'Red alert': Lake Mead falls to record-low level, a milestone in Colorado River's crisis

Lake Mead has declined to its lowest level since the reservoir was filled in the 1930s following the construction of Hoover Dam, marking a new milestone for the water-starved Colorado River in a downward spiral that shows no sign of letting up.

The reservoir near Las Vegas holds water for cities, farms and tribal lands in Arizona, Nevada, California and Mexico. Years of unrelenting drought and temperatures pushed higher by climate change are shrinking the flow into the lake, contributing to the large mismatch between the demands for water and the Colorado's diminishing supply.

The lake's rapid decline has been outpacing projections from just a few months ago. Its surface reached a new low Wednesday night when it dipped past the elevation of 1,071.6 feet, a record set in 2016. But unlike that year, when inflows helped push the lake levels back up, the watershed is now so parched and depleted that Mead is projected to continue dropping next year and into 2023.

Lake Mead, the largest reservoir in the country, now stands at just 36% of full capacity.

Colorado River in crisis: The Hoover Dam faces an epic water shortage

In the past month, Mead has already fallen below the official threshold of a shortage, which the federal government is expected to declare in August. That will trigger major cuts in water allotments for Arizona, Nevada and Mexico next year. And even bigger water reductions could be forced upon the Southwest if the reservoir continues to drop, which government estimates show is likely.

“It should represent an earthquake in people's sense of urgency, on all fronts,” said Felicia Marcus, a visiting fellow at Stanford University’s Water in the West program.

The reservoir’s continuing decline, Marcus said, should ring “alarm bells” across the West that the days of business-as-usual approaches are over and that "we need to accelerate everything we can to use less water.”

That includes speeding up efforts that cities and water agencies are already undertaking in parts of the Southwest, such as investing in recycling wastewater, capturing stormwater or cleaning up polluted groundwater, Marcus said. And it also includes promoting conservation and more efficient water use in a variety of ways, she said, from investing in water-saving technologies on farms to offering homeowners cash rebates to removing grass

and replacing it with drought-tolerant landscaping.

With shortage measures set to take effect next year, Arizona is in line for the biggest water cutbacks.

That will shrink the amount flowing through the Central Arizona Project Canal to farmlands in Pinal County that produce alfalfa, cotton, wheat and other crops. Farmers in Pinal plan to pump more groundwater from newly drilled wells, but they'll still be short with the loss of Colorado River water and are planning to leave some farmlands dry and unplanted over the next couple of years.

In a first-level shortage, the water supplies of Arizona's cities will be spared from cutbacks. But that could change over the next two years if Lake Mead continues to decline.

In the Las Vegas area, people are already conserving enough each year that their water supplier will be able to contribute its portion of the reductions from its unused allocation. But that hasn't stopped Nevada's leaders from pushing for more water-savings by getting rid of grass on medians and outside businesses and subdivisions, as required under a newly enacted law that bans "non-functional turf" in the Las Vegas area.

The Colorado River and its tributaries provide water for cities from Denver to Tucson and about 4.5 million acres of farmland from Wyoming to the U.S.-Mexico border. About 70% of the water diverted in the seven U.S. states is used for agriculture, flowing to fields of hay and cotton, fruit orchards and farms that produce much of the country's winter vegetables.

The watershed has been ravaged by one of the driest 22-year periods in centuries. Scientists describe the past two decades as a megadrought worsened by climate change, and say the Colorado River Basin

is undergoing "aridification" that will complicate water management for generations to come.

In 2000, Lake Mead was nearly full and its surface was lapping at the spillway gates of the Hoover Dam. Since then, the reservoir has fallen nearly 143 feet. And it's now at the lowest levels since 1937.

Two years ago, representatives of the seven states that depend on the Colorado River met at Hoover Dam to sign a set of agreements called the Drought Contingency Plan, which laid out measures to take less water and share in reductions during a shortage to reduce the risks of Lake Mead falling to critically low levels.

But the declines have continued and the drought has intensified over the past year, with much of the watershed baking through the driest 12 months in 126 years of records. The river and its tributaries have dwindled, shrinking the flow into Lake Powell at the Utah-Arizona border, and in turn driving the receding water levels at Lake Mead.

Arizona water officials have said voluntary conservation efforts over the past few years and initial cuts under the drought deal have boosted Mead's levels and pushed back the onset of the shortage. Ted Cooke, general manager of the Central Arizona Project, said during an April 29 meeting that the shortage will bring "a painful reduction" but that plans are in place to "share resources to reduce the pain" during the first-level shortage in 2022.

Arizona's plan for managing the shortages involves deliveries of "mitigation" water to help temporarily lessen the blow for some farmers and other entities, as well as payments for those that contribute water. The state and CAP approved more than $100 million for these payments, with much of the funds going to the Colorado River Indian Tribes and the Gila River Indian Community for water they contributed.

“There is a shortage, but we have a plan,” Cooke said. “We're implementing that plan.”

Over the past year, the declines in water levels have accelerated, outpacing previous estimates due to extremely parched conditions across the watershed in the Rocky Mountains, where much of the river’s flow originates as melting snow. Hotter temperatures have made the whole watershed "thirstier," as climate researchers put it, eroding the flow of the river as vegetation draws more water and as more moisture evaporates off the landscape.

The changes are starkly visible along the shores of Lake Mead, below the “bathtub ring” of whitish minerals that coats the rocky desert slopes.

