPC

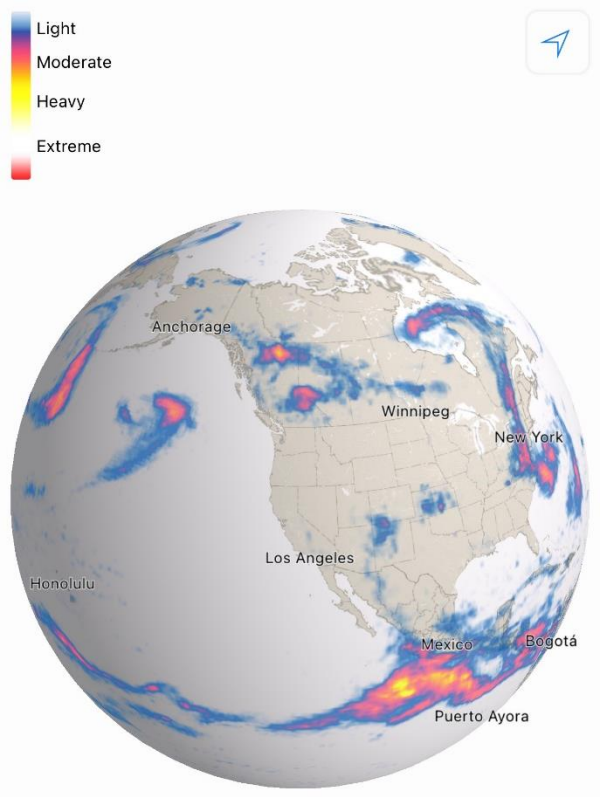
droughtmonitor.unl.edu



The US Drought Monitor release their statistics with a 1-week lag to this report. Over the past week the has been 0% change in Drought conditions in California.

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: Dark Sky

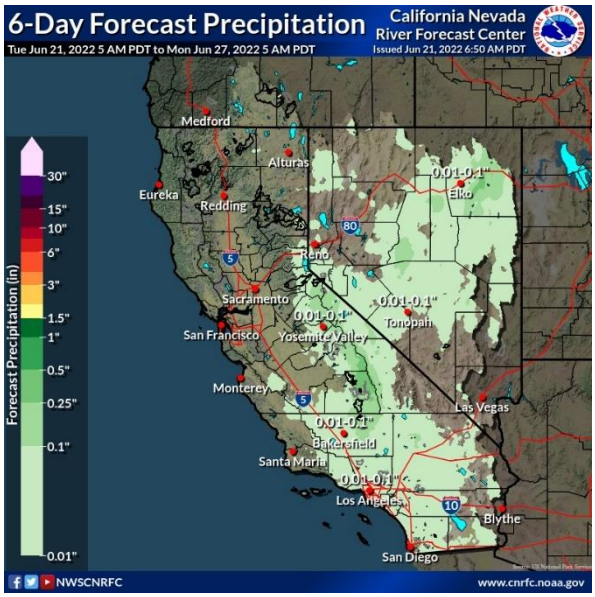
The current satellite picture shows a relatively dry Western and Central US. There is a dissipating frontal system over Western Canada moving eastwards.

There are 2 frontal systems brewing over the Northwestern Pacific which are not expected to bring much precipitation the the US only affecting the Northwestern regions and not in a big way. It is not expected that these fronts will bring any precipitation to California.

The North-eastern US has a large area of scattered cloud bringing summer rainfall to these regions stretching from the Carolinas up into Eastern Canada.

Most notably we are seeing further signs of the beginning of the Monsoon activity with moisture flow from the southern regions in Mexico starting to move northwards towards Arizona and parts of southern California. We expect this to develop further and strengthen over the next few months.

10 Day Outlook



An upper low currently sits along the Central CA coast as a large area of high pressure builds to the west over the Pacific. Dry conditions and above normal temperatures across the region today as the low slowly progresses southward towards Point Conception. By early Wednesday, the low will begin to pull in monsoonal moisture over central/southern CA. This may bring light precipitation over the area along with potential thunderstorms. The low will lift back northward into Thursday and begin to make landfall into central CA shifting precipitation/thunderstorm chances over the southern Sierra and NV. Areas north of the low will remain above normal throughout the rest of the work week by about 5-15 degrees. The low will open up into a trough and reach the CA/NV border by

early Friday morning pulling any precipitation along the border and into NV. Highest precipitation amounts in the first three days look to be over the southern Sierra at about 0.10-0.25" with generally less than 0.10" elsewhere.

A ridge will then begin to build in over the region this weekend allowing above normal temperatures to become more widespread. Some disagreement between the GFS/ECMWF in regards to precipitation. The GFS is showing showers over NV on Saturday while the ECMWF shows potential showers on Sunday. Should any precipitation occur, it does not appear to be more than a tenth of an inch. Bottom line, warming temperatures and potential light showers over NV over the weekend. Both the CPC 6-10 and 8-14 day out looks have above normal temperatures over CA and NV.

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

WESTERN WEATHER DISCUSSION

Much of the Northern Tier of the U.S. from the Pacific Northwest to the Northern Plains, has seen marked improvements in recent months due to a persistent storm track and near to below-normal temperatures. That same pattern continued this week and continued to eat away at long-term precipitation deficits and indicators, such as groundwater. Additionally, some high-elevation locations have even picked up additional snowpack and stream flows are running near to much above-normal over the past 28 days. Given the wet conditions in recent months and the continuation of the active storm track, broad improvements are warranted again this week. The only exception is parts of north-central Montana, where precipitation has generally missed many areas near the Golden Triangle in recent months, warranting some slight degradation this week, as precipitation again missed these areas. Elsewhere in the Western Region, despite the much above-normal temperatures, a general status quo depiction was warranted, the exception being Nevada and New Mexico. A slight expansion of extreme drought (D3) was warranted in central Nevada, where 7 to 28-day average stream flows are running below the 5th percentile of the historical distribution, vegetation indices are indicating similar signals as D3 areas to the east, and KBDIs are indicating high soil moisture deficiency in the upper layers. Despite some nearby monsoon precipitation in parts of New Mexico and Arizona, accumulations were not enough to change the severe (D2) to exceptional (D4) drought depictions in areas where the rains fell. Given the temperatures were running anywhere from 5°F to 10°F above-average, and coupled with windy conditions, additional degradations were made in parts of western and southern New Mexico. Additionally, CPC soil moisture continues to

remain below the 5th percentile much of the region and nearby stream flows are averaging in the bottom 2 percent of the historical distribution.
Reference:

Adam Hartman, NOAA/NWS/NCEP/CPC
Brad Rippey, U.S. Department of Agriculture

WATER NEWS

CALIFORNIA WATER NEWS

What the Future of Almonds Looks Like in a Dry California

It takes about four years for an almond tree to bear fruit and closer to seven years to get a full yield from the tree. That's seven years of planning, planting, irrigating, pruning and tending before the big payoff. It's a lot to ask of farmers in California's Central Valley, where nearly 80 percent of the world's almonds are grown. In 2021 alone, the 7,600 almond farmers in the state grew nearly three billion pounds of almonds, making it the state's most valuable crop.

But now, facing extreme weather events, shrinking water resources and rising costs, some farmers are leaving almonds behind, opting to put their efforts behind in-demand crops such as canning tomatoes, garlic or onions. In fact, this year's almond harvest is expected to drop from last year's, with drought and frost damage two of the main reasons for the dip. With ongoing droughts, heatwaves and wildfires across California, the state's farmers have less water to work with. That makes it hard to commit to a crop that takes years of careful irrigation before it produces a single kernel.

