Lake Powell could become a ‘dead pool’ as climate change, political wars and unabated growth drain its waters

Bullfrog Marina • Ever since the Colorado River began filling Utah’s Glen Canyon and its countless side canyons in 1963, conservationists have been calling for emptying the lake that now supports a recreation economy and power generation.

Climate change, unbridled development and Western water politics are conspiring to gradually grant this wish. The reservoir has shed an average of 155 billion gallons a year over the past two decades, the result of drought-depleted river flows coupled with rising demands from powerful downstream water users.

Without a change in how the Colorado River is managed, Lake Powell is headed toward becoming a "dead pool," essentially useless as a reservoir while revealing a sandstone wonderland once thought drowned forever by humanity's insatiable desire to bend nature to its will.

"Lake Powell is doomed," says Gary Wockner, an author and scientist who heads the group Save the Colorado. "The sooner we accept that inevitability, the sooner we will find a permanent solution."

(Brian Maffly | The Salt Lake Tribune) Sediments deposited by the Colorado River into the bed of the now receded Lake Powell in Hite, Utah. The marina shown on Nov. 28, 2018, was the first place to lose water.

Unless water managers curb releases from Glen Canyon Dam, the lake, within a couple of years, Wockner warns, could fall below the level at which its turbines can crank out power, effectively negating a reason for the dam in the first place.

Utah water captains dispute Wockner's dire forecast, but everyone agrees that the Colorado River is in crisis.

With seven Western states vying for what's left of the Colorado River's diminishing flows, Lake Powell and its older

downstream partner, Lake Mead, are shrinking in the face of unrelenting demands on the water stored behind their mighty dams. The crux of the problem is the fact that the two reservoirs' combined storage sits below 46 percent of capacity, the lowest since Powell began filling, according to Bureau of Reclamation Commissioner Brenda Burman.

"We are teetering on the brink of a shortage today," she told the Colorado River Water Users Association in November, "and we see real risk of rapid declines in reservoir elevations."

(Brian Maffly | The Salt Lake Tribune) In this Nov. 28, 2018, photo, the Colorado River cuts through sediment deposited on the bed of Lake Powell near Hite Marina in Hite, Utah.

Lake Powell operates as a key cog in a vast system that supplies water to 30 million people and irrigates 5 million acres.

To get a feel for the 55-year-old reservoir's plight, it helps to be in a boat sidled up against its vertical shoreline, oddly plastered with a white coating where normally the Entrada sandstone hums with pinks and reds streaked with dark varnishes.

Scott Hynek, a hydrologist with the U.S. Geological Survey, stands on the bow of a research vessel exploring the reservoir's Colorado River arm, examining the milky mineral deposits that extend 80 feet above his head. The vast stripe rimming Powell is a testament to how far its level has dropped since 2000, when the Colorado's flows began a steady decline in response to persistent drought, warming temperatures and the unabated thirst of a civilization that often pays insufficient heed to nature's limits.

The 1,450-mile Colorado River is subject to a complicated water-sharing agreement that is under severe strain as Utah and six other Western states craft "drought contingency plans" to align their water use with reality.

There will be no winners and plenty of losers, but everyone suffers if a consensus is not reached soon.

“The latest hydrological information is sobering,” Burman told the 1,000 water managers and scientists gathered in Las Vegas. “Today’s level of risk is unacceptable and the chance for crisis is far too high.”

The pressures on the river raise the possibility that Lake Powell or Lake Mead — or both — could cease functioning as designed. Water levels could become too low to produce power, to go boating, to store water, and, in Powell’s case, to meet downstream delivery demands.

“It is fair to say that the politics of water in the Southwest are more concerned about the future of Lake Mead than Powell. You can connect the dots to say the future of Lake Powell is questionable,” says Doug Kenney, a Western water law scholar at the University of Colorado.

After all, California, whose residents in the south rely on water from Lake Mead, has more than twice as many members of Congress as the four Upper Basin states combined.

“The conversation now is how do we manage the pain and spread it around so it’s not too devastating to one party,” said Kenney, who leads the Colorado River Research Group. “At some point, you can’t ignore reality anymore, and the reality is we need to use a lot less water in the Colorado Basin.”

(Brian Maffly | The Salt Lake Tribune) A mobile drill platform used to drill sediment core samples from the bed of Lake Powell on Nov. 29, 2018.

