COLORADO
Colorado Water Conservation Board
Department of Natural Resources

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Jared Polis, Governor

Dan Gibbs, DNR Executive Director

Lauren Ris, CWCB Director

TO: Colorado Water Conservation Board Members

FROM: Amy Ostdiek and Michelle Garrison

DATE: March 14, 2024

SUBJECT: Agenda Item 18: Colorado River Hydrology and Other Updates

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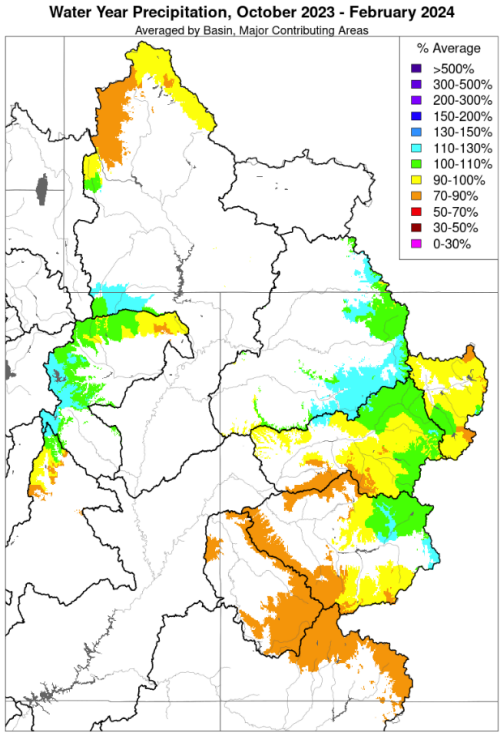
This is an informational item with no board action requested.

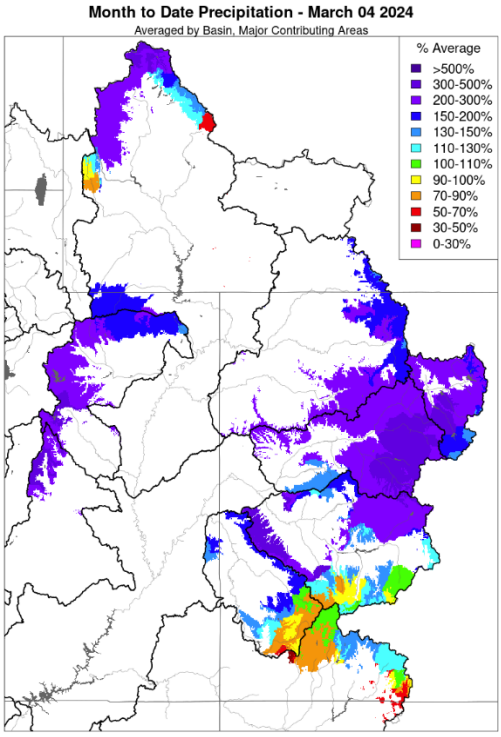
1. Hydrology and operations update

Hydrology

Streamflow for Water Years 2021 and 2022 was well below average throughout the basin, placing significant strain on basin storage and on water users in the Upper Basin. WY 2023 precipitation and streamflow were slightly above average, with well above average snowpack and high spring runoff followed by warm and dry summer conditions. WY 2024 precipitation has been slightly below average. A series of storms starting in January improved snowpack to near normal. Soil moisture conditions have improved but remain below normal in most basins in western Colorado. Inflow forecasts of 75% - 80% of average for Lake Powell reflect current snowpack and soil moisture conditions.

Drought and reservoir storage conditions have improved; however, long-term impacts from depleted storage are expected to continue, as indicated in current forecasts for reservoir operations.


Water Year Precipitation, October 2023 - February 2024
Averaged by Basin, Major Contributing Areas
% Average
>500%
300-500%
200-300%
150-200%
130-150%
110-130%
100-110%
90-100%
70-90%
50-70%
30-50%
0-30%
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov


