Congressional Research Service
Informing the legislative debate since 1914

INSIGHT

Responding to Drought in the Colorado River Basin

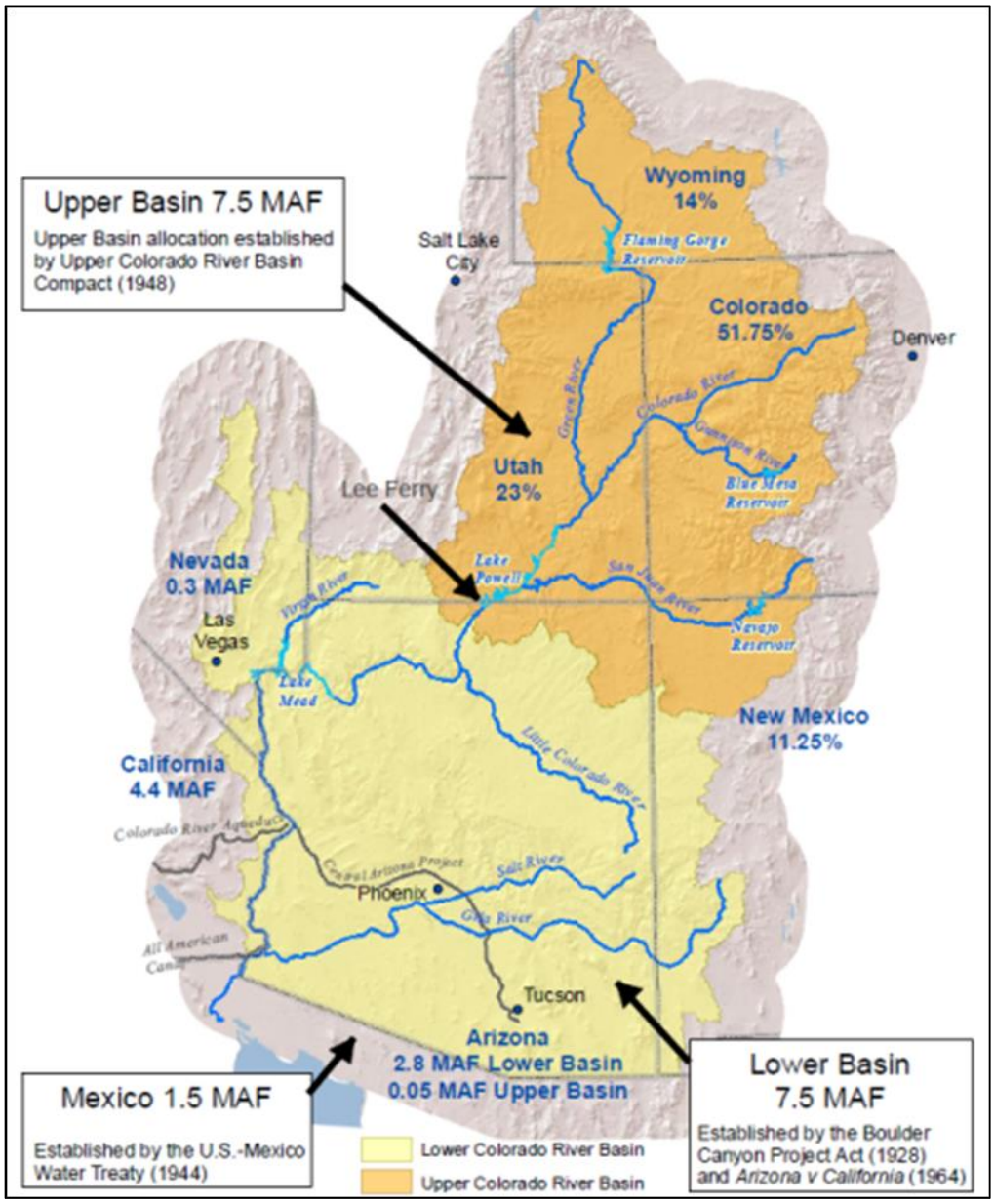
Updated March 12, 2024

The Colorado River Basin (**Figure 1**) covers more than 246,000 square miles in seven U.S. states and Mexico. Basin waters are governed by multiple documents, known collectively as the *Law of the River*. The Colorado River Compact of 1922 established the framework to apportion water supplies between the river's Upper and Lower Basins, with each basin allocated 7.5 million acre-feet (MAF) annually. 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 allocations in percentages of overall allocation, Lower Basin allocations in million acre-feet [MAF])



Source: CRS, using data from U.S. Geological Survey ESRI Data & Maps, 2017, Central Arizona Project, and ESRI World Shaded Relief Map.

