Crescenta Valley Water District

Weekly News Articles

January 22, 2023

CNN

January 21, 2023

The West's snow boom could ease the water crisis. But experts worry more hot, dry weather is coming

Photographers gather at a viewpoint overlooking Yosemite Valley as clouds begin to clear from the last of a series of atmospheric river storms to hit California on January 19.
Mario Tama/Getty Images

CNN —

A parade of storms has given the West some relief from its historic drought, replenishing the soil, filling reservoirs and increasing much-needed snowpack. But whether it will be enough to help lift the West out of its multi-year water crisis, experts say, depends on temperatures in the coming months.

Andrew Schwartz, lead scientist at the University of California, Berkeley Central Sierra Snow Lab, has been shoveling huge piles of snow at the lab site. The amount of snow the lab has received has been so excessive that

it reached the second floor of their building, which they've since boarded up with plywood, he said.

The snow's been "very exciting," Schwartz said, and he is "cautiously optimistic" that it will go far to alleviate reservoir concerns this year, at least in California.

Across Western states, snowpack has reached more than 200% of normal levels in some places, with record-high amounts in the central Sierra Nevada. What's already fallen there in the first couple of months of winter is what the region usually sees all the way through April 1.

But nearly 60% of the West is still in some level of drought. And as the rain and snow subsided earlier this week, experts now worry how long that white gold will last as conditions get hotter and drier.

"The numbers have been big, but we are still concerned that if we hit a prolonged dry and warm period, we may not end up in a spot that's favorable come March and April," Schwartz told CNN. "So cautious optimism is what we're looking at, as water measurers and managers, because it's been absolutely terrific so far. But we still have several months to get through in the water season."

"These aren't static numbers," he added. "They can easily drop if we see record high temperatures."

Less optimism for Colorado River

The West's high-elevation snow is a natural reservoir, storing water throughout the cold winter months that then slowly trickles down into rivers and lakes in the spring and summer. But if temperatures start to warm before spring, that melting can start too early.

Snowpack in the Sierra Nevada is critical, because it accounts for 30% of California's freshwater supply in an average year, according to the California Department of Water Resources. The drying Colorado River Basin, which supplies water to roughly 40 million people in seven Western states and Mexico, also relies on snow-capped mountain ranges in Wyoming, Colorado and Utah for replenishment.

But with human-caused climate change transforming weather patterns around the world, cranking up temperatures and making droughts more severe and frequent, less water is flowing into rivers. Record-low water levels in the nation's two largest reservoirs – Lake Mead and Lake Powell – have triggered mandatory water cuts for some Western states in the last year.

Schwartz said snowpack in parts of the Colorado River Basin is running above average. But he also said the region is going to need a lot more to make up for a yearslong deficit.

"The entire Western US snowpack is looking quite good right now," Schwartz said. "Will it be enough to fill up Lake Mead or some of these other places that have been decimated? Likely not."

So far, Lake Mead's water levels have risen by a few feet, though Lake Powell has yet to see an increase.

California reservoirs increase

California's recent storms significantly improved the surface drought there. It was only two weeks ago that nearly seven million Californians lived in areas of extreme drought – the second-worst designation. That number has since dropped to zero.

But Californians have seen this script before, and they know the pendulum can swing back hard the other way.

Just last January, the population in the state under extreme drought fell from over six million to under 20,000 after an extremely wet December. But that didn't last long – by May, more than 14 million were in extreme drought, nearly half the state's population.

This year's record-breaking, three-week deluge helped replenish some smaller reservoirs, bringing them back to historical averages, but many of the larger reservoirs – like Shasta Lake and Lake Oroville – remain below average for this time of the year.

"While precipitation over much of the state was over 300% of normal over the previous two weeks, deficits have been years in the making," Deborah Bathke with the National Drought Mitigation Center wrote in Thursday's drought report. "Historically, long-term drought is interrupted by a period of abnormally wet weather. However, it's too early to tell if the wet weather is enough to end the drought."

Daniel Swain, a climate scientist at the University of California at Los Angeles and the National Center for Atmospheric Research, said one thing that would concern him is if the West sees a series of warmer storms in the next couple months. One of the signatures of a warming climate, he said, is that storms in the region are becoming increasingly warmer, bringing rain instead of snow to higher elevations.

"That could be a problem because we do have such an enormous snowpack right now," Swain told CNN. "Although right now, for the next

two weeks, there is absolutely no indication of that at least, so that's good."

Groundwater crisis likely to continue

Beyond reservoirs, soil moisture has also been high, which is good for groundwater aquifers. But Swain said this moisture will not significantly alleviate the yearslong groundwater overdraft from the megadrought.

"This is not nearly enough, partly because it's a supply and demand problem. We still got a lot of straws in the ground," Swain said. "But you'd need multiple years like this in a row to really move the needle on recharging those aquifers. There's probably some recharge going on right now, but it's unlikely to be the very large amount that would be needed to really make a big difference there."

Climate experts have long said that it's a lack of precipitation, higher temperatures, and an increase in evaporative demand – also known as the "thirst of the atmosphere" – that has pushed the West's drought into historic territory.

Swain warned that "thirstiness of the atmosphere" may likely be higher than it used to be, despite this wet year.

"Once things clear out and dry out," he said, "the atmosphere is going to pull a lot of that water back out of the landscape faster than it used to."

CNN Meteorologist Brandon Miller contributed to this report.

https://www.cnn.com/2023/01/21/us/west-snowpack-california-drought-climate/index.html