Month to Date Precipitation - March 04 2024
Averaged by Basin, Major Contributing Areas
% Average
>500%
300-500%
200-300%
150-200%
130-150%
110-130%
100-110%
90-100%
70-90%
50-70%
30-50%
0-30%
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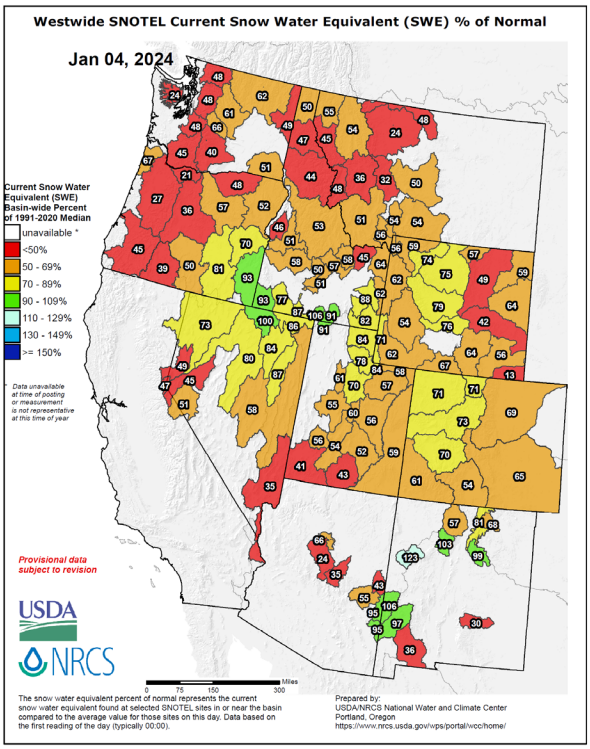
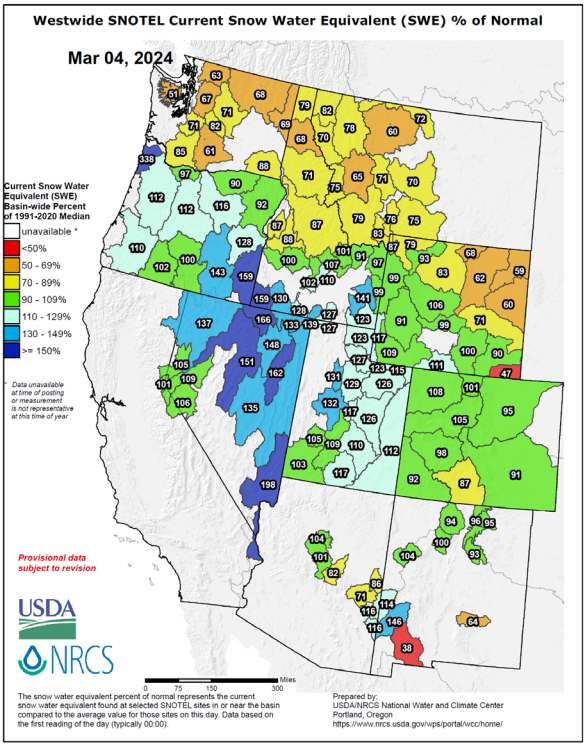

Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal
Jan 04, 2024
Current Snow Water Equivalent (SWE) Basin-wide Percent of 1991-2020 Median
unavailable *
<50%
50 - 69%
70 - 89%
90 - 109%
110 - 129%
130 - 149%
>= 150%
* Data unavailable at time of posting or measurement is not representative at this time of year
Provisional data subject to revision
USDA NRCS
Miles
The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).
Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
https://www.nrcs.usda.gov/wps/portal/wcc/home/


Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal
Mar 04, 2024
Current Snow Water Equivalent (SWE) Basin-wide Percent of 1991-2020 Median
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Prepared by:
USDA/NRCS National Water and Climate Center
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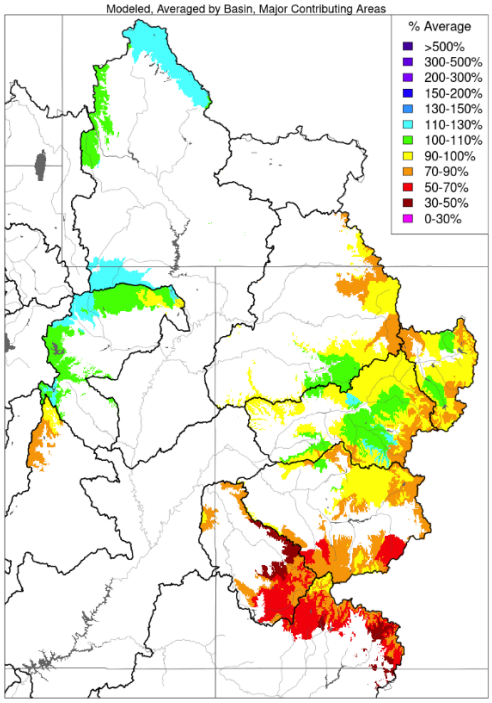
Soil Moisture - Fall - 2023 (November 15)

