

Veles Water Weekly Report

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December 1st 2022

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VelesWater



WATER FUTURES MARKET ANALYSIS

Welcome to ***WATERTALK***

by Joshua Bell

CLICK THE LINK BELOW

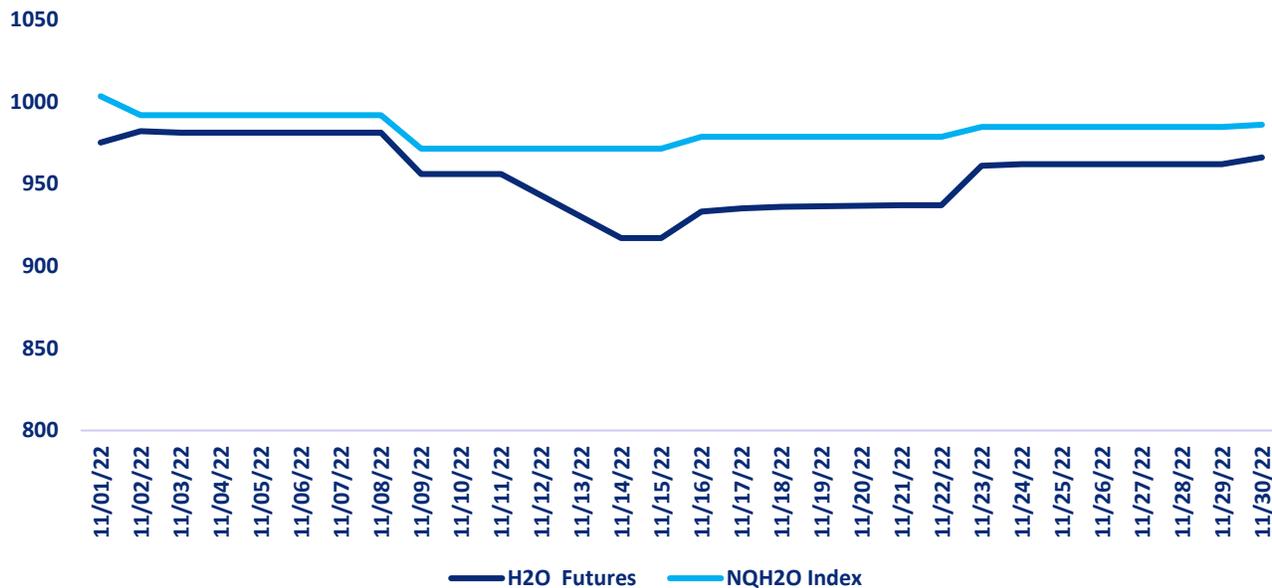
"A 2 minute technical analysis video of H2O futures"

<https://vimeo.com/776907309>



NQH2O INDEX PRICE vs H2O FUTURES PRICE

1 Month Price Performance NQH2O Index vs H2O Futures



Price Chart Based upon Daily Close

The new NQH2O index level of \$985.96 was published on the 30th November, up \$1.42 or 0.14%. The December contract is considered the front month contract. The futures have been closing at a discount of \$19.96 to \$23.96 to the index.

NQH2O is up 34.35% Year to Date.

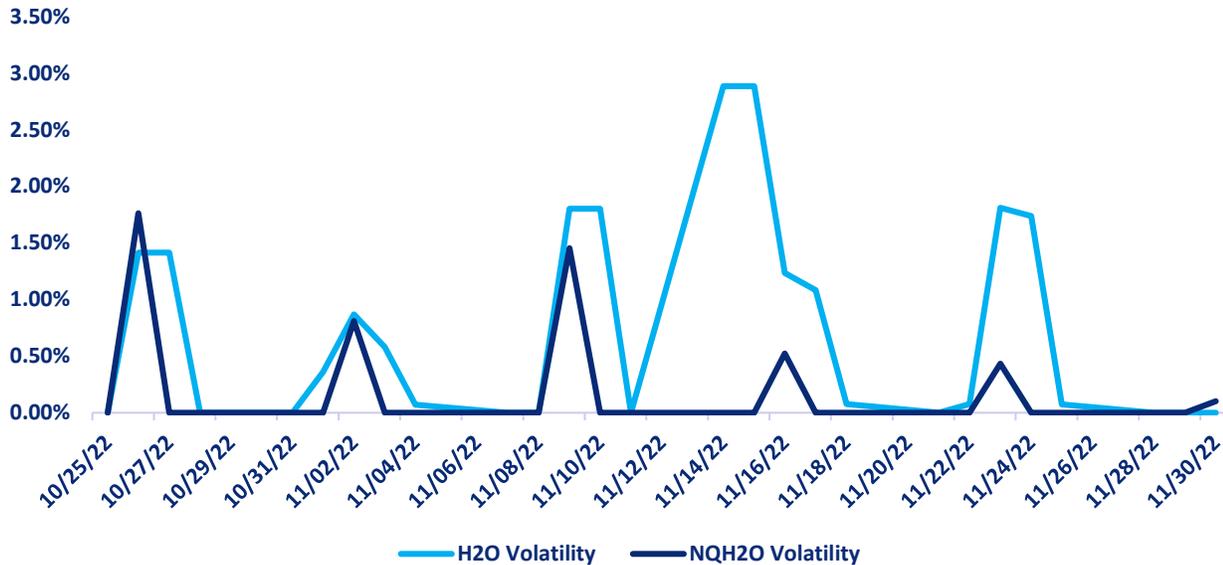
Below are the bid offer prices on different expiries being quoted in the market.

Dec 22	966@974
Jan 23	933@946
Mar 23	986@1024
Jun 23	1252@1260
Jun 24	1302@1480



H2O FUTURES AND NQH2O INDEX VOLATILITY ANALYSIS

Daily H2O Futures Volatility vs Daily NQH2O Index Volatility



DAILY VOLATILITY

Over the last week the December contract daily future volatility high was on the November 17th 1.08% and a low of 0% on the 21st.

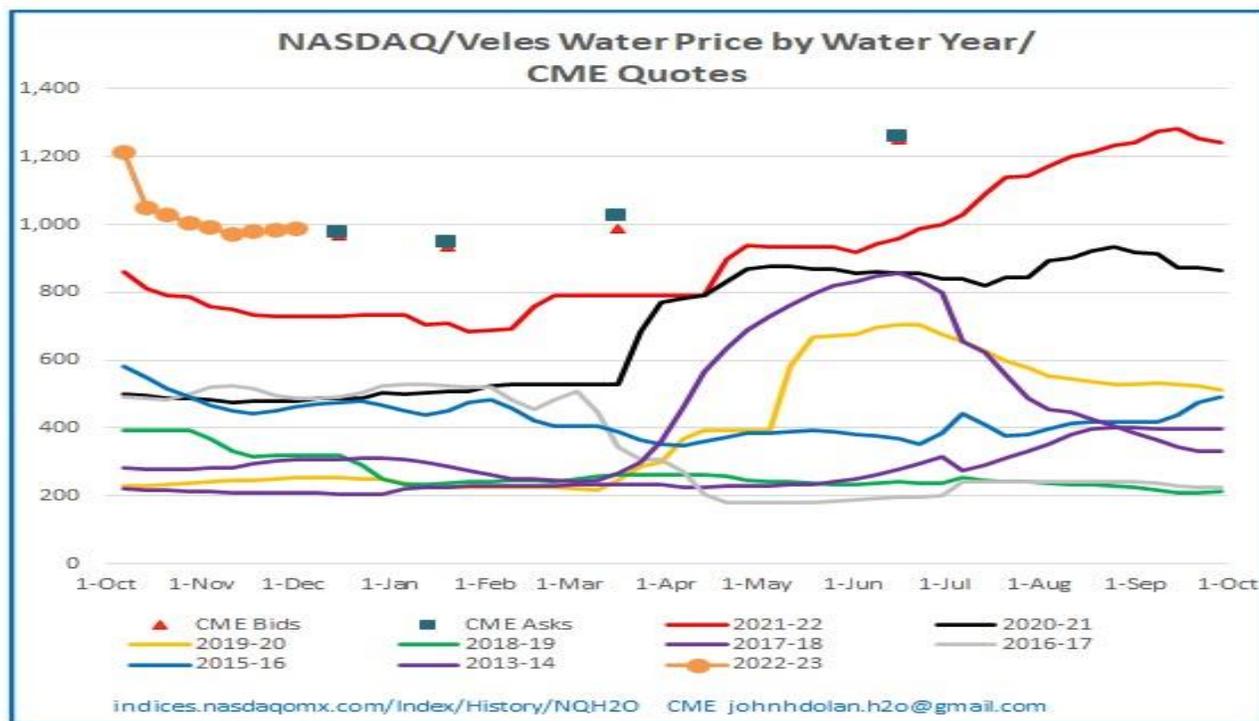
ASSET	1 YEAR (%)	2 MONTH (%)	1 MONTH (%)	1 WEEK (%)
NQH2O INDEX	25.18%	11.72%	0.63%	0.47%
H2O FUTURES	N/A	14.26%	5.86%	0.10%

For the week ending on November 30th, the two-month futures volatility is at a premium of 2.55% to the index, up 0.08% from the previous week. The one-month futures volatility is at a premium of 5.24% to the index, up 3.19% from last week. The one-week futures volatility is at a discount of 0.07% to the index, a reversal of 0.44% from the previous week.

*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.*



NQH20 INDEX HISTORY



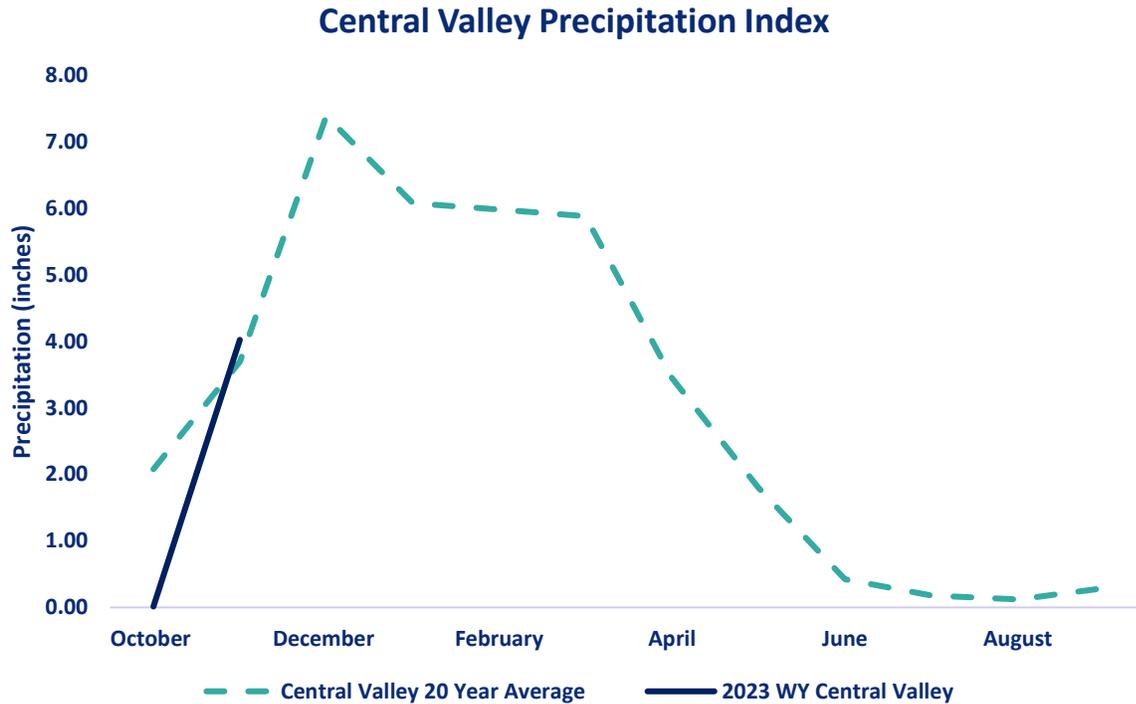
The graph above lays out the Nasdaq Veles water index by year, showing 2013- 2022. In very dry years, prices clearly rise through the spring, peaking in May to July (with the exception of 2015) as demand for water from farmers peaks. Prices then taper off heading into the winter on reduced demand, and 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 2021-2022 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)



