

# Damage to Glen Canyon Dam pipes threatens Colorado River water supply

Alex Findijs  
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A recent memo published by the US Bureau of Reclamation raises concerns about the future of water management in the Colorado River basin.

The memo details a discovery by inspectors at Glen Canyon Dam near Page, Arizona, which holds Lake Powell, the second largest reservoir in the United States. Following a “High Flow Experiment,” inspectors found considerable erosion in the backup “river outlet pipes” caused by “cavitation,” small shock waves produced by air bubbles that are powerful enough to damage the steel piping. These bubbles become more likely as the water level in the reservoir falls.

The outlet pipes are largely a backup release system designed for short-term use, with the main water outlet flowing through the turbine generators. Last April they were used as part of an experiment to release sediment downstream to help rebuild sandbars for natural ecosystems downstream.

An inspection following the release found the cavitation damage and the memo released by the Bureau of Reclamation notes that regular use of the pipes could cause severe damage to them, with the agency prioritizing keeping water levels above 3,490 feet above sea level to ensure water can flow through the generator outlets.

This presents significant challenges for water managers throughout the Colorado basin. Lake Powell is a major power generating reservoir, but even more importantly it is the most significant source of inflows to Lake Mead in Nevada, the largest reservoir in the US and the source of drinking and irrigation water for 30 million people and millions of acres of farmland.

Currently just a third full, Lake Mead has been declining in storage for more than two decades with major concerns through 2021 and 2022 that the lake would approach “dead pool,” the point where water can no longer pass beyond the dam.

Reclamation was already planning on keeping water levels in Lake Powell (currently at 3,558 ft.) above 3,490 ft., and with a strong snow season this past winter it does not expect water levels to fall below its current level through February 2026. However, the Bureau has a tendency to overestimate lake levels in its projections and there are serious concerns that a turn to drier weather over the coming years could put the entire river system at risk of collapse.

Zach Frankel, executive director of the Utah Rivers Council, told KLAS the pipe damage “reveals that the archaic plumbing inside [Arizona’s] Glen Canyon Dam is the most urgent water problem facing the 40 million people of the Colorado River Basin.” Eric Balken, executive director of the Glen Canyon Institute, added, “If we drop everything to solve it, the solution will still take 10 years to implement—so why are we procrastinating?”

In a public statement, Balken said:

Even if Reclamation can implement small fixes to the lower outlet tubes in the near term, they will continue to be a problem going forward. They were not designed to operate at low reservoir levels. Glen Canyon Dam will be overhauled eventually. It’s a when, not an if. We know that low reservoir levels are the new normal, and we know that the dam is extremely close to becoming a roadblock to water deliveries downstream.

Even with the outlets fully functional they would not be able to deliver enough water downstream to meet demand. According to the Colorado River Compact lower basin states (California, Arizona and Nevada) are entitled to at least 7.5 million acre-feet of water each year (one acre foot is enough for two households for a year). If water could only be released through the river outlets they would only be able to provide a maximum of 2.6 million acre-feet a year.

And if the outlets were unusable at all, shortages would be significantly worse. Lake Mead currently holds 9.5 million acre-feet. Without inflows from Lake Powell the reservoir would have just over a year’s worth of water left unless drastic cuts to use were made.

Strong rains and snow over the past year should keep levels in both dams steady in the short term but longer term risks, even just a few years ahead, are greatly exacerbated by this infrastructure damage. Recent heavy snow was fueled by El Niño conditions off the coast of South America. El Niño is the warming period of the El Niño Southern Oscillation, a fluctuating climate condition between warm and cool periods in

the Pacific Ocean with global impacts. El Niño brings wetter than normal seasons to the American Southwest while causing drier conditions in other parts of the world. Serious droughts in Mexico, Colombia, Peru, Bolivia, Zimbabwe and other countries have been fueled by El Niño.