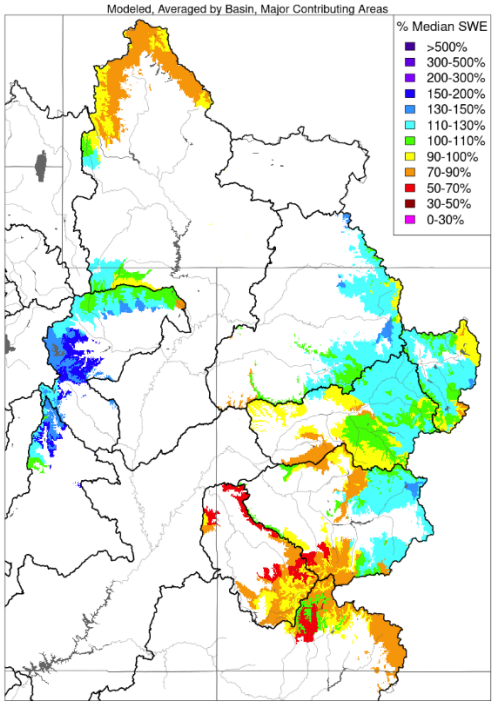
Modeled, Averaged by Basin, Major Contributing Areas



Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Snow Conditions - March 04 2024

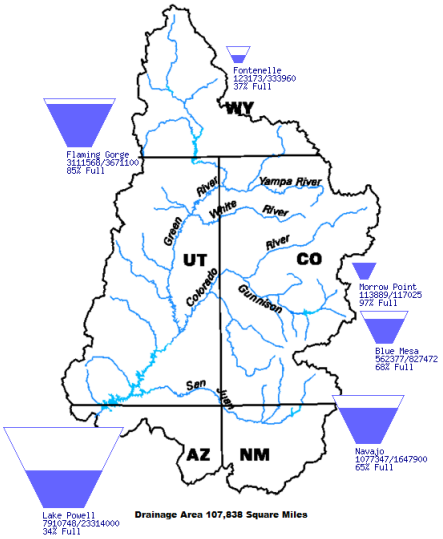
Modeled, Averaged by Basin, Major Contributing Areas

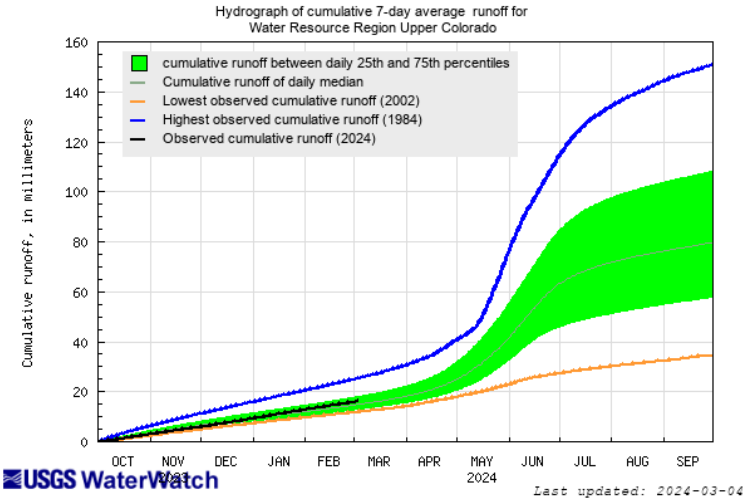


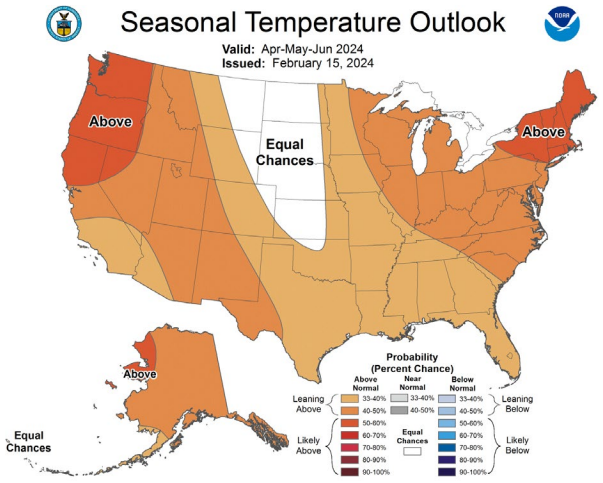
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

