Should Coloradoans Care about Water Levels in Lake Powell?

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Lake Powell

We occasionally hear about declining lake levels in Lake Powell or Lake Mead, but – apart from being nice places to boat and fish - what is the relevance of these water bodies to Colorado agricultural producers and rural residents? To understand this, we need to go back almost 100 years to the signing of the Colorado River Compact.

Under the 1922 Compact, Colorado and the rest of the Upper Basin states – Utah, Wyoming, New Mexico – have a shared obligation "not to deplete" the river by more than 7.5 MAF (million acre-feet) per year on average, or 75 MAF over a 10-year period. The three *lower* basin states – Arizona, Nevada and California - also have an allocation of 7.5 MAF per year, and Mexico gets 1.5 MAF. The Compact essentially obligated the river to supply up to 16.5 MAF per year, which was thought to roughly represent the long-term annual average flow of the Colorado River based on an estimate made at the time.[1]

The problem – as it turned out – was that the original estimate was high. The period 1905-1922, which was used to estimate water production allocated under the 1922 Compact had the highest long-term annual flow volume in the 20th century, averaging 16.1 M acre-feet per year at Lee's Ferry, AZ.[2] Since then, the average flow has been about 13.9 MAF.[3]

The collective water use of the four Upper Basin states is still well below the 7.5 million acre-feet annual average depletion allowance. U.S. Bureau of Reclamation 5-year retrospective "Consumptive Use and Loss" reports indicate that the Upper Basin water use averaged 4.4 MAF between 2000 and 2015. The highest use among these years was 4.9 MAF.[4]

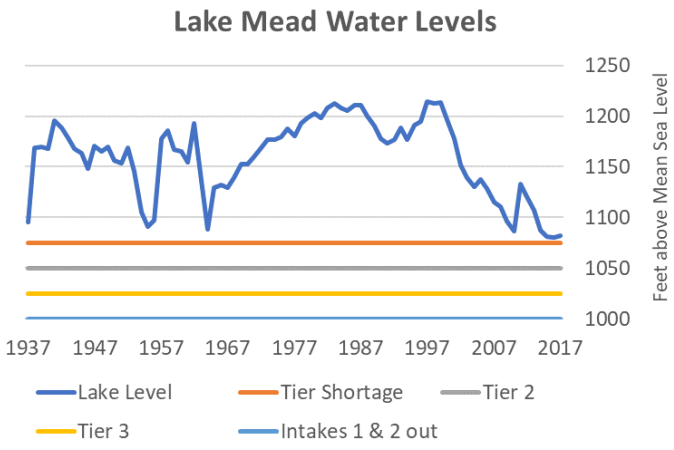
The Lower Basin states, with greater population and higher evapotranspiration, have a more difficult time managing water demands within the limitations of the Compact. For the last several years, annual releases from Lake Mead have averaged about 9 MAF to meet lower basin water demands. However, Lower Basin water users receive credits for unused return flows. Lake Mead also loses about 1.2 MAF in evaporative and system losses, so the total annual outflow from Lake Mead has been about 10.2 MAF.[5]

The imbalance between Lake Mead's long-term inflows and outflows is called the "**structural deficit**." This volume is estimated to be approximately 1.2 MAF annually. Lower Basin water users, including Mexico, are developing a Drought Contingency Plan (DCP) to address this imbalance by using a comprehensive demand management system that will better match deliveries to variable, and generally diminishing inflows into Lake Mead.

Lake Powell stores water that flows from the Upper Colorado River basin and is used to buffer declines in Lake Mead. Glen Canyon Dam – which creates Lake Powell – also has turbines that generate 5 Billion kilowatt-hours of hydroelectric power annually. The Western Area Power Administration (WAPA) distributes this electricity to Colorado and six other states at cost-effective rates. The total value of the electricity produced is about $120 M annually. A small but important portion of the annual power revenue is used to fund salinity control programs that help pay for irrigation infrastructure upgrades on the western slop

e, and provide funding for the Colorado River and San Juan River endangered species recovery programs.

In 1970, formal "Operating Criteria" were agreed upon by the seven states and the Bureau of Reclamation to provide for the coordinated operation of reservoirs in the Upper and Lower basins and set conditions for water releases from Lake Powell and Lake Mead.[6] In 2007, interim criteria were established to specifically enable coordinated operation of Lake Powell and Lake Mead that would "minimize shortages in the Lower Basin and help avoid the risk of curtailments in the Upper Basin." These interim criteria are based on specified reservoir conditions.



