

# Crescenta Valley Water District

Weekly News Articles

February 26, 2023



**KLAS**

**February 27, 2023**

## **Will Colorado River return to health this year? Snowpack remains a third above normal**



LAS VEGAS (KLAS) — February snowfall might have fallen behind January's brisk pace, but the Upper Colorado River Basin will go into March still well above average snowpack levels.

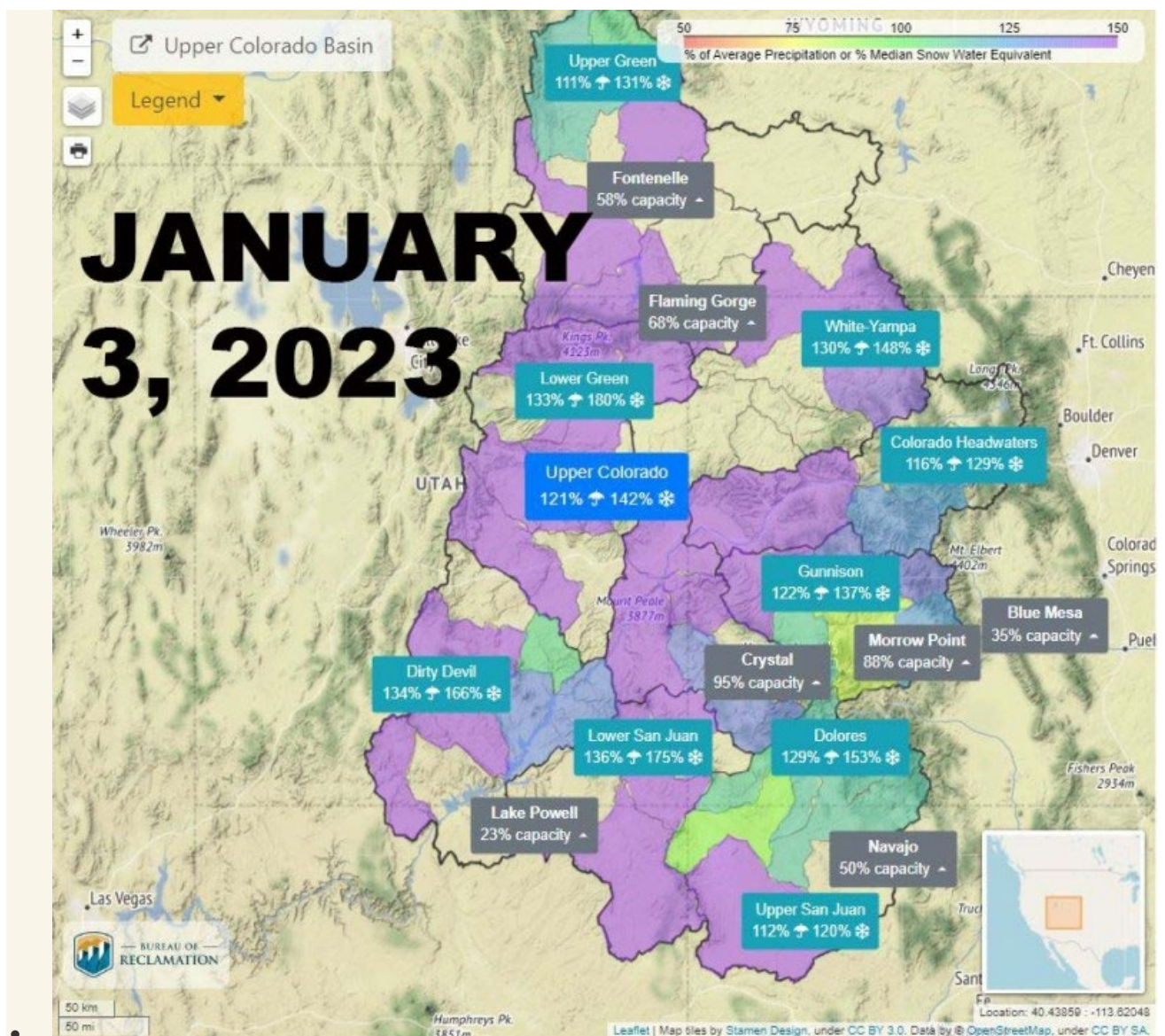
With all the headlines about snow in California and Utah, the area that matters most to the Las Vegas valley and Lake Mead is the region around the Colorado River's headwaters — where the river is born among the peaks in and around Rocky Mountain National Park.

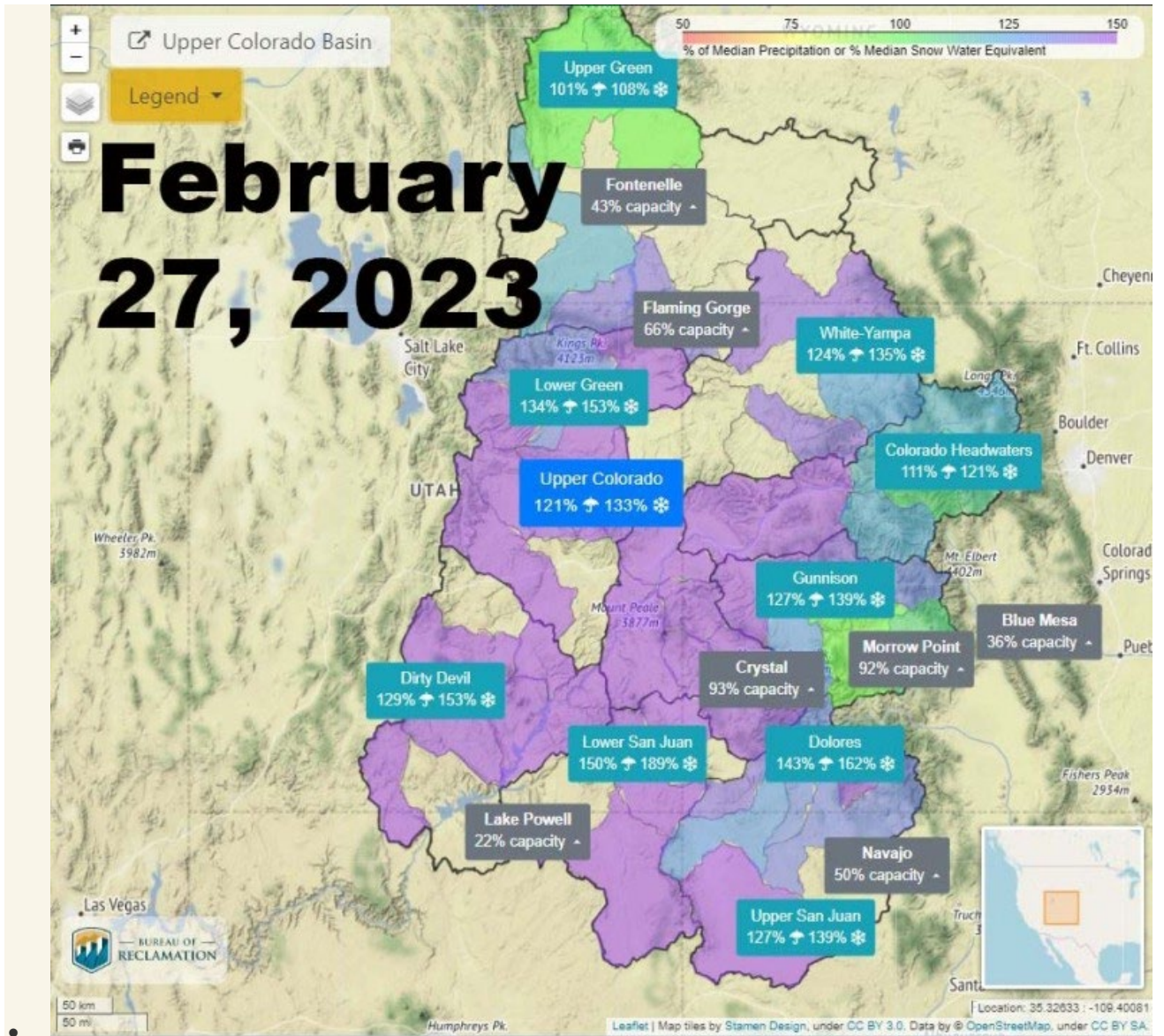
Overall, the Upper Basin is at 133% of normal snow water equivalent (SWE) in the snowpack that will provide water for 40 million people this

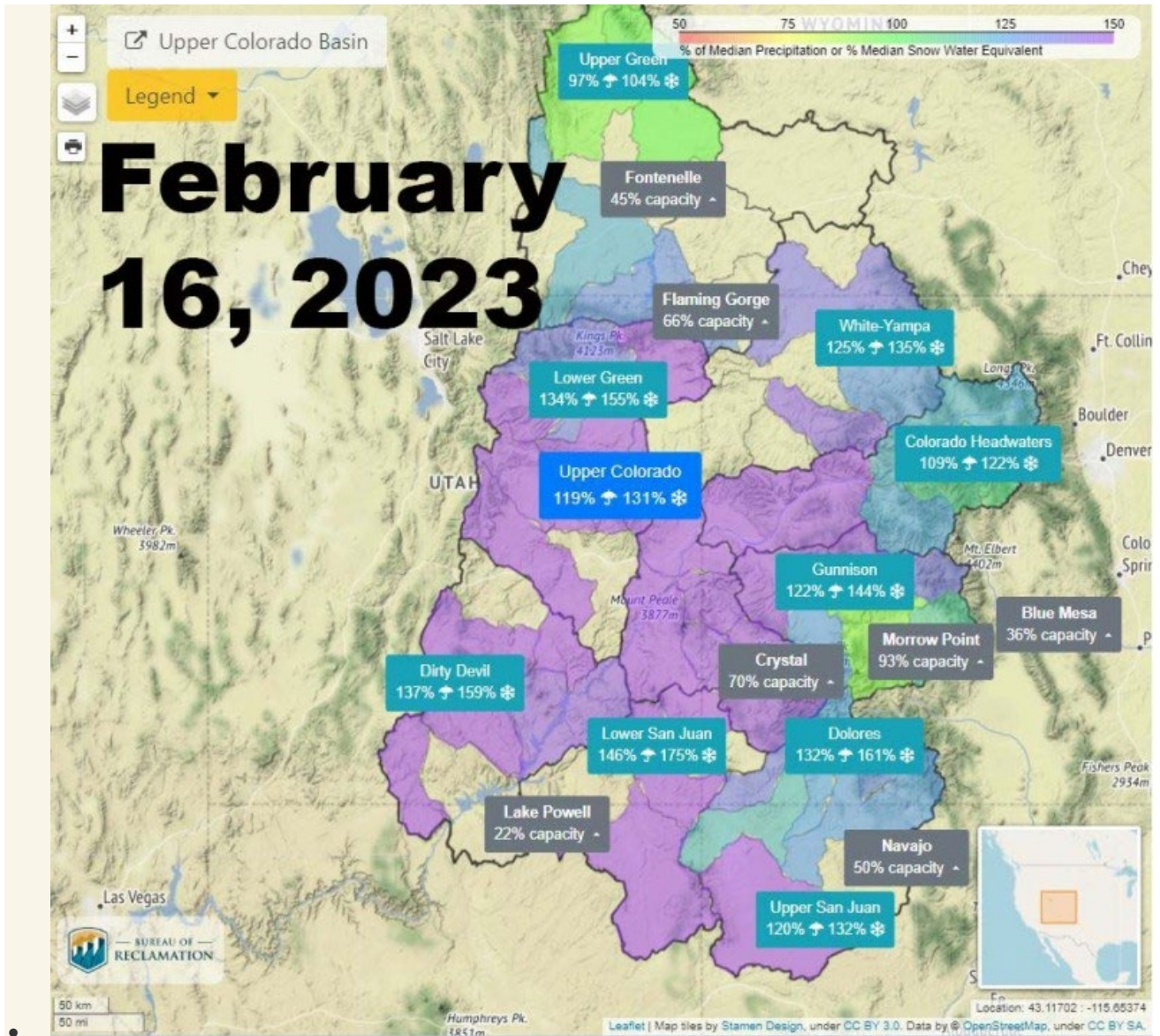
year, according to an update today from the U.S. Bureau of Reclamation. And while 133% is still quite a bit above average, the number has been shrinking since mid-January, when “atmospheric river” moisture dropped off.