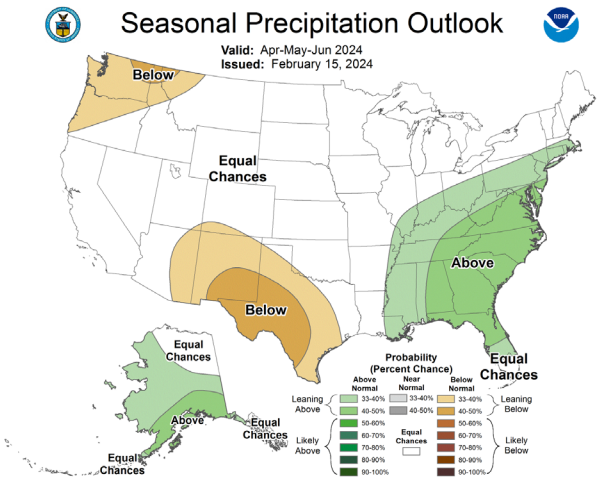
Data Current as of:
03/03/2024

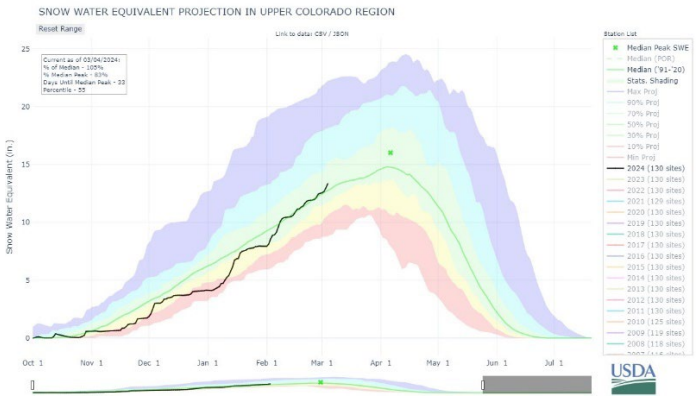
Upper Colorado River Drainage Basin

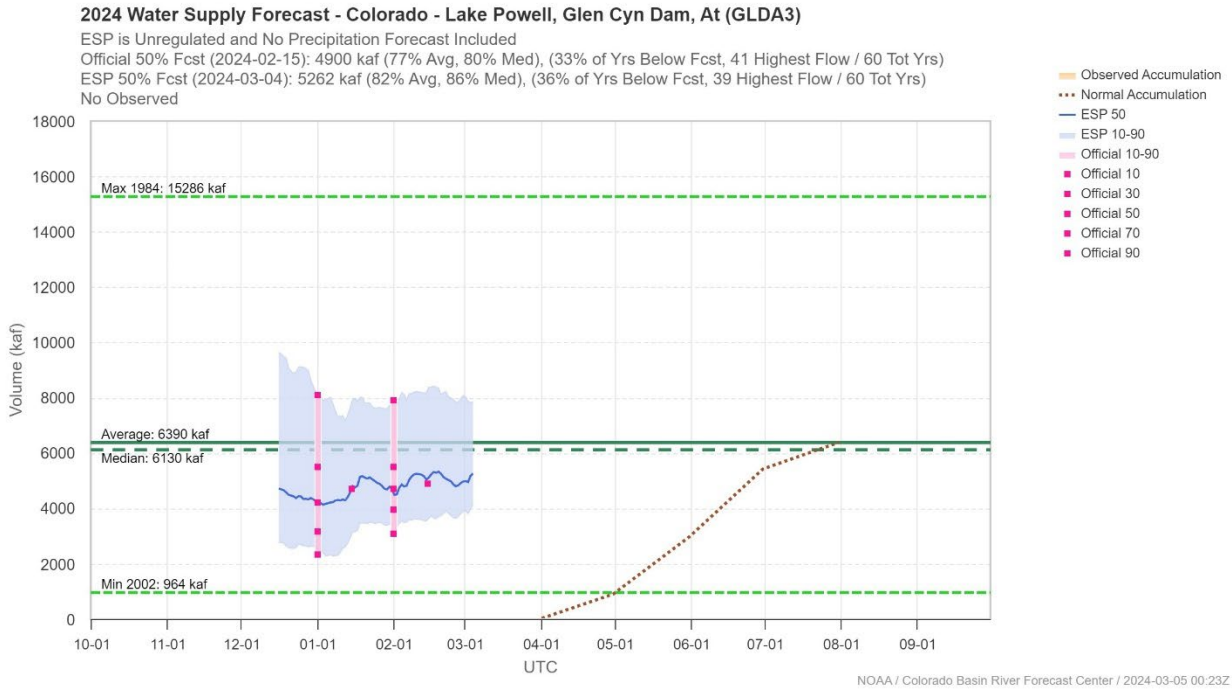




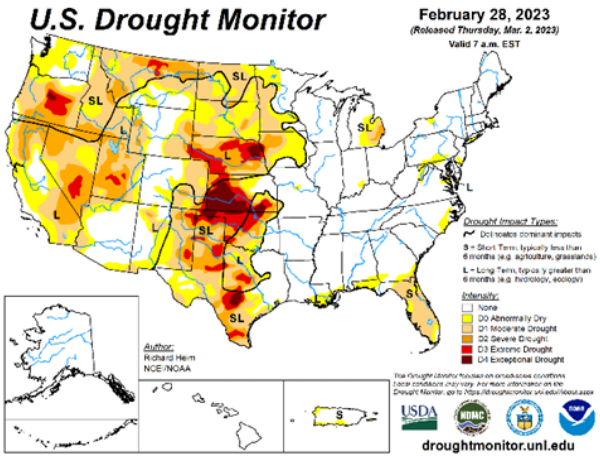


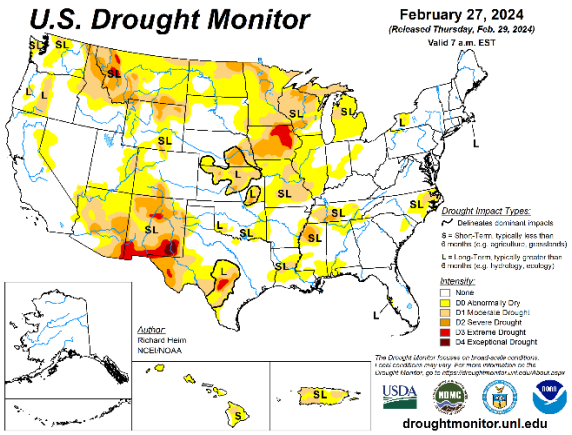






NOAA / Colorado Basin River Forecast Center / 2024-03-05 00:23Z





Operations

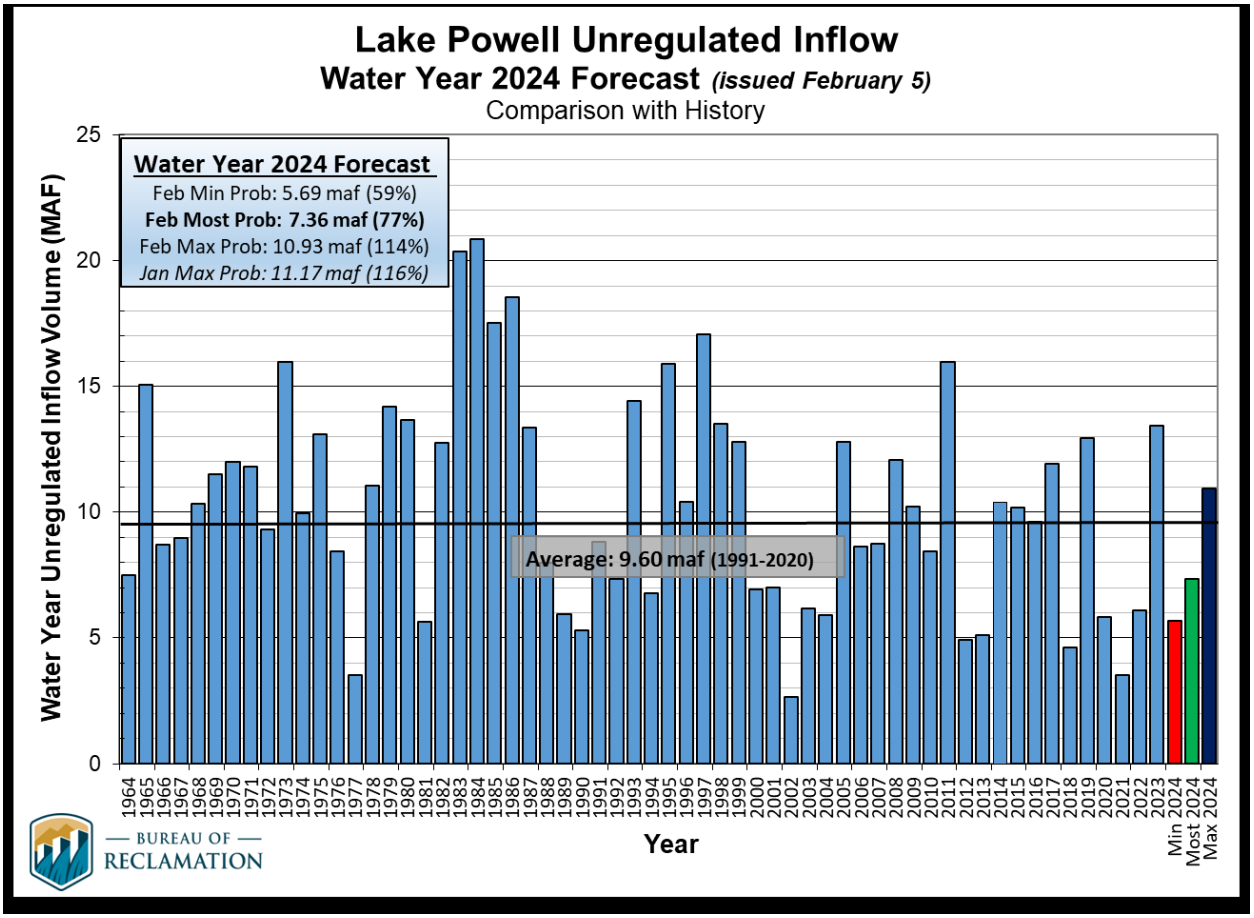
Low inflows and reservoir storage prompted multiple reservoir operation changes and Upper Basin Drought Contingency Plan (DCP) activities in WY 2022 and 2023. To protect critical infrastructure in Lake Powell, Reclamation decreased WY 2022 Lake Powell releases. May 2022 – April 2023 Flaming Gorge reservoir releases were increased as part of the Drought Response Operations Plan. Lake Powell rose above elevation 3525' in May 2022 and fell below that threshold elevation in December 2022. Due to improved hydrologic conditions in WY 2023, Lake Powell elevations rose significantly in April 2023 and remain above the 3525' threshold.