CENTRAL VALLEY PRECIPITATION REPORT



Central Valley average is calculated using data from 19 weather stations in the Central Valley, California.
Data as of 30/11/2022

STATION	MTD (INCHES)	WEEK ON WEEK CHANGE (INCHES)	% OF 20 YEAR AVERAGE MTD	2023 WYTD VS 2022 WYTD %	2023 WY VS 20 YEAR AVERAGE TO DATE %
SAN JOAQUIN 5 STATION (5SI)	4.35	0.00	126.24	199	107
TULARE 6 STATION (6SI)	3.46	0.00	140.24	177	144
NORTHERN SIERRA 8 STATION (8SI)	4.26	0.00	82.40	294	80
CENTRAL VALLEY AVERAGE	4.02	0.00	108.91	223	110

RESERVOIR STORAGE

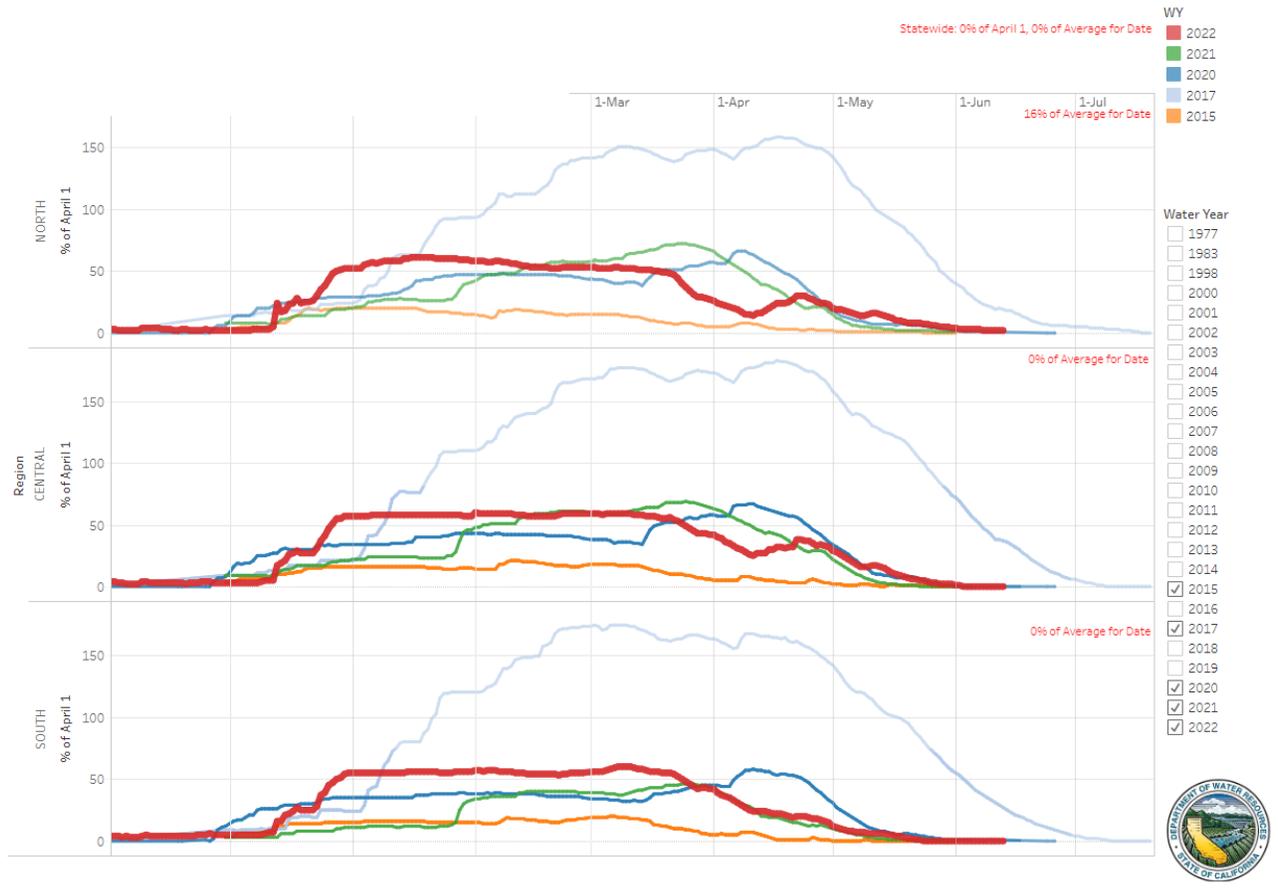
RESERVOIR	STORAGE (AF)	% CAPACITY	LAST YEAR % CAPACITY	HISTORIC ANNUAL AVERAGE CAPACITY %
TRINITY LAKE	528,090	22	29	38
SHASTA LAKE	1,405,220	31	25	58
LAKE OROVILLE	971,620	27	30	55
SAN LUIS RES	515,609	25	24	49

Reference: [California Water Data Exchange](https://www.waterdataexchange.com/)



SNOWPACK WATER CONTENT

Snow Water Equivalent Dashboard



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 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.

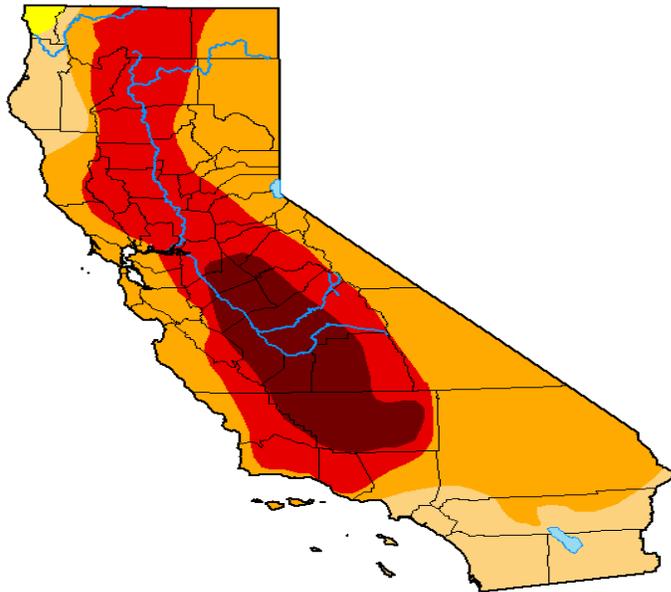
** April 1st is used as the benchmark as it when the snowpack in California is generally deepest. It has been used the benchmark date since 1941 by DWR and can be used to predict spring river flow.



DROUGHT MONITOR

U.S. Drought Monitor
California

November 22, 2022
(Released Wednesday, Nov. 23, 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	99.48	84.97	40.92	12.73
Last Week 11-15-2022	0.00	100.00	99.48	84.97	40.92	12.73
3 Months Ago 08-23-2022	0.00	100.00	99.76	97.53	43.16	16.57
Start of Calendar Year 01-04-2022	0.00	100.00	99.30	67.62	16.60	0.84
Start of Water Year 09-27-2022	0.00	100.00	99.76	94.01	40.91	16.57
One Year Ago 11-23-2021	0.00	100.00	100.00	92.43	80.28	28.27

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>

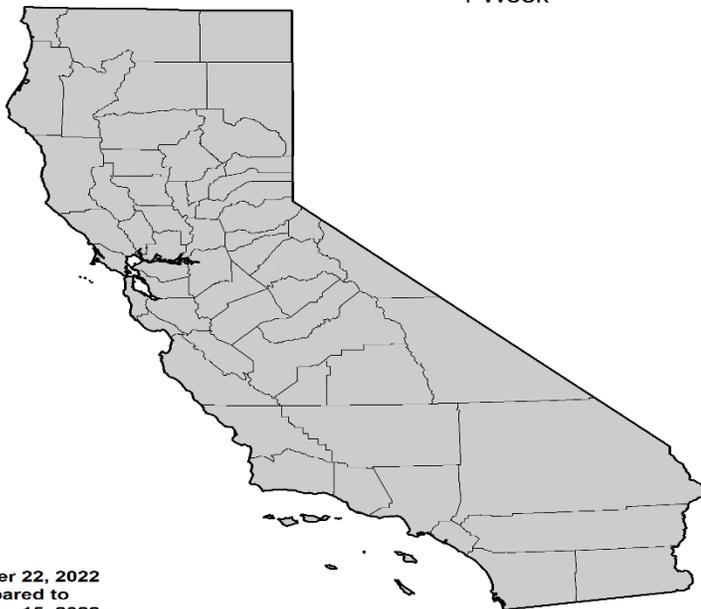
Author:

Brad Rippey
U.S. Department of Agriculture



droughtmonitor.unl.edu

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



November 22, 2022
compared to
November 15, 2022



- 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

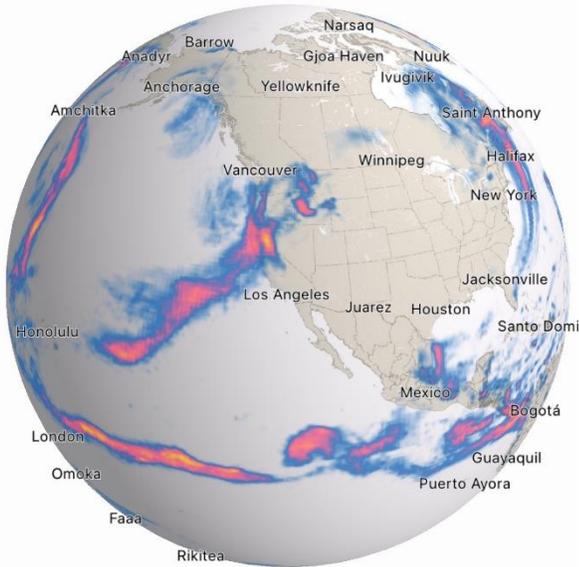
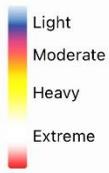
droughtmonitor.unl.edu

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



The current satellite picture shows a combination of frontal activity from the Northwest Pacific that is moving down the West Coast of the US.

