Congressional Research Service
Informing the legislative debate since 1914

INSIGHT

Responding to Drought in the Colorado River Basin: Federal and State Efforts

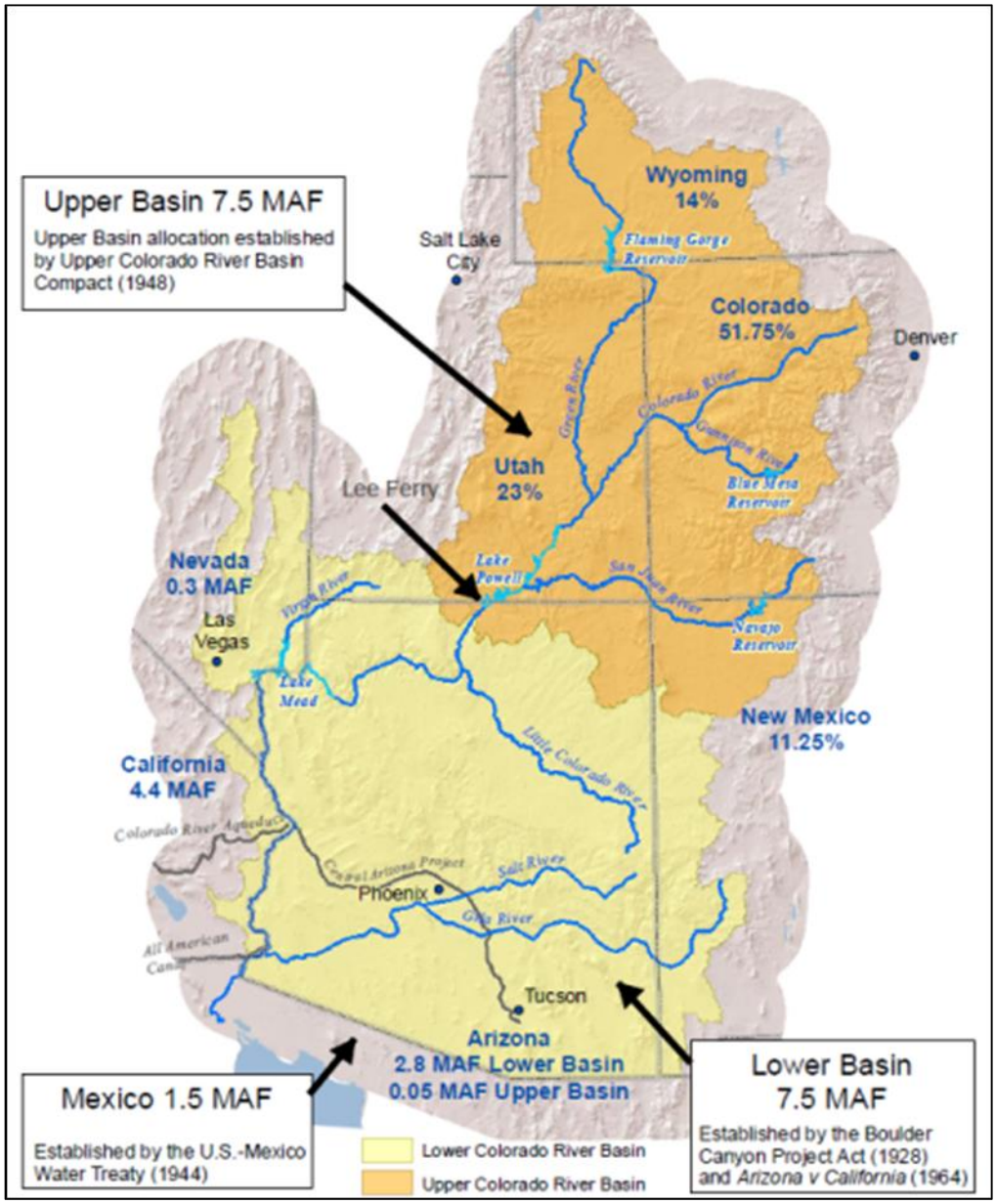
Updated October 14, 2022

The Colorado River Basin (**Figure 1**) covers more than 246,000 square miles in seven U.S. states and Mexico. Basin waters are managed and governed by multiple laws, court decisions, and other documents known collectively as the *Law of the River*. The Colorado River Compact of 1922 established a framework to apportion water supplies between the river's Upper and Lower Basins (divided at Lee Ferry, AZ). Each basin was allocated 7.5 million acre-feet (MAF) annually under the compact; an additional 1.5 MAF in annual flows was made available to Mexico under a 1944 treaty. Since the Upper Basin's waters were developed after the Lower Basin, its apportionments are less than the full amount allowed under the compact and are framed in