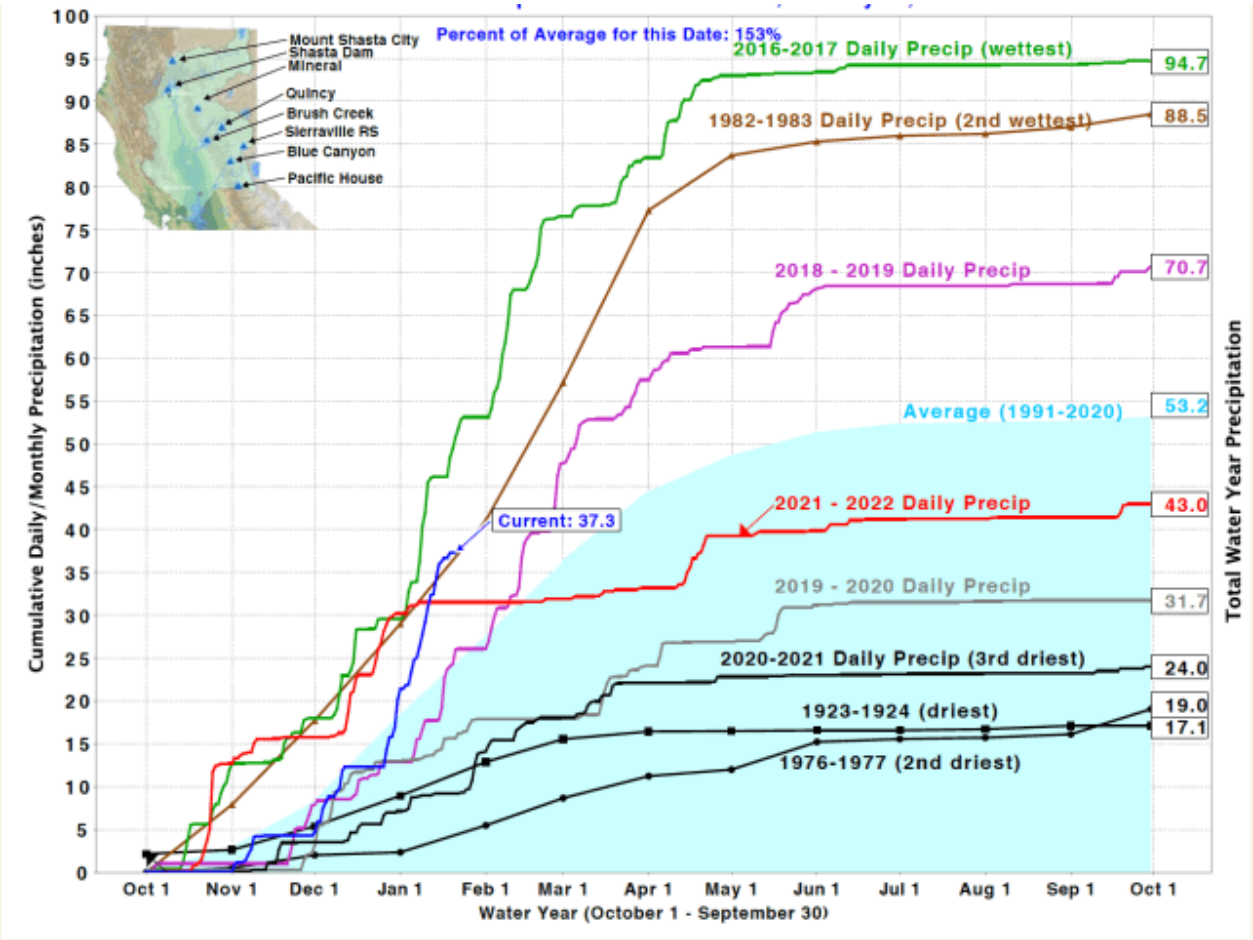
California Water Blog

January 22, 2023

Is the Drought Over? Reflections on California's Recent Flood-Drought Combo

By Andrew L. Rypel, Jay Lund, and Carson Jeffres

Early January was an unusually wild ride of atmospheric rivers. Nine sizable systems produced a train of storms beginning about New Years and lasting for several weeks across almost all of California. After three years of drought, the storms reminded us that California has flood problems similar in magnitude to its drought problems, and that floods and droughts can occur in synchrony. As the dust begins to settle, let's look at the impacts of these early January floods and examine if the recent three-year drought and its longer-term drought impacts might be ending.



Accumulated precipitation for northern California as of publication of this blog. Graph from the Department of Water Resources, California Data Exchange Center https://cdec.water.ca.gov/cgi-progs/products/PLOT_ESI.pdf

Impact of the Floods

Recent storms have been the proximate cause of about a billion dollars of damage to public infrastructure, private homes and businesses, not all from floods, but also from high winds and landslides. Homes and cars were smashed by downed trees, and roads eroded or washed away by streams and coastal waves. Some piers and harbors were damaged or closed.

More surprising was the number of deaths. Around 20 deaths have been attributed to the storms, about 6 of which were flood-related drownings. Of the thousands of miles of flood levees in California, only two areas seem to have suffered levee failures – a Merced suburb (from a levee

failure on Bear Creek) and Wilton (Sacramento County) on the Consumnes River, which had several levee failures. Flooding on major rivers was limited by low storage in most reservoirs, which let them capture large amounts of water rather than discharging it.

For a local reclamation district perspective on the Cosumnes River flooding, see the video below:

https://www.youtube.com/watch?v=dvon-wXSBgM

Modern flood forecast, warning, and evacuation systems have greatly reduced flooding deaths in the US since the early 1900s. These integrated national, state, and local alert systems appear to have functioned well, although some weaknesses will be evident. A major cause of flood-related drownings nationally is people driving into rising or moving water, erroneously thinking a car can pass safely. Most recent drownings were people in cars. In flood-prone areas, warnings and signage need to improve concerning driving through floodwaters. After more than a decade of levee improvements, no levees failed in protecting major cities. But failures did occur on smaller streams and tributaries. Overall, most of California's massive network of levees passed the test, but weaknesses should be systematically identified and addressed before the memory of flooding recedes.

Slusser Road in Windsor California, January 14, 2023. Photo credit: Sarah Stierch. Downloaded from commons.wikimedia.org

Although the increasingly older dam and reservoir spillway infrastructure in California (Rypel et al. 2020) did not fail, it was not thoroughly tested due to most large reservoirs being relatively empty at the start of the year and in the process of filling. In some reservoirs, normal flood reservoir releases were required (as with Folsom), resulting in the usual complaints of 'water being wasted to the sea' (Cloern et al. 2017). Yet such episodic high flows are important to ecosystems of California, and its unique biodiversity.

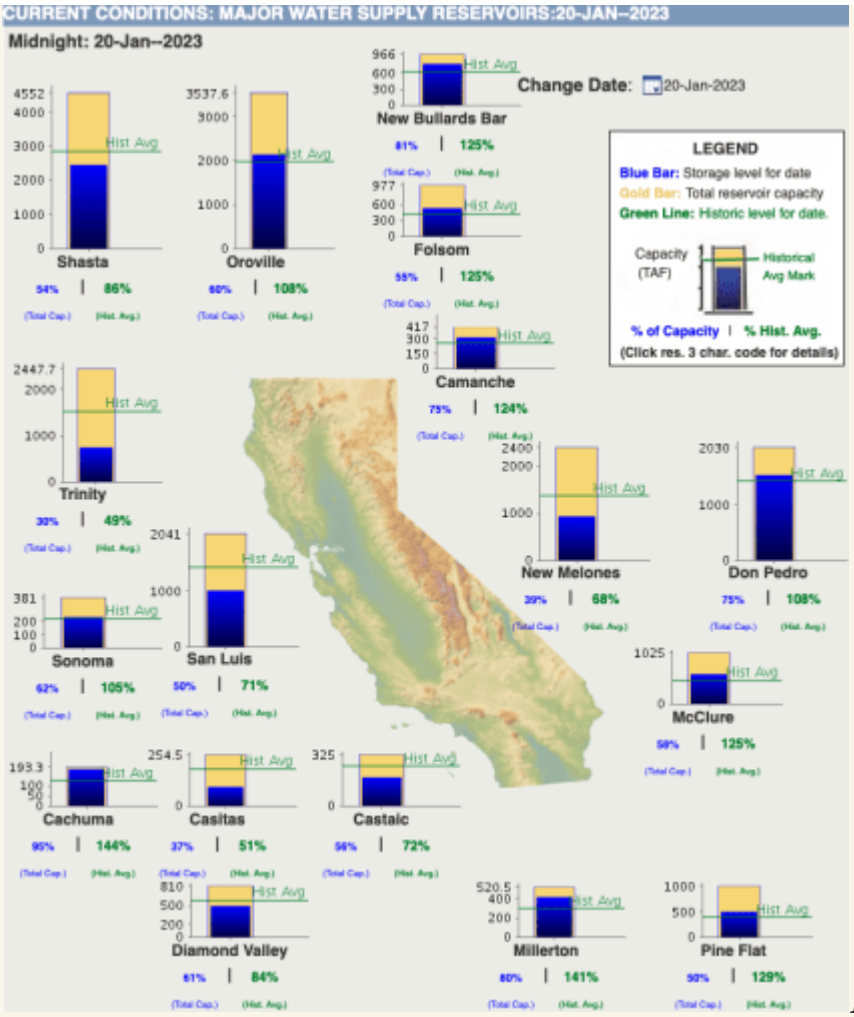
As featured in last week's blog (Mount et al. 2023), our early January storms might be described as 'nature's gift to nature'. Ecologically, these storms have been a bonanza for species and ecosystems that rely on floodplain and wetland habitats. In general, habitat science and management in aquatic ecosystems greatly lags that for terrestrial

environments (Sass et al. 2017). In California, access to floodplain habitat for freshwater species is of the highest importance (Opperman et al. 2017). Both the Freemont (Yolo Bypass) and Tisdale Weirs overtopped during recent storms, allowing massive habitat use by our Sacramento River natives. Salmon of several run types were captured in recent surveys of flooded fields along with many native and non-native species. Unfortunately, flooding arrived after some fairly low annual returns of salmon, especially winter-run Chinook salmon. Nonetheless, for the progeny of successful salmon spawners this year, conditions have been optimal so far. And because outmigration survival increases with river flows (Michel et al. 2021), these floods will help buoy Central Valley salmon stocks to some extent following several punishing drought years. There are some active scientific research projects in the floodplains this year that will be informative for learning more about how to manage floods and winter flows for California's biodiversity. The floods are extremely beneficial for these efforts.