Almonds get a bad reputation for being a water-intensive crop. A 2019 study showed that it takes on average 12 liters of water to grow one almond kernel, although there was "substantial variation" over time and geographic area. That same study also found almonds to be among the top three foods "providing the greatest nutritional benefit per unit weight; however, they had the highest water footprint value per unit weight." Of the 34 million acre-feet of water (the amount needed to cover an acre with a foot of water) that California uses for agriculture each year, the vast majority of that comes from surface water, such as diverting streams or pumped from ground water. One report calculated that almonds use 10 percent of California's annual water supply, which, on its face, seems like a lot. But is it?

"Almonds are not notably different in their water use than essentially any other irrigated agricultural crop," says Patrick H. Brown, a distinguished professor of plant sciences at UC Davis. Not only do almonds use a proportionate amount of water, Brown says that, for farmers, the crop is one of the best investments for limited water resources, as almonds generate a solidly good economic return. "A pound of almonds, when they are

priced at $2 to $4 per pound, equates to a very good choice of what to use your water on." In a good year, says Brown, prices have shot as high as $6 per pound.

Plus, that's just the going rate for a pound of the almond kernel, the nut we eat (or use to make milk or flour). There's also a secondary market for the hulls and shells, as they're used in dairy cattle feed, farm bedding material and even cosmetics.

That's one of the reasons growers such as Kiku Severson are optimistic about the future of almonds, and are working to make the industry more sustainable. Severson works alongside her parents at their farm in Turlock, California. She's also a member of the California Almond Board, focusing on the sustainability efforts of the industry. Severson says she's continually impressed by the efforts of almond farmers to adapt as their resources get scarcer. "We've been researching water since the '90s," Severson says, noting that, at the time, micro-irrigation—targeting water directly to a tree's roots rather than spraying it uniformly over an orchard—was a relatively new innovation. Now, more than 80 percent of almond farmers use micro-irrigation, "and we've been able to reduce water use by about 33 percent to grow a pound of almonds."

Now, Severson says farmers are relying further on technology such as precision sensors to pinpoint what specific plants might need and make the best use of the resources. Because the global supply of almonds is so concentrated in this one geographic area, Severson says it's "a huge responsibility. And I think almond farmers really feel that, and we want to be leaders in this agriculture space."

And it's not just the growers. Food brands are getting involved, too, with initiatives such as The Almond Project, whose founding partners include snack and baking company Simple Mills, plant-based meal delivery service Daily Harvest, almond flour-based frozen food company Capello's and Treehouse Almonds, along with the White Buffalo Land Trust and a family of farmers who are leading the on-the-ground work. The five-year project will test a variety of soil health practices and aims to measure which combination of factors is the most ecologically beneficial and produces the best almonds. They're testing things such as animal integration, reducing the amount of synthetic pesticides and fertilizers and increased compost applications. When it comes to cover crops, they're using more than 30 different species to introduce biodiversity, testing their outcomes.

One of the goals is to ensure that there's a future for California almonds. "We're thinking about the holistic ecosystem, to identify these areas of opportunity and to make continuous progress, rather than vilifying or boycotting a specific ingredient that has become quite a lightning rod," says Christina Skonberg, director of sustainability and missions at Simple Mills. Skonberg says they also wanted to take on this project to reduce the financial burden on farmers when testing out new practices. "Trying something like grazing sheep through the orchard, which is one of the practices we're testing, that risk is shared by all of the partners and doesn't fall fully on the farmer."

The Almond Project is only a five-year initiative, but farmers don't have five years. Changes are happening now. The project's partners understand the urgency. "We can't afford to wait until five years from now to take any action," says Skonberg. So, while there are formal measurements taken at regular intervals over the length of the project, they are also leaning on the expertise of the farmers to see what is working anecdotally, and adjusting as they go. "We're using those learnings, and existing research and projects on other lands, to make educated guesses about what might work in this system."

Original Article: Modern Farmer by Emily Baron Cadloff

'Substantial weather pattern change' bringing heat and monsoonal moisture to California

Tuesday is the first day of summer — and it will certainly feel like it across Northern California, where temperatures are expected to soar, the National Weather Service said.

After a weekend of mild weather, a "substantial weather pattern change" is coming to California this week, UCLA climate scientist Daniel Swain wrote on Twitter. "A prolonged period of significantly hotter temperatures is expected inland, which will be a dramatic shift from recent cool temperatures up north."

Swain said another twist is coming in the state's weather this week: "Additionally, it appears that an early/pre-monsoonal surge will arrive across southern 2/3 of CA by mid-week. This will bring chance of at least mountain/desert t-storms, & perhaps even chance of lightning over lower elevations south of I-80. Details still fuzzy, but could be some dry-ish lightning over peak drought region."

The Central Valley will see some of the hottest temperatures in the northern part of the state, with triple digits likely to persist in many locations through the weekend. Tuesday and Wednesday are likely to be the hottest days of the week in the Central Valley. Further north, Redding is forecast to record a high of 104 on Tuesday and 107 on Wednesday. Sacramento is predicted to hit 102 on both Tuesday and Wednesday, the weather service said.

"We're not expecting any records, but we're going to be about 10 to 15 degrees above normal for this time of year," said Scott Rowe, a forecaster with the weather service's Sacramento office.

In the San Francisco Bay Area, the mercury is expected to hit its peak of the week on Tuesday; Discovery Bay projected to reach 105, Concord 103, Santa Rosa 100, San Jose 98, Oakland 93 and San Francisco 83.

"It's still toasty through Wednesday, Thursday, and then by Friday starting to cool a little bit more," said Sarah McCorkle, a forecaster with the Bay Area office.

A surge of monsoonal enters the forecast on Wednesday, but forecasters said on Monday that it's too soon to nail down exactly what this low-pressure system will bring

to Northern California. In the Bay Area, forecasters think dry lightning and thunderstorms are highly unlikely, but the weather shift is likely to lead to a slight drop in temperatures.

"Temperatures on Wednesday will continue to be widespread 90s with some low 100s for the interior, but should be a touch cooler than Tuesday," the weather service said.

The highest chances for thunderstorms and dry lightning is along the Sierra crest, said Rowe.

"There's very low confidence as to the trajectory of this moisture," he said. "Right now, we have a 10% to 20% chance for dry lighting along the Sierra crest. It's one of those things that's hard to forecast."

Dry lightning is of concern in summer when it can spark wildfires, but Rowe said the fire risk remains moderate in the Sierra due to recent light rain that's keeping the vegetation somewhat moist.

Original Article: SF Gate by Amy Graff

What La Niña means for California's summer

While the lingering La Niña climate pattern is expected to bring soaking storms and strong hurricanes to parts of the U.S., it's a different story here in California. La Niña is favored to stick around through the end of the year, according to the latest outlook from the National Weather Service's Climate Prediction Center. While La Niña – and its opposite, El Niño – are characterized by the temperature of the Pacific Ocean, they have major impacts on the weather we experience on land.

Before we can understand how it's set to impact our summer, it's important to note it has already had an impact on our winter. La Niña typically brings drier conditions to the southern half of the country and wetter conditions to the northern half, but where that dividing line falls varies from year to year.

Sometimes La Niña splits California in two, bringing lots of rain to Northern California and drought to Southern California. This year, however, the dividing line was further north. While parts of Washington and Oregon are out of the drought, a dry La Niña winter and spring have left 99.8% of California suffering drought conditions.

Now it's summer, California's driest season, and drought conditions are only expected to worsen. NOAA is predicting a hotter-than-average summer for the entire state, which will further deplete reservoirs and dry up already parched land even more.

NOAA's summer outlook predicts average precipitation for California this summer. But "average precipitation" means no precipitation for most parts of the state. Average rainfall in Los Angeles in July is a negligible 0.02 inches, according to the Los Angeles Almanac, and zero inches in August. Fresno, Bakersfield, Sacramento and San Diego all typically get less than 0.1 inches of rain in July. The average July in San Francisco sees no rain at all.

As of this week, about 12% of the state is in the worst drought category – "exceptional drought" – and that figure is expected to rise through the summer.

A worsening drought means more fuels during peak wildfire season and could mean more water restrictions.