This frontal system will bring precipitation to Southern California over the next 2 days.

As expected it will move in an easterly direction thereafter bringing snow and other precipitation to the Rockies and Sierra mountain ranges.

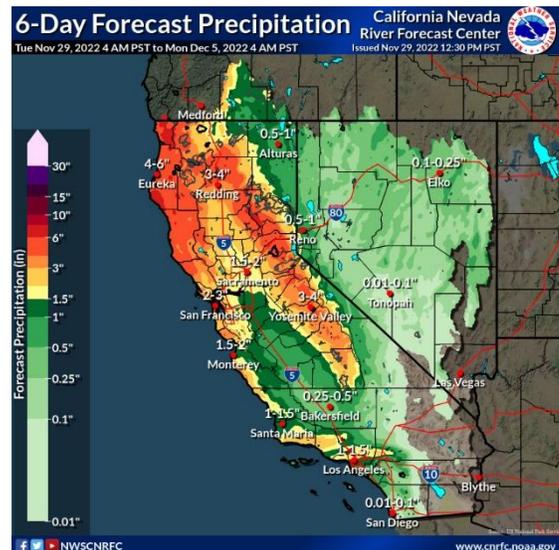
The hurricane season appears to have abated as there are no current threatening systems.

There are no Monsoonal effects at present and these may only appear again at beginning of

summer next year.

10 Day Outlook

An exiting system will keep lingering showers over soCal and NV Friday morning as the next one approaches from the northwest as a surface/upper low and cold front. The models generally remain in good agreement on the timing and movement of the low, though differences persist regarding precipitation amounts. Light showers may arrive along the north coast as early as Friday morning with little system movement throughout the day. Precipitation will begin to spread further across norCal Saturday morning. This is the main time frame of model disagreement (12z Sat-00z Sun) with QPF. The GFS shows higher precipitation amounts than the ECMWF along the north coast. For example, from 12-18z Saturday the GFS has 1-1.50" while the ECMWF has 0.50-1.00". Stuck closely to WPC guidance that seems a reasonable compromise between the two. It is worth mentioning that the ECMWF ensembles do show potential





VELES WATER WEEKLY REPORT

for higher QPF than officially forecast for that time period. The surface and upper low will begin to move inland Saturday night further spreading precipitation across CA. Amounts will begin to diminish Sunday morning, though with showers continuing throughout the rest of the period as the upper low moves inland. The system will then finally exit later Monday. PW values remain unimpressive at about 0.50-0.80", at least in comparison to Thursday's storm.

Day 3-6 QPF including lingering precip from Thursday's system and the low on Saturday/Sunday have not changed much since this morning for most locations. As expected, QPF over the soCal mountains has gone down for Friday morning since conditions look to dry out fairly quickly. Highest amounts are forecast along the north coast, across the Sierra (1.50-2.50+" for both), and near Shasta (1-2.25"). QPF for the rest of the region is as follows: 0.50-1.50" across the Central Coast and Bay Area, 0.25-1.25" coastal soCal/Transverse Range, and 0.25-1.00" down the Valley. Precip amounts taper off to the southeast.

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

WESTERN WEATHER DISCUSSION

Like much of the rest of the country, the West experienced a full week of cold, dry weather, leading to minimal changes in the drought depiction. Fog, air stagnation, and low temperatures plagued the Northwest. Daily-record lows for November 17 included -16°F in Butte, Montana, and -3°F in Burns, Oregon. On November 18-19, Big Piney, Wyoming, collected consecutive daily-record lows of -15°F. Other Northwestern locations reporting a pair of daily-record lows on November 18-19 were Eugene, Oregon (21 and 18°F); Olympia, Washington (17 and 18°F); and Montana's Bozeman Airport (-14 and -16°F). On the 18th, lows plunged to -22°F in Butte, Montana, and -21°F at Lake Yellowstone, Wyoming. Early-season snowpack remained mostly favorable west of the Continental Divide, but a return to stormy weather will soon be needed to sustain the promising start to the water year that began on October 1.

Reference:

Brad Rippey, U.S. Department of Agriculture
Richard Heim, NOAA/NCEI



CALIFORNIA WATER NEWS

U.S. warns California cities to prepare for possible water cuts and fourth year of drought

Federal water managers on Monday warned California cities and industrial users receiving water from the Central Valley Project to prepare for a fourth year of drought and possibly “extremely limited water supply” during 2023.

The U.S. Bureau of Reclamation, an agency of the Interior Department that oversees water resource management, said drought conditions in California have persisted despite early storms this month, and warned of looming water conservation actions.

“If drought conditions extend into 2023, Reclamation will find it increasingly difficult, if not impossible, to meet all the competing needs of the Central Valley Project without beginning the implementation of additional and more severe water conservation actions,” the agency said in a statement.

The agency said water storage is near historic lows in the reservoirs it oversees in the state, which irrigate more than 3 million acres of land in central California and supply major urban centers in the Greater Sacramento and San Francisco Bay areas. The project’s water provides supplies for approximately 2.5 million people per year.

The Shasta Reservoir, California’s largest reservoir located about 200 miles north of the Bay Area, is currently at 31% capacity, the agency said.

California gets most its water during the winter months when storms bring snow to the mountain ranges. But record temperatures and low precipitation have forced California and other states to address a future with dwindling water supplies.

The megadrought in the U.S. West has generated the driest two decades in the region in at least 1,200 years and conditions are likely to persist for years. Researchers have estimated that 42% of the drought’s severity is attributable to human-caused climate change.

Earlier this year, California water officials slashed State Water Project allocations from 15% to 5% of normal for water agencies serving roughly 27 million people and 750,000 acres of farmland.

The Reclamation Bureau said it will announce initial water supply allocations for the Central Valley Project in February.

Original Article: [CNBC by Emma Newburger](#)

California’s depleted, drying Salton Sea to get \$250 million in federal drought funding



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The federal government said Monday it will spend \$250 million over four years on environmental cleanup and restoration work around a drying Southern California lake that's fed by the depleted Colorado River.

The future of the Salton Sea — and who is financially responsible for it — has been a key issue in discussions over how to stave off a crisis in the Colorado River. The lake was formed in 1905 when the river overflowed, creating a resort destination that slowly morphed into an environmental disaster as water levels receded, exposing residents to harmful dust and reducing wildlife habitat.

The lake is largely fed by runoff from farms in California's Imperial Valley, who use Colorado River water to grow many of the nation's winter vegetables as well as feed crops such as alfalfa. As the farmers reduce their water use, less flows into the lake. California said it would reduce its reliance on the over-tapped river only if the federal government put up money to mitigate the effects of less water flowing into the sea.

"It's kind of a linchpin for the action we need to see on the Colorado River," said Wade Crowfoot, California's natural resources secretary. "Finally we are all in agreement that we can't leave the Salton Sea on the cutting room floor; we can't take these conservation actions — these extraordinary measures — at the expense of these residents."

The deal announced Monday needs approval from the Imperial Irrigation District, the largest user of Colorado River water. The water entity's board will take it up Tuesday.

Both the district's general manager and board member JB Hamby applauded the deal Monday.

"The collaboration happening at the Salton Sea between water agencies and state, federal, and tribal governments is a blueprint for effective cooperation that the Colorado River Basin sorely needs," Hamby said in a statement.

The \$250 million will come out of the recently passed Inflation Reduction Act, which set aside \$4 billion to stave off the worst effects of drought across the U.S. West.

Most of the money is contingent on the Imperial Irrigation District and Coachella Valley Water District making good on their commitments to reduce their own use of river water. Both submitted proposals to cut back their use for payment as part of a new federal program.

The quarter-billion dollars will largely go to bolster and speed up existing state projects designed to lower the negative environmental impact of the drying lake bed.

The state has committed nearly \$583 million to projects at the sea, including dust suppression and habitat restoration. One project underway aims to create wetlands and ponds that will limit dust from blowing into the air while creating safe spaces for fish and birds, according to the state.

The deal comes as the U.S. Interior Department and the seven states that rely on the river — California, Arizona, New Mexico, Colorado, Nevada, Utah and Wyoming — scramble to stave off the worst effects of the ongoing drought and historic overuse of



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the river. Lakes Powell and Mead, the key reservoirs that store river water and provide hydropower across the West, are only about a quarter full.

After months of failed negotiations over a deal to drastically cut water use, the federal government in October said it would pay farmers and cities to cut back through activities such as leaving fields unplanted or lining canals to prevent water from seeping into the ground. Proposals were due this month. Meanwhile, the Interior Department has taken steps to unilaterally revise guidelines that govern when water shortages are declared, a move that could force states to further cut back.

The Salton Sea, meanwhile, became its own political flashpoint in October when Arizona Sen. Mark Kelly, then up for reelection, urged the federal government to withhold any environmental cleanup money unless California agreed to give up more water. That prompted criticism he was using communities that already suffer from poor air quality as a bargaining chip.

The agreement marks a good step forward, but key details still need to be fleshed out, said Frank Ruiz, Salton Sea program director for Audubon California. He worries that \$250 million is not enough to mitigate all of the damage already done at the sea.

“This is a great step, but I think we need a lot more,” he said. “We need to continue discussing water sustainability in the region.”

Broadly, he wants to see a more equitable distribution of the region’s water supplies and hopes the Salton Sea gets a guaranteed minimum amount of water even as overall use declines.

Original Article: [The LA Times by Kathleen Ronayne](#)

A strong winter storm is spinning into California this week. Here's a timeline of its impacts

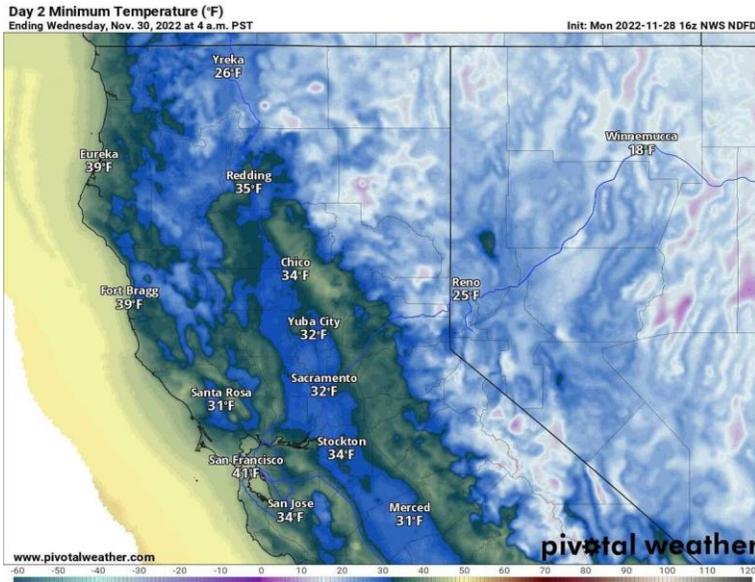
December is cutting in line and bringing its entourage of rain, wind and snow to Northern California this week. Bay Area residents are already getting a taste of this upcoming shift in the weather pattern as bitter, cold air sweeps into the region today.

