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RECLAMATION

Colorado River Basin

August 2022 24-Month Study Webinar

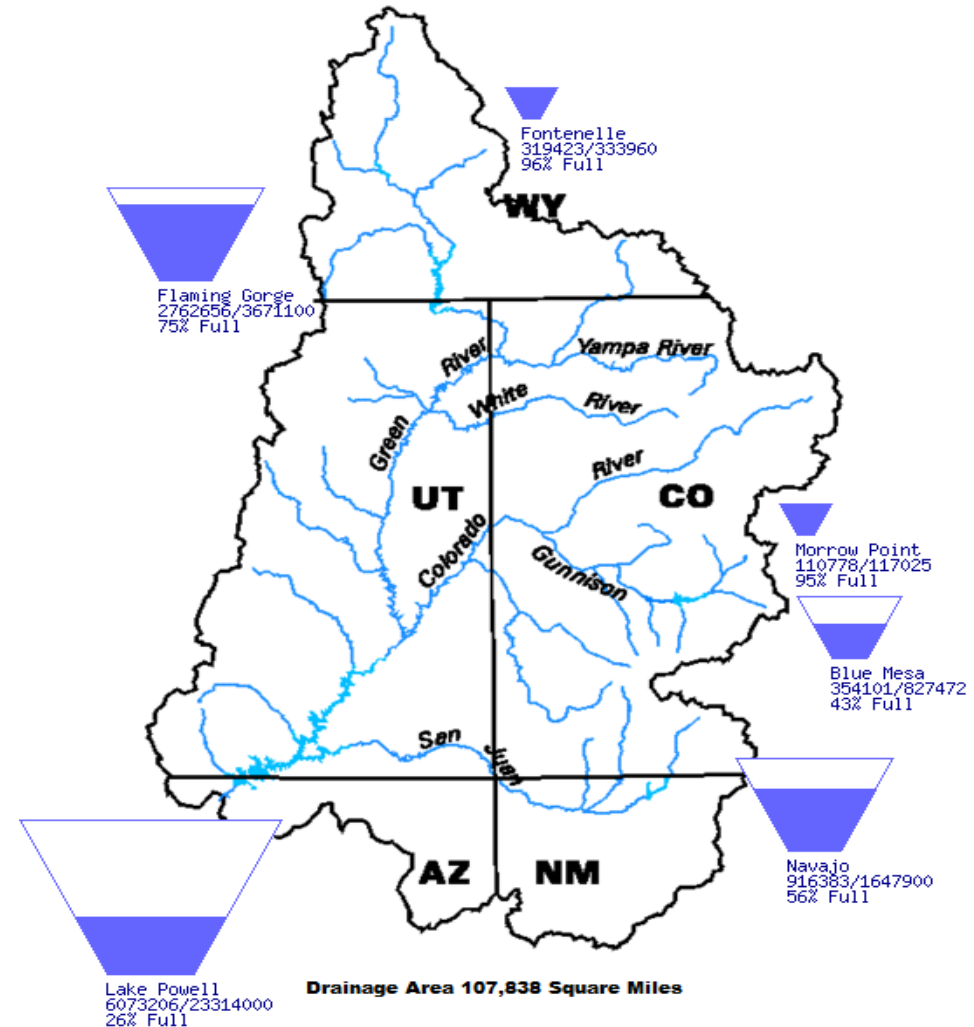
Upper and Lower Colorado Basin Regions
August 16, 2022

Upper Basin Storage (as of August 14, 2022)