There's a chance the La Niña pattern we're in now could shift to an "ENSO neutral" pattern in the late summer. That means we'd be in neither a La Niña nor an El Niño pattern. The Climate Prediction Center will update its outlook in mid-July.

Original Article: KTLA by Alix Martichoux

Drip-irrigation study sees 'huge' water reduction

A new study suggests that drip irrigation for sweet corn can significantly conserve water, reduce fertilizer use and boost crop yield in the low desert of California – and likely in other areas of California with similar conditions.

Although Imperial County is California's top sweet corn-producing county, with about 8,000 acres planted on average each year, irrigation methods for this crop have been rarely studied in this region (or anywhere else in the state), according to Ali Montazar, UC Cooperative Extension irrigation and water management advisor for Imperial, Riverside and San Diego counties.

Montazar conducted a study in the Imperial Valley over two crop seasons, 2020-21 and 2021-22, to demonstrate and quantify the potential benefits of switching to drip irrigation from the more common furrow irrigation method. The study, available in a recent issue of UC Agriculture and Natural Resources' Agricultural Briefs, will be published in a future issue of Vegetables West.

"I'm hoping with this project we can encourage growers to adopt it, because it seems very promising," said Montazar, noting that drip irrigation is a "new practice" for sweet corn in California.

Among the 11 commercial sweet corn fields in the study over the 2021-22 season, the six that were under drip irrigation used, on average, 37% less water than the five under furrow irrigation. In absolute terms, the drip-irrigated fields saw an average water savings of 2.2 acre-feet per acre; for Montazar, who has studied drip for a variety of crops in the Imperial Valley, that was an astonishing result.

"I've worked with drip on processed onions, lettuce, alfalfa, spinach … we've never seen a figure like 2.2 acre-feet per acre, that's huge," he said, attributing the dramatic drop-off to the high volume of water required to furrow-irrigate the sandy soil in the Imperial Valley.

More efficient irrigation also means less fertilizer is needed – a boon to the environment and Salton Sea water quality, as well as growers' bottom line. With fertilizer prices continuing to rise, sweet corn growers using drip could see a substantial 25% cost savings

on fertilizer expenses – about $150 per acre less – compared to furrow irrigation, according to Montazar's study.

And by relieving plants of the stress from over- and under-irrigated conditions, drip irrigation helps keep soil moisture at its "sweet spot" – resulting in a 5% increase in marketable crop yield for sweet corn in the study.

"When we have a better, more efficient irrigation system, we can maintain soil moisture at a desired level, over time and space," Montazar explained.

Because the benefits of drip appear to be linked to soil conditions (sandy loam, and other light soils), Montazar believes that this irrigation practice could deliver relatively similar water and fertilizer savings and improved crop yield in other regions across California, regardless of climactic differences.

"If you use drip in any part of the state, you have the benefits of drip – more uniform water application, more uniform fertilizer – that's not related to the desert," he said. "That's part of the system's potential."

Montazar plans to follow up on his preliminary study with additional research on sweet corn and drip irrigation during the 2022-23 crop season.

Original Article: Western Farm Press by Mike Hsu

Attorney General Bonta Urges Supreme Court to Uphold Federal Protections for Wetlands

California Attorney General Rob Bonta joined a multistate coalition in an amicus brief before the U.S. Supreme Court in defense of federal protections for wetlands. In Sacketts v. U.S. EPA, the Supreme Court will consider the scope of "waters of the United States" under the Clean Water Act and whether a narrower definition of protected waterways should be adopted. In the brief, the coalition argues that denying wetlands federal protection would undermine the Clean Water Act's goal of improving water quality and protecting states like California from upstream pollution.

"California relies on our waterways to sustain our communities, our economy, and our biodiversity," said Attorney General Bonta. "As California confronts a once in a century drought, it is essential that our ability to protect our waterways remains intact. Wetlands have a critical and long acknowledged role in maintaining the integrity of downstream waterways from upstate polluters. I urge the Supreme Court to uphold the longstanding and commonsense reading of the Clean Water Act's text and purpose that has been adopted by the EPA, the Army Corps of Engineers, and federal courts. Wetlands deserve federal protection."

The definition of "waters of the United States" under the Clean Water Act is critical to maintaining a strong federal foundation for water pollution control and water quality protection that preserves the integrity of our waters. While the Clean Water Act has resulted in dramatic improvements to water quality in the United States, its overriding

objective has not yet been achieved. Many of the nation's waters fail to meet water quality standards.

Justice Kennedy's concurrence in the Supreme Court case of Rapanos v. United States sets out the "significant nexus" test, which said that waterways that connect to or have a significant impact on navigable waters are protected under the Clean Water Act. The EPA and the U.S. Army Corps of Engineers relied on this interpretation, which is supported by the Clean Water Act's text, history, and purpose, when they expanded the definition of "waters of the United States" in 2015 to include the headwaters of rivers and creeks as well as other non-traditionally navigable waters, such as wetlands and ephemeral streams, which have significant impact on downstream water quality.

In the brief, the coalition describes how wetlands play a significant role in maintaining water quality, quantity, and biological integrity of navigable waters, trapping and neutralizing pollutants, controlling surface-water runoff and erosion, and preventing floods. Wetlands therefore meet the "significant nexus" test and are protected waters under Clean Water Act permitting programs. Eliminating federal protections for these waterways would cause significant harms to downstream states like California, who rely on the Clean Water Act to safeguard against the negative impacts of pollution from upstream states on our state's drinking water, wildlife habitat, agriculture, and recreation.

Attorney General Bonta joins the attorneys general of New York, Connecticut, Delaware, the District of Columbia, Hawaii, Illinois, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New Mexico, North Carolina, Oregon, Vermont, Washington, and Wisconsin in filing the brief.

Original Article: State Dept. California Dept. Justice

A major California reservoir has hit its peak for the year at just over half full

Lake Oroville, the largest reservoir in a state system that provides water to 27 million Californians, has already reached its peak level for the year, barely surpassing half of its capacity, according to the Department of Water Resources.

Officials had warned the lake — key to the roughly 700-mile State Water Project, which pumps and ferries water across the state for agricultural, business and residential use — was at "critically low" levels on May 8.

Those levels, data from the Department of Water Resources now shows, were the reservoir's highest for the year.

On May 8, Lake Oroville crested at 1.94 million acre-feet. As of Monday, it had dropped to 1.81 million acre-feet, the data shows. The reservoir can hold 3.54 million acre-feet of water, almost double its current level.

State water officials said the lake was at 51% of capacity and 66% of its historical average for this point in the year.

Though well below historical levels, the reservoir has improved over last year, when drought forced the hydroelectric power plant that relies on Lake Oroville's water supply to shut down. This year's peak water level was about 400,000 acre-feet above 2021's highest point, Department of Water Resources data shows.

Until 2021, water levels for the lake north of Sacramento had peaked at 2.5 million acre-feet or more each year since 2015 — about 600,000 acre-feet above this year's high.

The Department of Water Resources forecasts Lake Oroville's water level to continue falling through the end of the year, but the agency said it does not expect the hydroelectric power plant will need to shut down.

Despite California's below-average precipitation this year, the department said Lake Oroville benefited from last October's "record-setting atmospheric river," or belts of Pacific rain, increasing its water supply.

Snowfall in December also helped boost the reservoir, the department said, but the driest January, February and March of this century left Oroville with "below average storage for the season."

"DWR is taking actions to conserve as much water as possible within Oroville reservoir," the agency said, both to help ensure salmon migration isn't interrupted and to prepare for the possibility of a more severe drought next year.

Original Article: Hastings Tribune by Grace Toohey/ LA Times

Glendale declares drought watch, asks people to conserve water

The city of Glendale on Friday declared a Stage 1 Drought Watch and asked for residents and businesses to help conserve water.