Is the drought over?

There are many ways a drought can be indexed and measured, summarized conceptually in Table 1.

Storms so far this year have done well at replenishing soil moisture, which is good for annual pastures, dryland crops, forests, and shortening the wildfire season, so far. Ample soil moisture also means future storms will produce more runoff to streams, reservoirs, and aquifers. But two and a half months remain in the wet season, and the 2-week forecast is mostly dry.



Reservoir levels as of 1/20/2023. Graph from the Department of Water Resources, California Data Exchange Center https://cdec.water.ca.gov/cgi-progs/products/rescond.pdf

Water levels in California reservoirs are much improved across the board. Smaller reservoirs have filled and started discharging to make room for managing potential floods. Large reservoirs are refilling now to undo the cumulative impacts of a multiyear drought. This is partly because atmospheric rivers often soak a relatively narrow region with high precipitation, and until recently, most of the fire hose was pointed at the Central Sierra Nevada. With the recent storms, reservoirs are accumulating water. Shasta Lake is filling well at 86% of average for this time of year. Lake Oroville is at 108% of average for this date, having essentially recovered from the drought. However, Trinity Lake is only at 49% of its average for this date. Even major reservoirs can fill fairly

quickly from major storms, but it can still be months if storms are smaller. Snow conditions are excellent. Statewide snowpack is currently 141% of the January average and 160% and 119% for the Sacramento and San Joaquin rivers, respectively. More reservoir filling will occur as the accumulated snow melts during spring and early summer. Alternatively, snowpack could grow more with more storms, and in some places, we could have snowmelt floods if the spring is warm.

But many aspects of long and deep droughts end slowly, sometimes over years, and often only after several wet periods. Despite the welcome precipitation, the drought is over only in some facets, but not others. With more storms, many drought impacts will be reduced further.

Table 1. Is the drought over? Which drought?

Drought type	Effects	Current status
Soil moisture storage	Forests, Unirrigated crops and pasture, reduced runoff for human and ecosystem uses, longer wildfire seasons	Drought over.
Reservoir storage	Less water supply for irrigated crops, recreation, cities, hydropower, and cold water for salmon. Empty storage reduces flood risks	Much better, but still a ways to go. Many reservoirs might fill this year.
Groundwater storage	Irrigated crops, well-dependent households, towns, cities, spring and groundwater-dependent wetlands and ecosystems	A bit better, but perhaps years to go.
Ecosystems	Reduced survival rates of salmon, increased abundance of non-native species, harmful algal blooms, species at risk of extinction	Quite bad. CA freshwater ecosystems are functionally exposed to chronic, long-term drought every year. Actual droughts impose an additional step in the declining direction.
Lingering impacts	· Dead forest trees prolong fire risks for years	Too late, we'll have these for years to come.

	· Drawn-down aquifers increase pumping costs and new well costs · Need to replace drought pumping from aquifers can fallow lands in later wet years · Depleted fish and bird populations can take years to recover	

The chronic drought for ecosystems

Ecosystem impacts of droughts have been some of the most stubborn for managers and regulators. California's aquatic ecosystems have been systematically exposed to long-term chronic drought because of dam building and massive water storage, diversions, and extractions. These are good things for humans, but the debt is real for ecosystems. For some species like the Delta smelt, the end game is now as managers race to release hatchery fish into a fundamentally changed, and apparently hostile, Delta ecosystem. Longfin smelt are tracking closely behind. For other species, like Chinook salmon, the trend is not good. Last ditch actions like two-way trap-and-haul above Shasta are being tried to correct decades of decline. Although there is a tendency to divert as much water as regulations allow during high flows, it is important to recognize that periodic major storms and flooding help support the ecology and geomorphology of our remnant ecosystems, and make them more durable. Flooded bypasses provide a glimpse into a future of green infrastructure that might extend the duration and spatial footprint of flooding. Our flood protection system was designed without ecosystem priorities and with a different understanding of ecological benefits of seasonal flooding. Managed floodplains are a needed feature of our water management system, with many benefits (Torres et al. 2022).

Groundwater recharge is another nature-based solution linked to the multi-decadal drought experienced by ecosystems. California has modest systematic groundwater monitoring, so changes in groundwater stores are difficult to track. In general however, Sacramento basin groundwater has a history of refilling aquifers better and more efficiently than the

drier and more overdrafted San Joaquin and Tulare basins. Depleted groundwater in overdrafted basins is likely to extend the drought in these areas and accelerate State Groundwater Management Act (SGMA) actions to reduce pumping. Under SGMA, additional pumping during the drought has increased the overdraft debt that must be repaid by 2040. One potential lesson from this round of storms is the need for faster permitting or pre-event permitting to allow flooding of lands for groundwater recharge. And because increased groundwater recharge ultimately benefits people and ecosystems (especially local streams), this green infrastructure solution could be implemented more nimbly in the future.

Conclusion

The drought is not over, yet. Furthermore, many legacies from the current drought will endure for years. Impacts from recent flooding were intense and expensive, but the state fared mostly okay during the deluge. As usual, native biodiversity continues its stair step pattern of decline from droughts. For groundwater, pumping will need to be further reduced during ***wet years***, just to restore aquifers to 2015 levels needed to comply with SGMA. Nonetheless, at halftime for this wet season, the recent storms have provided hope that the current drought may be ending from multiple perspectives. Another dry year remains plausible, but looks much less likely than it did a month ago. And major floods are now a bit more likely this year.

But as always for California, both floods and droughts are inevitable in the future, and we should prepare.

https://californiawaterblog.com/2023/01/22/is-the-drought-over-reflections-on-californias-recent-flood-drought-combo

AOL News

January 22, 2023

La Niña shows signs of ending. Is El Niño next?

(NEXSTAR) – The long reign of La Niña may soon be over. According to the latest outlook released by the National Oceanic and Atmospheric Administration's Climate Prediction Center, there's an 82% chance that by springtime – sometime between March and May – La Niña will have faded away.

In the spring, La Niña is most likely to be replaced by conditions meteorologists refer to as "ENSO neutral," which is when neither La Niña nor El Niño is present.

Looking further down the forecast into late summer and early fall and there are signs of something we haven't seen in years: the return of El Niño.

By the August through October timeframe, there's about a 50% chance El Niño will take hold. Of course, that means there's also about a 50% chance it won't.