El Niño conditions this year are coming to an end with uncertainty if conditions will turn to neutral or swing back into a La Niña this year, the cooler period of the cycle. Regardless, all El Niño systems cycle into La Niña eventually. The last La Niña period lasted three years from 2020 through 2022 and brought rapid declines to storage in Lake Mead. Major declines in storage in Lake Mead often correspond with the transition to La Niña years as they bring less rain and snow to the region. Another major La Niña event could put the water supply for 40 million people at risk.

More broadly speaking it is capitalism-induced climate change that is driving the water crisis in the Southwest. A warmer climate is resulting in more serious and prolonged droughts and more devastating flood events when the rain finally arrives. Hotter temperatures are causing greater evaporation from reservoirs and reducing overall supply in the basin.

Despite nearly 25 years of drought in the Southwest only limited efforts have been taken to mitigate the imbalance between the supply of water and the demand. Along the Colorado, 15 million acre-feet of water is legally allocated every year, but supply is closer to 12-13 million. The Bureau of Reclamation estimates that Colorado River water users will need to collectively cut up to 4 million acre-feet to avoid catastrophe in the river's reservoirs.

Existing drought plans between the lower basin states promise up to 1.1 million acre-feet in cuts and additional agreements reached last year promise up to another 1 million acre-feet in cuts to use each year through 2026. Proposed short-term cuts by the Bureau of Reclamation could raise cuts to up to 4 million acre-feet under the most extreme shortage conditions through 2026 as well.

It is 2026 when the Colorado River Compact and a host of management programs and agreements are set to expire. The seven basin states (California, Arizona, Nevada, Utah, New Mexico, Wyoming and Colorado) have been locked in negotiations on a post-2026 water agreement for years but have failed to reach a deal. Both the Upper and Lower basin states insist that the other should contribute more to water conservation and refuse to budge on their own offers.

The states were supposed to submit a joint proposal to the Bureau of Reclamation earlier this year but submitted two separate plans instead. The Upper Basin states insist that the Lower Basin commit to making all of the cuts, arguing that they do not use all of their allocation and should not be required to cut their use. The Lower Basin states have offered to make cuts themselves but only if the Upper Basin states agree to make cuts to keep Lakes Mead and Powell from falling too low

as well. Without a mutual agreement the Bureau of Reclamation may submit its own plan and seek federal enforcement upon the states.

The infrastructure decay at Glen Canyon Dam and the impasse between the Colorado River states is a product of the irrationality and anarchy of the capitalist mode of production. A water resource necessary for 40 million people and over 5 million acres of farmland is split over seven states and Mexico, with the economic interests in each state heavily resistant to any infringement to their ability to profit.

In the Imperial Valley of California, the largest owner of Colorado water rights, just 400 farms produce over \$2.6 billion in agricultural goods that fuel billions of dollars more in economic activity across the food industry. These farms own 2.6 million acre-feet of water rights, and a report by the *Desert Sun* found that just 20 families control the majority of it. Such wealthy farmers have no interest in cutting back on water, unless they are paid handsomely to fallow their fields.

The profit drive is accompanied by the criminal neglect of critical infrastructure. Glen Canyon Dam was completed in 1964 and the damage to the river outlets is believed to have been caused over a prolonged period of time. Just as critical safety improvements were neglected for decades at the Key Bridge in Baltimore—resulting in its catastrophic collapse last month—essential maintenance at Glen Canyon Dam has been delayed to the point of critical risks to the dam's operations.

The application of a new layer of epoxy to protect the pipes is scheduled for 2025 but the risk of cavitation and system collapse are still present. In recent years several proposals have been made to modify, bypass or remove the dam entirely. Regardless of any action at Glen Canyon Dam, the proper management of the US Southwest's water requires adequate planning and funding, resources that have failed to be provided while nearly endless resources are made available for war. Major repairs to Glen Canyon Dam could cost up to \$3 billion, according to the Great Basin Water Network, one sixth the money the Biden administration has recently proposed to fund Israel's genocide in Gaza.



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