This cold air will be followed up by a winter storm that will bring strong winds and rounds of rain to most of Northern California. The system will likely cause myriad travel headaches for Californians across the state — especially those who live near the Sierra Nevada — over the next few days.



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Tuesday and Wednesday: precursors for what's to come



The cold front associated with this upcoming winter storm will sweep powerful winds gusting to 50 mph along the Highway 1 corridor between Point Reyes and Half Moon Bay. Exposed parts of the west side of San Francisco will get a taste of these winds, with weather models forecasting 30 to 40 mph gusts west of Sunset Boulevard.

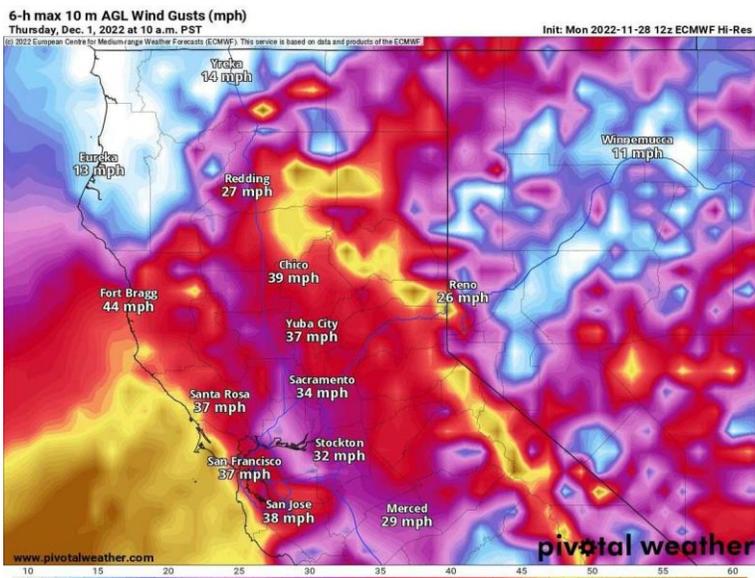
Gerry Díaz / Pivotal Weather

The last two days of November will be defined by some of the coldest air seen in California in nearly a year. A cold front will begin to take

shape around Tuesday afternoon as it rolls into the Eureka and Mendocino coastline. Both the European and American weather models are forecasting temperatures that will take a nosedive between Tuesday and Wednesday. Some residents in the Sacramento, Santa Clara and Napa valleys are waking up to frost and lows just below freezing.

Wednesday morning's cold air will then infiltrate the Peninsula and make it all the way to the Pacific coastline. This means that San Franciscans - especially those up in Diamond Heights, Bernal Heights, Twin Peaks and the outer Sunset and Richmond districts — will be waking up to temperatures in the upper 30s.

This blast of cold air will also help to keep temperatures near freezing for the next few days in Tahoe, Yosemite and communities around Lake Shasta. This is important because, by Wednesday night, the center of this upcoming winter storm will begin to make landfall in Northern California.



The forecast snow totals for the Sierra Nevada through Friday afternoon. Look for anywhere from 6 to 12 inches of snow along the I-80 corridor between Reno and the western foothills of the Sierra Nevada and for up to 2 feet of snow between 1,000 and 2,000 feet. Depending on the timing of the cold front, pockets of ski resorts like Kirkwood could end up with as much as 4 to 5 feet of fresh snow by the end of the week.

Gerry Díaz



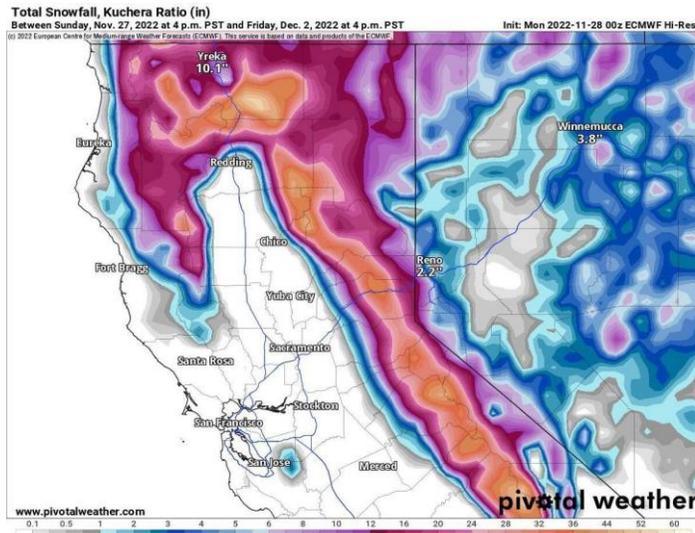
VELES WATER WEEKLY REPORT

Powerful winter storm rolls in by Thursday

The winter storm will march into Northern California by Thursday morning, and it's set to kick off strong winds across the Bay Area. The European weather model forecasts gusts reaching 35 to 40 mph along the shores of San Francisco Bay. Not only will this winter storm bring strong winds to the region, but it will also stream large quantities of moisture from the Pacific Ocean into California.

The global weather models — the European, Canadian and American — are projecting anywhere from an inch to an inch and a half of rain across the Bay Area on Thursday. A few pockets along the western flanks of the Sonoma and San Mateo County mountains, the Diablo Range and the Santa Cruz Mountains could see as much as two and a half inches of rain before all is said and done. These showers will then taper off by Thursday

night as they head south toward Los Angeles and San Diego.



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Gerry Díaz / Pivotal Weather

Significant snow on Thursday and Friday

The bitter cold air mass settling in Tuesday will help keep the snowline in the Sierra Nevada close to 1,000 feet through the rest of the week. Most of the rain showers from the coast will easily transition into snow. The northwest flow off the winter storm will also help to amplify snowfall rates above 2,000 feet.

This means that parts of the Sierra Nevada, including Donner Pass and several ski resorts above 7,000 feet like Kirkwood and Palisades could end up seeing as much as 4 feet of snow between Thursday and Friday. It's all thanks to the combination of cold air, strong winds and bountiful moisture. Even residents in Yosemite, Lake Tahoe, Mammoth Lakes and stretches of the I-80 corridor between Reno and Auburn could see as much as a foot and a half of snow before all is said and done.

Tuesday breakdown

- San Francisco: December's cold grip is coming early to the city. Look for bitter morning temperatures near 40 degrees in Noe Valley, the Castro and most of downtown right after sunrise. Northwest winds will drop temperatures even further this morning - as low as 38 degrees — in parts of Twin Peaks, Mount Sutro, Bernal Heights and even the Outer Sunset and Richmond districts.



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Thankfully, temperatures will rapidly climb back up to the upper 50s just before noon, with highs just shy of 60 degrees along Market Street between the Castro and the Embarcadero. But these mild afternoon highs will be short-lived. Bitter cold air returns after sunset and will be accompanied by an unpleasant sea breeze tonight. Be on the lookout for overnight patches of frost east of Sutro Tower, including downtown, North Beach, the Dogpatch neighborhood and Haight-Ashbury.

- **Pacific Coast and Peninsula:** Despite all the sunshine along Highway 1 from Pacifica to Half Moon Bay this morning, temperatures are going to start off in the bitter upper 30s. Look for patches of frost along the coastline as cold air seeps into all the corners of Highway 1. There will be some modest recoveries in temperatures this afternoon as cities like Half Moon Bay and Pescadero steadily climb to the mid-50s. But by tonight, the cold air will return, and frigid winds will help to drop overnight temperatures right back down to the upper 30s.

Heading toward the bay-facing side of the Peninsula, expect daytime highs in the upper 50s along 101 between South San Francisco and Millbrae. Winds will pick up to 15 mph as northwest flow from the Pacific seeps into the San Bruno Gap. Sunshine will help to raise temperatures closer to 60 degrees this afternoon as you head south on 101 toward Foster City, Redwood City, Menlo Park and Atherton. But be sure to bundle up after sunset, because temperatures will once again plummet to the upper 30s and lower 40s tonight.

- **North Bay:** Mild daytime highs and frigid nighttime lows are on tap for Sonoma, Napa, Marin and Solano counties this Tuesday. The Petaluma and Napa valleys are set to see patches of frost and morning lows in the mid-30s just before sunrise. A few isolated wind-sheltered spots in the valleys closer to Guerneville and Healdsburg could even dip down below 30 degrees if winds stay calm through 6 a.m.

Temperatures will then quickly recover as sunshine and warm breezes funnel into Highways 29 and 101 this afternoon. Petaluma, Napa and Santa Rosa will see their daytime highs peak at 60 degrees just before sunset. Look for a similar roller coaster of temperatures along Highway 37 from Novato to Vallejo, Benicia and Cordelia.

- **East Bay:** Some of the coldest air of the season will begin its descent onto the region from the Oakland and Berkeley hills. It will slowly seep into Richmond, Oakland and Berkeley right before sunrise, meaning residents along the I-80/I-880 corridor will be waking up to morning lows in the upper 30s. This cold air will make it all the way to San Francisco Bay, so be sure to bundle up if you plan on taking a jog along the shoreline. We'll see some modest recoveries in temperatures by noon all along San Francisco Bay. Look for daytime highs in the upper 50s as warm air off the water funnels back into Oakland and Fremont.

A similar warming effect will occur along the delta as you start heading east of I-680. Cities like Antioch, Brentwood and Walnut Creek can expect Tuesday's daytime highs to



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reach the 60-degree mark before sunset. Cold, bitter temperatures in the mid-30s will then sweep back into the San Ramon and Livermore valleys tonight.

- **South Bay and Santa Cruz:** Brrr. A powerful cold front will be marching over the region in the next couple of days, and it'll be leaving a trail of frigid air in its wake. Look for morning temperatures in the mid-30s in San Jose, Cupertino, Alum Rock, Los Gatos and Robertsville. Some parts of the Cupertino hills and eastern foothills of the Santa Clara Valley could even dip down to freezing just before sunrise. Daytime highs will then quickly reach the 60-degree mark all along the Santa Clara Valley thanks to some light, warm air off San Francisco Bay. Some of this warm air will stick around after sunset, but nighttime lows are still forecast to dip back down to the upper 30s tonight.

Upper 50s are on tap for the Santa Cruz Mountains this afternoon as some of the warmer air from the bays funnel through Highway 17. Look for a light, 5 to 10 mph breeze right before sunset. Temperatures will then take a nosedive, dropping to the 30s this evening as cold air returns to the mountains. Warmer air off Monterey Bay will help to keep Watsonville, Capitola, Santa Cruz and Davenport closer to the lower 40s tonight.

Original Article: [The San Francisco Chronicle by Gerry Diaz](#)

As California droughts intensify, ecosystems and rural communities will bear the brunt

Drought, human-caused climate change, invasive species and a “legacy” of environmental issues are permanently altering California’s landscape and placing some communities and ecosystems at increasing risk, a panel of experts told water officials recently.