terms of percentages of available supplies. The Bureau of Reclamation (Reclamation) plays a prominent role in basin water management due to the many federally authorized projects in the basin.

Congressional Research Service
https://crsreports.congress.gov
IN11982

Figure 1. Colorado River Basin Allocations

(Upper Basin allocation in terms of percentages of overall allocation, Lower Basin allocations in million acre-feet [MAF])



Source: Figure by the Congressional Research Service, using data from U.S. Geological Survey ESRI Data & Maps, 2017, Central Arizona Project, and ESRI World Shaded Relief Map.

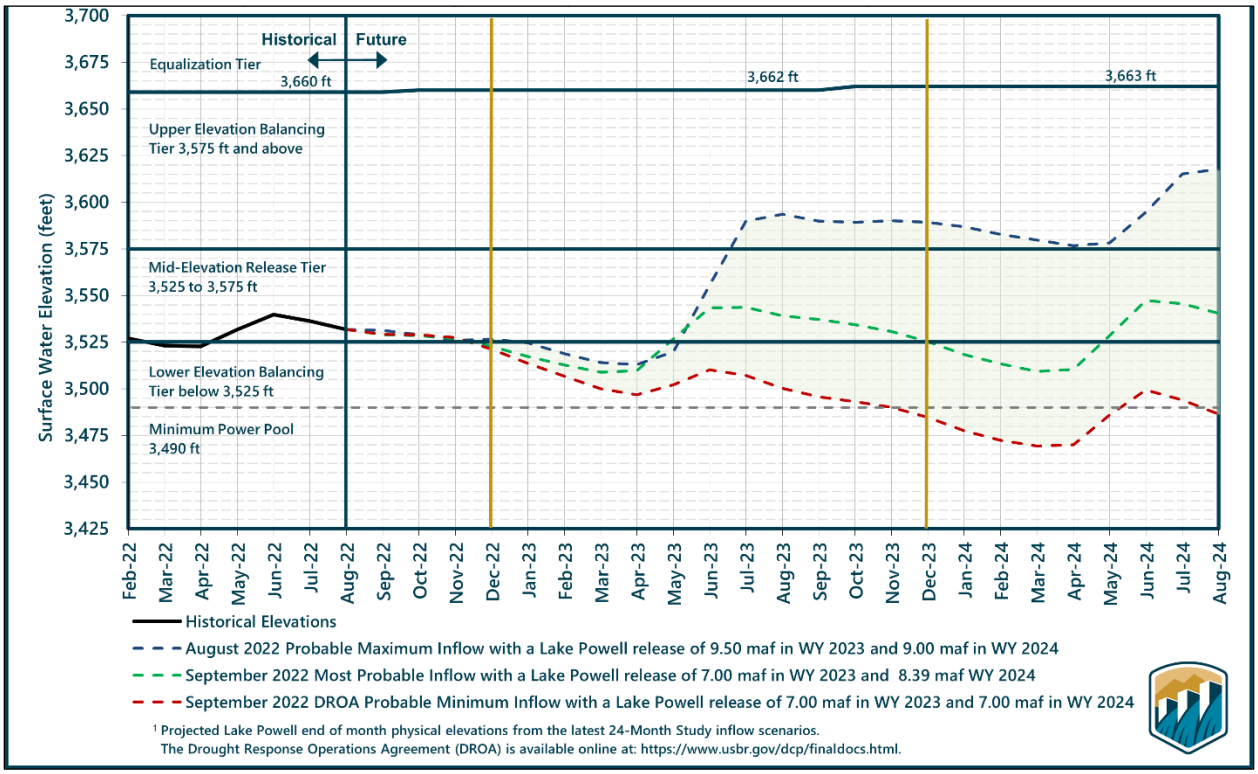
Notes: 7.5 MAF in Upper Basin allocations assumes full allocations under the Colorado River Compact. Due to uncertainty as to how much water would remain after obligations to the Lower Basin and Mexico are met, most Upper Basin Compact apportionments are in terms of percentage of the overall Upper Basin allocation.