High spring runoff and increasing reservoir elevations prompted the cessation of Drought Response Operations Agreement (DROA) releases in March 2023, changing focus to recovery of previously released DROA water for the May 2023 – April 2024 plan, and a substantial increase in WY 2023 releases from Lake Powell. WY 2023 was the first year in which Lake Powell operated in the Lower Elevation Balancing Tier. In that tier, releases from Lake Powell are initially set to 7.0 MAF but can be adjusted up to a maximum of 9.5 MAF based on inflow forecasts. Releases are adjusted monthly from April through September based on inflow and reservoir storage forecasts. Lake Powell releases totaled 8.58 MAF for WY 2023, including the release of the 480,000 acre-feet withheld in Lake Powell in WY 2022. As the inflow forecasts declined quickly due to the warm and dry conditions and Lake Mead projections increased due to precipitation and decreasing demand, Reclamation decreased Lake Powell releases, but still inadvertently released 40,000 acre-feet more from Powell than was required under balancing. They claim to have no authority to correct this inadvertent release in WY 2024.

As determined by Reclamation's August 2023 24-Month Study, Lake Powell will operate in the Mid-Elevation Release Tier in WY 2024 with a fixed annual release of 7.48 MAF. Streamflow at the Lees Ferry gage includes Lake Powell releases, flow of water around the Glen Canyon dam through bank storage and leakage, and inflows from the Paria River. The 10-year cumulative streamflow at Lees Ferry through WY 2023 was approximately 86 million acre-feet.

Blue Mesa reservoir achieved recovery of its previously released DROA water in late December 2023. Flaming Gorge reservoir achieved recovery of previously released DROA water in late February 2024.

DROA actions helped protect critical infrastructure in Lake Powell from late 2021 through April 2023. However, half of the DROA water in Lake Powell was released in WY 2023 as part of the balancing releases. Lake Powell elevations are now lower than they would have been without DROA releases, leaving Lake Powell at increased risk of dropping below critical elevations in the future. The lack of long-term effectiveness of the 2021 – 2023 DROA releases does not match the goals and objectives of the DROA and may factor into future Upper Basin DCP decisions.



The table below describes the Interim Guideline Lower Basin shortage tiers, reduction of deliveries to Mexico pursuant to Minute 323, Lower Basin DCP contributions and Binational Water Scarcity Contingency Plan contributions as determined by projected elevations at Lake Mead. In Calendar Year 2023 Lake Mead operated in a Tier 2a shortage condition. As determined by the August 2023 24-Month Study, in CY 2024 Lake Mead will operate in a Tier 1 shortage condition, as it did in CY 2022.

2007 Interim Guidelines, Minute 323, Lower Basin Drought Contingency Plan, and Binational Water Scarcity Contingency Plan

Total Volumes (kaf)