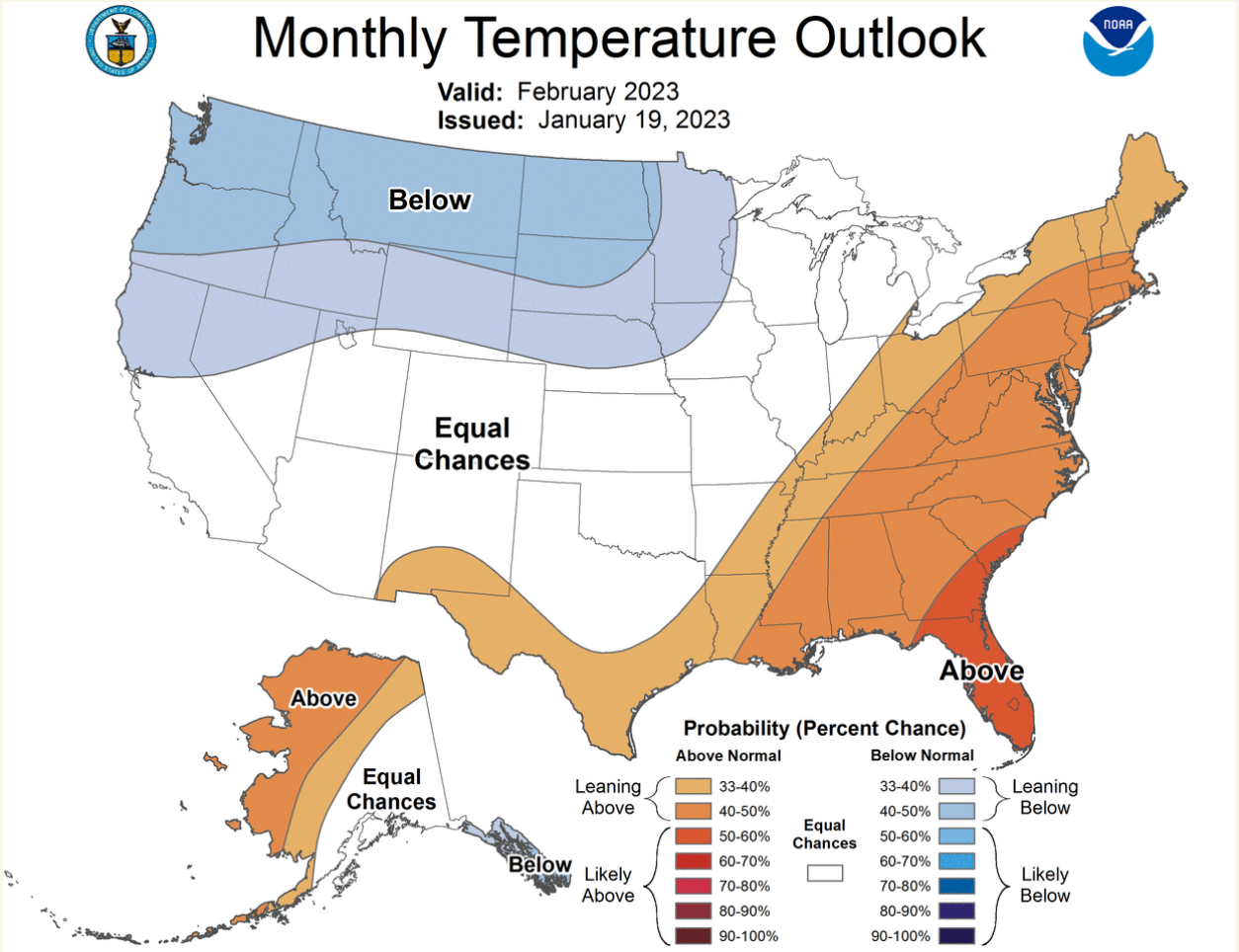
NOAA issues an "El Niño watch" when El Niño is possible within the next six months, explained Michelle L'Heureux, a meteorologist with the Climate Prediction Center, and so far, no watch has been issued. The team that monitors ENSO patterns is waiting a bit to see if the probabilities firm up, she said.

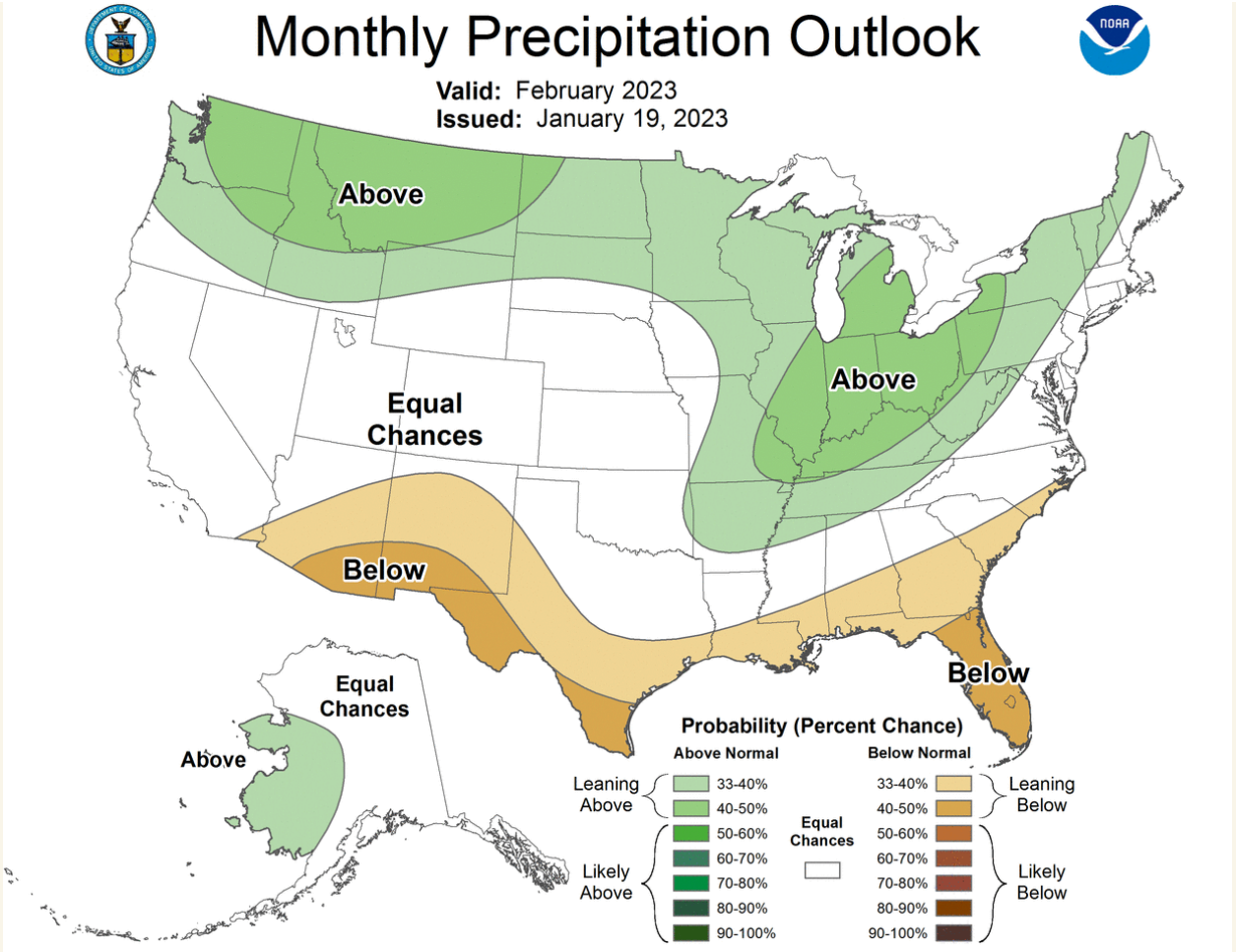
"We really do want to see more metrics in support of it before saying El Niño is possible and that we should be alert to it," L'Heureux said. "But with that said, those probabilities are not nothing. They're certainly something to keep an eye on and we will."

Both La Niña and El Niño usually grow strongest in the winter. A strong El Niño winter, if it were to develop, would be the inverse of what we've seen the last three years and would likely mean a cold, wet winter for California and the Southern U.S. El Niño usually means a warm, dry winter for the Pacific Northwest and Midwest.

In the near term, L'Heureux emphasized, La Niña is still with us. Its effect was apparent in the Climate Prediction Center's forecast for February released on Thursday.

For the southern half of the U.S., meteorologists predict a February that is warmer and drier than average – as is typical with La Niña winters. In northern states, it's the opposite: A colder and wetter February is expected.





If El Niño were to develop later this year, it's not yet clear how long it would last. It would be a big change from the dominance of La Niña, which has been present practically uninterrupted since the summer of 2020.

https://www.aol.com/news/la-ni-shows-signs-ending-151300458.html

The Hill

January 22, 2023

How Arizona, California and other states are trying to generate a whole new water supply

Underground storage may be a key for Western states navigating water shortages and extreme weather.

Aquifers under the ground have served as a reliable source of water for years. During rainy years, the aquifers would fill up naturally, helping areas get by in the dry years.