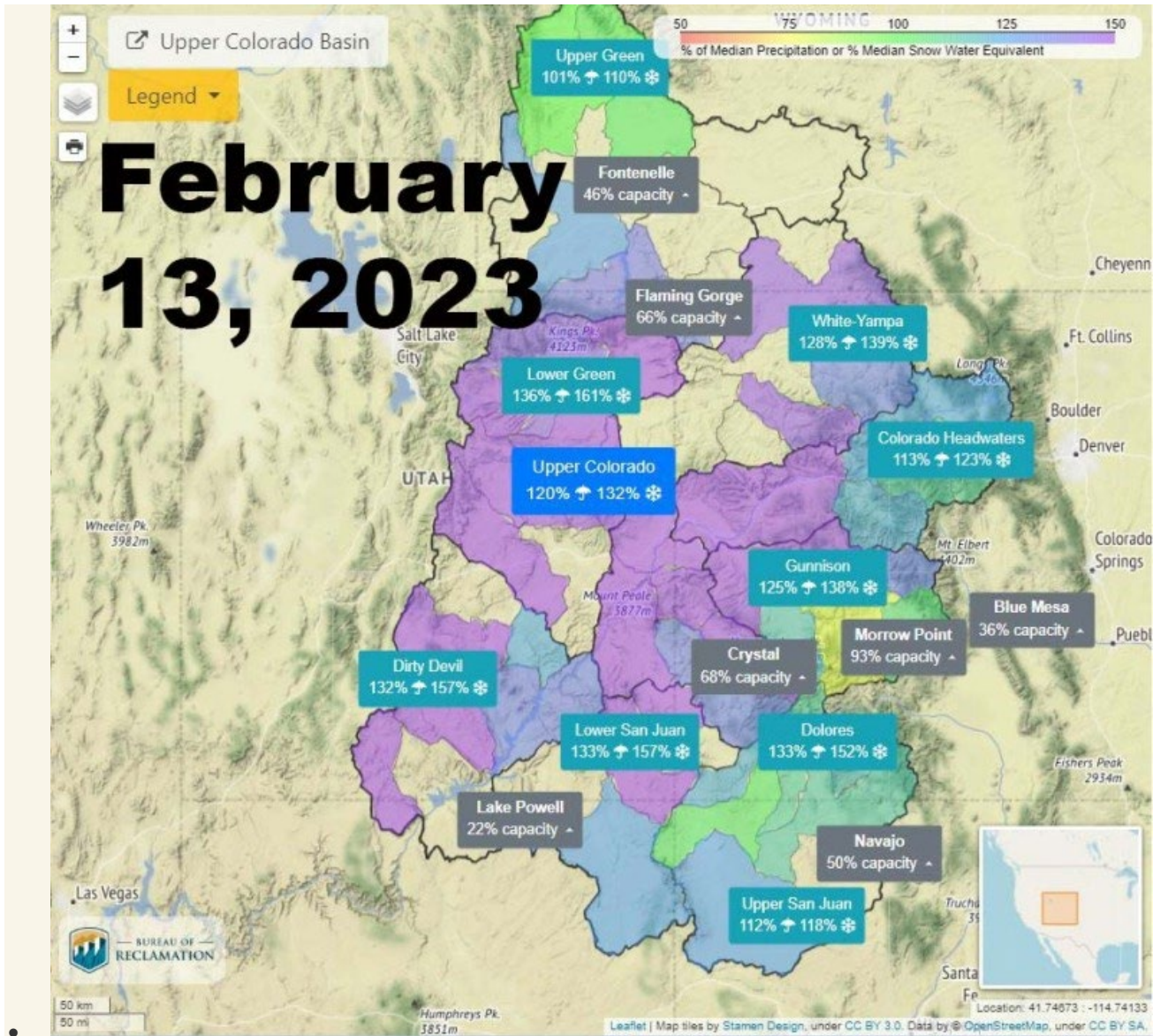
Storms in the southern Rockies have helped elevate the numbers. Snow in the San Juan range and parts of southern Colorado have built snowpack levels far above average.

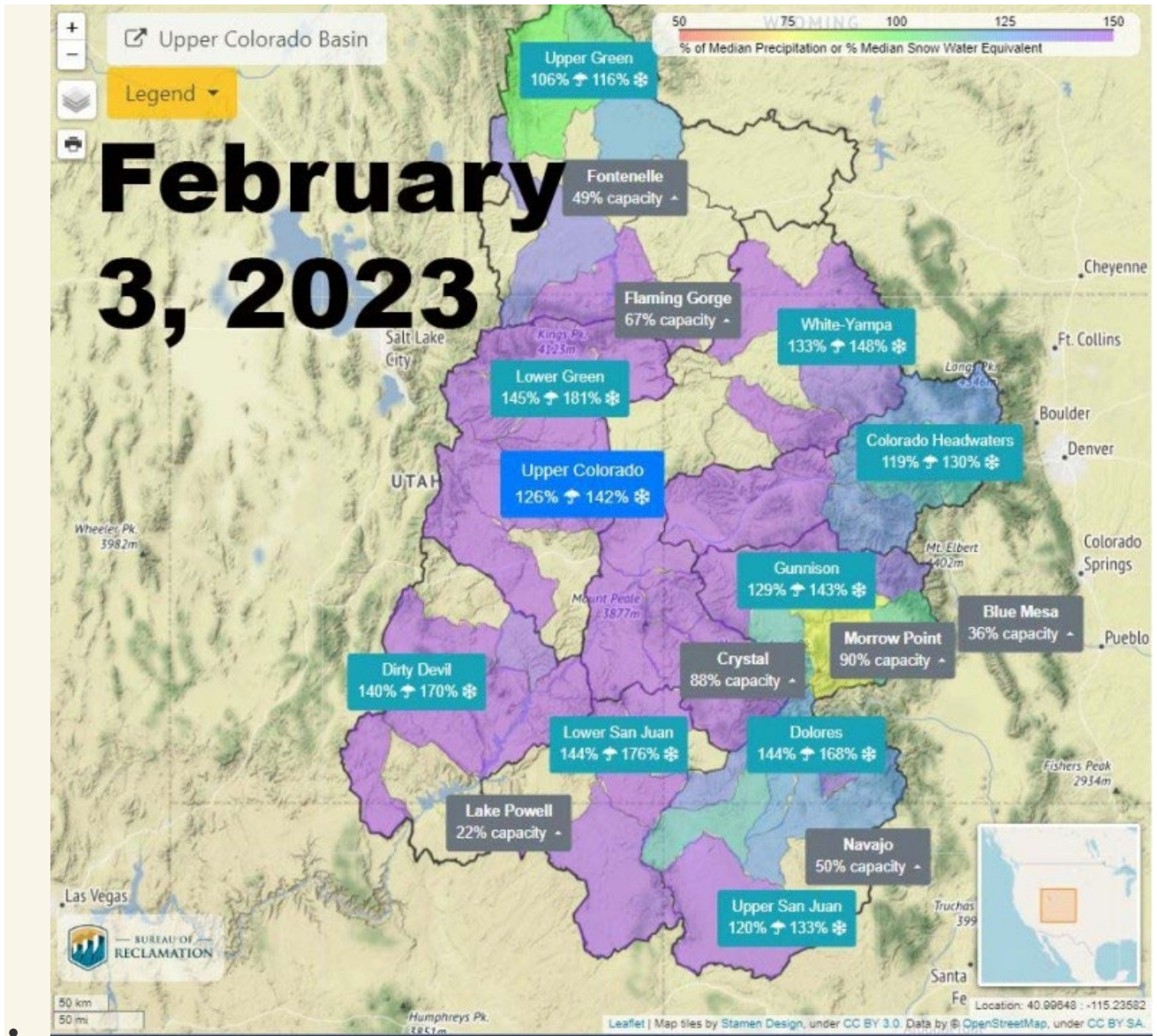
See how the snowpack levels have changed over the past two months (blue box in the middle of each image below):