There are no mandatory restrictions in the first part of the city's five-stage Drought Management Plan. Additional water reduction measures may be implemented by the city manager and council at each stage.

"Our city has invested in a diverse water portfolio and in infrastructure, like groundwater wells, which allow us to store water in a variety of places," Craig Johnson, Glendale Water Services director, said in a press release.

"Glendale is well-positioned to meet its customers' water needs, but we need to continue to use water wisely."

Activation of the plan comes amid conditions worsening on the Colorado River due to a historic drought, among other issues.

"Glendale identified this issue several years ago and since then, we have been aggressively storing water for future use," City Manager Kevin Phelps said in the release. "We understand the seriousness of the situation and our plans, actions and programs reflect our goal of being as drought-resilient as possible."

The city as part of the plan is targeting a 5% water reduction at municipal properties.

Glendale is also offering people incentives, assessments and conservation kits to promote water efficiency. More information about Glendale's free water conservation programs can be found on the city's website.

Phoenix, Tempe and Mesa also recently activated their drought plans, which like Glendale don't put any restrictions on residents and businesses but does ask people to help conserve water.

Original Article: KTAR News by Torrence Dunham

US WATER NEWS

Deepening fissures define rural southern Arizona's fight over groundwater rules

Cities and agriculture across the West put intense pressure on groundwater supplies. In some regions, few rules govern how and when people can pump.

That's true in rural Southern Arizona. Residents there are seeing their wells dry up as big farms move in, and they're pushing the state to better manage dwindling underground water supplies.

Tara Morrow can walk inside a crack in the ground that's deeper than she is tall.

"There's a really good snake den back in there," she said.

The fissure had even swallowed part of the road near her home. She said when these deep cracks open up, they make even a quick grocery run tough.

"You know, the desert is a beautiful place, and it's also a very harsh place," Morrow said.

It's already dry in southern Arizona's Sulphur Springs Valley and it's getting drier. The underground aquifer that lies beneath the desert used to be much higher, but as it drops the ground above it becomes unstable.

Residents like Morrow are seeing the wells they use to pump water for their basic needs -- to take showers and wash their hands -- dry up as large farming operations move in and drill deeper.

"It is a little bit scary to think that one day you're gonna wake up and your place might be condemned," she said.

Groundwater management isn't just an Arizona problem. Colorado's legislature just voted last month to put $60 million towards groundwater sustainability. California and Nevada have also struggled with the issue.

In rural pockets of Arizona, some residents are eager for change. They're pushing for stricter rules on groundwater pumping. Those who are fed up with dropping groundwater levels want the two basins in this valley to become what the state of Arizona calls Active Management Areas or AMAs.

Kathleen Ferris researches water policy at Arizona State University, and she knows all about AMAs–she helped get the policy on the books back in the 1980s.

"The advantage to being in the AMA depends on who you're talking to," Ferris said. "But for one thing, it means that you can't drill a well, and pump as much groundwater as you want, without constraint.

If someone is already pumping water in the area before it becomes an AMA, they'll get grandfathered groundwater rights. Someone who wants to drill a new one would have to prove they're not harming someone else's supply.

The state's big urban areas already tightly regulate groundwater under existing AMAs, but some rural areas lack oversight. The option to create a new one was always built into state law, but no one's tried to do it until now.

"We found a statute that was right there waiting for us," Arizona Water Defenders co-founder Rebekah Wilce said.

Her group has been gathering signatures to get a proposed AMA on the ballot this November for parts of the Sulphur Springs Valley.

They're on track to do it.

"It might not be the perfect solution," Wilce said. "In fact, it probably won't be, but it is the only thing, seemingly, that we actually can do and that we can do ourselves at the ballot."

Not everyone supports their efforts, however. Riverview, a Minnesota dairy company, moved in in recent years and built one of the largest operations.

A spokesperson for the company declined an interview for this story and said the company remains neutral.

The Cochise County Farm Bureau said it's also neutral on the ballot measure. President Sonia Gasho said the AMA designation is extreme.

"Our policy as Farm Bureau is that we want to respect private property rights. We want to conserve water. And we want to do that in a way that is as little government oversight as possible," Gasho said.

This is a familiar tension in the West where laws protecting privately held water rights butt up against realities on the ground.

Gasho said the local farm bureau is more interested in smaller-scale regulations.

Resident Tara Morrow said the fissures opening up near her home threaten her ability to live in the Sulphur Springs Valley long-term.

"It really looks like a little mini Grand Canyon, doesn't it?" she said, marveling at the crack.

Morrow said action needs to happen soon, before her well dries up completely.

"I love agriculture. I grew up in an agriculture community, a big part of my life is agriculture," she said.

But, she also said, if farms keep expanding unchecked, the region will become uninhabitable for those who've lived here for years.

Original Article: NPR for Northern Colorado by Megan Myscofski

Biden-Harris Administration Invests Over $74 Million in Federal-State Partnership for Critical Minerals Mapping

The Department of the Interior announced today that, thanks to a substantial investment from President Biden's Bipartisan Infrastructure Law, over $74.6 million will be distributed in 30 states to invest in geoscience data collection, mapping, data preservation, and scientific interpretation of areas with potential for critical minerals, under the U.S. Geological Survey (USGS) Earth Mapping Resources Initiative, or Earth MRI. These investments will help improve our understanding of domestic critical mineral resources, a key step in securing a reliable and sustainable supply of the critical minerals that power everything from household appliances and electronics to clean energy technologies like batteries and wind turbines.

Funding from the Bipartisan Infrastructure Law will account for $64 million in this effort. This is part of the broader $510.7 million investment in USGS from the Law to support scientific innovation.

"President Biden's Bipartisan Infrastructure Law makes historic investments to support scientific research, data mapping and preservation," said Secretary of the Interior Deb Haaland. "In order to make data driven decisions based on the best available science, we need to equip our premier science agencies with the resources they need. The funding we are announcing today and the partnerships it will foster will help us research and preserve vital scientific data."

Under Earth MRI, USGS has partnered with the Association of American State Geologists and state geological surveys to jointly fund and conduct new geologic mapping and geochemical reconnaissance sampling and preserve existing geologic data and samples.

"These historic investments will modernize our mapping of the United States," said Sarah Ryker, USGS associate director for energy and mineral resources. "The USGS and the state geological surveys collaborated to prioritize areas where new geoscience data will yield new understanding of the potential for sustainable mineral production and mine waste reprocessing and remediation, along with geothermal resources, groundwater and earthquake hazards."

"Merging federal resources with local knowledge of the state surveys creates an efficient and thorough venue to quickly further national understanding of the distribution of our

resources," said Erin Campbell, president of the Association of American State Geologists. "We at the state geologic surveys truly value our partnership with the USGS."

The focus of the Fiscal Year 2022 funding includes improving the nation's mapping of shallow and deep geology. This will lead to better scientific understanding of critical mineral resources – including minerals still in the ground and those found in mine waste materials. By improving this science, we can better ensure our mining actions in the United States secure the minerals needed for a clean energy revolution while being conducted with strong environmental, sustainability, safety, Tribal consultation and community engagement standards so that the American people can have confidence that the minerals and materials they use are responsibly sourced and our resources are stewarded wisely.