Invasive species and decades of disruptions from massive land and water developments are partly responsible for a continuous decline in native California species, experts told the California Water Commission on Nov. 16. Also, rural communities, many of whom are lower income and rely on privately owned wells, are disproportionately contending with water contamination and scarcity amid recurring cycles of drought, experts said.

Although droughts in California date back to prehistoric times, the state’s modern-day water issues are the repercussions of decades of decisions, said Jay Lund, professor of civil and environmental engineering at UC Davis.

“A lot of our environmental problems today are really legacies,” he said. We are witnessing “the dynamics of past impacts and past changes playing themselves out and our inability — both in terms of regulatory policy and economically, and practically in some cases with some invasive species — to manage that playing out of legacy impacts.”

Groundwater and the Sacramento-San Joaquin River Delta are also among the sectors most vulnerable to dry periods, according to Lund, who emphasized that although cities and agriculture are relatively prepared and well-insulated from drought impacts, irrigated agriculture needs to shrink between half a million and 2 million acres to be sustainable.



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About 5.5 million of California's nearly 40 million residents live in rural counties, which make up more than half the state's land mass. While urban areas like Los Angeles are under mandatory drought restrictions to reduce strain on state reservoirs, many rural residents reliant on groundwater wells are waterless. Compounding the issue is water affordability and a lack of safe drinking water, particularly in the Central Valley and Central Coast.

"We know that these challenges disproportionately impact low-income and Latino communities," said Justine Massey, policy manager and attorney for the Community Water Center. "People relying on private wells in particular are significantly impacted because often they don't know if their water is safe to drink since there's no other entity doing water testing, and they're also not aware until they start experiencing issues with pumping that they may be nearing water levels that will render their well not working." Although state legislation such as the Sustainable Groundwater Management Act is meant to regulate water availability and will help mitigate water scarcity in an increasingly arid California, thousands of people and delicate ecosystems will fall through the cracks.

A 2020 study commissioned by the Water Foundation found that under SGMA's minimum water threshold plans, between 4,000 and 12,000 wells will partially or completely dry out by 2040 just in the San Joaquin Valley — affecting roughly 46,000 to 127,000 Californians who may lose access to their current water supply.

"We really urge all decision-makers involved... to look at the worst-case scenarios and really plan for that, because that's what we're experiencing so far — worst case after worst case after worst case," Massey said. "And the folks who are most impacted are the ones who least contributed to the problem."

Climate change is increasingly being recognized as a "threat multiplier" that will accelerate and aggravate instability and insecurity around the world. In a drought-stricken California, as groundwater levels drop because of less rain and over pumping, concentrations of contaminants in water increase, Massey said.

The current and future health of California's ecosystems is also on the line.

Mild, short-term impacts of drought can result in reduced plant growth, but when dry periods are longer and harsher and groundwater depletion is more severe, widespread mortality of habitats and species can occur, said Melissa M. Rohde, principal of limited-liability company Rohde Environmental Consulting.

"If groundwater demand is high, groundwater can quickly become out of reach from plant roots and rivers because these ecosystems rely on shallow groundwater," she said. Rhode referenced the Nature Conservancy's Shallow Groundwater Estimation Tool, which found that 44% of ecosystems statewide have been impacted by a significant, long-term decline in groundwater between 1985 and 2019. "We also found that groundwater levels declines have intensified during the most recent two decades," she said.



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Under SGMA, 87% of ecosystems and 40% of wells dependent on groundwater exist outside of the legislation, Rohde said, and “one of the biggest disconcerting aspects of this is that... these ecosystems are often times the last refugia for federal and state threatened and endangered species. They’re very important biological hotspots, and if we’re not doing what we can to protect them under SGMA, we are not safeguarding our most vulnerable species.”

Drought conditions and extreme heat fueled by climate change have also pushed the chinook salmon to the brink of extinction.

The fish — which once swam upstream the Sacramento River to spawn in its chilly waters before the Shasta Dam’s completion in 1945 — has struggled to survive even with government intervention. Last year, the water flowing from Shasta Dam was so warm that most of the eggs and young salmon died.

Wildfires, drought and bark beetle infestations are also destroying the forests of the southern Sierra Nevada, which could have dire consequences for spotted owls, Pacific fishers and other protected species that depend on mature tree canopies for their habitats.

But refusing to accept these changes is pointless, Lund said. “Resistance is futile. We’re going to have a future that’s going to be different,” and learning to reconcile our ecosystems with human activity will be an ongoing challenge. “How do you manage your native species when everything else is changing is going to be a big conundrum for all of our agencies and all the people trying to do this,” he said.

So what can we do about it? For ecosystems, integrating them into water policies, identifying ecological oases and managing groundwater to ensure species have access to it during droughts will be critical, Rohde said.

As for rural communities, Lund suggested we look at how and why urban and agricultural spaces have responded more effectively to drought: Their missions are focused; they have reliable funding sources; they have organized authority and expertise; and they have accountability via voters, regulators and ratepayers.

“The state has the responsibility to make sure that drinking water needs are protected and not waved away as a cost of business or set aside as something that’s too difficult or inconvenient to address,” Massey said.

“Climate change is testing and surpassing our limits and our normal flexibility,” she added. “The margin of error becomes tighter and tighter. That margin of error is already extremely thin, and what’s on the line is Californians’ access to a life-giving resource.”

Original Article: [The LA Times by Dorany Pineda](#)

California farms face \$3 billion loss from historic drought

California’s worst drought has left growers in the top US agricultural state facing losses of \$3 billion, just as producers brace for more widespread cuts to water supplies.



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The state's driest three-year period on record resulted in crop revenue losses after growers left a total of 1.3 million acres unplanted over 2021 and 2022 as compared with 2019, according to a study commissioned by the California Department of Food and Agriculture. That's the most idled acreage in recent memory, with effects cascading down the food industry.

The Central Valley — which grows about a quarter of all US food, including 40% of fruits and nuts — is bearing the brunt of the losses so far. Things could still get worse, with the state's southern farming areas reliant on water from a shrinking Colorado River likely to see more fallowing in 2023, said Josue Medellin-Azuara, a University of California Merced professor who led the analysis.

“Strategic short-term land idling was the most common cropping decision adaptation in this drought,” researchers said in the report. “Some crops such as rice, and other field and grain crops showed extensive idling,” while beef and milk productions were “lower than they would have been.”

The estimated 752,000 acres of fallowed fields in 2022 alone represent nearly 10% of California's irrigated land examined by researchers. Growers also faced extra energy costs due to the need to pump water. The study is based on “water” years that run from October through September.

California's so-called senior water rights over other states have helped shield farmers who depend on the Colorado River from severe water cuts.

But with the basin that provides water for 40 million people from Denver to Los Angeles contending with a megadrought, states are being tasked by the US government to figure out a plan to conserve water. Federal officials also are considering action that would allow them to mandate restrictions.

“The pressure is on for cutbacks,” Medellin-Azuara said in a telephone interview. Looming water restrictions for farming in Southern California and Arizona are especially of concern because those regions grow lettuce and other vegetables heavily relied by the rest of the country during winter months.

At least 70% of irrigated land in the Colorado River Basin is used to grow feed for livestock, and the drought already is boosting prices for such crops, according to the study.

The report's findings weren't all grim. Statewide economic impacts on farm income were “softened considerably” by measures such as increased groundwater pumping, switching crops, water trading and insurance payments.

Key takeaways

- Researchers estimate initial crop revenue losses of \$1.3 billion in 2021 and \$1.7 billion in 2022, with the Central Valley accounting for the largest proportion of that.
- Vines and vegetables were the main source of revenue loss.
- Shortages of crops such as tomatoes and rice hurt food processors.



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—Surface water deliveries were reduced by nearly 43% in the Central Valley in 2021 and 2022.

—California collectively “lost out on over a year’s worth of precipitation” in the 2020-22 period.

—Temperatures were about 3 degrees Fahrenheit (1.7 Celsius) above 20th-century averages during 2020-22, contributing to reduced snow-pack.

Original Article: [The Orange County Register/ Bloomberg](#)

US WATER NEWS

State of Arizona invests \$40 million in ASU to lead water initiative

Arizona State University will lead a partnership to tackle future water needs.

A \$40 million boost from the state will help the Arizona Water Innovation Initiative to study and develop new water solutions and technologies.

Dave White is with ASU’s Global Institute of Sustainability and Innovation.

“So, the long-term goal of the Arizona Water Innovation Initiative is simple, and that is to ensure water resilience for the state of Arizona in the face of increasing levels of challenge related to drought and the impacts of climate change,” he said.

The initiative will be led by ASU’s Julie Ann Wrigley Global Futures Laboratory in partnership with the Ira A. Fulton Schools of Engineering.

Original Article: [KJZZ by Ignacio Ventura](#)

Liberty Gold Purchases Historic Black Pine Mine Water Rights, Securing an Additional Water Supply and Further De-Risking its Black Pine Oxide Gold Deposit, Idaho

Liberty Gold Corp. (TSX: LGD; OTCQX: LGDTF) (“Liberty Gold” or the “Company”) is pleased to announce that it has purchased and obtained registered title to two historical Black Pine Mine water rights totalling 868.5 acre feet per annum (“AFA”) (~1 million cubic meters per year “m³/yr”). Both rights are registered to the Black Pine Mine Well



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immediately adjacent to the potential site of a future heap leach pad. Liberty Gold has now secured, through a combination of purchase and long-term lease, an aggregate of 3,202 AFA (~4 million m³/yr) of process water supply, sufficient for any future large-scale mining operation envisioned at Black Pine. This final piece in the Company's proactive, early-stage water acquisition strategy materially de-risks the Black Pine project from a development perspective and also provides the Company with sufficient upside capacity in the event the deposit and current target areas continue to grow in scale.

The Company has also secured access to two other wells in the basin close to potential mining and processing operations, allowing it to manage the aquifer for a long-term, sustainable water supply. At mine closure, leased water rights would be returned to the owners, with the Black Pine Mine Well water rights available for future lease or sale to other potential users.

Jason Attew, President and CEO of Liberty Gold stated, "In this part of the world, I don't think it is possible to overemphasize the importance of securing water rights pursuant to the future permitting and operation of a mine. The team has worked diligently over the last two years to acquire water rights, secure land and mineral rights and advance power agreements, which have significantly de-risked Black Pine's future operations."

In other de-risking activities, the Company has received a positive initial system impact study from Idaho Power Distribution Company on the supply of up to 10 megawatts of electrical power along a 25-kilovolt distribution line provided by Raft River Rural Electric Co-op Inc. that terminates at the Black Pine Mine gate. Further studies are on-going to refine transmission bottlenecks, system design constraints and cost estimates.

In parallel with the water rights acquisition, the Company has completed a property-scale ground gravity survey focused over the western margin of the basin along the eastern edge of the Black Pine deposit. The survey pin-pointed the location of basin-bounding faults that likely control sub-surface water storage and flow. The gravity survey also identified uplifted blocks of potentially mineralized basement rocks as a future target of exploration drilling. These data will support future hydrologic modelling of the aquifer and will also allow us to refine exploration and condemnation drilling in the area. Drilling has commenced to test the geophysical interpretations and explore for gold beyond the eastern margin of the drill-defined Black Pine gold system.

