Forecasters couldn’t predict how quickly Colorado River reservoirs would dry up this year. Scientists are trying to improve their models.

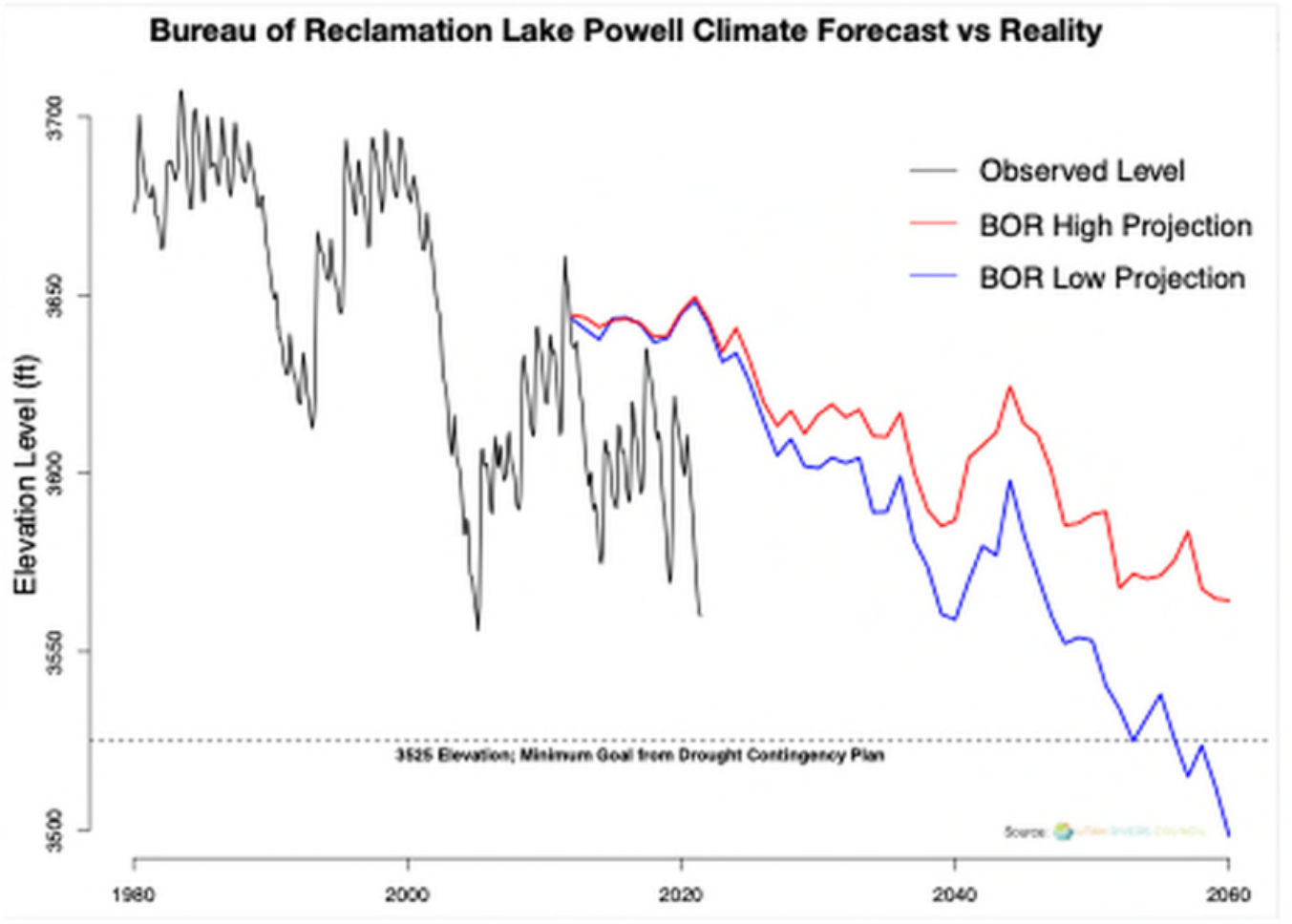
As climate change disrupts weather patterns in mountain regions across the world, scientists are recognizing the need to innovative new research models.

Water managers in the Colorado River basin knew that dry soil conditions and below-average snowpack last winter would lead to reduced runoff into streams, rivers and reservoirs this summer. But predicting just how much water would make its way into the Colorado watershed proved difficult.

In April, the Bureau of Reclamation, which oversees a vast network of water infrastructure in the United States, shared data with the National Park Service that projected a range of water levels in Lake Powell throughout 2021. The models showed the reservoir would likely remain above 3,554 feet in elevation — a level below which many of the boat ramps in Glen Canyon National Recreation area would become unusable — until as late as October.

But those projections turned out to be overly optimistic and were repeatedly revised as the spring snowmelt failed to recharge reservoirs in the basin. Lake Powell fell below 3,554 feet in July, and it has continued to decline, despite unprecedented emergency releases from other reservoirs upstream.

Longer-term models forecasting levels in Lake Mead and Lake Powell proved to be even further off-base, a prediction miss that has consequences for the 40 million people who rely on the Colorado River for water.



(Utah Rivers Council) The Bureau of Reclamation's predictions for reservoir levels at Lake Powell proved overly optimistic.

Improving the accuracy of weather and streamflow forecasts is one goal of a new project that U.S. Department of Energy scientists led by the Lawrence Berkeley National Laboratory are starting next month. The team is installing a field laboratory in the mountains of Colorado near Crested Butte that will collect a vast array of data to better understand the water cycle in high elevation environments.

Mountain regions, where most of the water in Western rivers originates, are changing rapidly in the face of climate change,

explained Alejandro Flores, a hydrologist at Boise State University who is involved with the project.

“Mountain environments,” he said in a press call with reporters Tuesday, “present a particularly difficult environment in which to model the weather and in particular the precipitation and other facets that control how snowpack accumulates over the course of the season.”

The snow that amasses on peaks throughout the winter can vary widely even within a few miles due to a complex array of factors, he said, “so it turns out when we predict things like snowfall and temperature distributions, we really can’t think of the atmosphere as being independent from the land.”

The field laboratory will operate for two years and will measure everything from groundwater conditions to wind, clouds, aerosols, temperature, humidity and ozone. It will also bring together scientists specializing in various fields — geologists, hydrologists, microbiologists, plant and vegetation researchers — as well as various universities and federal agencies, including the U.S. Geological Survey, National Oceanic and Atmospheric Administration and the Bureau of Reclamation. The data will be freely available to researchers worldwide.

“By fostering what we call ‘extreme collaboration,’” said Ken Williams, a Berkeley Lab scientist and lead on-site researcher

for the project, "it's allowed our collective research team to gather data that ranges from the treetops to soils to underlying bedrock.

"And by collecting data over that spectrum," he continued, "it allows us to develop predictive models that can examine impacts to future water availability and water quality tied to climate disturbance."

The range of data being collected by the project will allow researchers to study weather patterns in great detail, said Jessie Creamean, an atmospheric scientist at Colorado State University, and findings from the project will likely be applicable to other mountain watersheds.

The project leaders hope the findings from the project can be used to more accurately model runoff into reservoirs but also to improve weather forecasts used by skiers and other recreationists.

"I look forward not only to the science that will come out of it," Williams said, "but ultimately how that science is going to hopefully inform and improve our ability to manage water in the Colorado River system and throughout the western United States."

Zak Podmore is a Report for America corps member for The Salt Lake Tribune. Your donation to match our RFA grant

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