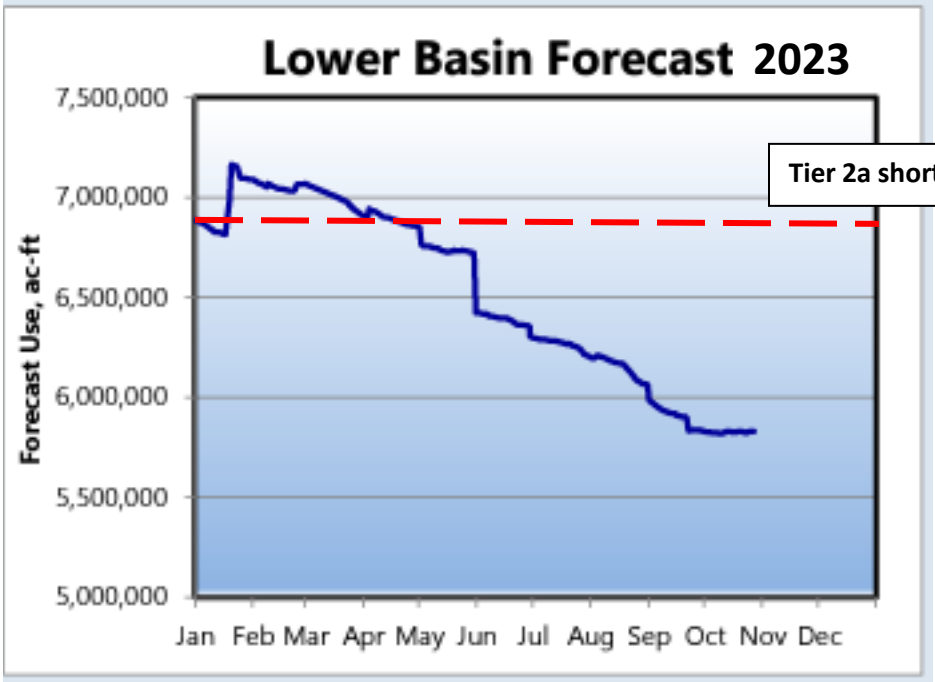
Lake Mead Elevation (feet msl)	2007 Interim Guidelines Shortages		Minute 323 Delivery Reductions	Total Combined Reductions	DCP Water Savings Contributions			Binational Water Scarcity Contingency Plan Savings	Combined Volumes by Country *US: (2007 Interim Guidelines Shortages + DCP Contributions)* *Mexico: (Minute 323 Delivery Reductions + Binational Water Scarcity Contingency Plan Savings)*					Total Combined Volumes
	AZ	NV	Mexico	***Lower Basin States + Mexico***	AZ	NV	CA	Mexico	*AZ Total*	*NV Total*	*CA Total*	*Lower Basin States Total*	*Mexico Total*	***Lower Basin States + Mexico***
1,090 - 1,075	0	0	0	***0***	192	8	0	41	192	8	0	*200*	*41*	***241***
1,075 - 1050	320	13	50	***383***	192	8	0	30	512	21	0	*533*	*80*	***613***
1,050 - 1,045	400	17	70	***487***	192	8	0	34	592	25	0	*617*	*104*	***721***
1,045 - 1,040	400	17	70	***487***	240	10	200	76	640	27	200	*867*	*146*	***1,013***
1,040 - 1,035	400	17	70	***487***	240	10	250	84	640	27	250	*917*	*154*	***1,071***
1,035 - 1,030	400	17	70	***487***	240	10	300	92	640	27	300	*967*	*162*	***1,129***
1,030 - 1,025	400	17	70	***487***	240	10	350	101	640	27	350	*1,017*	*171*	***1,188***
<1,025	480	20	125	***625***	240	10	350	150	720	30	350	*1,100*	*275*	***1,375***

2022 Operations → 2023 Operations

2022 Operations ← 2023 Operations

The Secretary of the Interior will take affirmative actions to implement programs designed to create or conserve 100,000 acre-ft per annum or more of Colorado River System water to contribute to conservation of water supplies in Lake Mead and other Colorado River reservoirs in the lower basin. All actions taken by the United States shall be subject to applicable law, including availability of appropriations.

Early in Calendar Year 2023, the Lower Basin was projecting to consumptively use about 320,000 AF more than their allocation under Tier 2a shortage. This would have involved the withdrawal of banked Intentionally Created Surplus (ICS). Extremely high precipitation amounts in 2023 flooded the Arizona tributaries and allowed the California State Water Project to issue a 100% allocation for the first time since 2006. Hurricane Hilary in August 2023 further reduced Lower Basin demands due to heavy local precipitation. The Lower Basin demand dropped approximately 1.4 MAF from their initial CY 2023 water orders, resulting in creation of large volumes of ICS. This “historically low consumptive use” in the Lower Basin was due to local hydrology – it was not caused by significant conservation actions by the Lower Basin contractors.



California State Water Project Allocation

YEAR	DATE	ALLOCATION
2020	12/2/2019	10%
	1/24/2020	15%
	5/22/2020	20%
2021	12/1/2020	10%
	3/23/2021	5%
2022	12/1/2021	0% [3]
	1/20/2022	15%
	3/18/2022	5% [4]
2023	12/1/2022	5% [5]
	1/26/2023	30%
	2/22/2023	35%
	3/24/2023	75%
	4/20/2023	100%

In addition to the shortages agreed to pursuant to the 2007 Guidelines and 2019 Drought Contingency Plans, in December 2021 the Lower Division States also committed to creating an additional 500,000 acre-feet of water per year in 2021-2022, and 2023, of conserved water to remain in Lake Mead on a voluntary basis. The amount of water modeled for each year pursuant to the "500+ Plan" is included in the table below. Planned conservation in late 2022 and 2023 increased by almost 600,000 AF from August 2022 projections, which reflects the improved hydrology in the Lower Basin. Similar to shortage conditions, the amount of water conserved in Lake Mead under the "500+ Plan" may be partially offset by other withdrawals.