In just 12 months, the lake’s level has dropped nearly 20 vertical feet.

The reservoir reached record-low territory four days sooner than the federal Bureau of Reclamation had projected a little over two weeks ago.

To adapt to the shifting shorelines at Lake Mead National Recreation Area, workers have been moving marinas and extending boat ramps.

“It's frightening that it's happening so quickly,” Marcus said. “I think people are surprised that it's so bad so soon, because of the role that temperature plays in aridification and sublimation — all those big words that just mean it's just so hot, the stuff evaporates, so that even the snow and precipitation we do get doesn't go anywhere near as far.”

She said the dropping levels of Lake Mead represent an emergency and should be treated as such.

“It's past yellow alert. It's the red alert,” Marcus said.

The response, she said, should be speeding up a range of actions to adapt to a

smaller supply of water from the river.

"And fortunately, for a lot of the things we use water for, we can use a lot less water and we can use it more times than we do," Marcus said. "There's plenty of room to become more efficient. It's just that we are in a bit of denial as to how bad it really can get."

During California's last severe drought from 2012-2016, Marcus was chair of the State Water Resources Control Board, which adopted mandatory conservation rules for cities and towns. Those rules have had a lasting effect in reducing water use.

She said representatives of the seven states that depend on the Colorado River have done impressive work getting together and agreeing on previous deals like the Drought Contingency Plan. And they're going to face negotiations again soon on how to manage shortages after 2026, when the existing rules are set to expire.

Officials from Arizona, Nevada, California and Mexico have been talking about other ways they might work together on long-term projects to shore up water supplies. One idea they're studying would be for Arizona to work with Mexico to build a desalination plant on the shore of the Sea of Cortez and trade some of the drinking water that's produced for a portion of Mexico's Colorado River water.

Officials from Las Vegas' Southern Nevada Water Authority have offered to invest in a water recycling project in Southern California, which would enable the agency to use some of the Metropolitan Water District's Colorado River water in exchange. Arizona water officials are also considering joining the other agencies and taking part in the project.

Marcus said there are various promising efforts underway, and Lake Mead's

retreating shorelines show the region needs to pick up the pace.

"We have to get off our butts and go faster on all of it," she said. "We know what to do. We just have to turn up the volume."

That includes investing in infrastructure projects to reduce reliance on importing water from elsewhere, Marcus said, and investing in better sensor networks so that officials aren't "guessing based on outdated models that weren't built for a climate change world."

She offered another analogy for the Colorado River's worsening crisis.

"The house is on fire and we're still rearranging the furniture and thinking about, you know, do we want to redecorate the kitchen?" Marcus said. "That's not to disparage all the work that's been done. It's just we have to do a lot more."

When representatives of the seven states signed the Drought Contingency Plan on a terrace overlooking Hoover Dam in 2019, some of them described the deal as a "bridge" solution to temporarily lessen the risks of a damaging crash and buy time through 2026, by which time new rules for sharing shortages would be negotiated and adopted.

The agreement establishes a series of progressively larger water cutbacks if Lake Mead continues to drop below lower trigger points in the coming years.

If the reservoir drops about 26 more feet to below elevation 1,045 feet, California would start to take cuts.

And if the water level falls below 1,025 feet, which is a scenario the deal aims to avoid, the largest reductions would take effect for all three states and Mexico.

Increasingly, some researchers are voicing concerns that even the major cuts contemplated in the deal might not be enough. Some have suggested that with extremely dry conditions persisting in the watershed, the region's water managers might need to take bigger steps before 2026 to prevent Mead's levels from continuing to plummet.

"We really have seen this coming all along on some level," said Brad Udall, a water and climate scientist at Colorado State University. "And we in some ways aren't ready for it, despite all the things we've done to make us feel good that we were ready for it."

Climate change in the headwaters: Hotter temperatures are hitting the Colorado River 'incredibly hard'

Udall said the network of people who work on Colorado River issues have made great strides in collaborating on adaptation strategies, including through the 2019 deal. But he said he's not convinced that adequate measures are in place to quickly scale up the more aggressive steps if the contemplated cuts turn out to be insufficient — other than the possibility that Interior Secretary Deb Haaland could convene the states' representatives and determine what steps to take, which is also included as a sort of backstop measure in the deal.

"This thing could spiral out of control pretty quickly," Udall said, if more years of severe drought desiccate the region as they did in the early 2000s.

He said he also worries about the fact that some of the water in Lake Mead is reserved for specific water users based on prior conservation, which has been encouraged under the deal and previous agreements.

Concerns about that banked water also have been voiced by others, including Margaret Garcia, an assistant professor at Arizona State University who focuses on water infrastructure and management. She said this system of

banking water, technically called "intentionally created surplus," poses concerns because it means some water in Mead is already spoken for beyond established allocations, and this stored water can still be withdrawn unless the reservoir hits critical lows.

As Garcia put it, "a savings account full with IOUs is not the same as a full savings account." And Lake Mead's account is far from full.

The heart of the issue, Udall said, may be developing new ways of quickly adapting to a river that's yielding less water as the West grows hotter and drier.

"We may need to take this next big step, which is how do you permanently reduce demands?" Udall said.

"How do you take that belt around your waist, where it's no longer elastic in the waistband, it's actually a new notch on the belt buckle that doesn't allow these large demands to occur on a regular basis," he said. "That may ultimately be where we need to go."

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