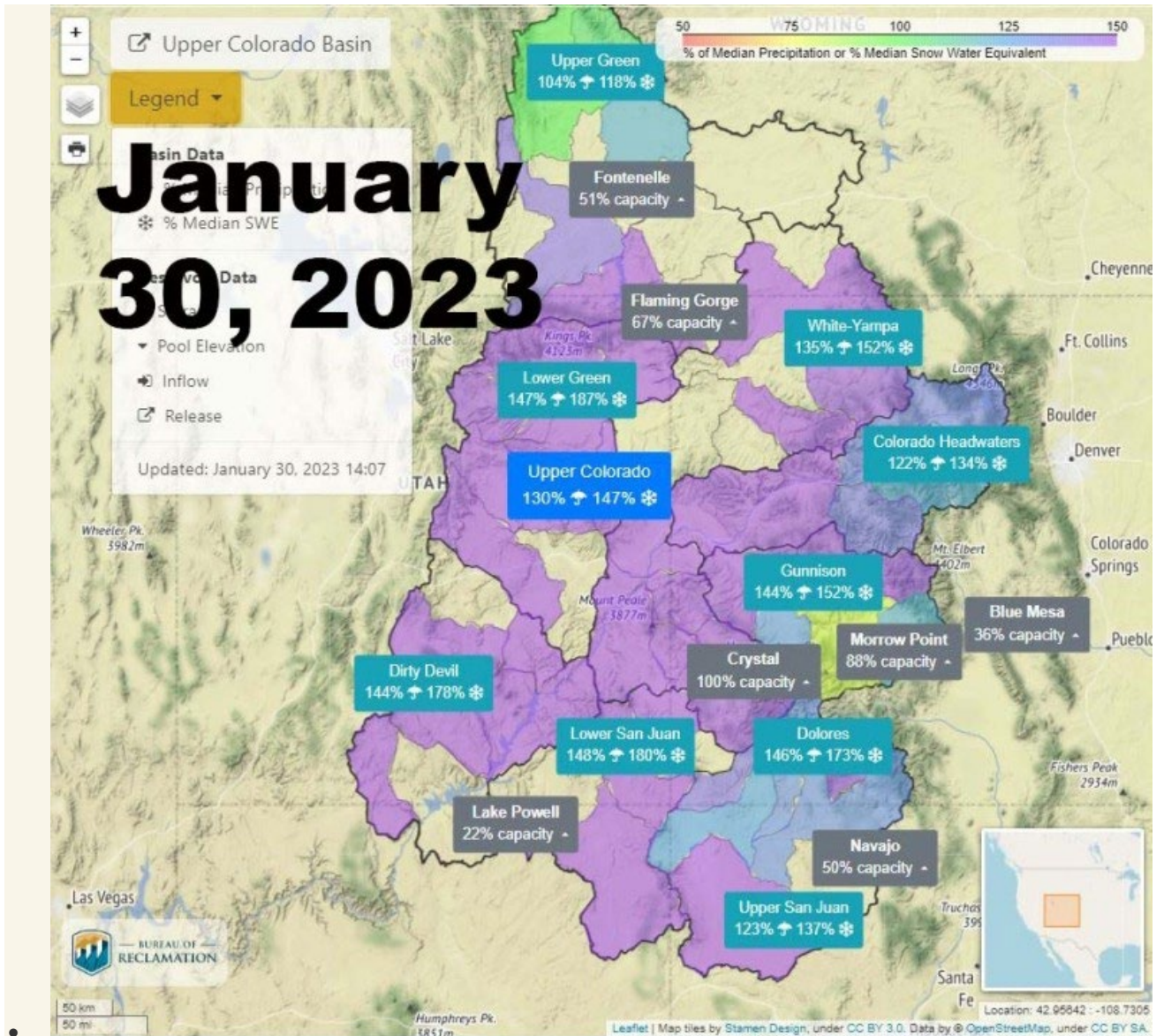


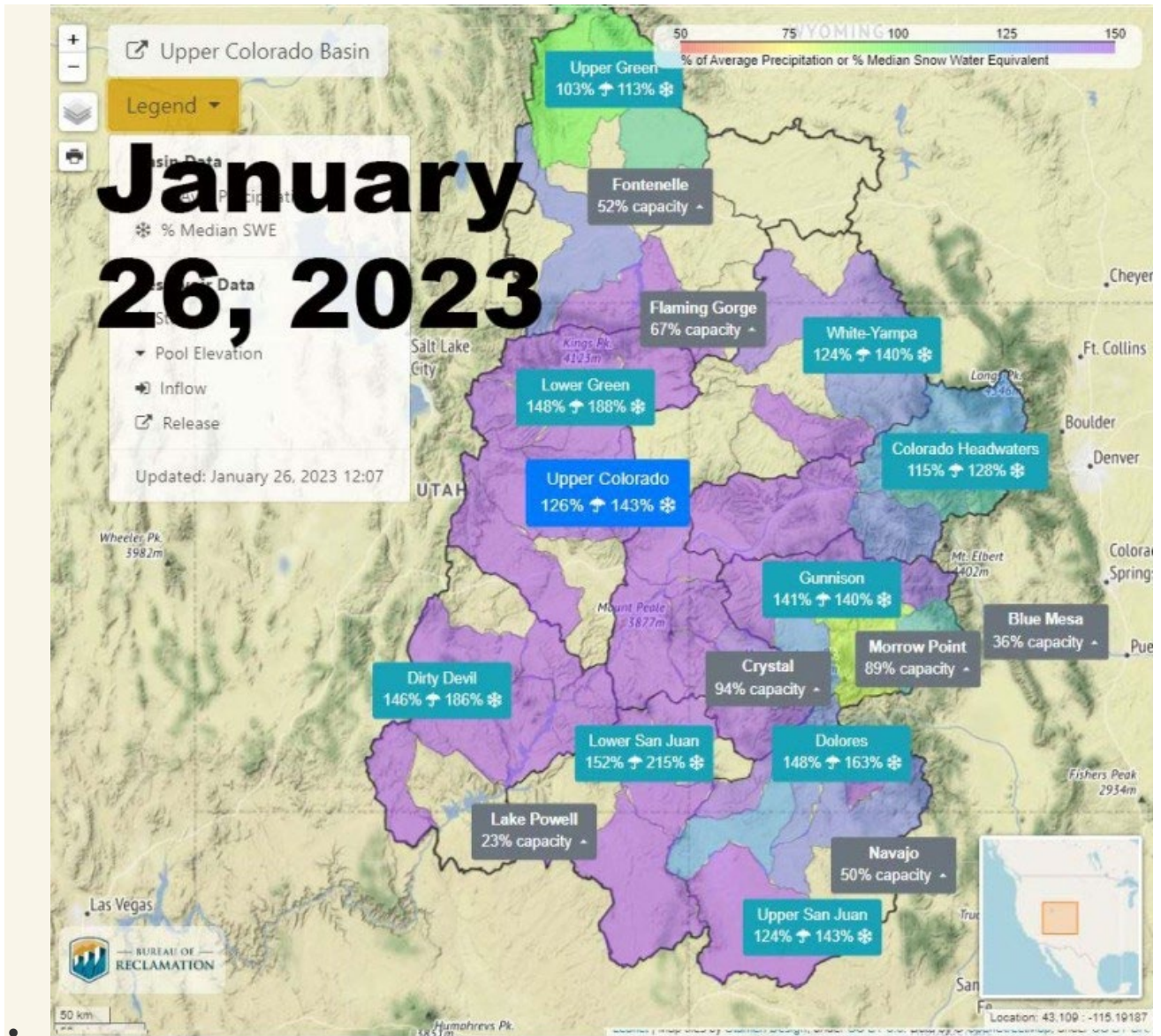


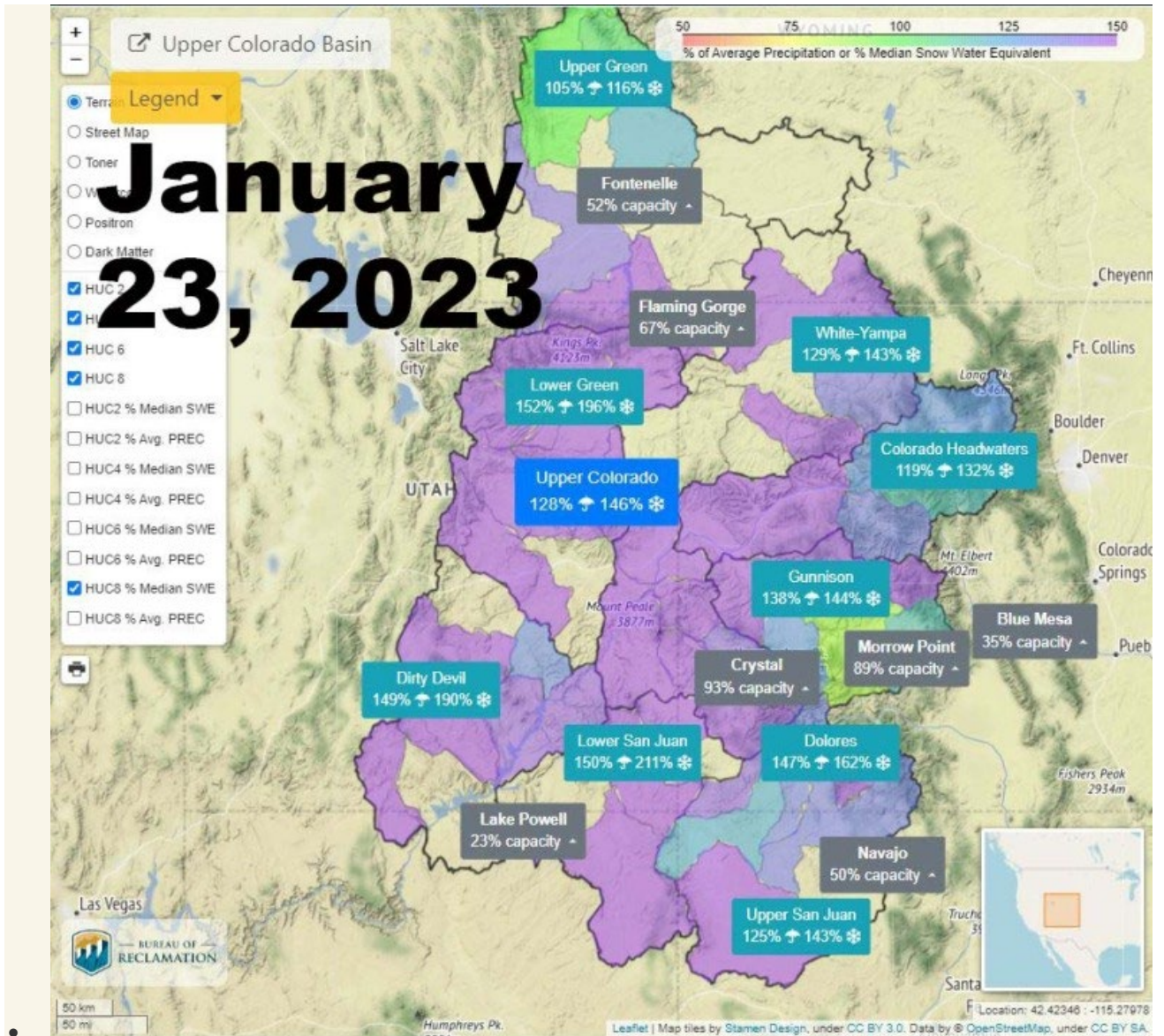


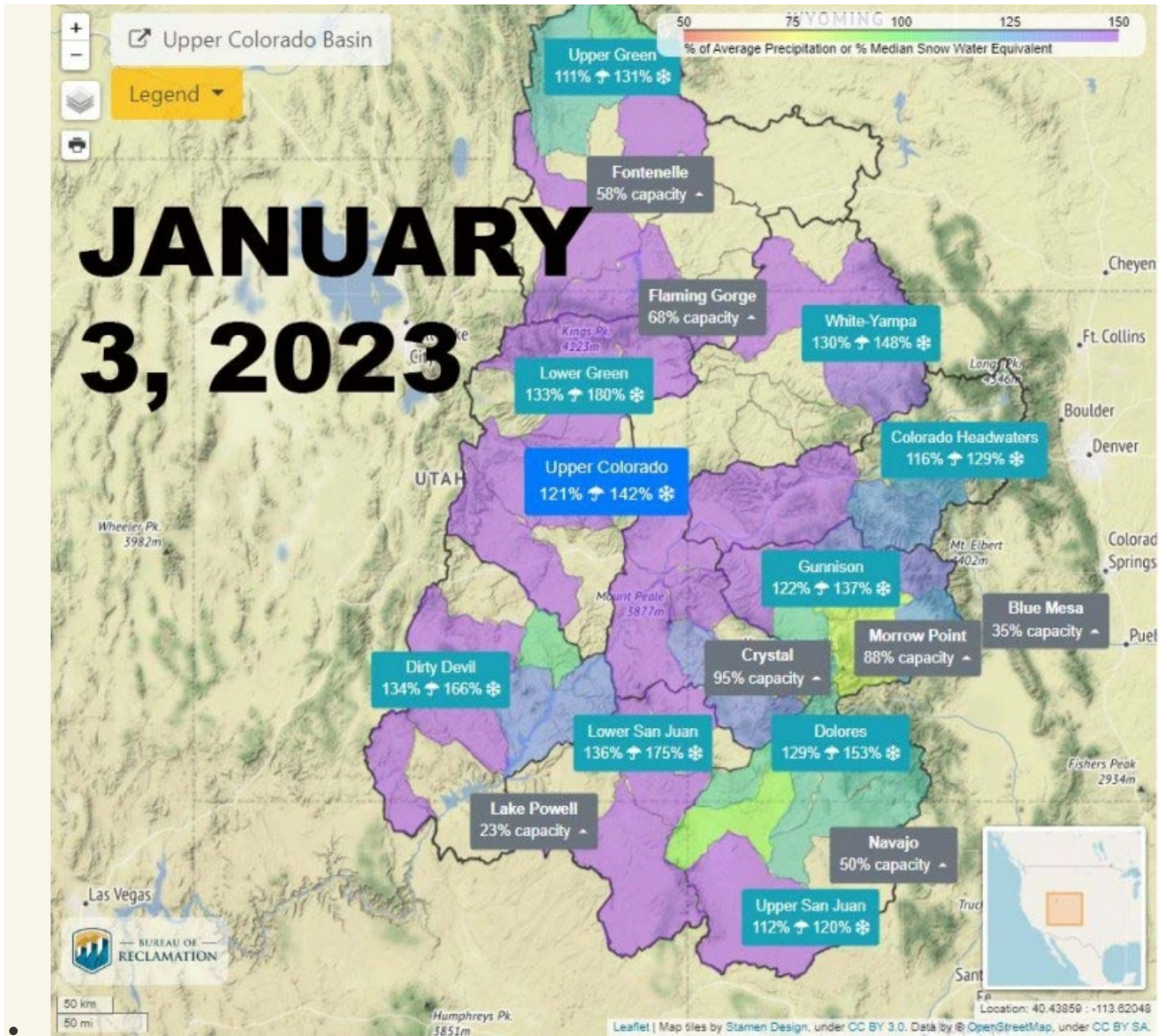


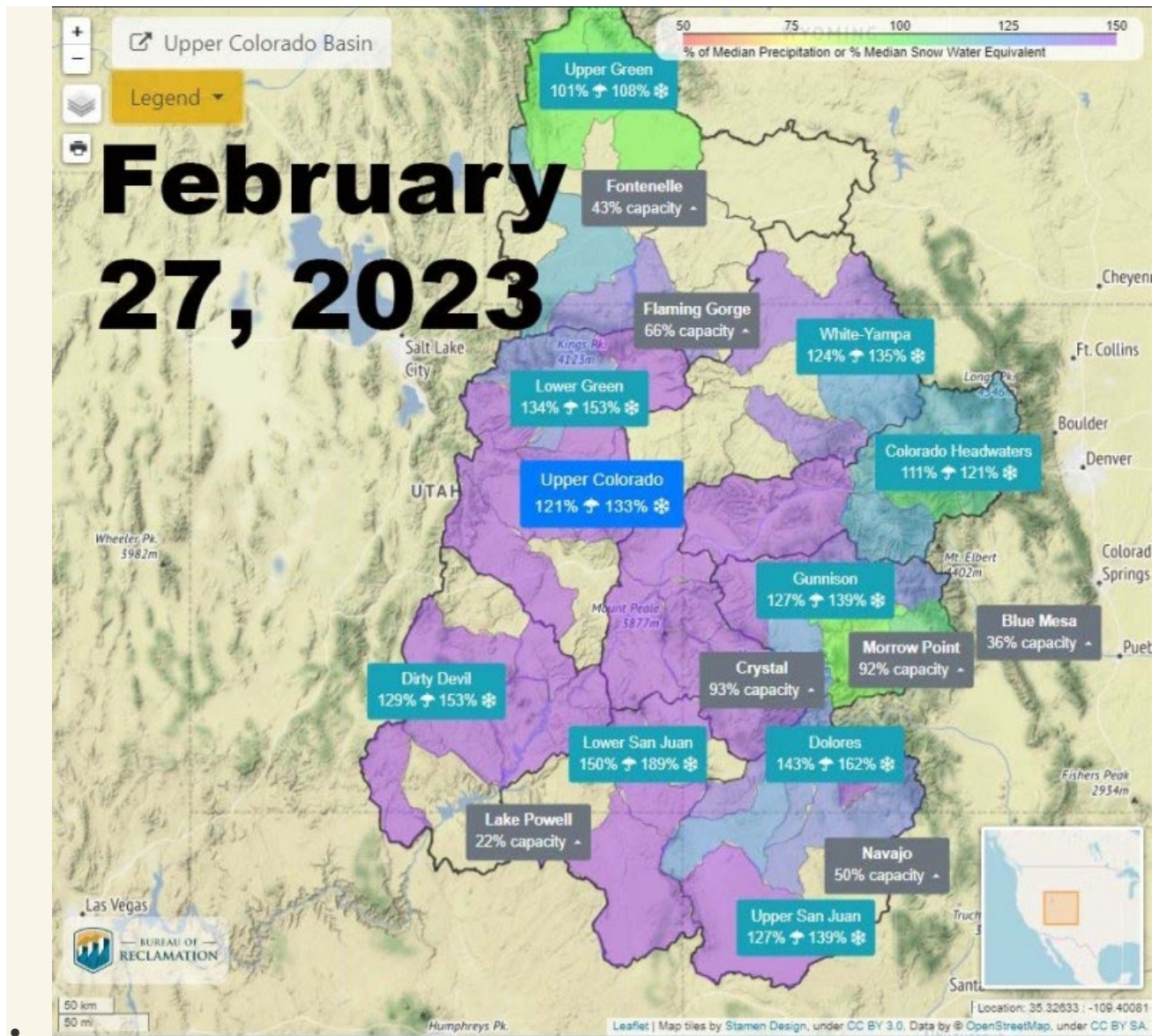












And now, new snow is in the forecast. More than half of the next 14 days are expected to bring “moderate to heavy” snowfall in the central Rockies.

In five weeks, we will be near the typical “deadline” for building snowpack levels. On April 6 — the day scientists see as the usual peak of snowpack levels — all the weather watching will turn to watching the snow melt.

As the water stored in mountain snowbanks begins its long journey through creeks, rivers and reservoirs, the science will turn to new

observations of how climate change has affected “normal” Colorado River conditions. More water absorbed into soils, more evaporation in hot, dry conditions — and the rising temperatures in the Desert Southwest.

Scientists have said that “normal” river flows are about 20% below where they were before the megadrought that began at the turn of the century.

Decisions by water managers in raising or lowering reservoirs along the river’s path, and how to meet the terms of a 100-year old “Law of the River” will become the focus. And even if the snowpack levels bring above-average water this year, it’s only temporary relief. Politicians and conservationists agree on that point.