Last August, his group of scholars released a white paper arguing that the river's status quo cannot be sustained, and structural changes are needed to avert a crisis.

Under a 1922 interstate compact, the river's water is evenly divided between its Upper Basin (Wyoming, Colorado, New Mexico and Utah) and Lower Basin (Arizona, Nevada and California) states. Each basin is supposed to receive 7.5 million acre-feet, with Mexico getting 1.5 million. But, in reality, far less water than that has been available during the past two decades, while the Lower Basin states have been pulling more than its allocated share.

For example, Utah is entitled to 23 percent of the Upper Basin's share, or 1.7 million acre-feet. It uses about two-thirds of that allotment.

Even with the Upper Basin taking far less than its share, the level of Utah's Lake Powell, which stores runoff originating in these upriver states, has been steadily dropping. Today, its surface sits at 3,575 feet above sea level, holding 10 million acre-feet of water, about half as much as it did in 2000, when its elevation was about 100 feet higher. Four of the 10 lowest-runoff years have occurred during this time

period.

According to Reclamation forecasts, Powell's inflows this year are expected to be about two-thirds of normal, and the lake will end the water year at an elevation of 3,571 feet, or 38 percent capacity. It would reach "dead pool" at 3,370 feet.

"Continuing this operational pattern will further drain Lake Powell and erode the benefits associated with its water storage," the researchers say in the report. "If storage in Lake Powell cannot rebound in an era where the Upper Basin consumes less than two–thirds of its legal apportionment, then the crisis is already real."

The report recommended managing Powell and Mead as a single giant reservoir, albeit one separated by a "ditch" known as the Grand Canyon. "Managing — and thinking — of these facilities as two distinct reservoirs, one for the benefit of the Upper Basin and one for the Lower, now seems outdated."

Utah State University hydrologist Jack Schmidt, a co-author of the report, likens Powell to a bathtub where water is draining out of the bottom faster than it enters from the Green, San Juan, Dolores and other Upper Basin tributaries.

"The Lower Basin is using more water than is sustainable,"

he says. “It’s like a complicated game of chicken where the Upper Basin states say, ‘You in the Lower Basin need to make the drain smaller,’ and the guys with access to water coming out of the drain saying, ‘You guys in the Upper Basin can’t use any more water.’”

Either way, Lake Powell is losing water to evaporation and seepage at rates that are poorly understood and inadequately monitored, according to Schmidt. He suspects Powell loses up to 50,000 acre-feet a year to seepage and evaporates water at about the same rate as the lower-elevation Mead, but the data have yet to be gathered and analyzed to know for sure.

“Mead has been studied closely for a long time,” Schmidt says. “In contrast, [evaporation] measurements out of Powell have not been seriously recorded since the 1970s.”

In response to a report he released two years ago referencing this information shortfall, Reclamation has initiated a program to measure evaporation with the sophisticated techniques in place at Mead.

To gauge rates of seepage, the bureau drilled observation wells around Glen Canyon Dam back when it was built 60 years ago, but the data they yield, Schmidt notes, are just sitting in books without being examined.

(Brian Maffly | The Salt Lake Tribune) Change in water level shows about 90 feet of rock near Bullfrog Bay on Nov. 29, 2018, that has been exposed since Lake Powell has receded.

Even amid all this uncertainty, Upper Basin states are pursuing more diversions, which could funnel up to 300,000 acre-feet from Powell.

One of those projects, Utah's Lake Powell pipeline to St. George, would siphon off 86,000 acre-feet. Critics argue the billion-dollar-plus undertaking defies the lake's dropping levels and fails to consider other options for meeting the water needs of mushrooming southwestern Utah.

Eric Millis, director of the Utah Division of Water Resources, however, contends it is unlikely Lake Powell will plunge to a critical level if the Upper Basin states' contingency plan is followed.

"If it does, there are ways to work around that," Millis says. "We believe the [water] supply for the pipeline is secure, and we are justified in expecting that we can use that water for a needed purpose."

Utah was among the first states to submit a draft drought contingency plan to federal water honchos, but it is short on specifics and does not call for mandatory reductions in

water use, in contrast with what's expected from Arizona.

It instead proposes allowing Utah and other Upper Basin users to "bank" water deliveries in Lake Powell so they can receive future credit for water conserved. This arrangement would require changes to water law in all four states.