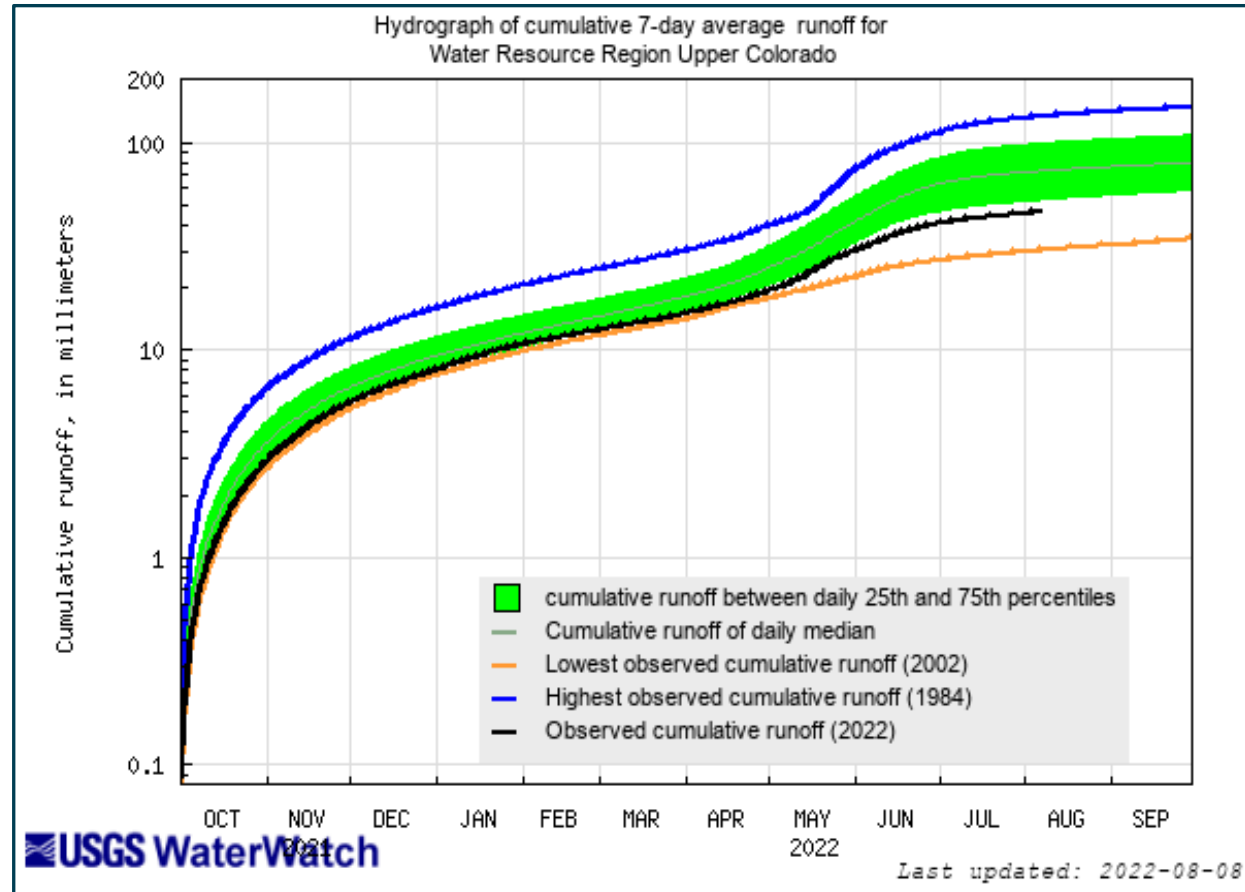
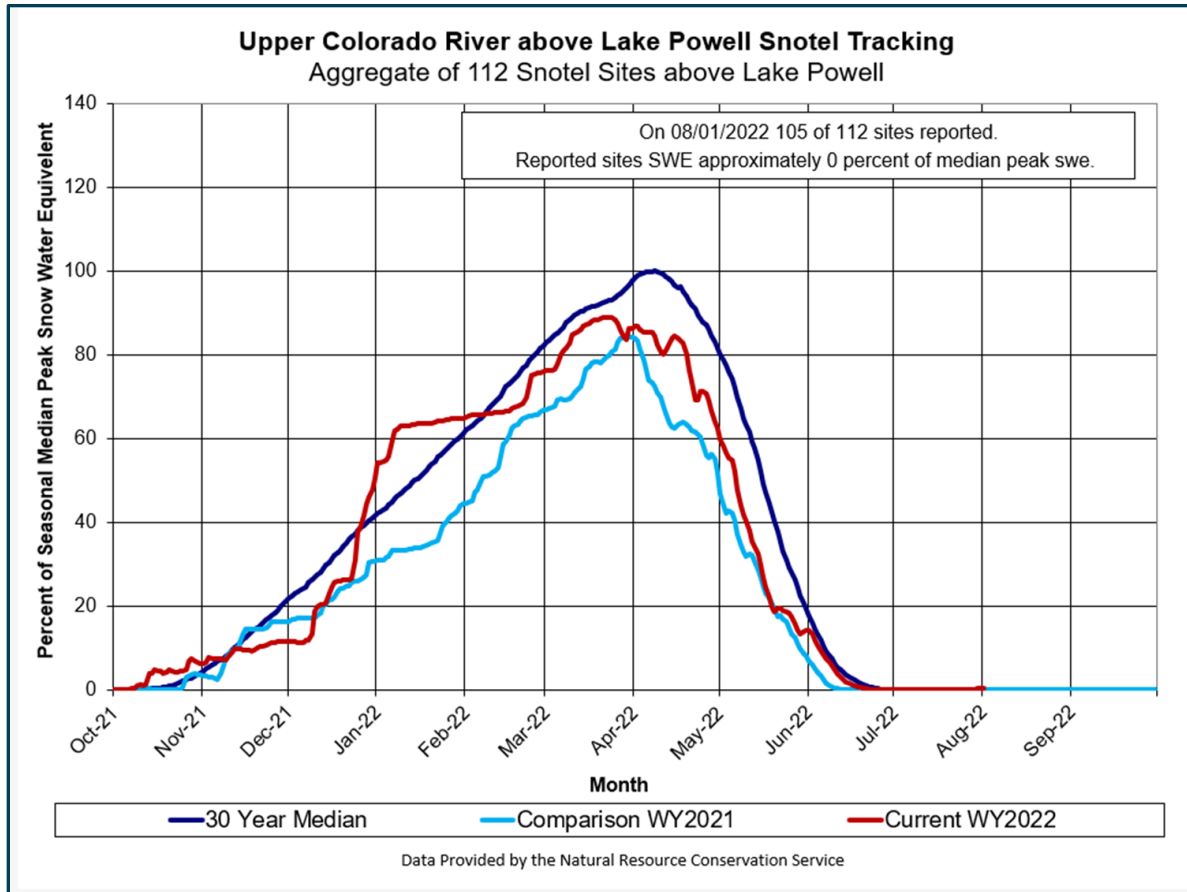
Data Current as of:
08/14/2022