<https://www.8newsnow.com/news/local-news/will-colorado-river-return-to-health-this-year-snowpack-remains-a-third-above-normal/>

February 27, 2023

# This reservoir on the Sacramento River has been planned for decades. What's taking so long?

### In summary

The Sites Reservoir — a \$4.4 billion project to add dams and store more water that'll be sent south — is still years away from completion. The final environmental report is expected this year, before construction of two large dams and other structures can begin.

Last century, California built dozens of large dams, creating the elaborate reservoir system that supplies the bulk of the state's drinking and irrigation water. Now state officials and supporters are ready to build the next one.

The [Sites Reservoir](#) — planned in a remote corner of the western Sacramento Valley for [at least 40 years](#) — has been gaining steam and support since 2014, when voters approved [Prop. 1](#), a water bond that authorized [\\$2.7 billion](#) for new storage projects.

Still, Sites Reservoir remains almost a decade away: Acquisition of water rights, permitting and environmental review are still in the works. Kickoff of construction, which includes two large dams, had been scheduled for 2024, but likely will be delayed another year. Completion is expected in 2030 or 2031.

Sites Reservoir would store as much as 1.5 million acre-feet of Sacramento River water and could eventually boost water supplies — especially in dry years — for more than 24 million people, mostly in Southern California, and 500,000 acres of Central Valley farmland. The reservoir is now projected to cost \$4.4 billion, with Prop. 1 covering up to

\$875 million and much of the rest coming from federal loans to water suppliers.

For years, state lawmakers, farm representatives and city water suppliers have bemoaned that the reservoir hasn't been built yet, and their criticism has escalated during rainy periods.

In less than two weeks of storms last month, Sites could have captured 120,000 acre-feet of water, enough to serve about 1.3 million Californians for a year, [according to water agencies supporting the project](#).

Rep. John Garamendi, a Democrat from Walnut Grove, is one of many long-time Sites advocates who have grown impatient waiting for the new reservoir.

“California just received 22 trillion gallons of rainwater last month, which could have filled Sites and provided a greater supply of water for the dry months,” Garamendi told CalMatters.

Loading graphic...

Gov. Gavin Newsom has rallied for the project, and his 2022 [water strategy](#) outlined a plan to create as much as 4 million acre-feet of new water storage space.

The Metropolitan Water District of Southern California, one of many potential investors, might get as much as 20% of the reservoir's water. The Coachella Valley Water District, Santa Clarita Valley Water District and Bay Area residents also could be receiving Sites' water.

Once built, the reservoir will almost certainly provide water storage benefits for people. But whether it will benefit the environment or not is being debated.

Environmental groups oppose the reservoir, fearing it will draw too much water from the Sacramento River and harm imperiled populations of salmon and other fish. An environmental review, which already has

gone through multiple rounds of revisions and public comment periods, is still underway and could wrap up this summer.

The reservoir's slow pace of progress doesn't surprise leaders and water supply experts.

"For any large gray infrastructure project, permitting and planning are stages that take time," said Nina Hawk, chief of Bay-Delta Resources for the Metropolitan Water District, which has chipped in about \$30 million for Sites planning.

Jerry Brown (not the former governor of the same name) of the Sites Project Authority, which represents local water districts pursuing the project, said it takes many years to develop and plan projects of this scale.

"My personal rule of thumb is that for every year of construction you spend about three years in the planning-permitting-engineering stage," he said. Since Sites' construction takes six years, the process would be expected to take 18 years.

### **Who gets the water? And how much?**

Proponents say the Sites Reservoir is a necessary step to bolster California's water supply, which is increasingly strained by drought as well as intense wet weather and flooding. Moreover, pressure is on Southern California to sharply cut its use of water from the Colorado River, perhaps increasing the importance of Delta water to Southern California.

Sites would make a small splash in California's water supply: Major reservoirs now hold 50 million acre-feet and Sites would add only about 1.5 million more. The Delta's state and federal systems export an average of 4 to 5 million acre-feet a year. (An acre foot is about 326,000 gallons.)

"It's an increase of a few percent, but it's real water to someone," said [Jay Lund](#), a UC Davis professor of civil and environmental engineering.

The Metropolitan Water District — which delivers 1.6 million acre-feet of imported water a year to 19 million people — would receive about 50,000 more from Sites., adding just 3% to its supply.

Another water district, the Zone 7 Water Agency that serves 270,000 people in the East Bay, would receive about 10,000 acre-feet annually from Sites, increasing its supply about 20%. Valerie Pryor, its general manager, said frequent droughts and residential demand have squeezed supplies, making Sites an appealing option.

*Sites would make just a small splash in California's water supply, but every drop helps. Major existing reservoirs hold about 50 million acre-feet, and Sites would add 1.5 million.*

Most of the Zone 7 agency's water comes from the State Water Project, which is increasingly strained by drought and so far this year will deliver only [35% of requested water](#).

“With declining reliability and some population growth, we do need some additional water supply,” Pryor said. She added that stormwater capture and continued conservation efforts will only go so far in making ends meet.

Climate change models suggest California will see longer, drier droughts and shorter but more intense wet periods – a pattern that has emerged prominently in the past several years. This is the sort of pendular weather pattern that Sites is being designed to take advantage of, by grabbing water when it's abundant.

### **A massive project: How the reservoir will be built**

Named for the historic quarry town of Sites, which will be submerged if the project is built, the reservoir would occupy remote hills and creek valleys west of the Sacramento River. Two large dams would contain the water, along with seven structures called saddle dams, which will close in the northern side of the basin like the rim of a large bowl.

Sites Dam will be nearly 300 feet high and more than 700 feet in length; Golden Gate Dam will be about the same height and three times as long.

The saddle dams, though not as tall, will be huge features, as well: One is sketched out in planning documents at 3,422 feet in length. Also included is a pair of tunnels 23 feet wide and 3,000 feet long. Building all of these features will account for much of the reservoir's \$4 billion price tag.

Mixing concrete for the dams could require as much as a million gallons of water per day for four years.

Other big tasks include buying land from local owners, ripping out a country road, demolishing structures, removing septic systems, clearing trees, scouring out mountains of topsoil and distributing it to local farms, and relocating two private cemeteries.

About 15 families live in and near the town of Sites, so building the reservoir will require their relocation. Brown, the project authority's executive director, said acquiring the private properties will be included in the project cost.

Homes and other structures in the small Sacramento Valley town of Sites will be removed when the Sites Reservoir is built. Photo by Julie A. Hotz for CalMatters

About 160 miles of existing canals will be used to transfer water into and out of the reservoir, with plans to build just 20 miles of new conveyance, according to Brown. Energy to pump water into the reservoir — a lift of 300 feet — will come from hydroelectricity generated by the dam's outflow, plus a planned solar array.

Brown said the availability of preexisting canals makes the project viable.

"If we didn't have all of that, this project would not be affordable," he said.

Sites would be different from most of California's other large reservoirs. Shasta, Oroville, Hetch Hetchy and many others were built by damming large rivers. But Sites would be what's called an off-channel reservoir, built away from the river. During storms it will fill with water, which will be delivered via canals and pipelines.

## What are the environmental impacts?

Off-channel reservoirs can cause less environmental harm because they don't block major fish migration routes. Still, environmentalists have questioned the reservoir's feasibility and operation: Will there be enough water to fill it? And what impacts will doing so have on fish and other wildlife in the Sacramento River?

John McManus, president of the Golden State Salmon Association, noted that few, if any, of California's dams have been beneficial for Chinook salmon. Today, several native fish species are close to extinction, and the commercially valuable fall-run Chinook salmon may be in danger of dropping below fishable numbers, which could lead to a shortened fishing season this summer, or a complete closure.

McManus thinks operation of Sites Reservoir will worsen the Chinook's plight. "We don't need more reservoirs and dams that will divert more water from the rivers," he said.

Biologist [Carson Jeffres](#) is on the fence about the project. Jeffres, a senior researcher at the UC Davis Center for Watershed Sciences, said the impact will depend on how and when water is diverted from the Sacramento River to fill it. He worries that filling the reservoir could drain the floodplains along the river used by fish and wildlife.

"I see so much potential and so much peril at the same time," Jeffres said. "The details of the operation will determine how this plays out."

The Sites planning process has involved [multiple rounds](#) of environmental impact reports and a few major changes to the design plan. A 2017 environmental review was deemed incomplete, leading to a revised draft in 2021. In May, the Sites authority is releasing its final report addressing the potential environmental impacts.

*"I see so much potential and so much peril at the same time. The details of the operation will determine how this plays out."*

*carson Jeffres, UC Davis Center for Watershed Sciences*

There was a big hiccup last year, too, when the State Water Resources Control Board ruled that the project's application for water rights did not adequately analyze water availability. The water board is currently mulling over a possible, controversial update to its plan, which would require that 55% of the river's unimpaired flow reach San Francisco Bay for environmental benefits. The board determined that the Sites analysis failed to "assess or consider" these changes.

The Sites Project Authority resubmitted a more thorough analysis in January and is now waiting for the board to issue a water right that will allow the reservoir to divert water.

Water board officials declined an interview request. But in a brief written statement they said before a water right is granted, "the board must ensure that instream flows necessary for the protection of water quality, fish and wildlife in the Delta can be met sustainably."

"At this point we are at the finish line with what we intend to proceed with," Brown said. "We are full-steam ahead."

Among changes to lessen the environmental impact, the reservoir's capacity has been downsized from 1.8 million acre-feet to 1.5 million.

*"At this point we are at the finish line with what we intend to proceed with. We are full-steam ahead."*

*Jerry Brown, Sites Project Authority*

Doug Obegi, a water attorney with the Natural Resources Defense Council, said there's simply not enough water left in the Sacramento River most years to operate Sites without causing more harm to critically endangered fish.

"A project that is biologically sustainable is not cost-effective, and a cost-effective project leads to extinction, and that is the rub," Obegi said.

### **Costly water**

The reservoir must provide public benefits in order to receive Prop 1 funding. This money is allocated under the assumption that operating the

reservoir will provide recreation opportunities, ecosystem and water quality improvements and enhanced flood control for downstream communities.

Paul Cambra, a public information officer with the California Water Commission, said an assessment of these public benefits will ultimately determine whether all, or just a portion, of the Prop 1 funding will support the reservoir's construction.

A [2022 federal loan](#) of \$2.2 billion and a \$449 million loan from the U.S. Department of Agriculture to the Sites Project Authority, plus a [financial pledge](#) from the U.S. Bureau of Reclamation, will cover much of the rest of the cost.

A map of the proposed Sites Reservoir shows the locations of dams and other parts of the project. Photo by Julie A. Hotz for CalMatters

Once built, the reservoir's water will cost about \$750 per acre-foot, according to Brown.

"That's at the reservoir," he said. The farther it travels, the more the water costs for the recipient, and for Metropolitan, Hawk said, the final cost per acre-foot will be roughly \$1,000 to \$1,300 — considerably more than the average State Water Project's cost of \$667 per acre-foot.

But Kightlinger, who helped conduct detailed cost-benefit analyses of the project when he worked for Metropolitan, said it's a lot cheaper than desalinating water.

The Sites reservoir "saves us billions and billions" that would be spent on desalination, Kightlinger said.

Pryor, at the Zone 7 Water Agency, said she understands the need for a cautiously paced planning stage "for a mega-project" like Sites. However, with every drought and deluge that comes, the reservoir's absence is sorely felt.

“The last three dry years, we were thinking, ‘Wouldn’t it be great if Sites was here?’” she said. “And with the January storms we had, we were thinking, ‘Wouldn’t it be great if Sites was here?’”

<https://calmatters.org/environment/2023/02/california-sites-reservoir/>

Public Policy Institute of California

February 28, 2023

## Testimony: Adapting California's Water Rights System to the 21st Century Climate



*PPIC Water Policy Center director Ellen Hanak, senior fellow Brian Gray, and senior fellow Jeffrey Mount testified before the Assembly Water, Parks, and Wildlife Committee Informational Hearing, “How Should California’s Water Right System Adapt to a 21st Century Climate?” Here are their prepared remarks.*

### **Introduction**

The climate shifts that California is experiencing—with warmer temperatures, less reliable snowpack, and more intense droughts—have

exposed critical weaknesses in the administration of our water rights system under conditions of scarcity. In particular, there are challenges curtailing diversions when supplies are inadequate. And on the flip side, this system also needs the capacity to better facilitate the management of abundance, by permitting the capture of more water from large storms to recharge groundwater basins.

In our remarks today we recap some of the key challenges the changing climate is posing for California's water rights system in both dry and wet times, illustrate how these issues are playing out in the state's largest watershed, and offer some recommendations for how the legislature could help strengthen the water rights system to better respond to water scarcity and abundance.

### **The Growing Challenges of Managing Water in a Warming, Increasingly Volatile Climate**

California has the most volatile climate in the nation, with large swings in precipitation across years. In consequence, our water infrastructure and operations have long had the goal of managing for both multi-year droughts and episodic floods. [Climate models project](#) warming temperatures, reduced snowpack, shorter and more intense wet seasons, and increased year-to-year volatility in precipitation—with drier dries and wetter wets. These changes are making the management of both dry and wet periods increasingly difficult.

Over the past two decades, California has experienced significant warming. This reduces the share of precipitation that falls as snow—historically an important part of seasonal water storage—and it contributes to another growing phenomenon: [atmospheric demand](#). This increasing “thirst of the atmosphere” is reducing water availability by further eroding snowpack, drying out soils, and increasing plants' water demands. In short, California's dry periods are getting drier. The two latest droughts—from 2012–16 and 2020–2022—[have broken records](#) for their combination of warmth and dryness. In both droughts, our spring runoff forecasts—based on the historical behavior of snowpack—underestimated how dry things would get. Unprecedented, widespread water right curtailments became necessary because there simply wasn't

enough water in rivers and streams to supply all water rights and comply with regulatory and public trust requirements.