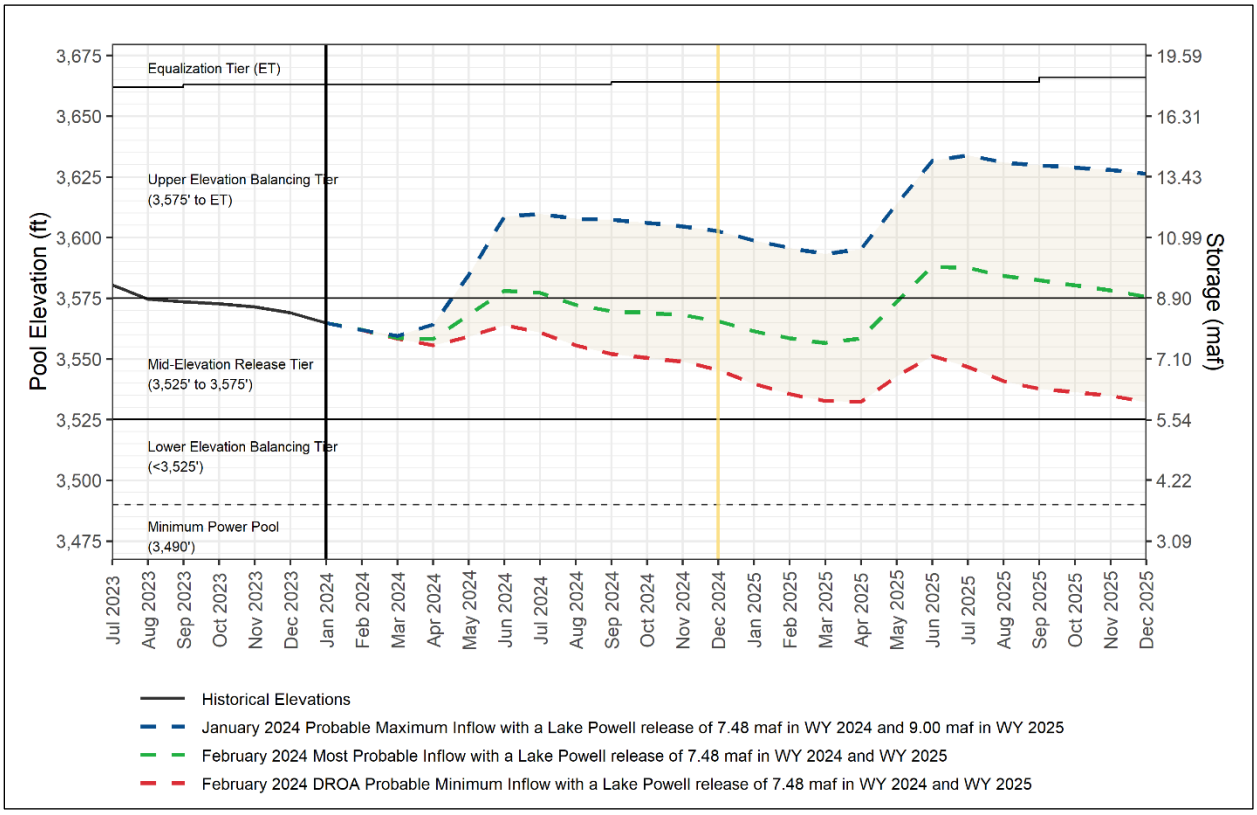
Notes: 7.5 MAF in Upper Basin allocations assumes full allocations under the Colorado River Compact. Due to uncertainty about how much water would remain after meeting obligations to the Lower Basin and Mexico, most Upper Basin compact apportionments are in terms of percentages.

When federal and state governments originally approved the Colorado River Compact, it was assumed that river flows would average 16.4 MAF per year. Actual annual flows from 1906 to 2023 were approximately 14.6 MAF, and these flows have averaged significantly less (12.4 MAF per year) since 2000. Several studies have projected lower annual runoff volumes in the future compared with the historical baseline.

The imbalance between basin water supplies and demand has depleted storage in the basin's two largest reservoirs—Lake Powell in the Upper Basin and Lake Mead in the Lower Basin—and threatens water supplies for millions in the Southwest. Reclamation makes operational decisions for basin reservoirs in monthly 24-month studies, which project operational conditions for upcoming years (**Figure 2**, **Figure 3**).

