

**Colorado River Crisis Mitigation Strategy #2, v2, April 26, 2022**  
**Eliminating Losses from Excess Reservoir Capacity**

**The Bureau needs to start engineering work ASAP to open bypass tunnels on one or more of the big reservoirs on the Colorado River and return them to river flow.**

This will **save hundreds of thousands of acre-feet a year in system losses**, it may be the easiest, cheapest, new water to be found in the Colorado River System.

**Rationale**

- There is **too much reservoir capacity on the Colorado for current hydrology.**
- Under strict interpretation of the 1922 Compact, Article IV(b) **hydropower has to be sacrificed before Ag and Domestic use** since its the secondary use:

ARTICLE IV

(a) Inasmuch as the Colorado River has ceased to be navigable for commerce and the reservation of its waters for navigation would seriously limit the development of its Basin, the use of its waters for purposes of navigation shall be subservient to the uses of such waters for domestic, agricultural, and power purposes. If the Congress shall not consent to this paragraph, the other provisions of this compact shall nevertheless remain binding.

(b) Subject to the provisions of this compact, water of the Colorado River System may be impounded and used for the generation of electrical power, but such impounding and use shall be subservient to the use and consumption of such water for agricultural and domestic purposes and shall not interfere with or prevent use for such dominant purposes.

(c) The provisions of this article shall not apply to or interfere with the regulation and control by any State within its boundaries of the appropriation, use, and distribution of water.

- **Evaporation losses** from underutilized reservoirs are costing the system precious water it can't afford to lose under current hydrology.
- **Continuous releases from Lake Powell through the bypass tubes has risks**
- **Trying to operate and generate power from multiple reservoirs all of which are losing their power head is problematic.**
- One head is better than two. **One good power head may generate more power, more safely than weak, failing power heads.** An engineer needs to compare the power production for various options
- The engineering will be expensive upfront but **you will gain water every year thereafter nearly for free** (well you are losing power and power revenue but we are losing those anyway)
- **This is more conserved water every year than you are probably going to get from Upper Basin Demand Management over many years.**
- **By draining a dead pool you will gain much needed water to buy much needed time to deal with this crisis.**
- **This water will probably be much cheaper than Desalination, Recycling or Importation especially since it's free once the engineering work is done.**
- Eliminating Powell or Mead **eliminates the need to fight over how to operate and balance reservoirs..**

## Issues to resolve:

- **Can a bypass tunnel be reopened in a controlled manner safely**
- **Can the dam be fitted with hydraulic gates** quickly and safely so the Bureau can regulate flow, hold small pools behind the dam as necessary or refill the reservoir if hydrology improves
- **The ability to close and refill the retired reservoir in event of flood or a return to pluvial hydrology like the 1980's is essential.**
- **Mud on and around the inlet to the bypass tunnel may pose challenges.** Some mud is probably good to restore the health of the river, too much would be bad. Will dredging be required?
- **NEPA on this may be tough and time consuming.** NGO's probably want to get rid of a reservoir so at least some may help instead of hinder.
- **Power and power revenue from still operating hydro would need to be split between Upper and Lower Basin** so neither is wiped out and everyone would suffer the loss equally. If the improved head on the remaining reservoirs produces significantly more power that will lessen the blow.
- **The Lower Basin will need to agree to continue to take shortages and to balance their demand with inflows to protect remaining reservoirs if Lake Powell is drained into Lake Mead.** Raising the elevation in Mead will create a temptation in the Lower Basin to stop making difficult decisions(i.e. taking shortages). Remaining reservoir storage must be protected. Continuing to drain Lake Mead once Lake Powell is gone would be bad.
- **Removing Powell may adversely impact Upper Basin III(d) compliance** which needs to be understood. III(d) needs to be thrown out anyway since the Upper Basin is never going to get its III(a) entitlement. Ideally the Upper Basin will agree to a cap on use and the Lower Basin will agree to not invoke III(d). This Brent Newman memo from 2019 is already pointing in that direction:

<https://twitter.com/edmillard/status/1492190838557974529>

## Targets

**Lake Mead** would probably be the biggest win, it's a big, low elevation lake in a hot region. This would solve a problem that has been unsolvable to date, getting the Lower Basin to take charges for the losses on Lake Mead... by getting rid of the losses :) The difficult to solve problem is keeping Las Vegas in water. You may need to maintain a small pool to get Water to Vegas and ensure orderly deliveries to contracts in the Lower Basin, Lake Powell is pretty far away for contract deliveries.

**Lake Powell** is probably easier than Mead, Page and some Navajo communities would need measures to secure their water supply, they are relatively small so easier to fix.

**Flaming Gorge** would probably be easier still, it's primarily for hydropower, probably not as much of a win.

## Miscellaneous

1. Article VIII of the compact requires only 5,000,000 acre-feet of storage for the Lower Basin, enough to store a single season's spring runoff and spread it out over the year. By developing ten times that much storage the Lower Basin was given too much latitude to overuse the available supply for too long without consequence. It also made management and balancing of the system much too complex:

*Present perfected rights to the beneficial use of waters of the Colorado River System are unimpaired by this compact. Whenever storage capacity of 5,000,000 acre-feet shall have been provided on the main Colorado River within or for the benefit of the Lower Basin, then claims of such rights, if any, by appropriators or users of water in the Lower Basin against appropriators or users of water in the Upper Basin shall attach to and be satisfied from water that may be stored not in conflict with Article III. All other rights to beneficial use of waters of the Colorado River System shall be satisfied solely from the water apportioned to that Basin in which they are situate.*

2. Eric Kuhn wrote an [interesting article](#) recently on the “bonus water” the Lower Basin is getting from seepage from Lake Powell into the river below Glen Canyon that isn't being properly accounted for at Lee's Ferry. This would be eliminated by draining Lake Powell probably to the benefit of the Upper Basin's III(d) moving average. Not sure if this is currently counted as evaporation losses to Lake Powell or not:

*If one checks the 24-month studies back to 2010, the average annual difference between the gage and the dam release is nearly 151 kaf.*

As Eric points out 151 kaf per year over 10 years is a lot of water towards III(d) compliance.

3. Rough estimate of reservoir evaporation losses is in the green wedge(needs verification), maybe 6.6% of current use in the whole Colorado River System.