California gets most of its water from a few big winter and early spring storms, and climate models project these storms will intensify. Although we have experienced some record storms in recent years, it is too soon to tell whether our wet periods have become wetter. But what's already clear is that [we need to do a better job](#) capturing and storing more runoff from high-flow storms. This is an important adaptation strategy for managing our warmer, drier droughts, and it is also essential for bringing overdrafted groundwater basins into balance under the 2014 Sustainable Groundwater Management Act (SGMA). While there is some potential to expand surface storage, the biggest—and most cost-effective—opportunities lie in groundwater recharge.

Effectively addressing the growing challenges of managing water in dry and wet times will require a range of actions by multiple parties. But one essential area for improvement is administration of the water rights system. Despite recent progress, the State Water Board still lacks adequate authority to enforce and curtail water rights under conditions of scarcity. And it needs to become more nimble at approving permits to recharge groundwater basins with water from large storms.

### **Recent Lessons from the Sacramento–San Joaquin River and Delta Watershed**

As we show in a recent PPIC study, [Tracking Where Water Goes in a Changing Sacramento–San Joaquin Delta](#), the dual challenges of managing scarcity and abundance have been on full display in California's largest watershed—which supplies water to some 30 million residents and 6 million acres of farmland, and supports an important, and threatened, ecosystem.

- **Dry-year challenges.** Recent droughts have proved especially challenging for the management of water supply, water quality, and ecological flows, but one year stands out. In 2021—a warm year with low precipitation and high evaporative demand of the atmosphere—all of that year's runoff in the watershed was used upstream or within the Delta. In consequence, *all* of the water

required to manage water quality, protect ecosystems, and serve export water demands had to be met from water stored in upstream reservoirs. Even though 2019 was a very wet year, these reservoirs were depleted by early 2021 because 2020 had also been dry. The State Water Board curtailed upstream and in-Delta diverters, but these orders [likely came too late](#) in the irrigation season to make a difference.

- **Wet-year challenges.** An analysis of water availability in the three most recent wet years—2011, 2017, and 2019—shows that there is ample opportunity to capture and store more water from large storms in such years without causing harm to ecosystems. This includes storing more water south of the Delta—which could be accomplished under existing diversion rights and regulations—and expanding recharge efforts upstream of the Delta, which will often require new high-flow diversion permits. The nine atmospheric river storms that pelted the state earlier this winter also created such opportunities, but taking advantage of them [remains a work-in-progress](#), in part because of permitting challenges.

## **Recommendations for Better Managing Scarcity and Abundance**

The State Water Board—with support from the legislature—has made important progress in adapting the water rights system to better manage both scarcity and abundance. To manage scarcity, the legislature gave the board explicit curtailment authority in a 2014 amendment to Water Code § 1058.5 (SB 104). A 2015 bill (SB 88) introduced new measurement and reporting requirements for surface water diverters—essential for helping the board understand and oversee diversions at a local level. The board has also been developing a “[water unavailability](#)” modeling framework for the state’s rivers and streams, to better anticipate when diversions will need to be curtailed during droughts. And to manage abundance, the board developed special permitting guidelines for temporary and long-term permits to divert high-water flows for groundwater recharge in 2019, building on legislation (AB 658) that authorized it to issue temporary permits to Groundwater Sustainability Agencies (GSAs) and other local water managers to advance groundwater sustainability.

This is significant progress, but more work is needed to bring water rights administration up to the tasks at hand. Here, we offer several recommendations for additional legislative action that could substantially improve the system's ability to support California's communities, farms, and environment during wet and dry periods. A [note accompanying this testimony](#) provides additional details.

### **To better manage scarcity:**

- 1. Expressly authorize the State Water Board to enforce and curtail all relevant water rights.**

One major obstacle the board has faced in enforcing the water rights system is the fact that its permitting authority is limited to surface water rights established from 1914 onwards. This excludes a substantial portion of diversions—perhaps a third or more statewide—that are under riparian rights or pre-1914 appropriative rights. Recent droughts have been so severe that even these high priority rights have required curtailment in some watersheds—with the Delta and its watershed as a case in point. While case law has recently established that the board does have authority to curtail these surface rights, it would be helpful for the legislature to clarify this. By the same token, the board should be granted express authority to enforce and curtail groundwater rights that significantly affect surface waters—a concern in some watersheds.

- 2. Enable the board to respond more quickly to changing conditions.**

Although the curtailment authority granted to the board in 2014 under § 1058.5 has been helpful, it currently contains two overly restrictive triggers: the board can only order curtailments if the governor declares a drought emergency, or during a critically dry year immediately preceded by two or more consecutive below-normal, dry, or critically dry years. We recommend relaxing these conditions. As recent experience has shown, conditions can evolve quickly; the extreme conditions of 2021 came just a year after a very wet 2019. Conditions in specific watersheds may also warrant attention before the governor declares a regional or statewide drought emergency.

**3. Create incentives to improve measurement and reporting of diversions and use.**

Obtaining accurate reporting of diversions has been a longstanding challenge in California; before legislation enacted in 2009 (SBX78), there was limited information on riparian and pre-1914 diversions, as these users faced little incentive to report. Although reporting has improved—especially since the passage of SB 88—there are still important gaps. Compliance with the requirement to use approved measurement devices is low, and adherence to reporting requirements is uneven. Yet understanding diversions and use is critical to the effective administration of water rights. To improve the board’s access to timely information, we recommend increasing the frequency of reporting required under SB 88—which now requires annual reporting of monthly data, too little and too late for managing droughts. And to incentivize compliance with measurement and reporting requirements, we also recommend considering legislation that would place the burden of proving both the existence of a valid water right and the lawful exercise of that right on the water right holder.

**4. Encourage renegotiation of CVP and SWP senior contracts.**

Although this goes beyond the issue of water rights administration, one additional finding [from our Delta analysis](#) is worth noting here: The current contracts with senior water users under both the Central Valley Project and the State Water Project promise water deliveries that can no longer be supported in many drier years. These contracts were written when the hydrology of the basin was quite different, and the volume of Delta outflow needed for salinity control was woefully underestimated. Meeting the terms of these contracts likely exceeded the volume of water that would have been available under the contractors’ pre-contract water rights in 2021. In 2022, even more dire conditions in Lake Shasta led to negotiations with CVP settlement contractors, who accepted unprecedented one-time cutbacks in their contract allocations. In California’s changing climate, it behooves all parties to renegotiate these contracts, to facilitate more flexible management of increasingly intense drought, while acknowledging the seniority of these water users. The legislature could encourage this next step.

## **To better manage abundance:**

### **1. Empower the State Water Board to administer a special permitting system for high-water flows.**

Although it builds on AB 658, most of the high flow permitting program is the board's own creation. It would be useful for the legislature to confirm the board's authority to issue special temporary and long-term permits for the diversion and storage of high-water flows.

### **2. Develop watershed-specific high-flow diversion thresholds.**

The board's streamlined permits are currently available only for diversions during "high flow events," which the guidelines define as (1) daily streamflow above the 90th percentile; and (2) high flows that trigger flood control actions necessary to mitigate threats to human health or safety. This is a useful starting point for ensuring that these diversions do not harm other water users or the environment. But there may be conditions when these thresholds are either too low (if existing water rights already encompass these flows, or if special ecological conditions warrant further limitations) or too high (if additional diversions would not cause harm.) We therefore recommend considering legislation that would direct the board to engage with the Department of Water Resources (DWR) and relevant basin stakeholders to study the appropriate thresholds for watersheds that are likely to be the source of future high flow diversions. The board could then set new diversion thresholds for each individual watershed.

### **3. Confirm that recharge with high flows is a beneficial use of water.**

Although the board has determined that "groundwater recharge is not a beneficial use of water on its own," it has built on the language in AB 658 to broadly define beneficial use in this context. This includes a variety of *in situ* beneficial uses from the underground storage itself, such as prevention of salt-water intrusion, subsidence, harm to groundwater-dependent ecosystems, and other undesirable results that groundwater sustainability plans must work to avoid under SGMA. This flexibility is not widely understood, and the definition of beneficial use for groundwater storage and recharge has been a contentious topic. It would be

helpful for the legislature to confirm the board's broad interpretation for its high flow diversion and storage program.

**4. Allow for quick action when storms come.**

As with enforcement and curtailment of water rights during periods of acute shortage, rapidly changing high-flow and flood conditions also require prompt action—both by the board and by parties seeking to divert the flows when they are still available. New legislation could further this goal by authorizing the use of programmatic hydrologic and environmental analyses that the board could use to review and approve specific high-flow diversion requests on an expedited basis.

**Conclusion**

California relies upon its water rights system to manage competing demands for water. Originally, this system was set up to manage scarcity, but increasingly, it is being asked to manage all facets of both wet and dry periods, along with complying with regulatory standards and fulfilling public trust requirements.

The legislature has a long history of adapting the water rights system to respond to new scientific information, changing hydrology, and evolving public values. Given the events of the past decade—along with projections of future climate change—it is appropriate for the legislature to update the Water Code to reflect these new conditions. In this testimony we offer suggestions for Water Code amendments, along with recommendations to revisit senior water right contracts. Although these policy reforms are modest, they are an important next step in matching water rights administration to current and future needs.

[https://www.ppic.org/blog/testimony-adapting-californias-water-rights-system-to-the-21st-century-climate/?utm\\_source=rss&utm\\_medium=rss&utm\\_campaign=testimony-adapting-californias-water-rights-system-to-the-21st-century-climate](https://www.ppic.org/blog/testimony-adapting-californias-water-rights-system-to-the-21st-century-climate/?utm_source=rss&utm_medium=rss&utm_campaign=testimony-adapting-californias-water-rights-system-to-the-21st-century-climate)

## Spectrum 1

February 28, 2023

# Heavy rainfall quenches California but won't replenish water supplies

ORANGE COUNTY, Calif. — Recent rains have distinguished this winter as one of the wettest to hit California in years. But experts say it won't erase the damage of the many years of drought the state has suffered.

Rains in the state have caused floods, forced road closures and initiated evacuation warnings. And the state has reached about 95% of its average water storage for February compared to the 70% range for the same month in each of the past two years.

“Groundwater has been depleted for a number of years, and one wet winter, no matter how wet it is, is not going to make up for the extensive amount of water that has been withdrawn from groundwater storage.” said Jeanine Jones, interstate resources manager for the California Department of Water Resources. “Because California's groundwater basins have been depleted for decades, not just years, it's very unlikely you would refill them.”

Droughts in California have led to water rationing at times and in certain areas. Add more frequent wildfires to the list, and drought-related problems have created a series of expensive challenges.

A slate of new water policies and initiatives have been deployed, including in Orange County, to try and slow down the steady decrease in groundwater. The Orange County Water District has gotten creative, sterilizing water from its sewage system for certain public uses. The district would not be able to support the needs of its 3 million residents from the natural water cycle alone, the OCWD reports.

Water collection systems, including reservoirs, can only hold so much and often must release large amounts to protect against flooding. Their

dual function, Jones said, prevents them from remaining at full capacity year-round. Other reservoirs, like Nevada's Lake Mead, can accumulate water year over year.

Folsom Lake in Northern California often has to release water in order to be available in case of a flood.

"So then, we have to explain to people why our reservoirs are releasing water in a drought," Jones said.

Restrictions loosen as spring progresses, allowing reservoirs to hold more water. But the problem remains: There's just not enough space for all the available runoff, and the groundwater storage is likely too depleted to ever fully recover.

Jones noted that the local water agencies are required to stabilize water supplies, and they're still submitting plans on how to do that.

"You're never going to recover to a 1920s level of water, but you might be able to stabilize it to a 2020 level," she said.

<https://spectrumnews1.com/ca/la-east/environment/2023/02/28/heavy-rainfall-quenches-ca--but-won-t-replenish-water-supplies->

The Washington Post

March 1, 2023

## A California tunnel could save stormwater for millions. Why is it so divisive?

**Even after storms drenched the drought-parched Golden State, a plan to capture more water and send it southward remains controversial**

As drought-weary Californians watched trillions of gallons of runoff wash into the Pacific Ocean during recent storms, it underscored a nagging question: Why can't we save more of that water for not-so-rainy days to come?

But even the rare opportunity to stock up on the precious resource isn't proving enough to unite a state divided on a contentious idea to siphon water from the north and tunnel it southward, an attempt to combat the Southwest's [worst drought in more than a millennium](#). The California Department of Water Resources said such a tunnel could have captured a year's supply of water for more than 2 million people.

"People are naturally focused on, are we doing everything we can to capture the water when we can?" said Karla Nemeth, the agency's director.

The proposal from Gov. Gavin Newsom's administration — one that would cost \$16 billion to help 27 million water customers in central and southern California — is spurring fresh outrage from communities that have fended off similar plans over four decades, including suggestions to build other tunnels or a massive canal. Before and since storms in December and January, there have been packed town halls and stern pleas to the Democratic governor from those for and against the idea. The appeals have come from state and federal lawmakers, including one

pushing legislation in Congress to block the tunnel from receiving a key permit.