- Through the National Cooperative Geologic Mapping Program, geologic mapping will be conducted by state geological surveys. The new maps will refine our understanding of the geologic framework of mineral areas of interest. In addition to helping identify mineral potential, these maps also support decisions about use of land, water, energy and minerals, and the potential impact of geologic hazards on communities.
- The National Geological and Geophysical Data Preservation Program partners with Earth MRI to support data preservation. The increased funding from the Bipartisan Infrastructure Law will support preservation of physical samples that would be costly or difficult to replace.
- The USGS 3D Elevation Program (3DEP) will acquire modern elevation (lidar) data flown by private sector mapping services contractors to fill data gaps in the nation's topographic mapping in areas with potential for critical mineral resources. Lidar is a laser-based scanning of terrain to create high-resolution digital elevation models. Lidar helps scientists develop accurate maps that depict the geology exposed at the surface and extrapolate the extent of the rock formations at depth. Lidar data also can help define the location and volume of mine waste materials exposed on the land surface.
- The Mineral Resources Program and the state geological surveys will conduct geochemical reconnaissance surveys to provide initial information on under-studied geologic settings, thus helping plan and prioritize future years' data collection and mapping. The Mineral Resources Program will also design airborne geophysical surveys that will be flown by private sector airborne geophysical survey contractors in areas with critical mineral potential. Airborne magnetic data indicate the relative amount of magnetic minerals in exposed and deeply buried rocks; airborne radiometric data indicate the relative amounts of potassium, uranium and thorium in exposed rocks and soils. Airborne electromagnetic surveys provide information on concealed minerals and groundwater resources.

This information allows scientists to identify likely locations of rocks and geologic structures (such as faults) associated with critical minerals, geothermal energy resources, groundwater and potential earthquake hazards in the region.

Original Article: U.S Department of the Interior

Drought impacts water rights on Rio Grande

For more than two decades, leaders in the local agricultural community have warned of the inevitability of less and less water being available for the irrigation of crops in the San Luis Valley.

As the current drought continues to persist, even those not engaged in farming or raising livestock can read the headlines or look at maps that show large swaths of the valley blanketed in colors indicating extreme drought. Yet, there are moments when the stark reality of those warnings becomes abundantly clear.

One of those moments occurred this week.

In a conversation held on Thursday with the Valley Courier, Cleave Simpson, general manager for the Rio Grande Water Conservation District, shared a sobering fact. “As of today, a water right adjudicated on the Rio Grande River in 1871 is the last water right being served on the river.”

Water rights in Colorado are based on the prior appropriation doctrine, otherwise known as “first-in-time, first-in-right.” Those with the oldest, and therefore most senior, appropriations of water have priority over other younger, or more junior, water rights.

In this case, those whose water rights were decreed in or before 1871 will have access to water from the Rio Grande. All those with water rights issued after 1871 up to 1959, the last year a new appropriation was made on the river, will not be able to use water from the river this season unless more rain falls.

“We’re not even at the end of June yet, and we are way down on the appropriation list,” Simpson said. “If you’re already down to turning off water that was appropriated after 1871, this is an ugly set of circumstances.”

The drought of 2002 was the worst drought in recorded history and is the standard by which other periods of drought are measured. “We’re not on pace with 2002 but we’re pretty bad,” Simpson said.

He speaks from experience. In 2002, Simpson had to ship his cows to calve in Missouri, which he described as a “disaster in itself.” While conditions today are not quite as extreme, there are similarities to what happened twenty years ago.

“People who rely on just surface water will be faced with choices. Sell your herd or be prepared to buy hay to feed their cows. But it’s going to be impossible to buy hay to feed cows this year from an economic standpoint. Those prices are going to be high because everyone is experiencing such a drought. And people who have wells to back up their supply, those resources are being stressed. You can see it in the unconfined aquifer very

readily every day. Look on our website and you can see the levels go down. We just don't have the water resources that we've had in the past, and we can't keep pumping the way we've been."

While farmers and ranchers will be facing tough choices soon, Simpson – whose approach is consistently equal parts recognition of a challenge and search for the solution – is also focused on the larger questions that extend beyond this growing season.

"How do we adapt and change without fundamentally changing what we look like and what drives our economy, culture and community? We're trying to do this very thoughtfully and incrementally. I think, without a doubt, there is going to be less irrigated acres here than historically there has been.

"And, for me, I've been focusing a lot of time and energy on is there a path here for renewable energy. Can solar energy fill some of that gap? There are tremendous hurdles in that space of trying to make that a reality. Of course, I don't want to see fifty-thousand acres of solar panels but there's certainly room for some here, and I think it could fill that economic void that will come from taking out some irrigated acres."

Without going into much detail, Simpson mentioned some recent "small wins" but recognizes it is going to take a collaborative, concerted effort to make the gains that, he feels, may hold promise.

"Interest is growing," he said. "And the timing couldn't be much better. The state wants to be carbon free. Xcel wants to be carbon free. Tri-state wants to be carbon free. It feels like there's momentum and the San Luis Valley would be the premier place for more solar. It's just a matter of getting the right people in the right place at the right time. There are a handful of us who are working toward that."

Simpson said another economic piece relates to changing crops that are grown. Personally, he is contracted with a local processor to raise 50 acres of industrial hemp, largely driven by the water scarcity that makes farming "harder and harder."

Historically, the valley raises about 150,000 acres of alfalfa and other hay. If Simpson can raise hemp with the same success he has raising alfalfa, he estimates it would cut his water consumption by half.

But the potential reward hemp can bring goes hand in hand with challenges with processing and marketing, a situation where Simpson reports being "really excited about hemp at times and really frustrated at other times."

Everything must be considered, he says, including co-ops, value added crops, diversification, resiliency. There is also potential in conservation easements on aquifers, as Colorado Open Lands is currently discussing with farmers.

"It's not a disaster yet," he said and then stopped, trying to remember a quotation to address how he sees things. He settled for paraphrasing. "Things happen as a result of catastrophe or thoughtful leadership."

Original Article: Alamosa News by Priscilla Waggoner

Az tribes get $105M for water sanitation projects; Tohono O'odham expecting payout for water settlement

Arizona tribes will get $105 million for “shovel-ready” sanitation projects, after water and wastewater improvements under the Indian Health Service were funded under the Bipartisan Infrastructure Law.

Major federal funding for tribal sanitation projects will continue for next few years because of the law, also called the Infrastructure Investment and Jobs Act. At least 83 such projects in Arizona will be funded through similar investments laid out in the infrastructure law, U.S. Sens. Sinema and Kelly said in a press release.

The $1.2 trillion funding package, passed in early November, sets aside $3.5 billion to build and improve sanitation infrastructure in tribal lands over the next five years. That includes $2.5 billion to complete water rights settlements with the Tohono O'odham Nation, the Gila River Indian Community and the White Mountain Apache Tribe.

Part of the $2.5 billion is for building infrastructure required by water rights settlements with the three tribes, including the Southern Arizona Indian Water Rights Settlement, which resolves claims in the San Xavier and Shuk Toak Districts of the Tohono O’odham Nation.

The settlement guarantees that the two districts will begin receiving water from the Central Arizona Project, which delivers water from the Colorado River to the Phoenix and Tucson areas, according to the U.S. Department of Interior.

“Under the agreement, the two districts would receive 37,000 acre-feet annually of water” from the CAP, according to Interior Department officials. “The U.S. government also would provide the districts an additional 28,200 acre feet annually from any source. All the water will be provided without cost to the Tohono O'odham Nation, which additionally has received a $15 million trust fund to develop its water resources.”

The five-year $3.5 billion spending package will be administered through the Indian Health Service, a Department of Health and Human Services agency tasked with providing federal services to tribes.

The federal Infrastructure law also sets aside $2 billion to expand high-speed broadband in tribal communities.

The $105 million for sanitation on Arizona’s reservations will be a boost to tribal water and wastewater systems, Sinema and Kelly said.

“We consistently hear from tribes across our state about the need to implement, modernize, and strengthen sanitation facilities on tribal lands,” Sinema said.

“I’ve seen firsthand the incredible impact of improved water and wastewater systems on tribal communities,” Kelly said. “Thanks to our bipartisan infrastructure law, even more families and businesses can benefit from investments in these shovel-ready projects.”

Original Article: Tucson Sentinel by Bennito L. Kelly

Texas receives federal funds to help with water preservation

Amid a drought and a rapidly growing population, water in Texas is in demand more than ever. U.S. Rep. Lloyd Doggett announced today two million dollars in federal funds that will hopefully address some of these issues and the impact of climate change locally.