The plan also proposes compensating agricultural users that don't take their water, a practice that has already been used to keep water in the Price River.

Millis says the plan has the four Upper Basin states working together to ensure Powell maintains a minimum level of 3,525 feet. That's the elevation at which generating power gets complicated. Ominously, it's also only 50 feet lower than the current elevation.

"At that point, we would see if people are willing to enter voluntary agreements and be compensated to forebear use of the water so we can get it to Lake Powell," Millis says. "That Lake Mead keeps dropping is testament to its overuse. Something has to be done."

Receipts from power generation pay for endangered-fish recovery, desalination and other projects that mitigate the environmental damage wrought by water diversions on the Colorado.

(Brian Maffly | The Salt Lake Tribune) Sediments deposited

by the Colorado River into the bed of the now receded Lake Powell in Hite, Utah. The marina shown on Nov. 28, 2018, was the first place to lose water.

Critics argue the Upper Basin's proposed contingency plans are based on wishful thinking.

"They are proposing to drain and destroy hundreds of thousands of acres of farms using billions of dollars of taxpayer money to try and save Lake Powell in opposition to scientific reality as well as political and financial common sense," says Wockner, executive director of Save the Colorado.

Between 2015 and 2017, $4.5 million was spent compensating Upper Basin farmers to forgo irrigation water, saving about 22,000 acre-feet. Wockner calculated that 478,000 acre-feet would need to be secured year after year just to stabilize Powell.

"Doing so won't increase the lake level," Wockner emphasizes, "and, further, won't address any future decrease in the lake level due to the increasing impacts of climate change, which will further decrease the flow of water in the Colorado River."

Meanwhile, it remains to be determined how to pay for these water purchases and account for the water that is

being banked in Lake Powell, according to Bart Miller, who leads Western Resource Advocates' Healthy Rivers Program.

"Each of those states needs to develop a program for actually putting water into that account. That will be really interesting work over the next several years to figure out when, where and who is putting that water in there on a voluntary, compensated basis," he says. "It's clear there has to be a funding source because it won't be done for free."

Western Resource Advocates contends municipal users, especially in Utah, need to cut back, even though agriculture laps up the lion's share. With higher per-capita water use than nearly any other state, Utah has plenty of room to conserve, but the political will is wanting, according to Amelia Nuding, a policy expert with the group.

A big obstacle to residential conservation is how Utahns pay for the water they use.

"There are so many providers who rely on property taxes to fund their operations, so users pay very low rates for the water they use, and that's a problem throughout the state," Nuding says. "It is more common throughout the basin for users to pay the full cost of water through their water-use rates."

She contends metering secondary water and reducing tax subsidies need to be part of any conservation strategy.

“When you are talking about billion-dollar water projects,” Nuding says, “the only rational thing to do first is to make sure everyone knows how much water they are using, and they are paying the appropriate amount for that water.”

But Millis says tapping tax revenue is critical to obtain low-cost financing for water projects. Meanwhile, he adds, Utah water districts are looking to boost “tiered” rates so that those who use more water pay higher rates.

Most of the Colorado’s flow originates in its Upper Basin, but most of the water is consumed downstream in Arizona, Nevada and California, an imbalance that promises to foment friction among water users as the feds finalize an overall Drought Contingency Plan gleaned from the various state proposals, which are due by Jan. 31.

Absent cutbacks to deliveries to the Lower Basin, a day could come when water managers may have little choice but to lower the waters that have inundated Utah’s Glen Canyon for the past half-century. Already much of the lakebed is exposed, opening countless side canyons to daylight and severely narrowing options for recreational boating.

Green and red buoys direct pilots where to point their bows to stay in safe water, while up-lake marinas have been left high and dry. The tiny shelled carcasses of an invasive mussel called quagga blanket the ground, still clinging to rocky outcrops — as if waiting for the waters to return.

Buoys at Hite, the ghost town where the Dirty Devil and the Colorado used to enter the lake, are tethered to ground that is nowhere near water. A half-mile hike across sun-cracked sediments deposited by the receding lake now separates the boat ramp from the river.

These sediments washing down countless tributaries are slowly filling the pool behind Glen Canyon Dam.

This process, which Hynek, the USGS hydrologist, is studying, reveals the limited life span of the reservoir named for John Wesley Powell, the 19th-century explorer who devoted his scientific career to warning about the limits of the arid West to support civilization.