The conflict underscores the increasing difficulty of keeping taps running in communities far from the sources of the water they drink, and underlines thorny questions about the consequences of taking water from one place and giving it to another. There are concerns the tunnel would hurt farmers while failing to solve California's larger water woes, stoking long-simmering state divisions: north versus south, inland versus coast, agricultural versus urban. Nevertheless, the water crisis demands solutions.

California faces a future climate marked by [both extended drought and increasingly intense rainstorms](#), known as atmospheric rivers, like the ones that repeatedly lashed the state in late December and January. Warming temperatures and dry conditions mean snowpack isn't translating to as much river flow as it once did, and at the same time, the West is struggling to develop a plan to [sustainably drink from the dwindling Colorado River](#), another key source of water there.

To be built, the idea would have to withstand a long vetting process and any expected legal challenges. Even then, the tunnel likely wouldn't be functional until maybe 2040. But the future of what would be one of California's largest infrastructure investments ever could come to a head much sooner. Nemeth expects to decide whether and how to proceed by the end of the year.

### **How California gets water where it's needed**

California has been moving water southward for generations — an effort to get water where it's not. While its largest population centers are clustered along the coast and across valleys in the lower half of the state, most of its precipitation falls on its northern half and inland mountains. Besides that, about half the state's annual precipitation typically falls on just 15 days, if not fewer.

To fix that imbalance, California built what is known as the State Water Project, a more than 700-mile system of canals, pumps, aqueducts, reservoirs and hydroelectric dams that date to the 1960s. It delivers

water to 750,000 acres of farmland and to communities across the Bay Area and Southern California.

The tunnel would be a key new element of that system, allowing it to take better advantage of the state's boom-and-bust precipitation patterns that climate change is forecast to make only more pronounced. It would carry water 100 feet beneath the delta — an estuary where the Sacramento and San Joaquin rivers meet, and which receives about half of all of California's streamflow. The tunnel would take water in from a location near Sacramento and bring it to a reservoir about 45 miles south.

Newsom emphasized the project's importance in August when he announced a new approach to water management. The new strategy acknowledges that rising global temperatures mean more water is being lost to evaporation and to parched soil and vegetation.

If the proposed tunnel had been in place when the series of rainstorms battered California beginning in December, it could have saved 202,000 acre-feet of water, state water managers said. That's about 35 percent of what the State Water Project delivered to customers in all of 2022. They estimated that there was an even larger missed opportunity to increase water stores during a series of storms at the end of 2021.

"This project would have enabled a significant amount of water to be moved in a short amount of time into storage, and that's what makes it so important," Nemeth said.

### **A thirsty state, divided**

It's one piece of a larger strategy to "modernize" California's water systems, Nemeth said. Other efforts aim to improve efficiency, promote reuse, adapt to a warming climate and prepare for damaging earthquakes, which the Army Corps of Engineers has said could damage levees that protect the water supply.

Nemeth said if there is a levee breach, it could allow salt water to taint the State Water Project system. But if there is a tunnel, she said it could

bypass the contamination and ensure a continuous supply of fresh water from the north side of the delta.

Opponents question the risk of a breach. John Herrick, general counsel for the South Delta Water Agency, called it a strategy to justify routes for the tunnel that take water from farmers to give to desert communities east of Los Angeles. “It’s going to be operated at the detriment of farmers in the delta,” said Herrick, whose agency defends the water supply of farmers.

In communities that would have to live around the tunnel, many say there are only costs, and no benefits. In the Sacramento-San Joaquin Delta region, where a patchwork of Central Valley farmland meets the Bay Area, the tunnel is viewed as a threat.

Worries are high there that it would reduce natural water flows enough to hurt farming communities and struggling fisheries, making the delta saltier and more prone to drought. Already there are concerns that, as water is pumped from the delta toward the 444-mile-long California Aqueduct, [too much salty water flows in](#) from the brackish bays to the west.

“We don’t believe one piece of infrastructure is going to solve California’s water woes with the extremes of climate change,” said Barbara Barrigan-Parrilla, executive director of Restore the Delta. “They’re really not planning for the future.”

For proponents of the project like Heather Dyer, general manager of the San Bernardino Valley Municipal Water District, separating into north vs. south or rural vs. urban factions misses a key point: That all of California needs water to support an economy, fifth-largest in the world, that likewise buoys all corners of the state.

### **Storms raise urgency – and opposition**

The series of storms in the state that began in December, and [killed at least 19 people](#), stoked strong opinions about the water supply.

As the rain fell, a bipartisan group of state lawmakers urged water managers [to pump as much of the excess water as possible](#) from the delta into the State Water Project — the amount of water that can be pumped into the system is, at times, restricted.

State Sen. Melissa Hurtado (D), for one, [pushed](#) for relaxing any restrictions, and collecting available water while it was plentiful. Hurtado argued there was “no reason” that more water could not be exported southward from the delta.

Similarly, Assemblyman Vince Fong (R) criticized constraints that made it harder to bring water where it’s needed. “When Mother Nature blesses us with rain, we need to save the water, instead of dumping it in the ocean,” he said.

But other lawmakers took the storms as an opportunity to push back against the tunnel proposal. Rep. Josh Harder (D-Calif.) and three colleagues in Congress [wrote to the Army Corps](#) demanding in-person hearings — so constituents could voice their concerns about the tunnel. A week later, about 150 people gathered at [a town hall Harder organized in the delta region](#) to air those grievances, including concerns that the tunnel would draw down water levels in the Sacramento-San Joaquin delta even during drier spells, allowing salinity to concentrate at harmful levels.

“This is not a solution to our drought issue,” Harder, who introduced the Stop the Delta Tunnels Act in Congress in September, said in an interview. “This exacerbates the drought issue.”

Barrigan-Parrilla said opponents are eyeing potential regulatory and legal challenges to the project as the Army Corps and the State Water Resources Control Board review it, and in December joined with Indigenous groups in filing a civil rights complaint with the Environmental Protection Agency.

The complaint asks the EPA to update water-quality standards for the delta and require increased river flows into the estuary, keeping water and salinity levels at safe and healthy levels for aquatic life and farming communities. It argues that reducing water levels in the delta violates

the civil rights of groups including the Shingle Springs Band of Miwok Indians and the Winnemem Wintu Tribe, harming their ability to carry on cultural traditions that center on the estuary and its wildlife.

Barrigan-Parrilla said the tunnel would only exacerbate problems related to high salinity and low water levels in the delta, reducing the Sacramento River's flow into the estuary.

In the meantime, the tunnel is in the midst of a review process under California environmental law. The Army Corps is accepting public input through March 16 on a draft environmental impact statement for the project, a document that will guide any detailed plans for the tunnel. If Nemeth decides to move it forward later this year, further hurdles include reviews under endangered species and water pollution laws.

### **What about an entirely new water strategy?**

There's a challenge in relying on an old water delivery system to fix present problems, said Jeffrey Michael, a professor of public policy at the University of the Pacific's McGeorge School of Law in Sacramento. He questioned why, as the home of Silicon Valley, California isn't more focused on meeting water needs through new technologies, instead of updating the State Water Project.

"They've got an interest in making that system last forever," Michael said. "They're simultaneously trying to do what's best for the State Water Project and what's best for the state. Those two objectives are not equivalent."

The state's water strategy does include a diverse set of solutions, Nemeth said, including investments in water recycling, exploration of desalinization and efficiency mandates to permanently lower demand in urban areas.

Still, she said adapting to climate change means not missing a chance to collect extra water from the delta when the weather allows.

"We need to be able to capture and store water when it's available, and then we have to reuse that water, and we have to be more efficient

across the board,” Nemeth said. “I don’t think of it as an either-or; we have to do all of it.”

But there are also those who watched the long-awaited rain, and did not mind seeing so much of it wash away. To Herrick, it was a vital natural process that needs to be protected. It flushed the system, and primed it for fish.

“It’s improved hundreds of miles of channels and open waters,” he said. “It’s not a waste.”

<https://wapo.st/3IH7kMe>

LA Times

March 1, 2023

## Yet more rain expected to hit California in March. Warmer storms could cause problems



Pedestrians toting umbrellas walk across the street amidst heavy rain in Pasadena on Friday.

(Allen J. Schaben / Los Angeles Times)

Soggy, snow-capped California faces the likelihood of yet another month of wet weather, but what remains uncertain is whether this late winter precipitation will augment weeks of record-setting snowpack, or cause it to vanish should warmer rains arrive.

Last week, a frigid storm transformed portions of the state into a white landscape while toppling trees, prompting power outages, spurring water rescues and leaving [some residents trapped by heavy snow](#).

Now, with forecasts calling for more rain and snow in March — including the potential for at least one more atmospheric river system — California is girding for what comes next.

“If we were to get heavy rain with a warm system and a lot of tropical moisture feeding into it, that would melt all of the snow that just fell in the mountains,” said David Sweet, a meteorologist with the National Weather Service in Oxnard.



[California](#)

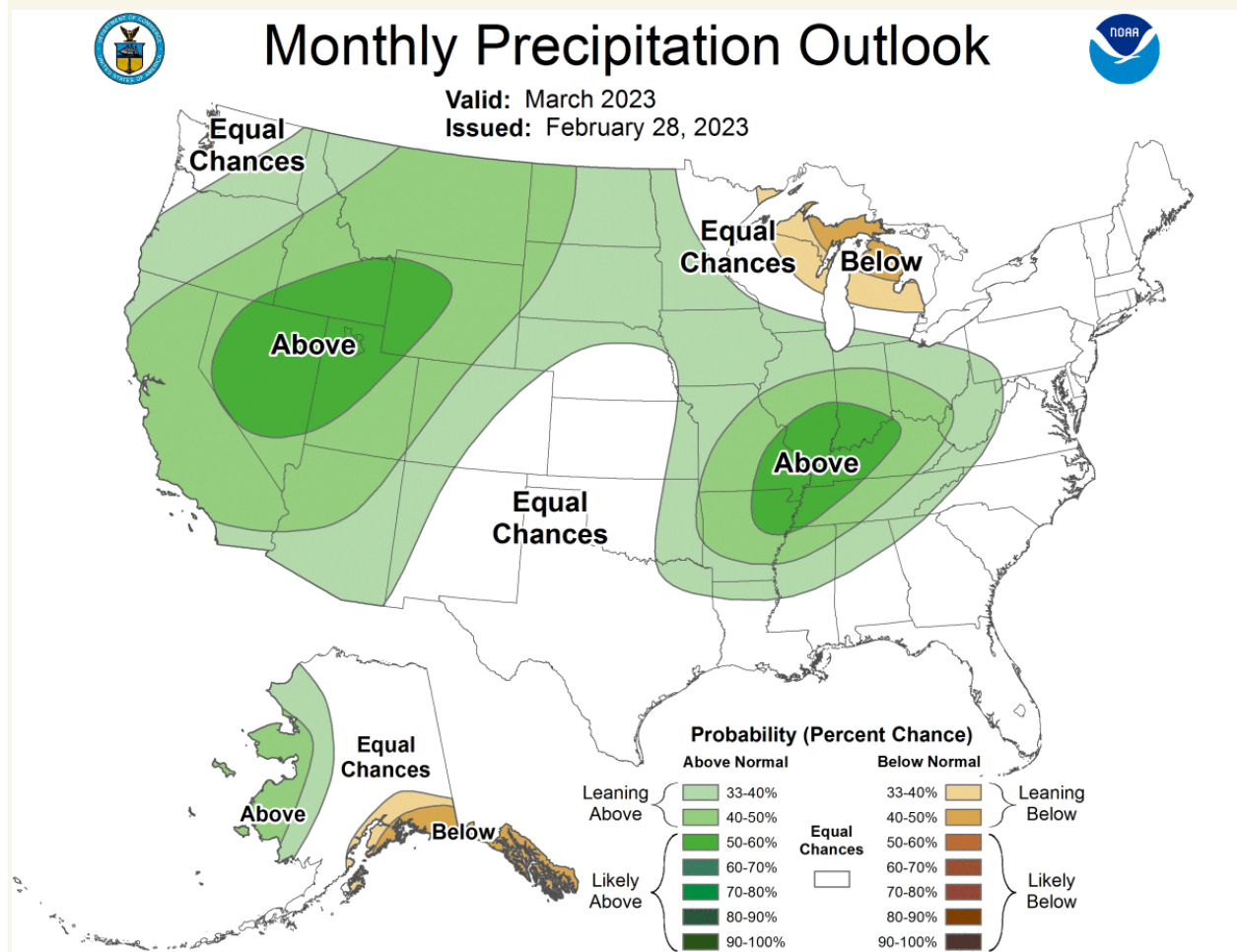
**[Photos: Southern California mountain communities buried in snow](#)**

San Bernardino County has declared a state of emergency, with mountain residents trapped in their homes.

March 3, 2023

Typically, California's snowpack provides about one-third of the state's water supply and has long been relied upon for its steady, slow melting during the hot, dry months of summer. A deluge of warm rain, however, could cause melting snow to fill rivers too quickly and trigger widespread flooding.

"We need to stick that in the back of our mind and think, 'Boy, I sure hope that doesn't happen,'" Sweet said.



The National Oceanic and Atmospheric Administration's outlook shows above normal chances of precipitation in all California through March. (NOAA)

Forecasters say it's still too early to say precisely how the rest of winter will play out, but the latest 30-day outlook from the National Oceanic and

Atmospheric Administration's Climate Prediction Center, issued Tuesday, shows [above-normal chances of precipitation](#) in all of California through March, as well as a higher likelihood of cold temperatures. That could bode well for the state's ample snowpack.