To facilitate the next stage of exploration activities the Company has submitted an application to the United States Forest Service ("USFS") for a modification to its existing USFS Plan of Operations. This proposal would add peripheral drill sites to and expand the existing permit area, allowing the Company to test surrounding high-priority step-out and reconnaissance targets.

Original Article: [Globe News Wire by Liberty Gold](#)



VELES WATER WEEKLY REPORT

Colorado River users, facing historic uncertainty, are set to meet in Las Vegas next month

As Colorado River water users prepare to meet in Las Vegas next month, the reality they face is one of growing uncertainty with few simple options left on the negotiating table. The math is well understood: There are more demands for the river than there is water coming into its reservoirs.

But cutting back at the scale necessary — and on a voluntary basis — has proven painstakingly difficult this year as top officials from across the Colorado River watershed have failed to reach a settlement. If the cuts are inevitable based on physical realities, questions remain about what form they will take. Will they be voluntary? Mandatory? Both? And how would they be enforced?

The federal government is pursuing a two-pronged strategy: On the one hand, it is seeking to fund voluntary conservation programs, paying irrigators to forgo water. But federal officials are also analyzing mandatory cutbacks if a negotiated deal cannot be reached among water users.

How the two strategies will work together — and in light of a century of contracts, agreements and guidelines that govern the river — remains a lingering question as water managers prepare for a conference in Las Vegas next month. The conference, hosted by the Colorado River Water Users Association, or CRWUA, brings together water officials, policymakers and interest groups from across the basin, which includes seven U.S. states, 30 Native American tribes and Mexico.

The conference will cap a dizzying year of crisis on a river beset with long-term challenges and inequities weaved into its foundational rules. In June, as negotiators were looking at reworking the operating rules on the Colorado River (set to expire in 2026), the federal government called on water users to agree on substantial short-term cuts that would stave off disastrous declines in Lake Mead and Lake Powell, the river's largest reservoirs. Yet with such deep cuts needed, negotiators failed to develop a binding agreement after an August 15 deadline came and went.

"The level of uncertainty is increasing," Tom Buschatzke, who directs the Arizona Department of Water Resources, said. "I haven't seen anything that's got the pendulum to stop swinging in the increasing direction and maybe at least stop — and maybe start going the other way."

Since 1922, the Colorado River Compact has guided development in the watershed. On top of that foundational document are a century of treaties, federal laws and agreements dictating how the river and shortages are apportioned. But those deals have not shielded those reliant on the river, which serves 40 million people in the Southwest, from low reservoirs and mounting risk.

Together, the many reservoirs that store water for Arizona, California, Nevada and Mexico, are 33 percent full. Lake Mead, held back by the Hoover Dam and the reservoir from which the Las Vegas Valley draws 90 percent of its drinking water, is 28 percent



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full. Upstream at another large reservoir, Lake Powell, low water has exposed submerged landscapes. It is 25 percent full.

Modeling by federal water experts forecast both Lake Mead and Lake Powell continuing to drop below critical levels. Without changes in water use, Lake Mead, over the next two years, could drop below the threshold triggering deeper water shortages. And Lake Powell could drop below its minimum power pool, the point at which water is so low the dam cannot generate electricity.

In June, U.S. Bureau of Reclamation Commissioner Camille Calimlim Touton called on all water users and all sectors on the Colorado River to come together with a plan that would cut a huge amount of water — about 2 million to 4 million acre-feet — as a measure to stabilize the two reservoirs (an acre-foot is enough water to roughly fill a football field to a depth of one foot).

That put most of the onus on the Lower Colorado River Basin, the states downstream of Lake Powell (Arizona, California and Nevada), where most of the water is consumed in cities, farms, businesses and lost to evaporation. Of the seven states that rely on the Colorado River, Nevada has the smallest apportionment, with entitlements to only 1.8 percent of all the water that's been allocated. Still, Las Vegas is also heavily dependent on the river as a long-term water supply.

John Entsminger, the general manager of the Southern Nevada Water Authority, said in a recent interview that Nevada faces less physical risk than water users downstream of Lake Mead. The agency recently completed construction of a low-level intake and pumping station that allows it to draw water out of Lake Mead, even in the most extreme water-shortage scenarios. Still, the interstate negotiations are highly consequential for shaping what future cuts might look like.

“So our risk really has to be evaluated in terms of how big of a reduction we could face and what are our plans for dealing with that,” he said. “I think we have the ability to adapt to anything that might come our way... We're not going to start publicly negotiating against ourselves about how low we think our reduction might be, but we do internal modeling and look at additional steps we can take in conservation, and I think we're at a pretty good place to take care of ourselves.”

With no agreement in place to cut close to 2 million acre-feet, the federal government has been stepping in. Earlier this year, the federal government injected an infusion of cash — \$4 billion — into managing the river, a portion of which was set aside for conservation. In October, federal water managers began soliciting proposals to pay irrigators \$330 to \$400 for each acre-foot of water they conserved (federal officials said they would also accept different pricing proposals).

The proposals for voluntary and compensated conservation closed last week. California said it would commit to cutting 400,000 acre-feet of water (it is entitled to 4.4 million acre-feet), a mix of water from irrigation districts and through the primary municipal provider for Southern California.



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“This isn’t the grand solution or all that California is going to do as we look to right sizing water usage,” said Wade Crowfoot, California’s natural resources secretary.

“But our take was we’re on borrowed time so let’s step up and do as much as we can do collectively, voluntarily.”

Original Article: [The Nevada Independent by Daniel Rothberg](#)

GLOBAL WATER NEWS

Cash Assistance Allows Drought-Displaced Families to Prioritize their Needs

Halimo is a 42-year-old drought-displaced (IDP) mother of eight (four boys and four girls) living in Balisbasle village in the Jariiban district, Mudug region. Halimo and her family used to be pastoralists before she came to Balibusle village in early 2022. Her family used to have more than 300 goats and sheep, but due to the drought, they lost their livestock, and nothing was left behind.

In August 2022, Halimo was selected as one of the beneficiaries of the European Union-funded humanitarian cash program, which is intended to address the basic food and non-food needs of the most vulnerable and disaster-affected households across Somalia. NRC implements the project in Jariiban through the Somali Cash Consortium led by Concern Worldwide.

“I received three cycles of multi-purpose cash assistance, and I received all proposed transfers for Aug, September, and October 2022, each month. We have received \$60 for three months period. Thanks to the assistance, I was able to meet my family’s basic needs. I do not have to worry about what we will eat; I now have the money on my mobile phone. It’s just a matter of going to the market and buying what we need,” says Halimo.

She also added, “The cash assistance allowed me to prioritize the needs of my family, like buying food, water, scholastic materials, and medicine. I paid all my debts, and most importantly, I was able to send two of my children to school, and I was able to pay their school fees, thanks to NRC and the European Union for the support”.

Original Article: [Relief Web by NRC](#)



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In Spain, Medieval Irrigation Canals Rehabilitated To Fight Drought

Armed with pickaxes, shovels and shears, around twenty volunteers climb the rocky path that climbs from the village of Aldeanueva de la Vera (Spain), in Extremadura, towards the Sierra de Tormantos. This Saturday in November, this varied group of small farmers, retirees and young neo-rurals is united by the same mission: to restore an acequia, an ancestral irrigation canal.

“We will sow water, corrects with a smile the secretary of the community of irrigators Ocho Caños, José Antonio Jimenez, advancing at a brisk pace under a radiant sky. Thanks to acequias we are going to make the water seep into the subsoil, like a sponge, and circulate slowly in the water tables, instead of trickling down, hurtling down the rivers and getting lost in the Tagus and then the sea.” Thus, water will be maintained on the territory and “harvested” in summer, when it fails.

Dug between the VIII and the X century, during the Muslim era, thousands of acequias channeled water from rivers, rain and snowmelt for centuries to supply fields and villages in Spain by gravity irrigation, before falling into disuse from the 1960s.

In recent years, faced with the effects of climate change and advised by a group of researchers, around fifty communities of irrigators – groups of landowners with water supply rights – from Andalusia, Extremadura, of Castile and Leon and Castile-La Mancha, have decided to proceed with their restoration.

“It’s not snowing like before. However, the gradual melting of the snow made it possible to lengthen the availability of water over time, explains the president of the community of irrigators Ocho Caños, Jesus Valleros, a 63-year-old former agricultural worker. It is urgent to find another way to conserve water in the territory, because in summer we can go three or four months without a drop of rain. »

” Immediate effect “

After two hours of walking, the small group grabs its tools and begins to clear a furrow of land, shallow, less than a meter wide, overgrown with brambles and stones, which winds its way up the side of the mountain. L’acequia, impossible to spot for a layman, is known as the Pesquera de Navalajarre by the village elders. “When I was young, these meadows were always populated by herds of goats and the shepherds took care of the maintenance of the fishing to keep them green”, remembers Mr. Valleros, cap and short sleeves under the autumn sun.

Original Article: [Globe World News Echo by David Sadler](#)

Anglian Water fined £560k for sewage release in Essex waterway

A water company said it “deeply regretted” failures that resulted in the release of millions of litres of sewage into a river and a £536,000 fine.

Anglian Water admitted failures in managing its water recycling centre near Brentwood in Essex.



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The pollution killed fish along a 3km (1.8 miles) stretch of the River Wid in 2018, the Environment Agency said.

District Judge Sam Goozee described Anglian Water's record as "lamentable".

A fault in the aeration system at an Anglian Water treatment plant caused pollution in the River Wid, which flows into the River Can in Chelmsford

The offence of causing water discharge activity took place between 27 September and 2 October 2018.

Chelmsford Magistrates' Court was told a fault in an aeration process at the Doddinghurst water recycling centre at Wyatts Green meant 3.9 million litres of sewage was discharged into Doddinghurst Brook - a tributary of the River Wid.

It went unchecked for nearly three days, damaging the river's ecosystem and killing a number of a protected fish species, including the freshwater bullhead, the agency said.

It added that the pollution could have been avoided had Anglian Water spent £205 on software for an early alarm system.

It was the second time in six months that Anglian Water had been fined for polluting the same stretch, the agency said.

The water company, whose headquarters are in Huntingdon in Cambridgeshire, was also ordered to pay costs of £27,439.21 and a victim surcharge of £170.

Environment Agency officer Gavin Senior said the public demanded tough action when it came to water quality.

"The invertebrate and fish population in this area, including a protected species, suffered significantly because of this sewage pollution and it took time for the local ecosystem to recover," he said.

In a statement, Anglian Water said it "deeply regretted any negative impact" and had donated £60,000 to the Essex and Suffolk Rivers Trust.

"We take our duty of care to the environment incredibly seriously .. and find it deeply distressing when incidents like this occur," the company said.

"We know there's no room for complacency, and we're absolutely determined to improve further and progress towards achieving our zero pollutions goal."

Original Article: [The BBC](#)

£2m water quality project to protect river ecosystems

New research led by the University of Stirling is to explore how pollution and climate change are impacting freshwater ecosystems for the first time.