Figure 2. Lake Powell Storage Elevations and Projections

(January/February 24-month study inflow scenarios)

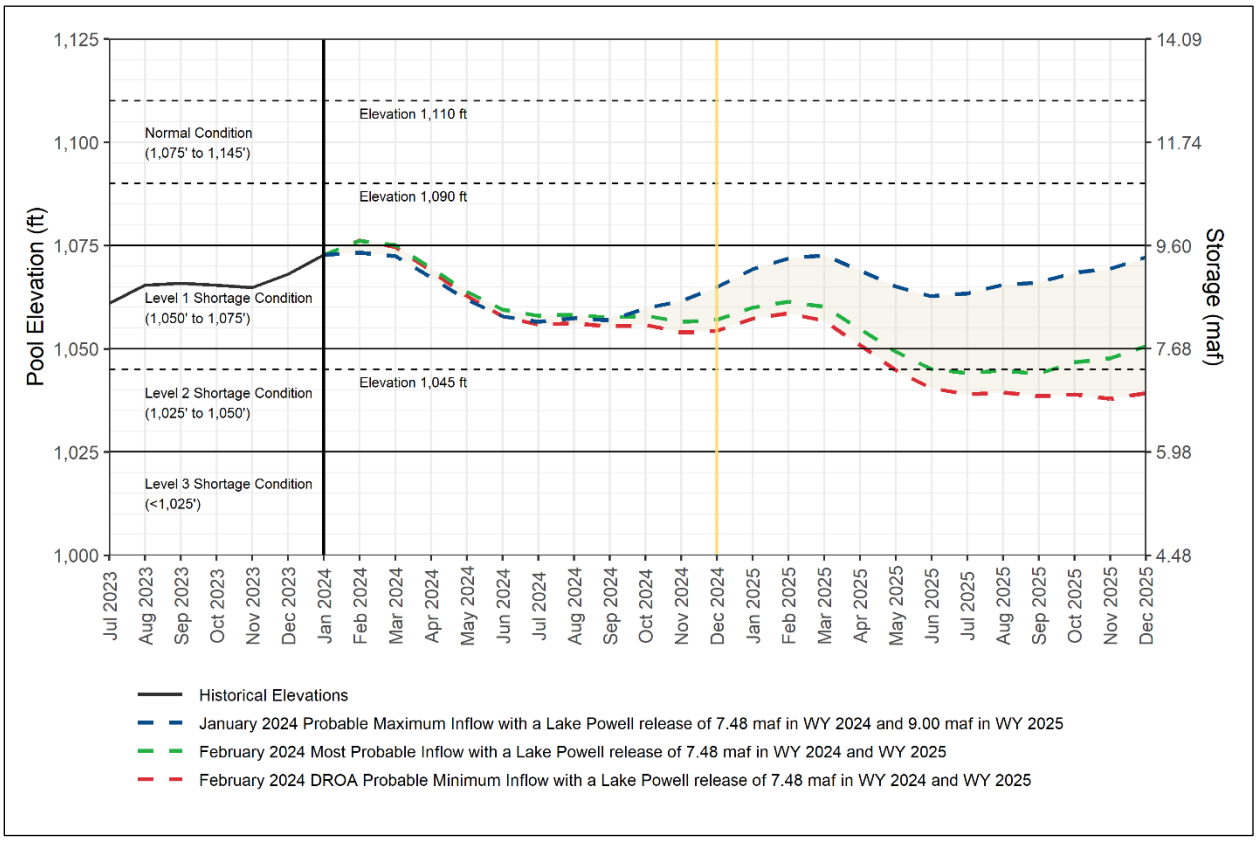


Source: Bureau of Reclamation, 24-Month Study Projections, https://www.usbr.gov/lc/region/g4000/riverops/24ms-projections.html.

Note: DROA = Drought Response Operations Agreement; maf = million acre-feet; WY = water year.

Figure 3. Lake Mead Storage Elevations and Projections

(January/February 2024 24-month study inflow scenarios)



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

Notes: DROA = Drought Response Operations Agreement; maf = million acre-feet; WY = water year.

Mitigating Drought in the Colorado River Basin

Previous efforts to improve the basin's water supply outlook resulted in agreements in 2003, 2007, and 2019. The agreements reduced Lower Basin deliveries based on operational "tiers" for Lake Mead, authorized additional water conservation efforts, and implemented a framework to coordinate Upper Basin operations and protect hydropower generation at Glen Canyon Dam.

Despite these efforts, storage levels declined. Since 2020, Reclamation has curtailed water deliveries for Arizona and Nevada based on annual hydrologic conditions (**Table 1**) and implemented Upper Basin operational changes in 2021 and 2022. Storage at both lakes rebounded in 2023, but there remains widespread concern about the long-term water supply outlook.