The basin is in the midst of a long-term drought, during which consumptive use has regularly exceeded natural flows. When federal and state governments originally approved the compact, it was assumed that river flows would average 16.4 MAF per year. Actual flows from 1906 to 2020 were approximately 13.9 MAF, and have averaged approximately 12.5 MAF since the onset of the basin's drought in 2000. These conditions are projected to continue.

Observers track the status of two large federal reservoirs—Lake Powell in the Upper Basin and Lake Mead in the Lower Basin—as an indicator of basin storage conditions. Reclamation makes operational decisions for basin reservoirs in monthly 24-month studies. Recent studies projected additional reductions in water storage at both reservoirs (**Figure 2**, **Figure 3**).

Figure 2. Lake Powell Storage Elevations and Projections

August 2022 24-Month Study

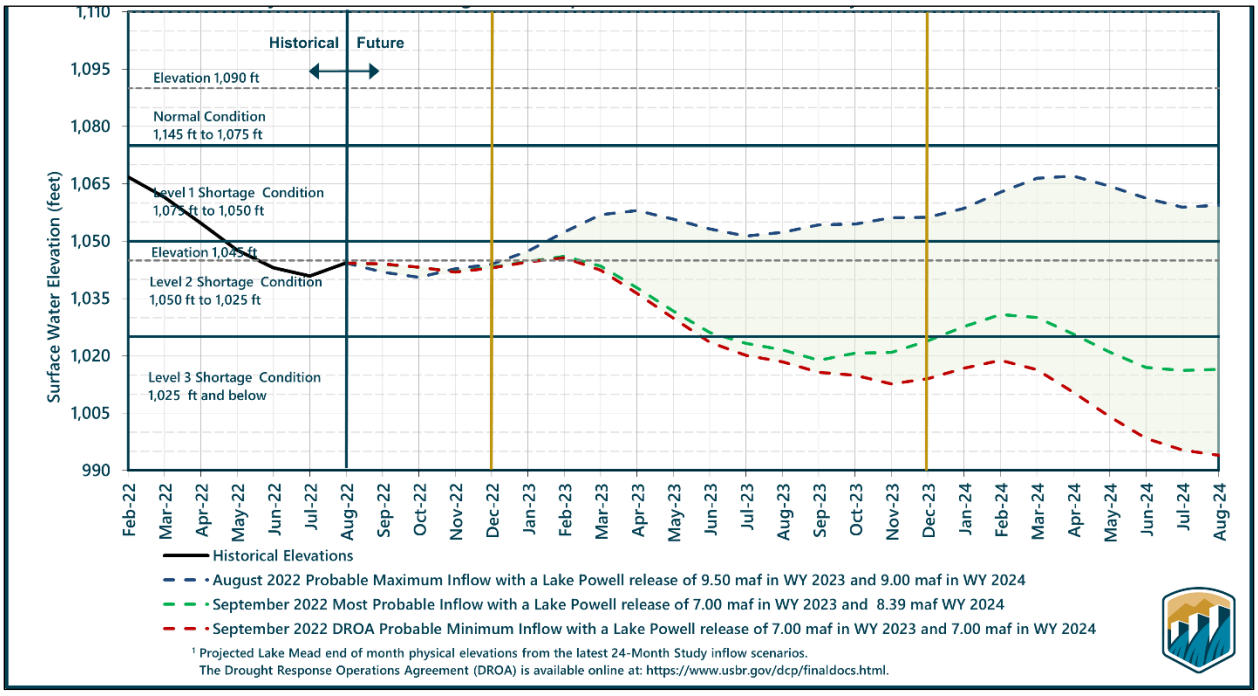


Source: Bureau of Reclamation, https://www.usbr.gov/lc/region/g4000/riverops/24ms-projections.html.