But growing demand for water coupled with climate change has resulted in shortages as states pump out water from aquifers faster than they can be replenished.

The fallout can also lead to damaged vegetation and wildlife as streams run dry and damage to aqueducts and flood control structures from sinking land.

Municipalities and researchers across the country are working on ways to more efficiently replenish emptied-out aquifers.

By overpumping aquifers “you’ve created space. There’s space under the ground that used to be filled with water,” explained Michael Kiparsky, water program director at the Center for Law, Energy & the Environment at the University of California, Berkeley School of Law.

“And what we can do with these groundwater recharge projects is take advantage of that space, which is vastly greater than the sum of all of the surface storage reservoirs that exist now or could be built,” he said.

Several communities across California, Arizona and other states have been using managed aquifer recharge for years to better regulate local water supplies.

If implemented on a wide enough scale, recharge projects hold the potential to bolster water security in drought-stricken regions while improving the health of the environment.

Kiparsky said if it can be pulled off, “it holds the promise of being able to generate a whole new water supply we really didn’t even know that we had.”

Regional efforts

In California — where 85 percent of the population relies on groundwater for some portion of their supply — more than 340 recharge projects have already been proposed.

The California Department of Water Resources announced this month it will expedite the permitting process for recharge projects to help meet its goal of expanding average groundwater recharge by at least 500,000 acre-feet each year.

In Orange County alone, officials pump 65 million gallons of treated water into recharge basins in Anaheim each day. The county began recharging water through infiltration basins in 1936 and serves as a model for other communities looking to implement managed aquifer recharge projects.

“If we want to maintain our groundwater systems and sustain them, not deplete them, not mine the water, and we want to have enough water for everything else — for agriculture, for cities, for the environment, for the streams — so forth, we have to put a lot of water into the ground,” said Andrew Fisher, a professor of earth and planetary sciences at the University of California, Santa Cruz. “There is literally no choice if we do not do that.”

Groundwater recharge projects can take many different forms.

Communities could create percolation basins, where stormwater or excess river flows are collected in basins that are intentionally left open. Over time, water settles itself into the soil below and eventually into aquifers. Dry wells, which stop above the water table and allow water to percolate the rest of the way, can be constructed, along with injection wells, which lead water directly into aquifers.

Arizona has a long history of managed aquifer recharge efforts, thanks in part to the 1996 establishment of the Arizona Water Banking Authority (AWBA). Since its inception, the authority has used recharge to store nearly 5,600 million cubic meters of surface water from the Colorado River, as of 2019.

The number and capacity of recharge projects increased throughout Arizona during the early 2000s, with researchers crediting the project's success to local political consensus, favorable hydrogeology and public funding, along with other factors.

"AWBA is an important example of how a strong regulatory framework, coupled with public institutions and funding can help support the adoption of [managed aquifer recharge] on a large scale, and how [managed aquifer recharge] can achieve broad water management and public policy objectives," a 2021 Unesco report said of the practice.

The city of Tucson also serves as a model example thanks to its flexible approach to using renewable surface water supplies.

In 2018, the city stored and recovered 76 million cubic meters in the same year, while an additional 76 million cubic meters was stored for long-term use.

The city uses "soils as the treatment method for the surface water," explained Sharon B. Megdal, director of the University of Arizona Water Resources Research Center in an interview with Changing America.

The surface water infiltrates into the aquifers and mixes with the existing groundwater, and then officials can pull out that blended mixed water to serve customers, she said.

Despite the established nature of Arizona's programs, groundwater is still over pumped in some areas, and aquifer levels continue to decline.

"Arizona has quite an extensive history of utilizing managed aquifer recharge successfully, and yet there are still more opportunities," said Megdal. "We don't have all the answers. We still have lots to do. But from the basic point of what's going on in managed aquifer recharge, we've done quite a lot successfully."

When it comes to expanding the scope of recharge operations, "it's very important that you have the right regulatory framework for it both for sufficient protections — because there are water quality implications, other types of implications — as well as predictability," Megdal said.

Challenges remain

One type of groundwater recharge project is called Flood-MAR, or flood-managed aquifer recharge. As part of this process, water managers could divert water accumulated in rivers during big flows to other areas, flooding land during the winter, or wet season, and farming the land in the summer.

"Part of the challenge for flood recharge is finding land that's not already in use for other things, houses or fields. And finding areas where there's enough infiltration capacity, which is a term of art that means where water can flow quickly underground and into the groundwater aquifers," Kiparsky explained. Legal questions also come into play when projects aim to capture floodwater, as claims on downstream flows may already exist.

Additional challenges with recharge projects arise when water is collected in urban settings. Cities may not be located above opportune geological conditions for water to seep into aquifers. Groundwater in urban areas can also be contaminated with oil drippings or bits of tires from cars. Although this water can be treated before it's put into the aquifer, treatment can be expensive.

For other projects, communities need to determine the best sites for recharge to mitigate the need for building new transfer infrastructure.

“In some cases, some of that stored water has to remain in the aquifer and can’t be pulled out later on,” said Megdal. That’s because groundwater is in motion, and communities may not be able to get back all the water they put in before it moves on.

Despite the many challenges unique to collecting different types of water at different times, through different means and in different areas, “there’s a lot of opportunity to implement [managed aquifer recharge] depending upon what water source you’re talking about, what ultimate use you’re talking about,” said Megdal.

“People are recognizing that we have to look at all sources of water and opportunities to make wise use of them,” added Megdal.

Not only can increased water storage help with water security in the future, but higher groundwater levels can also reconnect with streams, improving conditions for fish and vegetation along the stream’s corridor.

“We have and will continue to have too much water when we don’t want it and not enough when we do, and so storage is the key,” said Kiparsky.

“The fact that we’ve created this massive space underground holds the key to that problem,” added Kiparsky.

https://news.yahoo.com/arizona-california-other-states-trying-220000809.html

LA Times

January 23, 2023

Uncaptured water isn't wasted. But more could be stored for a non-rainy day

The San Joaquin River along Brannan Island Road on Nov. 29 in Isleton. (Gary Coronado / Los Angeles Times)

SACRAMENTO —

A gazillion gallons of stormwater have been rampaging down rivers into the sea. But that uncaptured bounty hasn't been "wasted."

"Wasted water" being dumped in the ocean is an old cliché that resurfaces whenever there's a big storm in this weather-eccentric state — or during the inevitable dry periods when crops are thirsty and homeowners are told to shut off their lawn sprinklers.

But “wasted water” is a myth.

Uncaptured runoff flowing to the sea flushes pollutants out of rivers and bays, helping to cleanse water for local domestic use. It also saves many kinds of fish, including salmon, not only for recreationists but for the coastal fishing industry. And it deposits sand on beaches.

In the vital Sacramento-San Joaquin River Delta, runoff pushes back saltwater from San Francisco Bay, making the relatively small amount of water that is captured potentially drinkable.

That’s the view of water scholars I’ve talked to recently. And it makes sense, particularly concerning flows through real rivers. That doesn’t necessarily include concrete-lined flood channels, such as the so-called Los Angeles River.

“Every drop of water flowing out of the Central Valley into San Francisco Bay creates benefits,” asserts Jeffrey Mount, a water expert at the Public Policy Institute of California. He’s a former UC Davis science professor and founding director of the university’s Center for Watershed Sciences.

But he continues: “I want to be perfectly clear. That doesn’t mean we couldn’t harvest more.”

He also adds this caveat: “There are some places where water is just wasted to sea. I’m thinking where I grew up — in Santa Monica. Street runoff there has no demonstrable value.” That is, unless it’s captured and recycled or stored underground, he notes.

California

L.A. has $556 million and a plan to capture more storm water. But will they ever do it?

In 2018, L.A. County voters approved Measure W, a massive tax aimed at protecting beaches and improving water supply through storm water capture. Yet only $95.5 million has been disbursed for projects out of $556 million collected.