Table 1. Lower Colorado River Basin Operational Tiers, 2020-2024

(water delivery cutbacks in thousand acre-feet [KAF])

Year	Operational Tier	Cumulative Delivery Cutbacks (percentage of total deliveries)		
		Arizona	California	Nevada
2020	Zero	192 (6.8%)	—	8 (2.6%)
2021	Zero	192 (6.8%)	—	8 (2.6%)
2022	One	512 (18.2%)	—	21 (7.0%)
2023	Two	592 (21.1%)	—	25 (8.3%)
2024 (forecast)	One	512 (18.2%)	—	21 (7.0%)

Source: CRS, based on Bureau of Reclamation data, 2019-2023.

Near-Term Operations

At a July 2022 congressional hearing, Reclamation asked states to come up with plans to conserve an *additional* 2-4 MAF in 2023 and 2024, and in October 2022 Reclamation noticed its intent to analyze near-term operational changes through 2026. In 2023, California and the six other basin states each responded to Reclamation with competing water conservation proposals.

On April 11, 2023, Reclamation released draft modeling for two federal alternatives that both would have imposed new Lower Basin cuts (0.020-2.900 MAF per year in water years 2024-2026, depending on Lake Mead elevations). One alternative would have apportioned reductions based on water rights, whereas the other would have imposed percentage-based delivery reductions tied to evaporation and other factors. In lieu of these plans, on May 22, 2023, Reclamation announced a consensus proposal in which Lower Basin states agreed to conserve a total of 3 MAF prior to 2026, with 2.3 MAF of these cuts compensated by the federal government via $4.0 billion in drought response funds appropriated to Reclamation in P.L. 117-169. Reclamation finalized this plan on March 5, 2024 (**Figure 4**).

Figure 4. Near-Term Lower Colorado River Water Delivery Cuts After 2024 SEIS

Acre-feet (af) in thousands

Lake Mead Elevation (feet)	2007 ROD Shortages + 2019 DCP Contributions (1,000 af)				Proposed Action Modeled SEIS Conservation (1,000 af)*				Total ROD Shortages + DCP Contributions + SEIS Conservation (1,000 af)			
	AZ	NV	CA	Total	AZ	NV	CA	Total	AZ	NV	CA	Total
1,090 – >1,075	192	8	0	200	280	70	400	750	472	78	400	950
1,075 – 1,050	512	21	0	533					792	91	400	1,283
<1,050 – >1,045	592	25	0	617					872	95	400	1,367
1,045 – >1,040	640	27	200	867					920	97	600	1,617
1,040 – >1,035	640	27	250	917					920	97	650	1,667
1,035 – >1,030	640	27	300	967					920	97	700	1,717
1,030 – 1,025	640	27	350	1,017					920	97	750	1,767
<1,025	720	30	350	1,100					1,000	100	750	1,850

Source: Bureau of Reclamation, Near-term Colorado River Operations, Final Supplemental Environmental Impact Statement, March 5, 2024, https://www.usbr.gov/ColoradoRiverBasin/documents/NearTermColoradoRiverOperations/20240300-Near-termColoradoRiverOperations-FinalSEIS-508.pdf.

Notes: SEIS= Supplemental Environmental Impact Statement; 2007 ROD= 2007 Record of Decision for Lower Basin Operations; DCP= 2019 Drought Contingency Plans. Proposed action modeling for 2024 SEIS does not represent state-level commitments.

Post-2026 Operations

Most existing plans to conserve Colorado River Basin water supplies expire in 2026; thus, Reclamation is also analyzing post-2026 operational alternatives for the system. To date, Upper and Lower Basin states have been unable to agree on a consensus-based plan for post-2026 operations. The two sub-basins submitted competing plans to Reclamation in early March 2024. The Lower Basin's plan proposes a new paradigm in which total basin storage dictates water cuts, with equal cuts across the basin at lower storage levels and cuts to only Lower Basin users at higher levels. The Upper Basin's plan proposes a separate set of changes, including Lake Powell water releases to the Lower Basin dictated by Lake Powell storage conditions (i.e., in lieu of the compact's required release of 7.5 MAF).

Questions for Congress include whether Reclamation's authorities for basin management are sufficient, how competing operational proposals would affect water supplies, and what ongoing federal funding commitments are necessary to support conservation plans by Reclamation and the basin states.

Author Information

Charles V. Stern
Specialist in Natural Resources Policy

Disclaimer