The fund will help provide a new project at The Meadows Center. The project has three goals:

- Study the impact climate change is having on Texas water resources.
- Find solutions for these issues.
- To educate the public and state leaders about the issues facing our water supply.

"This is really transformative funding for us," said Robert Mace, executive director and chief water policy officer at The Meadows Center for Water and the Environment at Texas State University. The nonprofit is based out of Texas State University. The center serves as a hub for research into water preservation.

As climate change worsens, these hotter temperatures are going to have a direct impact on our water, Mace said. "Hotter temperatures mean higher evaporation rates, and greater use of water by plants. And this results in drier soils."

Water preservation is a growing concern in Texas as the population grows and climate change becomes more of an issue. A recent study by Rice University found demand for water in Texas is expected to grow by 9% over the next 50 years, while supplies are expected to decrease by 18%.

At the same time, droughts, brought about by climate change, are expected to become more frequent and more severe. The number of 100-degree days each year has more than doubled since the 1970s.

"Water is such a precious resource in our state, it always has been. But with a climate crisis, it becomes more precious," Rep. Doggett said. He hopes that the funding that The Meadow Center receives will lead to actionable research.

"I think if we're not doing more planning, we can't meet future development needs. And we can't meet the needs of people that are right here now, on a thirsty hot day."

Educating a state in denial

Climate change is a topic of debate in Texas. A recent study found that while 70% of Americans believe in climate change, people are less worried about it. While three in ten Texans do not believe in climate change at all.

Only about two in three baby boomers believe in Climate Change, according to that report. Congressman Doggett said combatting these beliefs are a major issue as the water crisis continues.

"When Odessa goes without water on the edge of the Permian Basin, when people are talking about water rationing already, when we see the effect of heat already this year on our water supply. There are practical people out there at the city and county level who wants to do something about it."

One of this things Doggett hopes the money will do is help develop a curriculum to educate K-12th graders about climate change.

Moving forward, he hopes that more funding can be appropriated for further research at The Meadow Center.

Original Article: KXAN by Eric Henrikson

Nearly 80% of Texas experiencing drought conditions

About 80% of Texas is currently experiencing some level of drought conditions, ranging from "moderate" to "exceptional."

The drought, which caused wildfires across the state earlier this year and prompted burn bans, is now negatively affecting farmers and ranchers.

A lack of rain during the spring resulted in lower crop production and decreased soil moisture levels, with no relief in sight.

"This is a tough situation," Tracy Tomascik from Texas Farm Bureau told Houston Matters on Monday, comparing this year to Texas' historic drought in 2011. "It's something that we hoped we'd all put in the back of our minds, but this year it has a little added sting to it."

Hay supply is down, and 78% of the wheat supply in Texas is in “poor” or “very poor” condition.

"It's as bad as it's been since 2011, if not worse," Texas State Climatologist John Nielsen-Gammon said about the state's wheat supply. "2011 was a wake-up call... I think that experience will be of considerable help this time around."

Tomascik said that farmers are monitoring their crops, focusing on drought-tolerant corn and grain crop varieties.

"To be in agriculture, you've got to constantly be flexible," Tomascik said.

Because of the shortage of hay, many ranchers and farmers are starting to sell their herds.

"In order to maintain good conservation practices on that land, livestock have to be reduced," Tomascik said, adding that the agricultural supply chain has faced disruptions as ingredients have been removed, straining the system.

"It's not just a Covid issue, it's a drought issue as well," Tomascik said of the supply chain troubles.

May and June are typically the wettest months of the year in Texas and are the prime months for plant growth. Hungry plants and no rain can quickly lead to a bad situation.

"It’s a flash drought," Nielsen-Gammon said about the combination of factors working together to cause Texas' current weather conditions and agricultural obstacles.

The drought is also causing water supply issues statewide as officials ask residents to conserve water.

"The way the weather pattern looks, it's going to be like that for a while," Nielsen-Gammon said.

While Houston has not been severely affected by drought conditions, Nielsen-Gammon said that could change.

"Coastal areas have been fairly dry, and with the high temperatures, the dryness is spreading over the whole area now."

Currently, more than 140 counties across Texas have implemented burn bans, including in neighboring Liberty, San Jacinto, Walker, Grimes, Waller and Galveston County.

Original Article: Houston Public Media by Duaa Faquih

Surviving The Megadrought In Southwestern US

For two decades, the southwestern region of the United States has been in the grips of one of the most severe droughts of the last 1,200 years.

It is a grave challenge to the most basic of rights: access to water, basic food production, and the habitability of cities. Policymakers across the country have needed to be bold and varied in their quest to secure water and draw upon the lessons of the past.

The causes of the multidecadal drought, often referred to as a 'megadrought', can be largely attributed to lower rainfall. The deficit is driven by natural variability in rainfall patterns, ocean dynamics in the tropical Pacific, and exceptionally warm temperatures. Collectively, these phenomena have dried out soil, reduced stream flow, and created snow droughts. It has prompted a major decline in surface and groundwater resources, economic losses, ecosystem disruptions, and an increased risk of wildfires.

From January 2020 to August 2021, six southwestern states (Arizona, California, Colorado, Nevada, New Mexico, and Utah) experienced the lowest total precipitation and the third-highest daily average temperatures recorded since 1895.

The weather pattern continued into 2022 and prompted governors in each of the six states to issue drought emergency declarations. The federal government issued an unprecedented water shortage declaration, ordering water restrictions along the Colorado River, a major source of water for agriculture and cities in the region.

The frequency and intensity of such droughts, and their cross-cutting and compound effects, are projected to increase as a result of climate change. In response, policymakers and water agencies across the southwest have developed new water management strategies to enhance local drought resilience.

At the local level, such efforts are frequently nested within a complex inter- and intrastate institutional framework in which surface water supplies (as opposed to groundwater) are governed using an 'appropriative' system of water rights.

Administered by state-level agencies, the allocation of finite surface water flows is complicated by the diversity of competing stakeholders – social, economic, and

environmental – intensifying discussions in dry times. Water management decisions at the local level may be hindered by state-level water restrictions enacted ad hoc, intergovernmental treaties concerning transboundary water resources, and environmental regulations.

Despite the challenges imposed by drought and the region's Byzantine water policy structure, many of the southwest's largest and fastest growing cities have been able to adapt and increase their drought resilience.

Water has been conserved through both regulation and incentive-based programmes that focus on increasing the installation of water-saving technologies and transformation of urban landscapes from water-dependent turf lawns to drought-tolerant vegetation.

Residents and businesses located in San Diego, California, for example, have access to a variety of programmes and services facilitated by the San Diego County Water Authority (SDCWA).

A wholesale water supplier, the SDCWA serves the city along with 23 other municipalities and water agencies located within San Diego County. The SDCWA's WaterSmart initiative includes various rebates and educational resources to subsidise a portion of the costs to residents and businesses that invest in more water-efficient technology and landscapes.

In other regions, policymakers have taken a more heavy-handed approach to reduce the use of water-intensive turf lawns. In 2021, amidst the region's most recent drought emergency, Nevada lawmakers passed an unprecedented law that banned "non-functional turf" in the Las Vegas area.

Efforts to reduce urban water use have been coupled with initiatives to enhance water supply diversification. The city of Phoenix, the fifth largest city in the US, largely relies upon water pumped across state lines from the Colorado River.

However, the city also receives water in-state from the Salt and Verde rivers via the Salt River Project, which are generally less constrained than the Colorado River, as well as a small portion of water drawn from local groundwater reserves.

In 2003, the SDCWA took an innovative approach to diversify its water supply through a water transfer agreement with the Imperial Irrigation District, which provides water for irrigation to farmland located in southern California's Imperial Valley.

The SDCWA agreed to fund irrigation improvements for the District and lease the resulting water savings. With funding assistance from the state government, the SDWCA also lined two transfer channels to reduce water loss caused by seepage.