March 4, 2022

But even uncaptured water headed to sea through the L.A. River is beneficial, he contends.

“It cleans out the channel. The L.A. River is watered by urban slobber, an unpleasant mix of oils and other nasty stuff.”

Unfortunately, it winds up “in places where surfers are,” he says. “The ocean is full of viruses by the time they paddle out.”

Mount's PPIC colleague, Greg Gartrell, says the L.A. and lower San Gabriel rivers were turned into flood control channels "to get the water off the land as fast as possible so they could build houses in floodplains."

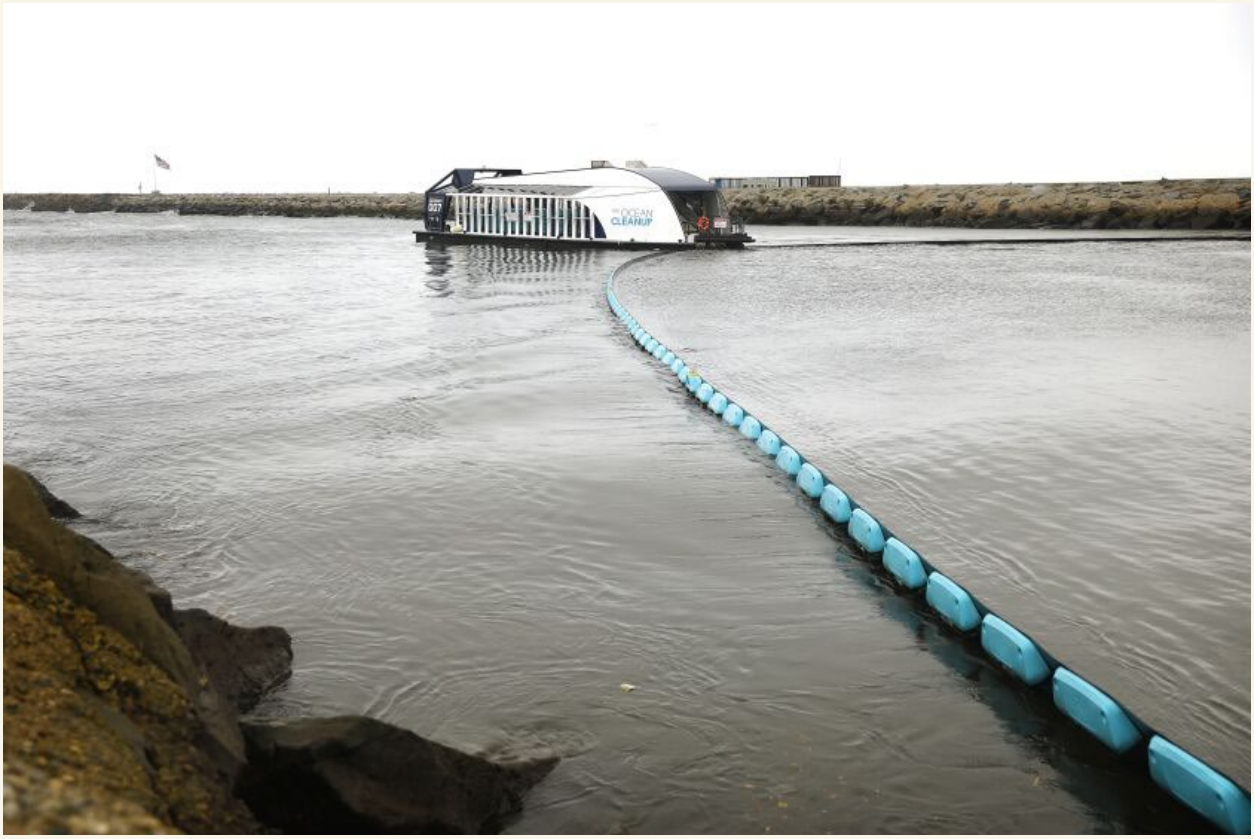
The channels "almost immediately filled up with sediment," he continues.

"They put in sediment basins to catch the sediment so it wouldn't go into the channels. Then we started losing sand on the beaches."

The sand flows down from mountains as well as ocean cliffs.

"If we didn't build in flood plains," Gartrell adds, "we wouldn't have to do many of these projects."

The issue of whether to capture and store more runoff or allow it to flow freely into the ocean is more controversial in Northern California, where there are bona fide rivers.



California

Storm is an ‘extreme test’ of waste capture system protecting the Pacific from L.A. runoff

The atmospheric river storm hitting California this week presents a test for an experimental waste-capturing system that’s intended to keep plastic bottles, diapers and other trash from flowing into the Pacific.

Jan. 4, 2023

The Sacramento-San Joaquin delta, fed by several rivers originating in the snow-covered mountains and flowing through the agriculture-rich Central Valley, is the source of drinking water for 27 million Californians and irrigation for 3 million acres of crops. The uncaptured water flows into San Francisco Bay and out through the Golden Gate into the Pacific.

“Most of this water is not just uncaptured — it’s uncapturable,” says Gartrell, a delta expert, independent consulting engineer and former assistant general manager of the Contra Costa Water District.

“And it’s not actually wasted. It’s freshening San Francisco Bay.”

It’s uncapturable because of pumping capacity and aqueduct sizes, and often in wet years because reservoirs are practically full — particularly San Luis Reservoir in Merced County, the big holding pond for both the federal and state water projects. Last week, it was only half full, but is expected to fill by spring.

The future of storage is underground in aquifers, now dangerously depleted by over-pumping.

“We have a 150-million-acre-foot capacity underground — more storage than we’ll ever be able to use,” says Wade Crowfoot, secretary of the state Natural Resources Agency.

But Mount says, “We’re currently not set up for pumping underground” in large quantities. “We haven’t gotten our act together.”

State and federal delta pumps now are operating at near capacity, sending nearly 14,000 cubic feet per second through aqueducts into the San Joaquin Valley and Southern California. But that’s tiny compared to

delta outflows, which last week were roughly 150,000 CFS. None of it wasted.

The wasted water issue is more relevant when runoff is normal or very low.

I called Mount after reading a UC Davis blog post he co-wrote six years ago, titled “Water wasted to the Sea?”

“The seaward flow of freshwater is essential to [delta] farmers, fishers, conservations, seashore lovers and government agencies that manage drinking water supplies, restore wetlands, protect coastlines and clean up sewage and storm pollution,” he concluded then.

“Wasted water to some is essential water to others.”

“I feel even stronger about it today,” Mount told me. “It’s a mistake to refer to any water that goes to the ocean as wasted.”

“I’m not saying all the water should go to the ocean. We could do a better job of storing some of it without impacting benefits.”

So, uncaptured water isn’t wasted. But when large amounts are suddenly gifted by nature, more could be stored for a non-rainy day.

https://www.latimes.com/california/story/2023-01-23/skelton-water-capture-myth-california

Newsweek

January 25, 2023

If America's Megadrought Continues, the Impact Will Be Catastrophic

The western half of the United States is currently experiencing a long-running megadrought that is putting a significant strain on water resources across the region, and experts say that another decade or two of dryness could have "catastrophic effects" on the country.

The latest data from the U.S. Drought Monitor shows that 65 percent of the continental U.S. is experiencing some form of drought or abnormally dry conditions. Some of the hardest-hit states include Utah, Oregon, Nebraska, Kansas and Oklahoma, which all contain regions that are undergoing "extreme drought" conditions.

"This region is experiencing an exceptional drought condition, with a severity that we have not seen in the past 1,200 years," Rick Relyea, director of the Darrin Fresh Water Institute at Rensselaer Polytechnic Institute, told *Newsweek*.

Heavy rainfall over the past weeks affecting some parts of the western U.S. has helped to alleviate the drought in certain regions—notably California, where the percentage of the state categorized as being under extreme drought has dropped to practically zero.