Note: WY = water year (the 12-month period from October through September).

Figure 3. Lake Mead Storage Elevations and Projections

August 2022 24-Month Study



Source: Bureau of Reclamation, https://www.usbr.gov/lc/region/g4000/riverops/24ms-projections.html.

Note: DROA = Drought Response Operations Agreement

Mitigating Drought in the Colorado River Basin

Previously, there have been multiple efforts to improve the basin's water supply outlook, including the 2003 Quantitative Settlement Agreement, the 2007 Interim Shortage Guidelines, and the 2019 drought contingency plans (DCPs) for the Upper and Lower Colorado River Basins. (The latter were authorized in P.L. 116-14.) The DCPs required reduced Lower Basin deliveries based on Lake Mead storage levels, authorized additional water conservation efforts, and put in place the framework for a Drought Response Operations Agreement (DROA) to coordinate Upper Basin operations to prevent the loss of hydropower generation at Glen Canyon Dam. In 2021, Lower Basin states agreed on a new set of actions—the 500+ Plan—which are expected to result in the conservation of an additional 500,000 AF in Lake Mead in 2022 and 2023 (i.e., 1 MAF total).

Despite these efforts, storage levels at both reservoirs have continued to fall. Reclamation declared the first ever level one and level two shortages for the Lower Basin in August 2021 and 2022, respectively. These declarations resulted in delivery curtailments for Arizona and Nevada. Reclamation studies indicate the ongoing possibility of Lake Mead falling significantly more (and triggering additional shortages/actions) within two years.

In the Upper Basin, in March 2022 Lake Powell fell below 3,525 feet for the first time since the late 1960s. To alleviate the potential for lost hydropower generation at Glen Canyon Dam, the Department of the Interior initiated DROA operations, resulting in operational changes in July 2021 and January 2022. In May 2022, Reclamation invoked emergency authority to move approximately 500,000 AF of water from Flaming Gorge Reservoir to Lake Powell and held back 480,000 AF of Lower Basin releases pursuant to the 2007 guidelines.

At a June 14, 2022, congressional hearing, Reclamation announced that states needed to conserve an *additional* 2 MAF to 4 MAF in 2023 to protect storage volumes over the near term (2023-2026). This estimate was the result of a 2022 Reclamation analysis. Reclamation noted that if the target is not met with voluntary commitments, the agency was prepared to act unilaterally. In a July 18, 2022, letter to Reclamation, Upper Basin representatives declined to contribute a specific volume of cutbacks to these efforts, instead laying out a five-point plan as the basis for its water conservation efforts.

Congress influences basin water management through authorizations and appropriations for Reclamation projects and activities. In addition to the 2019 authorization of the DCPs, Congress authorized "system conservation" efforts in the basin that expire in 2022 and are proposed for renewal. Recent legislation included regular and supplemental appropriations for Colorado River water conservation efforts, and, in Section 50233 of P.L. 117-169, Congress provided $4.0 billion for drought mitigation in the West, with priority given to Colorado River Basin activities. Reclamation used this funding to establish a Lower Basin Conservation and Efficiency Program in October 2022. The program will fund water conservation agreements on a sliding scale (e.g., $330-$400 per AF for one to three years). Reclamation is developing a similar program for the Upper Basin.

The 2007 guidelines and the 2019 DCPs are set to expire at the end of 2026. Extending, amending, or replacing these agreements is central to future basin water management. Reclamation previously published a "pre-scoping" notice seeking input on how to foster participation in the National Environmental Policy Act process to develop post-2026 basin operations.

Author Information

Charles V. Stern
Specialist in Natural Resources Policy

Disclaimer