The study, which has been awarded funding of £2million from the Natural Environment Research Council (NERC), will investigate how pollutants interact with rivers and ecosystems, and devise a system to monitor and measure pollution.

Professor Andrew Tyler, the Scotland Hydro Nation Chair and project lead, said: "Our rivers and freshwater species are being challenged by a bewildering combination of



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pollutant cocktails including pharmaceuticals, pesticides, illicit drugs and micro plastics – the effects of which are poorly understood.

“Now more than ever, climate change is warming waters, increasing flooding and changing rainfall intensity, coupled with increased urbanisation.

“This research will transform our knowledge in this area and use innovative technologies and transformative data analytics to improve our understanding of how climate and evolving mixtures of pollutants interact and ultimately impact on freshwater ecosystems.”

Using next generation sensors and satellite monitoring, experts will assess water pathways, follow pollutants and monitor the impact of contaminants on freshwater environments. The team will also call on existing national data to investigate the impacts of longer-term exposure to pollutant cocktails across the UK on water quality and ecosystems health whilst also identifying effective solutions.

The project, MOT4Rivers, also includes experts from the James Hutton Institute, UK Centre for Ecology and Hydrology, The School of Engineering at the University of Edinburgh, University of Glasgow and is supported by Scottish Water.

Professor Marian Scott, of the University of Glasgow’s School of Mathematics & Statistics, is one of the leaders of MOT4Rivers’ analytics team. Professor Scott said:

“MOT4Rivers has the potential to make a real impact on the quality of UK freshwaters.

“New sensor technology, supported by high-quality analysis, gives us the chance to tackle pollution in our rivers and their supporting ecosystems. I’m looking forward to working with colleagues to develop our understanding the impact of environmental changes on microbial form and function.”

George Ponton, Head of Research and Innovation at Scottish Water, said: “This project tackles key questions on the impact of both individual climate extreme events on releasing an increasingly complex cocktail of pollutants from society to aquatic ecosystems and the longer term climate change implications on water quality management across the UK.

“Finding effective solutions to these challenges is part of our strategy to deliver net zero across the water sector.”

The study’s findings will be reported in mid-2025, with the research team hopeful the results will inform priorities for policy, regulation and investment in measures to promote sustainable freshwater ecosystems under a changing climate.

Original Article: [University of Stirling](#)

Cash from water company fines to be used to improve environment

UK Ministers are planning to use money from fines handed to water companies – for polluting rivers and seas – to improve the natural environment, rather than giving the funds to the treasury.



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Under government proposals, funds will be ringfenced to invest back into water quality improvement initiatives, according to the Department for Environment, Food & Rural Affairs.

Defra said these could include the creation of wetlands, re-vegetating river banks and reconnecting meanders to the main channel of rivers.

At present, money from fines imposed by Ofwat and those arising from Environment Agency prosecutions is returned to the treasury.

There has been growing public outrage in recent months at the volume of raw or partially treated sewage pumped into the UK's rivers and coastal waters.

Water firms are being criticised for not investing money back into the UK's outdated water infrastructure, with mounting pressure on ministers to intervene.

The government came under fire in October after Environment Secretary Therese Coffey admitted the deadline to publish landmark legally binding targets to clean up Britain's waters would be missed.

Coffey said she was "disappointed" by the delay in producing the targets – which are obligations under the post-Brexit Environment Act – but was "working at pace on building on the work of my predecessors".

Defra said further details of its plans to re-allocate funds from fines imposed on water companies will follow next year.

Water inMister Rebecca Pow said: "Water company fines reached a record level last year, and moving forward these plans will significantly increase funding that will be used to recover, protect and enhance our natural environment."

Chancellor Jeremy Hunt said: "These fines hold rule-breaking companies to account and mean record investment in our waterways.

"It comes on top of our requirement for water companies to invest in the natural environment – raising the largest ever environmental infrastructure investment of GBP56 billion over 25 years."

Original Article: [Shareprices.com](https://www.shareprices.com)

Water as Part of the Climate Solution

The intersection of freshwater and climate is a frequently ignored but critical element of the climate problem, according to a new study from Sweden that explores the link and offers solutions that will help lower emissions.

Two years in the making, the study, "The Essential Drop to Reach Net-Zero: Unpacking Freshwater's Role in Climate Change Mitigation," published by the Stockholm Resilience Centre, identifies forests and freshwater wetlands as a crucial depository of carbon. More than 30 percent of estimated global carbon emissions are sequestered in wetlands. So the need to protect and restore them is urgent.

"The global water supply is the bloodstream of the Earth and the foundation of any successful mitigation action, since Earth's climate system and water cycle are deeply



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intertwined,” said Malin Lundberg Ingemarsson, program manager at the Stockholm International Water Institute and the study’s lead author. “Ours is the first-ever summary of current research on the role of water in climate mitigation.”

Top of Form

Bottom of Form

Swamps, bogs and marshes cover 118,000 square miles in the U.S., an area larger than the state of Arizona. More than half of the wetlands the U.S. originally held have been lost due to farming and development, even though wetlands have one of the highest stores of soil carbon in the Earth’s biosphere. The best known wetland in the U.S. is the Florida Everglades. Despite its vast expanse, the Everglades is only 50 percent of its original size—much has been drained for development. Other famous wetlands include the Okavango Delta in Botswana, the Mekong Delta in Vietnam and the Pantanal, an area of Bolivia, Brazil and Paraguay which covers an area larger than England.

“Water is continuously overlooked in discussions about climate,” said Juliet Christian-Smith, Western States Regional Director at the Union of Concerned Scientists, who was not involved in the study. “This report gives great advice. It’s very unwise not to consider water as part of the solution.”

The study also concludes that water loss caused by climate change can severely affect power production. Dams with poor siting, design and management can result in lower power generation and higher climate emissions.

Drought conditions in the Southwest, long predicted by climate experts, threatens hydropower production at Lake Mead and Hoover Dam in Nevada and Arizona, for example, where water levels are at their lowest since 1937, when the reservoir was first filled.

Lake Mead is currently at 27 percent capacity, according to NASA. Hydropower is a vital source of alternative energy and generates power without climate emissions. Freshwater is also vital for other forms of carbon-free energy production, such as nuclear power plants, which need freshwater for cooling. Over the summer, two reactors in France were shut down entirely because prolonged drought reduced the amount of available cooling water. Several other French nuclear plants along the Rhone and Garonne Rivers were forced to reduce their output.

The transition to renewable energies can reduce the pressure and effects on water resources from energy production, largely due to the low water demands of solar and wind.

The study also examines wastewater as a major source of emissions, both from treatment plants and untreated waste. Greenhouse gases, primarily methane, are created by biological processes taking place in untreated wastewater. In the U.S., wastewater also contains nitrogen and phosphorus from human waste, food, fertilizer, soaps and detergents.



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More than 2 million people in the U.S. live without access to adequate wastewater infrastructure. By some estimates, nearly half of wastewater released into the global environment is untreated. Treatment plants globally account for roughly 3 percent of greenhouse gas emissions.

Emissions from wastewater treatment plants, however, can be cut with improved design and management, the study says. Energy efficiency measures can lower emissions, and wastewater plants can install anaerobic digesters that produce methane, which can be burned for heat and power.

Much of the wastewater from cities and rural areas around the world is either untreated or partially treated, and emissions from untreated sewage is an estimated three times higher than emissions from conventional wastewater treatment plants. The expansion of wastewater collection and treatment systems will be critical to reducing climate change in the future, according to the study.

“Water is rarely taken into account when we look for climate solutions,” said Ingemarsson. “We need to take an integrated approach. We can no longer work in silos.” Looking forward, Ingemarsson called for further research in the role water plays in climate mitigation and hopes for broader dissemination of the study, especially at an important U.N. conference on water in New York in March 2023. It will be the most important water conference of its kind since the 1970s.

This study led by Ingemarsson, included contributions from the Potsdam Institute for Climate Impact Research (PIK), the Stockholm Resilience Centre (SRC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the United Nations Development Programme (UNDP).

Original Article: [Inside Cimate News by Charlie Miller](#)

India’s water sector investment from 2019 to 2024 is an estimated \$210 billion says Jal Shakti Minister

India’s estimated investment in the water sector from 2019 to 2024 at \$210 billion is the highest in the world, said Union Jal Shakti Minister Gajendra Singh Shekhawat. The Minister added that access to tap water has grown from 16% to 54% of Indian households in 2019, as per a press release.

The Minister was speaking at the four-day business leadership programme, ‘Isha Insight: The DNA of Success’ conducted by the Isha Yoga Center in Coimbatore district held recently. The programme was conducted along with the director of the Himalayan Institute of Alternatives (HIAL) Sonam Wangchuck; co-founder, AceVector Group (Snapdeal, Unicommerce and Stellaro) Kunal Bahl and managing director and CEO of Bandhan Bank, Chandra Shekhar Ghosh, who all shared their insights with nearly 200 business leaders.

Mr. Shekhawat listed the Central government’s undertakings under the Jal Jeevan Mission to ensure adequate drinking water through individual household tap



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connections to all households in rural areas by 2024. He also spoke about the leveraging of technology to craft innovative solutions. “We started training the ladies in the villages and gave them hand-held devices to test the quality [of water] on all basic 12 parameters. They can test the water in their village frequently,” he stated. The event, which took place from November 24 to November 27, also included meditation sessions, and lectures by Jaggi Vasudev.

Original article: [The Hindu](#)

Energy Positive Wastewater Treatment: Montpellier’s Maera €165m Upgrade

A €165 million upgrade will enable a wastewater treatment plant in southern France to generate twice as much energy as it consumes, as well as water for agriculture and industry.

Addressing three major planetary crises

A wastewater treatment plant in southern France is being upgraded to eventually generate twice as much energy as it consumes, as well as water for agriculture and industry.

By 2031, the Metropolis of Montpellier’s Maera wastewater treatment plant will be generating enough biomethane, heat and electricity to cover 205% of its energy consumption.

A €165 million, nine-year contract was awarded to Veolia, with its subsidiaries OTV and Veolia Eau France to undertake the extension and upgrade works as well as the operation of the Maera wastewater treatment plant.

The extension will allow us to face the future more serenely.

The upgrade also supports the Territorial Climate-Air-Energy Plan of the Montpellier Metropolis.

OTV will lead a consortium made up of Veolia Eau, Razel Bec, GTM TP GC SO, Egis Eau, Cabinet Merlin, Bouygues Energies and Services, Tourre Sanchis Architectes, AI Project, as well as many local players.

The extension works will gradually increase the plant’s treatment capacity from 470,000 to 695,000 Population Equivalent (PE), covering the needs of 19 municipalities.

Environmental performance

Excess energy produced will be used, among other things, to supply gas to 9,000 homes and heat to more than 7,500 households.

The Maera project is part of an “agroecological approach” to promote treated wastewater in agriculture. A rooftop vegetable garden and greenhouses on the ground will be created and watered by treated water from the station.



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Veolia added that in addition to testing other types of uses such as fire control, cleaning of streets, public spaces and networks, and watering green spaces, vines or any other crops close to the site.