Additional Water Modeled Under 500 Plus Plan

(as anticipated to be modeled in the April 2023 Most Probable 24-Month Study)

Conservation Activity *(volumes in AF)*	2021	2022 *(Provisional)*	2023 *(Projected)*
CAP ICS delivery offset	6,147	15,876	-10,900
GRIC System Conservation	40,000	58,837	125,000
GRIC ICS creation	0	78,565	0
CRIT System Conservation	4,685	4,685	0
CAWCD System Conservation	0	87,794	0
YMIDD System Conservation	0	8,523	13,670
MVIDD System Conservation	0	9,531	12,819
FMYN System Conservation	0	0	13,933
MWD ICS delivery offset and/or creation	58,134	58,211	107,347
PVID System Conservation	12,305	52,789	58,400
CVWD System Conservation	0	9,083	0
SNWA ICS creation	12,832	28,330	44,000
Annual Total *(Non-Shortage/DCP)*	**134,103**	**412,224**	**364,269**
Cumulative Total	**134,103**	**546,327**	**910,596**

- 2023 volumes reflect executed agreements under the 500+ Plan and LC Conservation Program and current operational projections and are subject to change.
- Additional conservation activities are being considered. After new agreements are finalized and executed, these additional activities will be included in Reclamation's operational planning and modeling.

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The Lower Basin proposed up to 3 million acre-feet of compensated conservation and other activities through 2025 to address drought conditions as part of Reclamation's current SEIS process to contemplate additional changes to Lake Powell and Lake Mead reservoir operations through the end of the Interim Guidelines. A final Interim Guidelines SEIS and Record of Decision are expected in Spring 2024. Reclamation is adding the expected conservation volumes to its models as conservation agreements with participating entities are signed, which is increasing projected Lake Mead elevations.

Reclamation recently released a draft SEIS for the Glen Canyon Dam Long-Term Experimental and Management Plan (LTEMP) that explores options for changing monthly and daily releases and release temperatures to help prevent establishment of smallmouth bass and other non-native fish in the Grand Canyon and to alter sediment accounting and implementation windows for high flow experiments to distribute sand higher on sand bars. LTEMP does not alter annual releases, which are determined according to the Interim Guidelines. A final LTEMP SEIS and Record of Decision are expected by the end of June 2024.

2. Upper Division States Modeled Alternative for Post-2026 Operational Guidelines for Lake Powell and Lake Mead

Background

In June 2023, the Department of Interior announced the initiation of the formal process to develop future operating guidelines for Lake Powell and Lake Mead. The new guidelines will replace the 2007 Colorado River Interim Guidelines, which govern the operations of Lake Powell and Lake Mead through 2026. The 2007 Guidelines are set to expire in 2026. The formal process was announced through a Notice of Intent published in the Federal Register. The Bureau of Reclamation set a deadline of March 11, 2024, to provide modeling concepts for analysis as part of the National Environmental Policy Act (NEPA) process.

Commissioner Mitchell has worked closely with the Basin States in an effort to reach consensus on a post-2026 modeling framework for operations of Lake Powell and Lake Mead. Throughout this effort, Colorado's negotiation strategy has been guided by the "irrefutable truths" developed by Commissioner Mitchell and the State team, in coordination with water users and key stakeholders across the State. Despite best efforts by the Upper Division States, it was not possible to reach a 7-state consensus on a modeling framework by the March 11 deadline.

Upper Division States' Post-2026 Alternative

The Upper Division States will submit a modeling Alternative (UDS Alternative) to the Bureau of Reclamation for post-2026 operations of Lake Powell and Lake Mead that is intended to be responsive to hydrologic conditions, rebuild storage in these reservoirs, and protect water users and resources. The UDS Alternative is designed to:

- Be consistent with the Law of the River and applicable environmental laws
- Reduce risks to water supplies and operations caused by depleted storage in Lake Powell and Lake Mead
- Address the imbalance between water supply and demands in the Lower Basin and rebuild storage in Lake Powell and Lake Mead
- Provide greater predictability and reliability for reservoir operations under a wide range of potential future conditions due to climate change and depleted storage
- Operate Lake Powell and Lake Mead based on observed conditions instead of unreliable forecasts
- Recognize and account for hydrologic shortages in the Upper Basin
- Acknowledge settled but undeveloped Tribal water rights in the Upper Basin

Staff will discuss the UDS Alternative in greater detail at the Board meeting.