But despite the wet weather and flooding, more than 40 percent of the state is still considered to be under "severe" drought and much more precipitation will be needed over time to replenish reservoirs and groundwater stores.

The megadrought is causing drinking water shortages in some areas and reductions in the quality of drinking water, as well as reducing the amount of water available for crops, industries and households.

Water shortages in the western U.S. are being driven by increased demand from growing populations and other uses such as agriculture in combination with climate change, experts told *Newsweek*.

"Water availability is always a balance between supply and demand," Relyea said. "For many regions in the western U.S., cities have experienced rapid growth over the past century but the water supply remained relatively steady. When the megadrought began, it caused water availability to decline while water demand continued to grow."

Natural climate variability is a significant factor driving the current megadrought, although experts say anthropogenic global warming is playing a major role in the dry conditions many parts of the western United States are currently experiencing.

One study published in the journal *Nature Climate Change* suggested human-caused climate change was responsible for more than 40 percent of the soil dryness over the 2000-2021 period, likely tipping what would have been a moderate drought into megadrought territory.

When discussing the impact of the megadrought, David Feldman, a researcher with the University of California, Irvine, who specializes in water resources management, climate change policy and sustainable development, told *Newsweek* it is important to recognize that the effects differ widely at a local level, with some communities affected much more than others.

"As a general rule, we'd have to say that the region as a whole is intensely affected," he said. "There are places throughout the southwest—smaller, rural communities—that are in the position of not having stable water supplies. There are other places that are water stressed, but probably to a slightly lesser degree. Some are less affected. So it does vary."

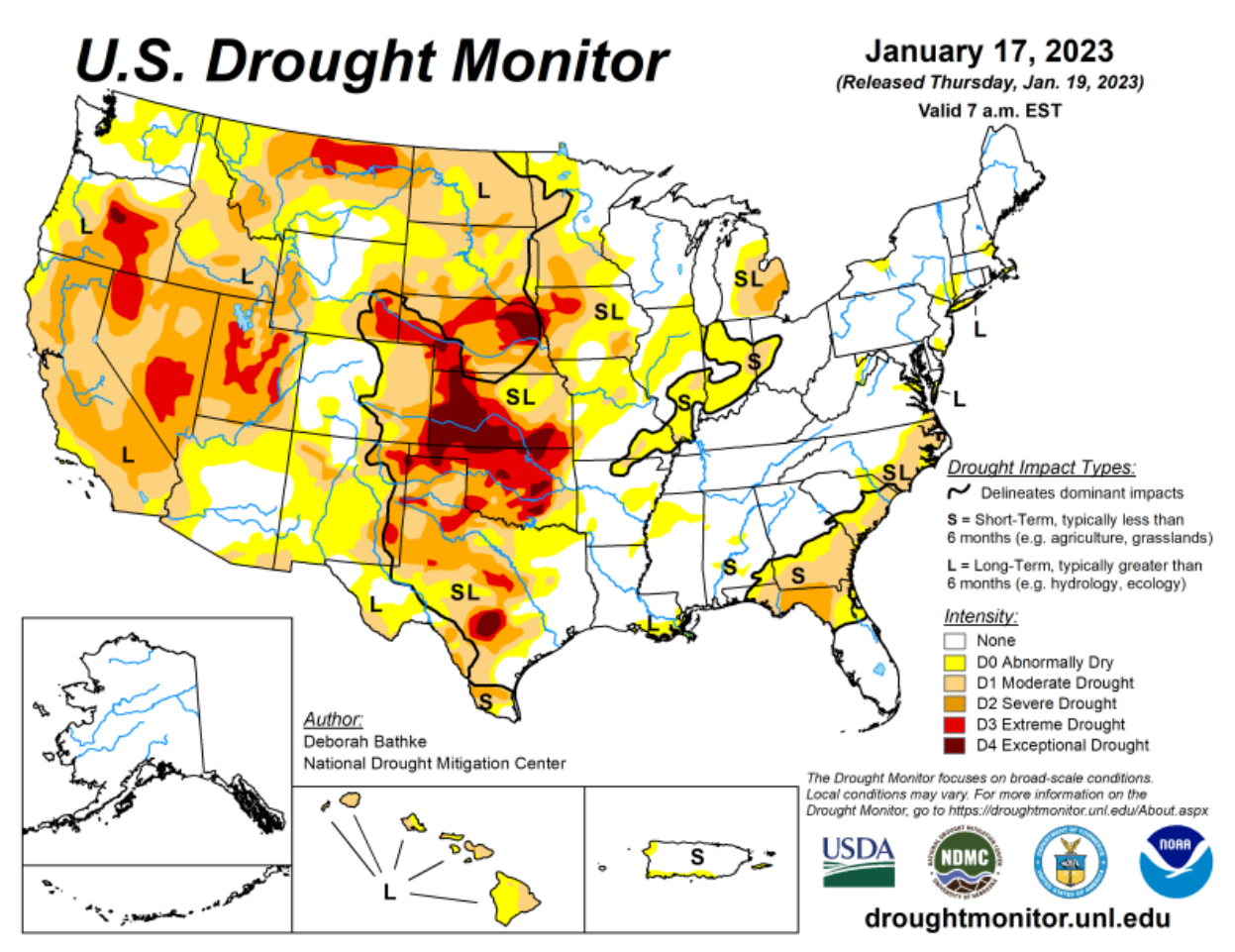
But how might the situation progress in the foreseeable future?

"This is the billion-dollar question," Relyea said. "It is hard—in fact, nearly impossible—to predict how much rain and snow will fall in future years. What we do know is that historic megadroughts have typically lasted 20-30 years, but that is no guarantee of when the current megadrought will end."

"With continued climate change, we expect to see rain and snow events that are less frequent, but more intense," he said. "Such events can cause flash flooding, which makes it difficult for the water to slowly permeate into the soil to recharge the underground aquifers."

While it is unclear how much longer the megadrought will last, some research has indicated that the dry period could continue for several more years yet, while water shortages are forecast to be widespread.

In the *Nature Climate Change* paper, models indicate there is a strong chance the megadrought will continue through 2030.



Jonathan Deason, co-director of the Environmental & Energy Management Institute at George Washington University, and a professor in the School of Engineering and Applied Science told *Newsweek* he does not expect to see much if any, relief soon because even when dry conditions abate, it's going to take several years of above-average rainfall for there to be a significant recovery.

Furthermore, a 2019 study that took into account future population growth and climate change projected that by 2071, nearly half of the 204

freshwater basins in the United States may not be able to meet the monthly water demand, without sufficient mitigation measures.

If current trends persist, the drought will continue to affect the entire country both directly in certain regions where there will be insufficient water available for homes, businesses, and farms, and indirectly as a result of higher food costs, given the huge amount of food that is produced in the western half of the United States.

The result of another decade or two of drought conditions would lead to "catastrophic effects" such as major aquifer depletions causing not only loss of groundwater resources but also land subsidence that will damage community infrastructure and even depletion of groundwater storage capacity, Deason said.

"There also would be many other adverse effects such as increases in invasive species due to the death of native plants, increased wildfires, crop failures, inflationary pressures, and so on. These changes would affect well more than half of the U.S. population directly, and essentially all of the U.S. population either directly or indirectly."

While continued drought would present significant problems, there are reasons to be optimistic, Feldman said.

"When you talk to water agencies, the actual organizations that are responsible for providing public water supply, or even when you talk to irrigation districts, they realize there is a problem and they are trying in various ways to do something about it," he said. "Water agencies are always thinking at least 20 years in advance of what they're going to do about their supplies and how they're going to supplement it. Climate change is a part of that formula.

"The thing that worries me the most is not the competence or the capability of these water planners and agencies but the less regulated uses for which we have existing conflicts here in the west over water rights. That is to say, people fighting over withdrawals of water from streams or groundwater basins. As you have less water you're going to have more likelihood of conflict," he said.

So, what can be done to mitigate water shortages amid the megadrought?