"We have considerable confidence that wet weather is likely for the next two weeks and an active pattern [of wet weather] could very well remain for the rest of the month," Jon Gottschalck, chief of the climate center's operational prediction branch, said in an email.

In the coming days, the western United States is expected to be "dominated by upper-level low pressure," Gottschalck said, which will probably deliver more low temperatures and low-elevation snow to California. That means "much of the precipitation, at least in the next week, will add to the snowpack."

But the arrival of more precipitation in the weeks that follow could be some cause for concern.



## California

### Photos: Snow, heavy rain pummel Southern California

Scenes from across Southern California, where a powerful winter storm dumped heaps of snow and record-setting rain.

Feb. 25, 2023

UCLA climate scientist Daniel Swain said about 20% of forecast models are currently depicting a very strong and warm atmospheric river storm in California around mid-March. A series of nine atmospheric river storms hammered California in early January, breaching levees and contributing to [nearly two dozen deaths](#).

Should such an event occur in the wake of extensive snow, “that could indeed pose [a] significant flood threat,” [Swain said on Twitter](#). However, he said that is “speculation at this early juncture” because the present odds of such a warm storm are about 1 in 5.

The recent winter storm already dropped heaps of cold rain and snow in parts of California. Many Southland peaks received more than 50 inches of fresh powder, with the Mountain High ski resort in Wrightwood recording 93 inches, according to the National Weather Service. Daily rainfall records were set at Los Angeles International Airport and in Burbank, downtown Los Angeles and several other parts of the region.

If similar conditions continue, the season has the chance to become [one of California’s snowiest on record](#), Swain said.

Across the state, snowpack remains incredibly healthy — 186% of normal for the date as of Tuesday, according to state data. In the southern Sierra, it’s 224% of normal. Reservoirs are notably healthier too, with Lake Shasta nearly doubling its volume from two months ago.



## California

### California approaching a record snow year as yet another storm hits

New winter storms are expected to bring even more snow and rain to Southern California through Wednesday.

Feb. 27, 2023

The immediate forecast in the Sierra is continued icy conditions, including “a very cold pattern with multiple feet of snow this weekend,” said Wendell Hohmann, a meteorologist with the National Weather Service in Reno.

“The atmospheric river signals are pretty far out there, so predictability is pretty low and confidence is therefore pretty low on that,” Hohmann said, “but it does kind of open the door for us to keep an eye on it at this point, see how it evolves.”

In addition to flooding, a warm rain-on-snow event could pose challenges from a water supply perspective. Earlier-than-usual snowmelt, especially in the Sierra, can make it harder for the state's water managers to plan ahead, and can have negative effects on hydropower and ecology, [experts say](#).

Sweet, of the weather service, said he primarily focuses on short-term forecasts but has also been keeping an eye on the longer-range models, which are “starting to hint” at the possibility of such a system.

As it stands, the forecast for more precipitation of any kind comes amid a winter that has already defied expectations in California. In October, seasonal outlooks pointed to a [drier-than-normal season](#) driven by a rare third appearance of La Niña. The fact that conditions ended up so wet speaks to the challenges of long-term forecasting, Sweet said.

“We still don’t have an absolute razor-sharp focus, or way of looking at the extended forecast, and being really sure of it,” he said.



## California

### San Bernardino County declares state of emergency as snow traps residents, visitors

The Lake Arrowhead area has received 5 feet of snow in the last five days, trapping residents, vacationers and students. More snow is on the way.

Feb. 27, 2023

Despite its hazards, the wet weather has had many upsides in California.

Improved snowpack and reservoir levels have allowed the state's water managers to tentatively [increase State Water Project allocations](#) to 35%. In December, they said they would be able to [give only about 5%](#) to 29 agencies, which together serve about 27 million Californians.

The U.S. Drought Monitor also moved nearly all of California [out of its worst two categories](#) — exceptional and extreme drought — this year for the first time since 2020.

As of this week, about 33% of the state remains in severe drought, the third-worst category, [according to the Drought Monitor](#). About 52% of the state is categorized in moderate drought and 15% as “abnormally dry.”

One small county — Del Norte, in the state's far northwest corner — has moved out of drought completely.

<https://www.latimes.com/california/story/2023-03-01/will-california-lose-its-snowpack-in-warm-march-rains>

LAist

March 2, 2023

## Some Of California Is Free Of Drought, But The Climate Crisis Is Changing What That Means



From left to right: Jacob Kollen and Anthony Burdock, both California Department of Water Resources engineers in the Snow Surveys and Water Supply Forecasting Unit, take the measurements for the February snow survey. Thomas Gibson, Department of Water Resources Executive General Counsel and Sean de Guzman, the unit's manager, weigh the aluminum snow depth survey pole to measure the water content of the snow during the second media snow survey of the 2023 season at Phillips Station in the Sierra Nevada.

(Fred Greaves

/

California Department of Water Resources)

The wet winter this year has many of us asking: Is California out of the drought? If only the answer were a simple yes or no — but drought, of course, is more complicated than that. Let's dig into it.

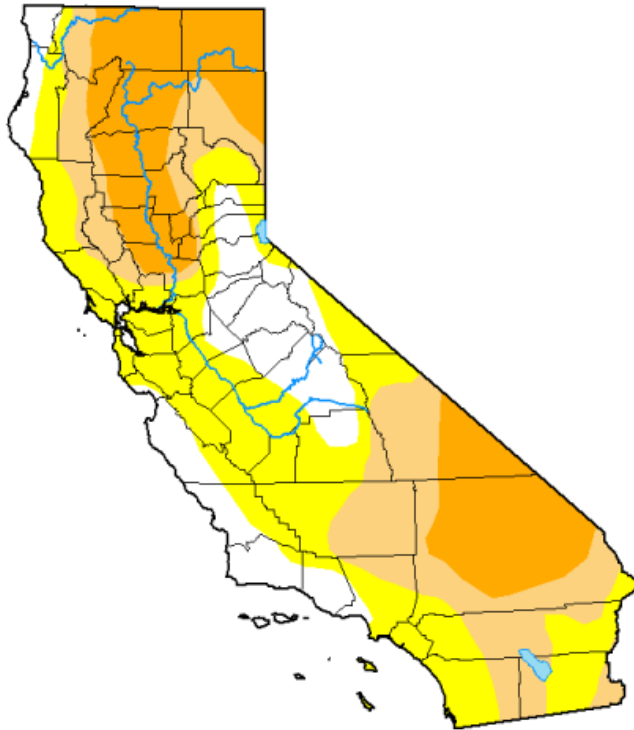
## **The current state of drought**

The rain and snowstorms we've had since late December have made a significant dent in California's current drought, [which has spanned the last three years and been the driest period in more than 100 years](#).

The [latest data from the U.S. Drought Monitor](#) show that recent storms have freed 17% of the state from drought conditions, with the biggest areas of improvement being the Sierra Nevada, central coast and far northern coast. That's good news for our water supply, most of which comes from snowmelt in the Sierra Nevada.

## U.S. Drought Monitor California

**February 28, 2023**  
(Released Thursday, Mar. 2, 2023)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

|                                             | None  | D0-D4  | D1-D4  | D2-D4 | D3-D4 | D4    |
|---------------------------------------------|-------|--------|--------|-------|-------|-------|
| <b>Current</b>                              | 16.71 | 83.29  | 49.13  | 24.96 | 0.00  | 0.00  |
| <b>Last Week</b><br>02-21-2023              | 0.61  | 99.39  | 84.60  | 32.62 | 0.00  | 0.00  |
| <b>3 Months Ago</b><br>11-29-2022           | 0.00  | 100.00 | 99.48  | 84.97 | 40.92 | 12.73 |
| <b>Start of Calendar Year</b><br>01-01-2023 | 0.00  | 100.00 | 97.93  | 71.14 | 27.10 | 0.00  |
| <b>Start of Water Year</b><br>09-27-2022    | 0.00  | 100.00 | 99.76  | 94.01 | 40.91 | 16.57 |
| <b>One Year Ago</b><br>03-01-2022           | 0.00  | 100.00 | 100.00 | 86.98 | 12.82 | 0.00  |

### Intensity:

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

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

### Author:

Richard Heim  
NCEI/NOAA

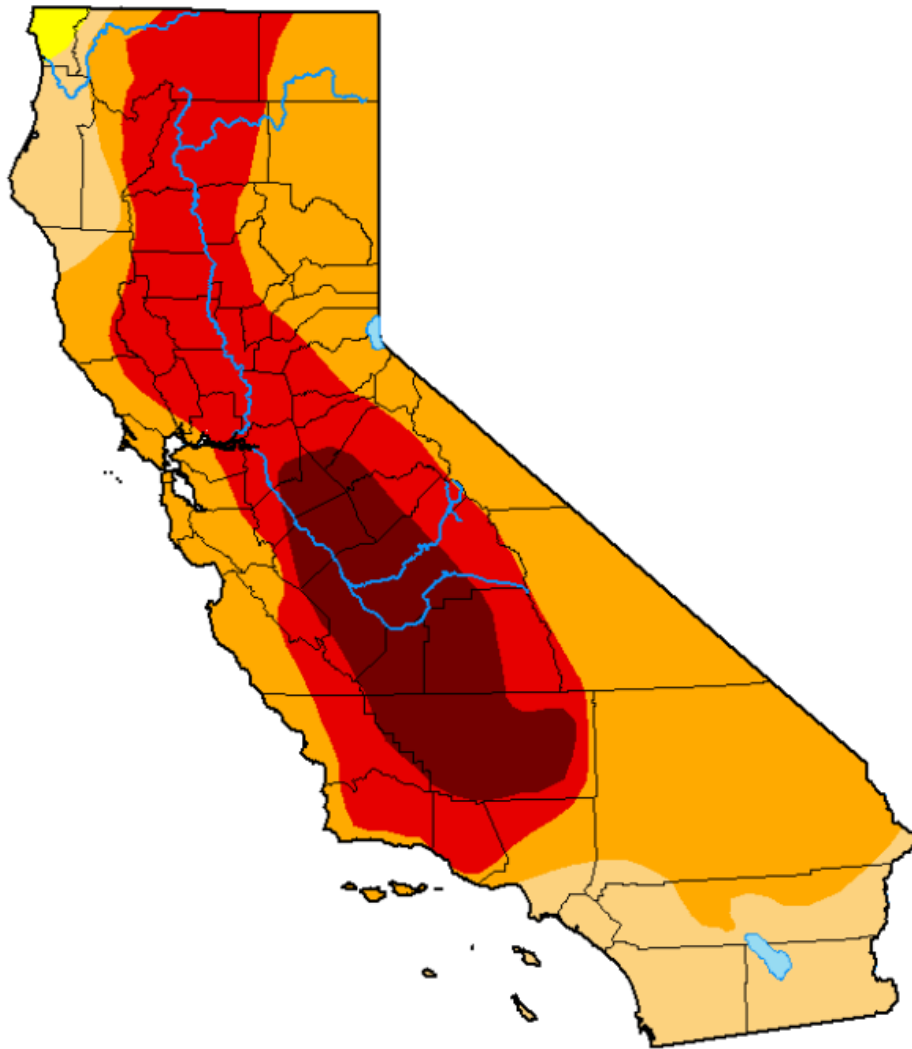


[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

The state of drought conditions in California, according to the latest data from the U.S. Drought Monitor.  
(U.S. Drought Monitor)

Just three months ago, almost the entire state was experiencing severe to exceptional drought. While recent storms have helped ease drought conditions, about half of the state still remains in “moderate to severe” drought, [according to the U.S. Drought Monitor](https://droughtmonitor.unl.edu).