“The extension of the treatment capacity combined with the proposed improvements will allow us to face the future more serenely and to offer a structure that is better integrated with an overall strategy for limiting noise (reinforcement of acoustic devices) and odours (coverage of all structures, enhanced deodorization),” said René Revol, president of the Montpellier Méditerranée Métropole Water Authority and vice president in charge of water and sanitation.

Other notable elements include a control centre using real time data and systems, to help monitor the plant’s performance and anticipate heavy rainfall to minimise spills and manage crises.

Original Article: [Aquatech](#)

How artificial ground freezing works as a ground improvement technique

Artificial ground freezing has been successfully applied on ground engineering and tunnelling projects in recent decades but is still not a commonly used method.

Züblin ground engineering and tunnelling senior project manager Christian Perl spoke at a recent event organised by the British Geotechnical Association, giving a historical overview of artificial ground freezing and explaining the working principles of the method.

Ground freezing is a ground improvement technique that can provide temporary support and groundwater control to enable the safe excavation and construction of underground structures.

With a growing demand for better urban public transport and infrastructure, the need to work in difficult ground conditions under complex existing structures has also increased. Ground freezing can be applied in these conditions, especially when more common methods, including dewatering, shoring and grouting, are unfeasible.

History

Ground freezing is not a new technology. It has been used to support shaft sinking in mining for more than 100 years. It was patented by German mining engineer Hermann Poetsch in 1883 as a “method for sinking shafts in floating rock mass”. It had, however, already been used in 1862 for mine shaft construction in South Wales. The Yorkshire-based Shaft Freezing Company was also founded in the early 1900s.

The method was initially only applied to shaft sinking operations. And while “shaft freezing” continues to be used globally, the technology has also been adopted by the wider ground engineering and tunnelling sector.



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Famous tunnelling projects that have used artificial freezing include the Big Dig road tunnel in Boston, United States in 1991 and the Donau Canal crossing for a new metro line in Austria, Vienna in 2004.

It has also been increasingly applied to complex tunnel and ground engineering projects in water-saturated, loose ground to provide structural support and seal against groundwater ingress.

The main applications in ground engineering include:

gravity walls with and without tiebacks

creations of cross-cuts between bored tunnels

remediation of defects in conventional retaining walls

temporary strain relief of buildings with underpinning

securing large scale tunnel excavation using cylindrical and horseshoe patterned “freezing bodies”

obtaining undisturbed ground samples.

The technique

The method works by temporarily stabilising and hydraulically sealing the ground.

“We’re using a refrigerant which absorbs the heat from the ground,” Perl explained.

“The pore water freezes to ice, creating cylindrical frost bodies around the freezing pipes – usually steel pipes installed in the ground in which the liquid is circulating – that grow together.”

The “frost/freezing bodies”, or frozen zones, around the pipes thus combine into one solid wall of soil and ice that is watertight.

Generally, there are two procedures and refrigerant types used for the technique – brine and nitrogen freezing.

In brine freezing, there is a cooling agent within a closed circuit that is pumped into the freeze pipe and then returned to a freezing plant. Usually the temperature of the brine, mainly calcium chloride, is between -30°C to -38°C .

“This technology can be used if there is groundwater flow of less than 1m/day, because if we have higher groundwater flow, then there’s a constant heat transport and the gap between the freezing pipes cannot be closed.”

In nitrogen freezing, cryogenic liquid nitrogen is used as the cooling agent.

Perl added: “When using nitrogen as the refrigerant, it is transported to the construction site in a truck and then stored in storage tanks. It’s pumped through the freezing pipes, through which it comes in contact with the warm ground, and it evaporates at a boiling point of -196°C . So that means that we have a very fast freezing process, and we can deal with a groundwater flow of up to 7m/day.

“But we need to take safety issues into account if we are in confined spaces such as shafts or tunnels. It is also more expensive than brine freezing, because the production of the liquified nitrogen is very energy intensive.”

Advantages



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A key advantage of ground freezing is that nearly all water saturated soils can be frozen. However, groundwater flow must be considered and the salinity of the ground can also have a negative influence on the freezing point and the strength of the frozen zone, Perl noted.

While using the method, temperatures can be accurately measured with sensors in the ground, which also helps with determining the dimensions of the frost zone.

Another advantage is that the frozen ground is absolutely watertight.

“In terms of stability, the ground characteristics like strength and creep rate are related to the temperature distribution. The latent heat of the frozen water also provides a temporary stability reserve. That means if there is a malfunction in the freezing system, we will not have a collapse of the frost body right away. We usually have an hour or even days to fix the system,” Perl explained. “Altogether, the method provides us with a reliable and safe working method under complicated ground conditions.”

Before applying ground freezing to a project, a thorough ground investigation and design programme is required. The interaction with other project elements, in particular dewatering work, must also be carefully studied.

Original Article: [GePlus/ Ground Engineering by Nia Kajastie](#)

Palestine PM says Israel steals 600m cubic meters of Palestinian groundwater

The Palestinian Prime Minister, Mohammed Shtayyeh, accused, on Sunday, Israel of stealing 600 million cubic meters of Palestine's 800 million cubic meters and diverting it into its cities and settlements.

Shtayyeh made the remarks at the Fourth Arab Water Conference organised by the State of Palestine under the title "Arab Water Security for Life, Development and Peace".

Shtayyeh said two-thirds of the Palestinians' groundwater in the West Bank is used inside Israel, explaining that an average Israeli consumes 430 litres of water per day, while a Palestinian only consumes 72 litres, much less than the global average of 120 litres.

"We are fighting for our water rights, and this conference is an eye-opener for more Arab cooperation in the water sector," Shtayyeh said, explaining that the Palestinian government is implementing a "water harvesting strategy", and has launched a dam project in Wadi Al-Far'a, as well as working on building huge water desalination projects in Gaza, funded by the European Union and other donors.

The Prime Minister explained that his government, since assuming its duties 3.5 years ago, has invested about \$500 million in water and sanitation projects, thanking international partners for financing this "strategic sector".

Shtayyeh warned that the Dead Sea is threatened with complete drought by the year 2044, because of the Israeli measures against it, including diverting its water resources



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and depleting its capabilities, including minerals and salts that are extracted by Israeli companies.

"Water in the Arab world is a political and economic issue that needs a strategic vision ... and our country is facing a real challenge regarding the scarcity of its water resources and theft," he said.

Shtayyeh explained that water is a major component in the Palestine-Israel conflict, adding that the Israeli agricultural settlements aim to control water resources from an early stage.

"Despite the importance of technological solutions to the water crisis, it is not a substitute for the realisation of water rights based on international law, in order to meet the gap between the availability of water resources and the growing need with an increasing population," he added.

Original Article: [Middle East Monitor](#)

UAE provides \$29mn financing to modernise Argentina's water infrastructure

Abu Dhabi Fund for Development (ADFD) signed a financing agreement with the Argentine government for an AED105.8 million (US\$28.8 million) project to build modern water plants and rehabilitate and expand existing water stations in 26 villages in Cordoba province.

The agreement was signed by Mohamed Saif Al Suwaidi, Director-General of Abu Dhabi Fund for Development; and Juan Schiaretti, the Governor of Cordoba.

"The agreement is part of our effort to strengthen strategic relations with our partners and support them in implementing their development programs that are in line with ADFD's vision to promote socioeconomic prosperity in developing countries," said Al Suwaidi.

"The event highlights ADFD's effort towards achieving this objective and supporting the Argentine government in achieving its sustainability goals through the modernisation of the water infrastructure."

Schiaretti expressed appreciation for the UAE and ADFD for enabling various countries to strengthen their economies. "The Abu Dhabi Fund effectively contributes to Argentina's priority projects. The latest agreement will enable the country to achieve its goal to upgrade the water sector, make it more sustainable, and maintain an adequate supply of drinking water in densely populated areas in a sustainable manner."

The project will involve the laying of about 255-kilometer supply lines, establishing 14 new pumping stations and purification plants, and raising the efficiency and capacity of the existing stations, in addition to service and advisory work and conducting a study on the environmental impact of the project.

Abu Dhabi Fund for Development started its operations in Argentina in 2016 by financing the AED55 million Nihavi hydroelectric project, and the AED294 million water networks



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development project in the province of Santa Fe. These strategic projects have had a major developmental impact on the country.

Original Article: [Utilities Middle East](#)

Amazon Web Services plans to be water positive by 2030

Amazon Web Services (AWS) on Monday revealed that it plans to be water positive, giving back more water than it uses directly, by 2030. Amazon's (AMZN) cloud business has long been exploring water sustainability and innovation, but this marks a new level of public commitment, said AWS CEO Adam Selipsky in an exclusive interview prior to the announcement.

“This started as an internal goal a couple of years ago,” Selipsky told Yahoo Finance. “We’re really just externalizing that goal now.”

There's increasing pressure on global water resources: By 2030, worldwide demand for water will outpace supply by 40%, according to the United Nations. For Selipsky – whose past work has emphasized sustainability both within Amazon and beyond – it's also key that, in addition to announcing the business's commitment to water positivity, the company is releasing its 2021 global water use efficiency metric (WUE), which comes out to 0.25 liters of water per kilowatt-hour.

“That makes us the leader in water efficiency among cloud providers,” said Selipsky. “Some don’t release statistics at all, others do, and we perform best on that accepted metric. So, we’re really well on our way to becoming water positive and innovating to lower water use across our facilities.”

Other tech giants, including Microsoft (MSFT), Google parent Alphabet (GOOG, GOOGL), and Meta (META) have made water positive pledges in recent years. For AWS, though, this is especially salient because it's coming from the cloud business. The data centers that a cloud business requires are notably water-intensive, as they often require large amounts of water for cooling. In recent years, some drought-prone areas have even begun to push back against Big Tech's water usage in their communities.

The stakes for AWS are high – AWS growth has long been exponential and considered key to Amazon's future; some of that growth slowed slightly last quarter. However, sustainability isn't at odds with growth, Selipsky told Yahoo Finance.

“We’re trying to embed sustainability in everything we do as a company, and I think that organizations need to do exactly that,” he said. “That said, I think there are many places where sustainability and good economics are partners, not enemies ... To look at another part of the business, since 2015, Amazon’s reduced the amount of packaging per delivery by 38%... and that's led to a 30% reduction in packaging weight.”

Pursuing sustainability can actually provide wins across the board, Selipsky said.



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"It's good for the environment, it's good for the convenience of our customers, and it's good for Amazon economics," he added.

As it pursues its water positivity goals, AWS is focusing on four different areas that it identifies as water efficiency, "sustainable sources," "community water reuse," and water replenishment projects. Some of these projects have been in progress for years. There's also a heavy emphasis on partnerships, as Amazon has linked up with The Nature Conservancy, WaterReuse Association, Freshwater Trust, WaterAid, and Water.org, which was co-founded by actor Matt Damon.

AWS plans to update its WUE metric and provide progress updates in 2023, and said it will report on its progress to water positivity annually.

Original Article: [Yahoo Finance by Allie Garfinkle](#)



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