More recently, the city of San Diego and the SDCWA have also invested in water pipe monitoring technology to detect and repair leaks in the municipality's water distribution system.

Lastly, in 2015, San Diego County opened the nation's largest desalination plant. The SDCWA entered a public-private agreement that will meet approximately 10 per cent of San Diego's water needs.

Original Article: Code Blue by Duran Fiack

Nevada Supreme Court: Senior water rights holders must join in drought pain

In a majority opinion, the Nevada Supreme Court this week approved a groundwater management plan for Diamond Valley that reduces not only the water junior water rights holders can pump but what senior water rights owners can pump.

The plan developed by the state engineer is designed to reduce the water use over the next 35 years to the level Diamond Valley can actually support.

But opponents, including three members of the high court, say the ruling effectively punches a hole in 155 years of Nevada water law that has always allowed senior water rights owners to keep pumping their full allotment of water even if that means other users go dry during times of drought.

The state engineer argued and a majority of the court agreed that state law "unambiguously" gives the state engineer authority to approve a management plan that departs from that doctrine.

That doctrine says simply that the water rights are vested based on when they were appropriated. Senior water rights in Diamond Valley are those the owner has had since before May 1960. Junior water rights are those issued after that date.

Still exempt are those vested water rights holders whose appropriated rights date to before 1913 when Nevada's original water laws were passed.

The issue went to court because Diamond Valley, in Eureka County, is dramatically over-appropriated and has been pumped at a rate exceeding its annual recharge for more than four decades. The opinion authored by Justice Jim Hardesty says 76,000 acre feet of water is pumped from the valley every year but the aquifer can only support 30,000 acre feet of annual pumping. As a result, Diamond Valley has been designated a critical management area, which gives the state engineer the power to impose a management plan on users.

That plan requires senior water rights holders to reduce their pumping along with junior water rights holders. Its goal is to get the valley into balance with the total available water over the next 35 years.

Senior water rights holders sued and a district court agreed with them. The Supreme Court this week reversed that ruling.

Even though the plan would curtail water pumping by senior rights holders, the opinion points out that they would still be able to pump more than junior water rights holders if pumping is curtailed by drought.

They ruled the state engineer's plan was neither arbitrary nor capricious and took into account substantial factual findings to support the decision. Hardesty was joined in the opinion by Justices Lidia Stiglich, Elissa Cadish and Doug Herndon.

In separate dissents, Chief Justice Ron Parraguirre and Justice Kris Pickering argued the law doesn't plainly and unambiguously give the state engineer the power to depart from long standing rules basing priority on when the water rights were appropriated to the holder.

"Moreover, the majority's interpretation of these statutes could raise constitutional doubts," he wrote.

Parraguirre argued that doctrine is more than a guiding principle, that it's the basis of all Nevada water law.

Parraguirre and Pickering also argued the plan allows an unconstitutional "taking" of private property without just compensation.

But the majority opinion said there is no taking at this point, that if senior holders lose water in the future, that could be the subject of litigation to compensate them for the loss.

"The GMP does not compensate or provide a mechanism for compensating the senior water right holders," Pickering wrote.

She argued that puts the plan, "in direct conflict with the two fundamental principles underlying Nevada's water law statutes:" the priority of the date of appropriation and the requirement that the water be put to beneficial use.

"Nothing in this statute expressly allows the state engineer to approve a GMP that restores hydrological balance by usurping senior rights," she concluded.

Original Article: Nevada Appeal by Geoff Dornan

GLOBAL WATER NEWS

Dead rivers: The cost of Bangladesh's garment-driven economic boom

Bangladeshi ferryman Kalu Molla began working on the Buriganga river before the patchwork of slums on its banks gave way to garment factories—and before its waters turned pitch black.

The 52-year-old has a constant cough, allergies and skin rashes, and doctors have told him the vile-smelling sludge that has also wiped out marine life in one of Dhaka's main waterways is to blame.

"Doctors told me to leave this job and leave the river. But how is that possible?" Molla told AFP near his home on the industrial outskirts of the capital Dhaka. "Ferrying people is my bread and butter."

In the half-century since a devastating independence war left its people facing starvation, Bangladesh has emerged as an often unheralded economic success story.

The South Asian country of 169 million has overtaken its neighbour India in per capita income and will soon graduate from the United Nations' list of the world's least developed countries.

Underpinning years of runaway growth is the booming garment trade, servicing global fast-fashion powerhouses, employing millions of women and accounting for around 80 percent of the country's $50 billion annual exports.

But environmentalists say the growth has come at an incalculable cost, with a toxic melange of dyes, tanning acids and other dangerous chemicals making their way into the water.

Bangladesh will soon graduate from the UN's list of the world's least developed countries, but environmentalists say the growth has come at an incalculable cost.

Bangladesh's capital Dhaka was founded on the banks of the Buriganga more than 400 years ago by the Mughal empire.

"It is now the largest sewer of the country," said Sheikh Rokon, the head of the Riverine People environmental rights group.

"For centuries people built their homes on its banks to bask in the river breeze," he added. "Now the smell of toxic sludge during winter is so horrible that people have to hold their noses as they come near it."

Water samples from the river found chromium and cadmium levels over six times the World Health Organization's recommended maximums, according to a 2020 paper by the Bangladeshi government's River Research Institute.

Both elements are used in leather tanning and excessive exposure to either is extremely hazardous to human health: chromium is carcinogenic, and chronic cadmium exposure causes lung damage, kidney disease and premature births.

Ammonia, phenol and other byproducts of fabric dyeing have also helped to starve the river of the oxygen needed to sustain marine life.

Water samples from the Buriganga river found chromium and cadmium levels over six times the World Health Organization's recommended maximums.

'They are powerful people'

In Shyampur, one of several sprawling industrial districts around Dhaka, locals told AFP that at least 300 local factories were discharging untreated wastewater into the Buriganga river.

Residents say they have given up complaining about the putrid smell of the water, knowing that offending businesses are easily able to shirk responsibility.

"The factories bribe (authorities) to buy the silence of the regulators," said Chan Mia, who lives in the area.

"If someone wants (to) raise the issue to the factories, they'd beat them up. They are powerful people with connections."

The crucial position of the textile trade in the economy has created a nexus between business owners and the country's political establishment. In some cases, politicians themselves have become powerful industry players.

The Buriganga river is “now the largest sewer of the country," says Sheikh Rokon, the head of the Riverine People environmental rights group.

Further south, in Narayanganj district, residents showed AFP a stream of crimson-coloured water draining into stagnant canals from a nearby factory.

"But you cannot say a word about it loudly," an area resident told AFP, speaking on condition of anonymity. "We only suffer in silence."

The Bangladesh Garment Manufacturers and Exporters Association (BGMEA), which represents the interests of around 3,500 top factories, defends its record by pointing out the environmental certifications given out to its members.

"We are going green—that's why we are witnessing big jumps in export orders," BGMEA president Faruque Hassan told a recent press conference.

But smaller factories and sub-contractors operating on the industry's razor thin margins say they are unable to afford the cost of wastewater treatment.

A top garment official in the Savar industrial district, speaking to AFP on condition of anonymity, said even most high-end factories serving major US and European brands often do not turn on their treatment machinery.

"Not everyone regularly uses it. They want to save costs," he said.

Bangladesh's booming garment trade accounts for around 80% of the country's exports, but many factories are close to rivers with a toxic melange of dyes, tanning acids and other dangerous chemicals making their way into the water.

'Facing the same fate'

Bangladesh is a delta country criss-crossed by more than 200 waterways, each of them connected to the mighty Ganges and Brahmatura rivers that course from the Himalayas and through the South Asian subcontinent.

More than a quarter of them are now heavily contaminated with industrial pollutants and need to be "urgently" saved, said an April legal notice sent to the government by the Bangladesh Environmental Lawyers Association (BELA).