**November 29, 2022**



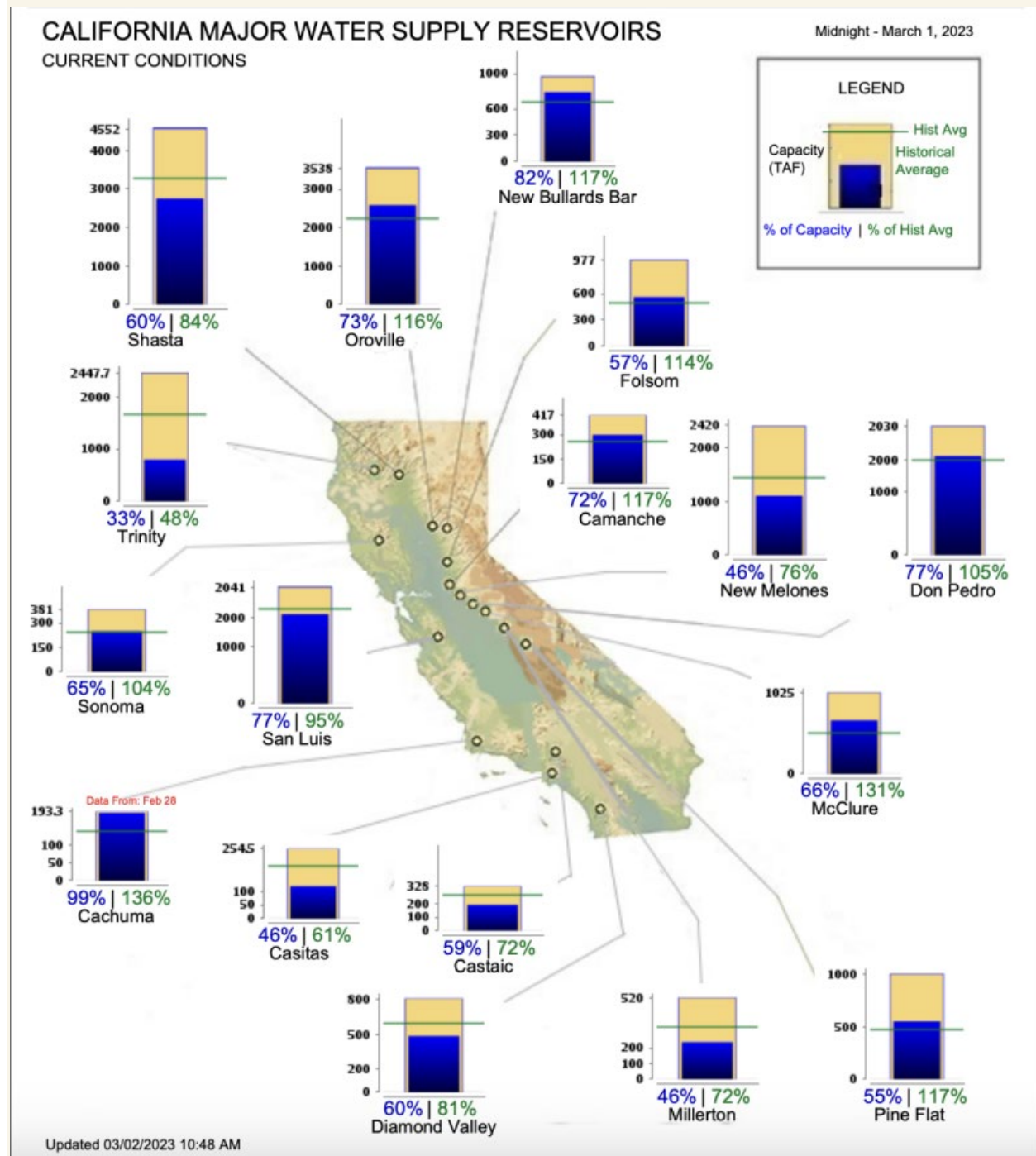
Drought conditions were much more severe and widespread before winter storms marched through starting in December.  
(U.S. Drought Monitor)

Snowpack is far above the amount we usually have this time of year, and ideally that snow will slowly melt over the spring months and help refill the reservoirs that hold most of our water supply.

Some of those reservoirs have risen to above-average levels for this time of year — for example, Lake Oroville, the state's second-largest reservoir, is 116% of the average for this time of year. But Lake Shasta, the state's

largest reservoir, remains at 84% of average for this time of year, [according to the California Department of Water Resources](#).

While all this rainy and snowy weather has helped improve snowpack and surface water levels, it's done far less for groundwater, which much of the agriculture industry relies on, particularly during dry years.



The current state of reservoirs in California. L.A. gets much of its water from Lake Oroville, which has now above average levels for this time of year.

(California Department of Water Resources)

And the Colorado River, the Southland's other main water supply, has also [not benefited as much](#).

Furthermore, the climate crisis is driving what many scientists call [“weather whiplash.”](#) That's shrinking the spring and fall seasons, which is not only bad for water management — we don't want all that snow melting at once and causing dangerous flooding — but also for wildlife and plant species that are struggling to adapt to these increasingly extreme changes.

What is the U.S. Drought Monitor?

- At this point, you've probably seen a lot of versions of those maps with splotches of red, orange and yellow, like the ones in this story.
- Those are created by the U.S. Drought Monitor, which provides an updated map every week on drought conditions across the U.S. It started in 1999, when parts of the east, southeast and midwest were in the grips of record-breaking drought and heat.
- The data to create those maps is compiled by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of Agriculture (USDA). The idea is to give a big-picture view of drought to help with planning efforts and trigger aid. For example, the USDA uses it to declare disasters and low-interest loans for aid. State, local and tribal governments use it to coordinate drought responses.
- The map labels drought by levels of intensity, from “abnormally dry,” to “exceptional drought,” and aims to estimate how long- or short-term those conditions are expected to be. Learn more [here](#).

## Drought in an era of climate change?

First, what actually is the official definition of drought?

The U.S. Drought Monitor defines it as “a moisture deficit bad enough to have social, environmental or economic effects” and labels dry periods on a scale of intensity, from “abnormally dry” to “exceptional drought.”

| Category | Description         | Possible Impacts                                                                                                                                                                                                                                                                                   | Ranges                               |                                       |                                      |                                        |                                                  |
|----------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|----------------------------------------|--------------------------------------------------|
|          |                     |                                                                                                                                                                                                                                                                                                    | Palmer Drought Severity Index (PDSI) | CPC Soil Moisture Model (Percentiles) | USGS Weekly Streamflow (Percentiles) | Standardized Precipitation Index (SPI) | Objective Drought Indicator Blends (Percentiles) |
| D0       | Abnormally Dry      | Going into drought: <ul style="list-style-type: none"> <li>• short-term dryness slowing planting, growth of crops or pastures</li> </ul> Coming out of drought: <ul style="list-style-type: none"> <li>• some lingering water deficits</li> <li>• pastures or crops not fully recovered</li> </ul> | -1.0 to -1.9                         | 21 to 30                              | 21 to 30                             | -0.5 to -0.7                           | 21 to 30                                         |
| D1       | Moderate Drought    | <ul style="list-style-type: none"> <li>• Some damage to crops, pastures</li> <li>• Streams, reservoirs, or wells low, some water shortages developing or imminent</li> <li>• Voluntary water-use restrictions requested</li> </ul>                                                                 | -2.0 to -2.9                         | 11 to 20                              | 11 to 20                             | -0.8 to -1.2                           | 11 to 20                                         |
| D2       | Severe Drought      | <ul style="list-style-type: none"> <li>• Crop or pasture losses likely</li> <li>• Water shortages common</li> <li>• Water restrictions imposed</li> </ul>                                                                                                                                          | -3.0 to -3.9                         | 6 to 10                               | 6 to 10                              | -1.3 to -1.5                           | 6 to 10                                          |
| D3       | Extreme Drought     | <ul style="list-style-type: none"> <li>• Major crop/pasture losses</li> <li>• Widespread water shortages or restrictions</li> </ul>                                                                                                                                                                | -4.0 to -4.9                         | 3 to 5                                | 3 to 5                               | -1.6 to -1.9                           | 3 to 5                                           |
| D4       | Exceptional Drought | <ul style="list-style-type: none"> <li>• Exceptional and widespread crop/pasture losses</li> <li>• Shortages of water in reservoirs, streams, and wells creating water emergencies</li> </ul>                                                                                                      | -5.0 or less                         | 0 to 2                                | 0 to 2                               | -2.0 or less                           | 0 to 2                                           |

The U.S. Drought Monitor's scale for intensity of drought.  
(U.S. Drought Monitor)

The National Weather Service defines drought as “a deficiency in precipitation over an extended period.” Then it breaks it down into four categories:

- **Meteorological drought:** the degree of dryness or rainfall deficit and the length of the dry period.
- **Hydrological drought:** the impact of lack of precipitation on the water supply.
- **Agricultural drought:** the impacts of drought on agriculture based on factors including lack of rain, how dry the soils are, and groundwater and reservoir levels needed for irrigation.

- **Socioeconomic drought:** occurs when the demand for needs such as food exceed the supply due to a weather-related deficit in water supply.

So, if we're just talking semantics, you could technically say we're out of drought, but when you dig into definitions within that definition, the picture becomes a lot more complicated.

And our understandings of what's normal drought and what isn't are changing as global carbon pollution pushes us into a drier climate as a whole — what's called "aridification."

#### A changing water cycle

- Maybe you remember the concept of the water cycle from elementary school: when water from lakes, rivers and the ocean evaporates, it condenses to form clouds, then falls back to the earth in the form of rain or snow.
- But as our climate heats up, water on the landscape, such as mountain snow and rainfed streams and lakes, evaporates more quickly and dries out soils faster. That leaves less water for humans and the animals and plants that rely on that surface water, and also leads to a "thirstier" atmosphere, which then dumps that evaporated water in the form of increasingly intense storms, or atmospheric rivers.
- That's why the climate crisis is making California's drought-to-deluge cycle even more extreme and less predictable.

"As the climate continues to warm, we're going to need to continue to better account for this so that we can manage our water resources in a way that better reflects this new reality," said Joaquin Esquivel, Chair of the State Water Resources Board, in a segment on the LAist 89.3 daily program [AirTalk in July](#).

A changing water cycle is part of aridification and the shifting definition of drought. It's a big reason California [is expected to lose at least 10% of its total water supply as soon as 2040](#) — that's more water than the state's largest reservoir, Lake Shasta, can hold at capacity.

“Droughts and floods are a common part of California's climate, but without a doubt, climate change has worsened the severity of those problems,” Peter Gleick, co-founder of the Pacific Institute, an Oakland based nonprofit that focuses on the global water crisis, said on [AirTalk](#). “We have to understand that we're not facing a temporary short-term problem, but a permanent shift in our climate.”

That means drought or no drought, we need to continue to use less water in cities — one reason why water restrictions have yet to end — and agriculture, Gleick said. He said there are still [significant water savings possible both inside and outside of homes and businesses](#), but the major conversation will have to be about agriculture, which uses 80% of the water in California. Fallowing land, shifting to less water-intensive crops, and improving water use efficiency are needed strategies to adapt, and are particularly important for restoring groundwater supplies, Gleick said.

<https://laist.com/news/climate-environment/some-of-california-is-free-of-drought-but-the-climate-crisis-is-changing-what-that-means>

**Maven**

**March 3, 2023**

## **THIS JUST IN ... California's Snowpack Shows Huge Gains from Recent Storms**



*From the Department of Water Resources:*

The Department of Water Resources (DWR) today conducted the third snow survey of the season at Phillips Station. The manual survey recorded 116.5 inches of snow depth and a snow water equivalent of 41.5 inches, which is 177 percent of average for this location on March 3. The snow water equivalent measures the amount of water contained in the snowpack and is a key component of DWR's water supply forecast. DWR's electronic readings from 130 snow sensors placed throughout the state

indicate the statewide snowpack's snow water equivalent is 44.7 inches, or 190 percent of average for this date.

“Thankfully the recent storms combined with the January [atmospheric rivers](#) have contributed to an above-average snowpack that will help fill some of the state's reservoirs and maximize [groundwater recharge](#) efforts. But the benefits vary by region, and the Northern Sierra, home to the state's largest reservoir Lake Shasta, is lagging behind the rest of the Sierra,” DWR Director Karla Nemeth said. “It will also take more than one good year to begin recovery of the state's groundwater basins.”

Although the statewide snowpack is currently just behind the record snow year of 1982-83, the snowpack varies considerably by region. The Southern Sierra snowpack is currently 209 percent of its April 1 average and the Central Sierra is at 175 percent of its April 1 average. However, the critical Northern Sierra, where the state's largest [surface water](#) reservoirs are located, is at 136 percent of its April 1 average. With one month of the traditional wet season remaining, DWR is providing updated runoff forecasts to water managers and is closely monitoring spring runoff scenarios and river flows to ensure the most water supply benefits from this year's snowpack while balancing the need for flood control.

“The recent storms over the past week broke a month-long dry spell in a dramatic way,” said DWR's Snow Surveys and Water Supply Forecasting Unit Manager Sean de Guzman. “We are hopeful that we will see more cold storms to add to our snowpack for the next month and help set up a long, slow melt period into spring.”

DWR will host a virtual media briefing via Zoom with DWR experts today at 1:00 p.m. to expand on the impacts of the snowpack results, discuss what the results mean for the state's water supply, and take media questions. Credentialed media can register for the media briefing [here](#).

To ensure water supply managers have the most current forecasts of snowpack runoff, DWR is utilizing the best available technology to collect the most accurate snow measurements. DWR's Snow Surveys and Water Supply Forecasting Unit is utilizing [Airborne Snow Observatory \(ASO\)](#)

[surveys](#) across 12 of California's major snow-producing watersheds to collect data on the snowpack's density, depth, reflectiveness, and other factors down to a 3-meter resolution. These flights, which utilize LiDAR and imaging spectrometer technology, provide DWR with more information on water content than ever before, which is then fed into advanced physically based and spatially explicit models to generate the most accurate water supply runoff forecasts possible. These forecasts are used to develop the Bulletin 120 for forecasted spring run-off to determine water allocation and stream flows for the benefit of the environment.

While winter storms have helped the snowpack and reservoirs, groundwater basins are much slower to recover. Many rural areas are still experiencing water supply challenges, especially communities that rely on groundwater supplies which have been depleted due to prolonged drought. It will take more than a single wet year for groundwater levels to substantially improve at a statewide scale. Drought impacts also vary by location and drought recovery will need to be evaluated on a regional scale and will depend on local water supply conditions.

On February 13, Governor Newsom issued an [Executive Order](#) directing state agencies to review and provide recommendations on the state's drought response actions by the end of April, including the possibility of terminating specific emergency provisions that are no longer needed, once there is greater clarity about the hydrologic conditions this year.

Californians should still continue to use water wisely so that we can have a thriving economy, community, and environment. DWR encourages Californians to visit [SaveOurWater.com](https://www.saveourwater.com) for water saving tips and information as more swings between wet and dry conditions will continue in the future.

DWR conducts five media-oriented snow surveys at Phillips Station each winter near the first of each month, January through April and, if necessary, May. The next survey is tentatively scheduled for April 3.

<https://mavensnotebook.us7.list-manage.com/track/click?u=88af2b23c65f1c863838dd9a5&id=a1145d9b18&e=81894fb4e3>

