Is the Colorado River "Stress Test" stressful enough?

Posted by on

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Earlier this year, we argued in a [Science magazine editorial](#) that Colorado River forecasting must take the growing risk of climate change seriously. The latest five-year projections from the U.S. Bureau of Reclamation offer a practical example of the challenge.

Published July 8 (see [here](#) and [here](#)) with an accompanying [news release](#), the projections suggested that if the trends of the last 30-plus years continues, there is a 79 percent chance that Lake Powell could drop next year below elevation 3,525 – a danger zone for managing power production and releases to the Lower Basin going forward. With the reservoirs behind Hoover and Glen Canyon dams expected to drop below 30% by early 2022, these projections take on a new importance — we no longer have a huge water buffer to protect us from future low flow years.

It is stark news. But perhaps not stark enough.

This forecast takes advantage of an important new tool

Reclamation has invested in called the "Stress Test" to give us a sense of the future risks we face.

The Stress test goes beyond the old "the future will be like the past" scenario building we have used in the past on the Colorado River. This new tool takes an important step toward incorporating climate change. But we are concerned that it doesn't go far enough.

The five-year projections come in two flavors. One, "the future will be like the past," uses the historical hydrology since 1906 with a mean flow of 14.8 maf. In a stationary climate, this hydrology would be fine. But the climate is not stationary, and the only real use for this hydrology is to see just what we've lost as climate change saps the river, not what the future might hold.

The alternative 'Stress Test' hydrology uses the period from 1988 to 2019 with an annual flow of 13.3 maf. While more reflective of current conditions than the full hydrology, these flows also do not reflect the past 22 years with its annual runoff of 12.4 maf. When river managers first began using it, the "Stress Test" marked an important step toward taking climate change seriously. But these flows are no longer what they purport to be.

What we really need, and what we argued for in our Science editorial, is a 'reasonable worst case future'. This is the

future that a prudent person would plan against, knowing what we currently know.

The last 22 years are the best analog for our 5-year future. And within those 22 years one period stands out as the worst, the period from 2000-2004. These years averaged 9.4 maf, and during that time Powell and Mead lost ~25 maf. This period is what a prudent person would pick as a reasonable worst case — it happened before and it can happen again. In fact, the extreme dry of 2020 and 2021 suggests it may be happening *now*.

It would be interesting to see how Reclamation's model performs against 2000-2004 and also against 2000-2021.

Within the Colorado River management community, there are questions about these modeling exercises on the demand side as well. Are water uses across the basin overstated? Might that at least partially offset overly optimistic supply estimates?

Pat Mulroy, after being burned by false probabilities, famously said that as a water manager she was only interested in possibilities, not probabilities. The hydrology from 2000-2004 is a possibility. Let's learn the lessons it holds.