Authorities have established a commission tasked with saving key water bodies, upon which close to half the country's population depend for farming, according to the UN Food and Agriculture Organization.

The National River Commission has launched several high profile drives to fine factories found to have polluted rivers.

Its newly appointed chief, Manjur Chowdhury, said "greedy" industrialists were to blame for the state of the country's waterways.

Any action will be too late for the five rivers that circle Dhaka and its industrial outskirts - all are already technically dead, meaning they are completely devoid of marine life, said prominent environmental activist Sharif Jamil.

But he also admitted that the enforcement of existing penalties was inadequate to address the scale of the problem.

"We have to frame new laws to face this emergency situation. But it will take time," he told AFP.

Any action will be too late for the five rivers that circle Dhaka and its industrial outskirts. All are already technically dead, meaning they are completely devoid of marine life, said prominent environmental activist Sharif Jamil.

"With factories now moving deep into the rural heartland, rivers across the country are facing the same fate," he told AFP.

Original Article: Phys.org by Sam Jahan

Saudi desalination plant to use RO tech to provide water to Makkah, Jeddah

Saudi-based ACWA Power and the Saudi Water Partnership Company (SWPC) have signed an agreement to reconfigure the Shuaibah 3 to a greenfield reverse osmosis (RO) plant from an energy-intensive water and power facility.

Deemed as one of the largest desalination projects in the Kingdom, Shuaibah 3 independent water project (IWP) will utilise state-of-the-art RO technologies to ensure the highest level of production efficiency and reliability that can be benchmarked globally.

Shuaibah 3 is expected to be commercially operational by Q2 2025. Upon completion of the project, Shuaibah 3 will produce 600,000 cubic metres of water a day, catering to the water demand of Jeddah and Makkah al-Mukarramah, especially during peak demand periods such as the Holy Month of Ramadan and the Hajj seasons.

"The energy sector is witnessing strategic shifts towards reducing the dependence on liquid fuels as a vital energy source for water desalination and power production," Mohammad Abunayyan, chairman of ACWA Power, said.

"Shuaibah 3 will be the first project in which a thermal water desalination plant is converted into a greenfield reverse osmosis facility that utilises renewable energy to save up to 70 percent of energy consumption," Abunayyan added.

Abdulrahman bin Abdulmohsen Al-Fadli, Minister of Environment, Water and Agriculture in Saudi Arabia, and Chairman of the Board of Directors of SWPC, signed a 25-year water purchase agreement for the new Shuaibah 3 IWP with a consortium led by ACWA Power and Public Investment Fund (PIF)-owned Badeel.

The agreement is valued at approximately SAR 3 billion.

The ACWA Power-Badel consortium will lead the implementation of the project, while SWPC will serve as the off taker.

The project will produce potable water at record-low power consumption and be partially energized by photovoltaic solar energy, which will reduce power consumption by 45 percent and minimise the carbon footprint, the company said.

The switch from thermal to RO will reduce the power needed to desalinate seawater by 70 percent.

Local content of the project will amount to 40 percent in the construction phase and 50 percent in the operation and maintenance phase for the first five years.

This is slated to eventually increase to 70 percent.

ACWA Power, a leading private operator of water desalination plants globally, has a production capacity of 6.4 million cubic meters of desalinated water a day.

The company has a portfolio of 10 SWRO projects in the Kingdom and GCC, in which some projects are partially powered by renewable energy.

Original Article: Arabian Business

Major water transfer project to start construction in China

The construction of a project to channel water from China's Yangtze River to the Hanjiang River will start by the end of this month, the Ministry of Water Resources said. This was reported by The Xinhua News Agency.

With a total investment of ¥59.8 bln (about $8.93 bln), the project is a supplement to the middle route of the country's South-to-North Water Diversion Project.

The new project is expected to enhance the water allocation capacity of the Hanjiang River Basin to further ensure water supply to the dry north, the ministry said.

The South-to-North Water Diversion Project transfers water from China's water-rich south to the arid north through the middle, eastern and western routes. The middle route, the most prominent one due to its role in feeding water to the nation's capital, begins at the Danjiangkou Reservoir in the Hanjiang River in central province of Hubei and runs northeastward to Beijing and Tianjin. It began supplying water in December 2014.

Original Article: Ukranews

Odisha's hydropower generation hit due to delayed monsoon, low reservoir level

With the delay in monsoon arrival and water level in all reservoirs low, regulated release by the Water Resources department has hit the hydropower generation in the State. The average generation of power from the six hydro generating stations of the State has come down to 182 MW against an installed capacity of 2,099.5 MW.

The five units of the Rengali hydropower station with a generating capacity of 250 MW (5 x 50MW) were kept idle on Friday in view of the dipping water level in the dam. The live storage capacity of the Rengali dam is 109.93 meters against the full reservoir level (FRL) of 123.5 meters. The water level in the Rengali dam on this day last year was 112.83 mt. The minimum draw-down level (MDDL), the level below which the water will not be drawn so as to maintain a minimum head required in power projects, is 109.72 meters. The live storage of the dam is only one per cent of the FRL.

Sources in Odisha Hydro Power Corporation (OHPC) said the water level in the Rengali dam is at a critical stage and water from the reservoir is released only for irrigation and drinking water purpose. The live storage level in Hirakud dam (FRL 630 ft) on Sunday was only 13 per cent of the FRL. The current water level is 599.93 ft which is 9.93 ft above the MDDL of 590 ft. The water level on this day last year was 601.25 ft.

The average generation from Hirakud hydropower station on Saturday was 4.37 MW against its generating capacity of 287.5 MW. Similarly, the hydel power generation from Upper Indravati with an installed capacity of 600 MW was only 17.39 MW because of the low water level in the reservoir. The Indravati dam has an FRL of 642 meters but the live storage is at 629.3 meters.

The Upper Kolab hydropower station with a generating capacity of 320 MW generated only 5.9 MW on Friday. The State is getting its peaking power from the Balimela hydropower station with an installed capacity of 510 MW. The instantaneous peak demand of the State crossed the 6,000 MW mark at noon on Friday with an actual power demand of 6,106 MW.

With an average daily demand of 5,250 MW, the State is comfortable with thermal power from its own sources, IPPs, CGPs and Central share, sources in Gridco said.

Original Article: The New Indian Express

VELES WATER WEEKLY REPORT

Snowy Hydro's water problem shows how weather is a driver of the energy crisis

As Australia's power crisis began to ramp up early this month, Snowy Hydro was called on to increase production.

But the hydro-electric generator remains significantly constrained by a surprising problem — too much water.

It's only one example of how weather extremes have deepened the nation's man-made power crisis.

Snowy Hydro's biggest power station is Tumut 3. At maximum output, it can generate 1,800 megawatts of electricity.

That's as much as a large coal-fired power station, but with zero emissions.

The huge volumes of water used by Tumut 3 are either pumped back up the hill to an upper reservoir or emptied into Blowering Dam.

The problem according to Snowy Hydro is that Blowering Dam is full, following back-to-back years of La Niña rain, and increased hydro-electric generation risks flooding, according to an alert released by Snowy Hydro on June 3.

"There is an energy crisis in the National Electricity Market (NEM) unfolding and Snowy Hydro is being called on more than ever to keep the lights on," the post on Snowy Hydro's website read.

"Generation from Tumut 3 Power Station is significantly constrained by the current storage levels in Blowering Reservoir and the release capacity of the Tumut River.

"In order to meet the predicted energy demands in the coming days, it is possible Blowering Reservoir will fill and spill, potentially exceeding the Tumut River channel capacity.

"In this scenario, there is potential for the inundation of low-level causeways and water breaking out of the river channel onto agricultural land adjacent to the river."

Snowy Hydro doesn't own or operate Blowering Dam. It's managed by WaterNSW, which has been releasing water to lower dam levels there for months, while trying to avoid flooding people downstream.

Original Article: ABC News by Ben Deacon

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