"There are many things we can do, and in fact, are doing," Feldman said. "We do conserve—there are mandated cutbacks of water that we see during periods of drought. But we need to do much better."

Continued drought for another decade or so would likely see residents, businesses, and farms in the region being subjected to more severe water rationing and increased use of water-conservation strategies.

In homes, this may include retrofitting older housing stock and commercial buildings with low-flow water appliances as well as bans on watering lawns. In agriculture, which is the primary user in most areas, expanded efforts may be implemented to deploy water-saving irrigation technologies while farmers might shift to less water-thirsty crops.

"The drought will also inspire a new generation of water-saving technologies," Relyea said.

A persistent drought will also mean communities increasingly depend on having to import their water supply or share water supplies, according to Feldman. But aside from conservation measures, planners will need to "aggressively" adopt measures that already exist in some locations.

"We need to recycle more wastewater. We are doing this already in some places," Feldman said. "You don't necessarily have to recycle the wastewater to a quality useful for drinking. You can use it for agricultural irrigation or landscaping, which in effect will conserve precious drinking water supplies.

"We can also be harvesting more rainwater—this is done in various parts of the region now," he said. But we need to do this more aggressively. The climate models suggest that while we're going to have a longer period of drought, that may be punctuated by short and intense periods of very heavy precipitation. When that precipitation occurs, we need to figure out ways to capture and store it so that it can be used in the drier periods."

Desalination is also an option that is available although it is very expensive, very energy intensive, and has some environmental impacts that will have to be mitigated.

"It's probably not likely to be the very first choice that most water providers will lean toward, but it probably will be in the mix in certain communities," Feldman said.

https://www.newsweek.com/megadrought-impact-united-states-catastrophic-1775438

Maven's Notebook

January 26, 2023

THIS JUST IN ... State Water Project allocation increased to 30%

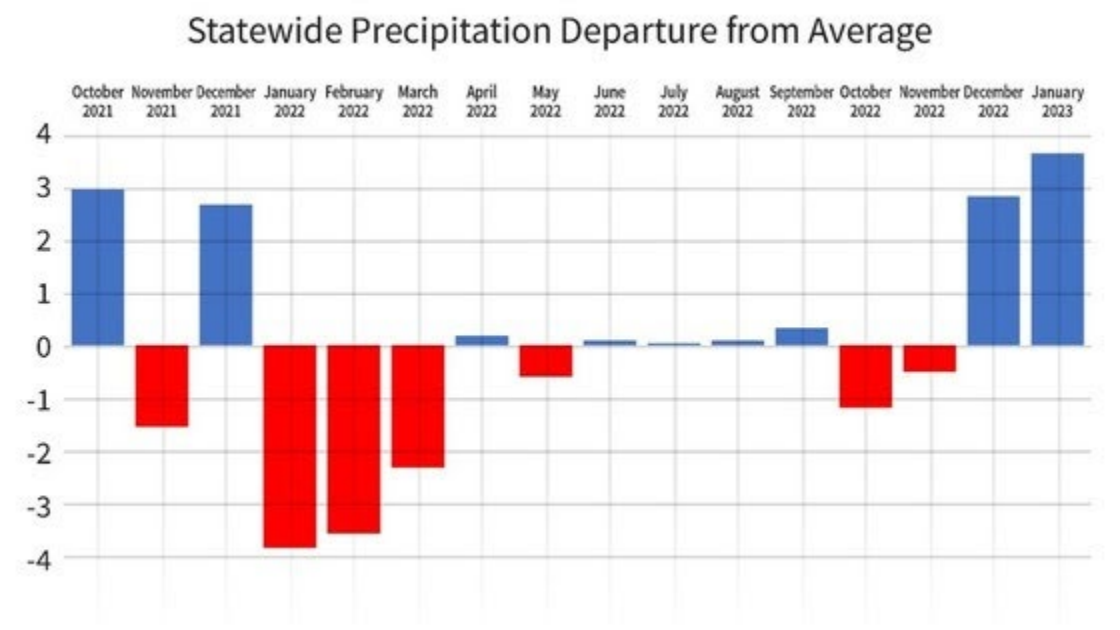
Recent Storms Allow State Water Project to Increase Expected 2023 Deliveries to 1.27 Million Acre-Feet of Water

From the Department of Water Resources:

The Department of Water Resources (DWR) today announced that recent storms will allow the State Water Project (SWP) to boost deliveries to 29 public water agencies serving 27 million Californians. Based on the

amount of water captured and stored in recent weeks, DWR now expects to deliver 30 percent of requested water supplies – or 1.27 million acre-feet — in 2023, up from the initial 5 percent announced on December 1.

The allocation increase is the direct result of extreme weather in late December and nine atmospheric rivers in early January that helped fill reservoirs and dramatically increase the Sierra Nevada snowpack. The SWP's two largest reservoirs (Oroville and San Luis) have gained a combined 1.62 million acre-feet of water in storage — roughly enough to provide water to 5.6 million households for a year. While Water Year 2023 began with below average precipitation, conditions shifted to extreme above average conditions.



"We are pleased that we can increase the allocation now and provide more water to local water agencies," said DWR Director Karla Nemeth. "These storms made clear the importance of our efforts to modernize our existing water infrastructure for an era of intensified drought and flood. Given these dramatic swings, these storm flows are badly needed to refill groundwater basins and support recycled water plants."

The updated SWP delivery forecast takes into account current reservoir storage and is based on a conservative runoff forecast. It does not take

into account the current Sierra Nevada snowpack. DWR will conduct snow surveys on February 1, March 1, April 1, and May 1 and may further update the allocation as the water supply outlook becomes clearer with the new data.

In addition to on the ground surveys, DWR will gather data from its Airborne Snow Observatory (ASO) surveys. For the second year in a row, DWR is broadening the deployment of these more sophisticated technologies, such as ASO surveys, that can collect snow measurements farther upslope of the Sierra Nevada. The data from these flights, which use LiDAR and spectrometer technology to measure snowpack across broad swaths of key watersheds, will be used by DWR to get a more accurate account of California's snowpack and to update water supply runoff forecasts. Since the storms California experienced this month saw variable snow elevations, the data from ASO flights will help DWR verify snow course and snow sensor data and understand how snow has been distributed across the Sierra Nevada.

DWR cautioned that while recent storms have been impressive, two months remain in the wet season and California could see a return to warm and dry conditions prior to April 1. Californians should continue to

use water wisely to help the state adapt to a hotter, drier future and the possible return of drought.

The SWP pumps currently are operating at maximum capacity of 9,500 cubic feet per second (cfs) and will continue to be adjusted as needed to meet State and federal requirements. However, had the proposed Delta Conveyance Project been in place, the SWP could have stored an additional 202,000 acre-feet of water – enough to supply more than 710,000 households for a year – between January 1 and January 23 while staying within compliance of rules to protect endangered species.

California traditionally receives half its rain and snow by the end of January. Water managers will reassess conditions monthly throughout the winter and spring. Starting in February, the assessments will incorporate snowpack data and runoff forecasts.

Water managers will be monitoring how the wet season develops and whether further actions may be necessary later in the winter. Additional actions that have been taken previously, such as submission of a Temporary Urgency Change Petition (TUCP) or installation of the West False River Emergency Drought Salinity Barrier in the Sacramento-San Joaquin Delta, are unlikely this year based on current conditions.

Each year, DWR provides the initial SWP allocation by December 1 based on available water storage, projected water supply, and water demands. Allocations are updated monthly as snowpack and runoff information is assessed, with a final allocation typically determined in May or June.

The lowest initial SWP allocation was zero percent on December 1, 2021, with limited water designated only for any unmet human health and safety needs. Last year's final allocation was 5 percent plus unmet human health and safety needs. Four of the 29 State Water Contractors ultimately requested and received additional human health and safety water supply.

https://mavensnotebook.com/2023/01/26/this-just-in-state-water-project-allocation-increased-to-30-2/