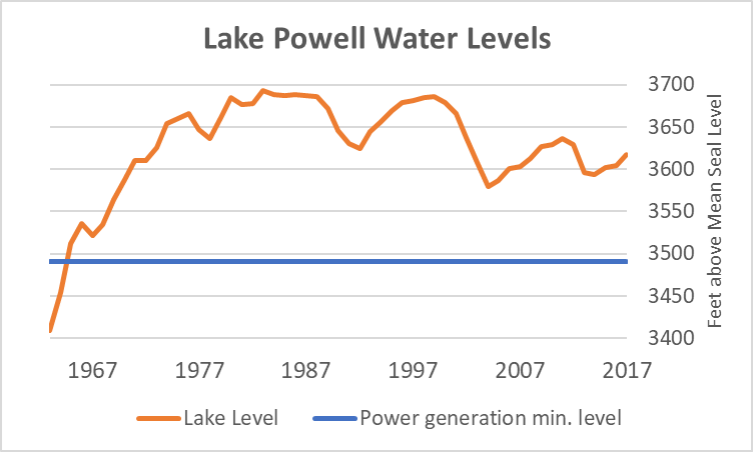
Operating Criteria allow the Secretary of the Interior to make releases from Lake Powell to raise the water level in Lake Mead so that the stored volume of the two reservoirs is roughly equal.[7] The upshot is that Lake Powell declines when Lake Mead declines, even if ample flow is entering Lake Powell from the upper basin states.

Since 2000, the two reservoirs have fallen to approximately half of their combined capacity in response to hydrological conditions and to meet Lower Basin water needs and Upper Basin power needs. The current water level of Lake Mead - 1,087 feet above sea level – remains above the "Tier 1 Shortage level" of 1,075 feet, which is the point where water allocations to Arizona and Nevada are reduced under the Interim Operating Guidelines. These reductions become increasingly severe at Tier 2 and Tier 3 levels. [8]

The current level of Lake Powell is about 3,619 feet above sea level. [9] The concern for the Upper Basin states is that if the structural deficit continues and/or a drought returns, Lake Powell could fall to a level below 3,490 feet, which is the minimum level needed to generate electricity (ie. the "power pool").

The Lower Basin states and Mexico have implemented conservation measures that have saved about 1.2 million acre-feet in Lake Mead since 2014. This has resulted in the lake level being 14 feet higher than it would have been otherwise. [10]

For Colorado and the other upper basin states, the challenge isn't complying with the depletion limit spelled out in the 1922 Compact. Instead, it is simply how to deal with snowpack variability and potential water supply shortages over a multi-year period. Since many Front Range cities and east-slope irrigation districts rely on Colorado River Basin water via trans-mountain diversions, runoff shortages on the western slope also directly affect eastern slope residents and farmers. And of course, multiple years of drought in the upper basin could result in lowering of Lake Powell to the power pool level simply because of inadequate runoff. When the 2002-2003 drought began, Lake Powell was full. Today it is about 56 percent of its capacity. [11]



In 2015, a program was created to determine whether voluntary, compensated reductions in consumptive use in the upper basin states could be a useful tool to put water into Lake Powell and minimize lake-level declines during drought periods. The System Conservation Pilot Program (SCPP) is funded by southern California's Metropolitan Water District, Central Arizona Project, Southern Nevada Water Authority, Denver Water, US Bureau of Reclamation, and NGOs. About $4.5 M has been spent on the program through 2017 and approximately 22,000 acre-feet of consumptive use water has been conserved through fallow and deficit irrigation, alternative cropping and a municipal water savings program. The program is being continued in 2018. [12]

Lake Powell and Lake Mead tie the Upper and Lower Basin states together. Sustaining a pool level in Lake Powell above the "power band" is in the best interests of Coloradoans due in part to the inexpensive electricity and revenue that the hydroelectric plant generates. Additionally, severe drought in Lower Basin cities could have unexpected and undesirable implications for water and power users in both the Eastern and Western slopes of Colorado. Establishing strategies now that enable structured yet nimble responses to future water shortages downstream will help lessen negative impacts to Colorado agricultural producers.

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Lake Powell photo: *the Atlantic*