Upper Colorado River Drainage Basin

Reservoir	Percent Current Live Storage	Current Live Storage (maf)	Live Storage Capacity (maf)	Elevation (feet)
Fontenelle	96	0.32	0.33	6,504.13
Flaming Gorge	75	2.76	3.67	6,015.57
Blue Mesa	43	0.35	0.83	7,457.84
Navajo	56	0.92	1.65	6,025.48
Lake Powell	26	6.07	23.31	3533.93
UC System Storage	35	10.55	29.79	



Upper Colorado SWE and Observed Inflows



Available online at: https://waterwatch.usgs.gov/index.php?id=wwdur_cumrunoff



Most Probable Forecast – August Final

Water Years 2022 and 2023

April – July 2022 Preliminary Observed Unregulated Inflow

Reservoir	Inflow (kaf)	Percent of Avg ¹
Fontenelle	456	62
Flaming Gorge	552	57
Blue Mesa	431	68
Navajo	381	60
Powell	3,750	59

Water Year 2022 Unregulated Inflow Forecast as of August 2, 2022

Reservoir	Inflow (kaf)	Percent of Avg ¹
Fontenelle	736	69
Flaming Gorge	890	63
Blue Mesa	573	71
Navajo	561	62
Powell	5,961	62

Water Year 2023 Unregulated Inflow Forecast as of August 2, 2022

Reservoir	Inflow (kaf)	Percent of Avg ¹
Fontenelle	925	86
Flaming Gorge	1,210	86
Blue Mesa	820	91
Navajo	810	89
Powell	8,300	86

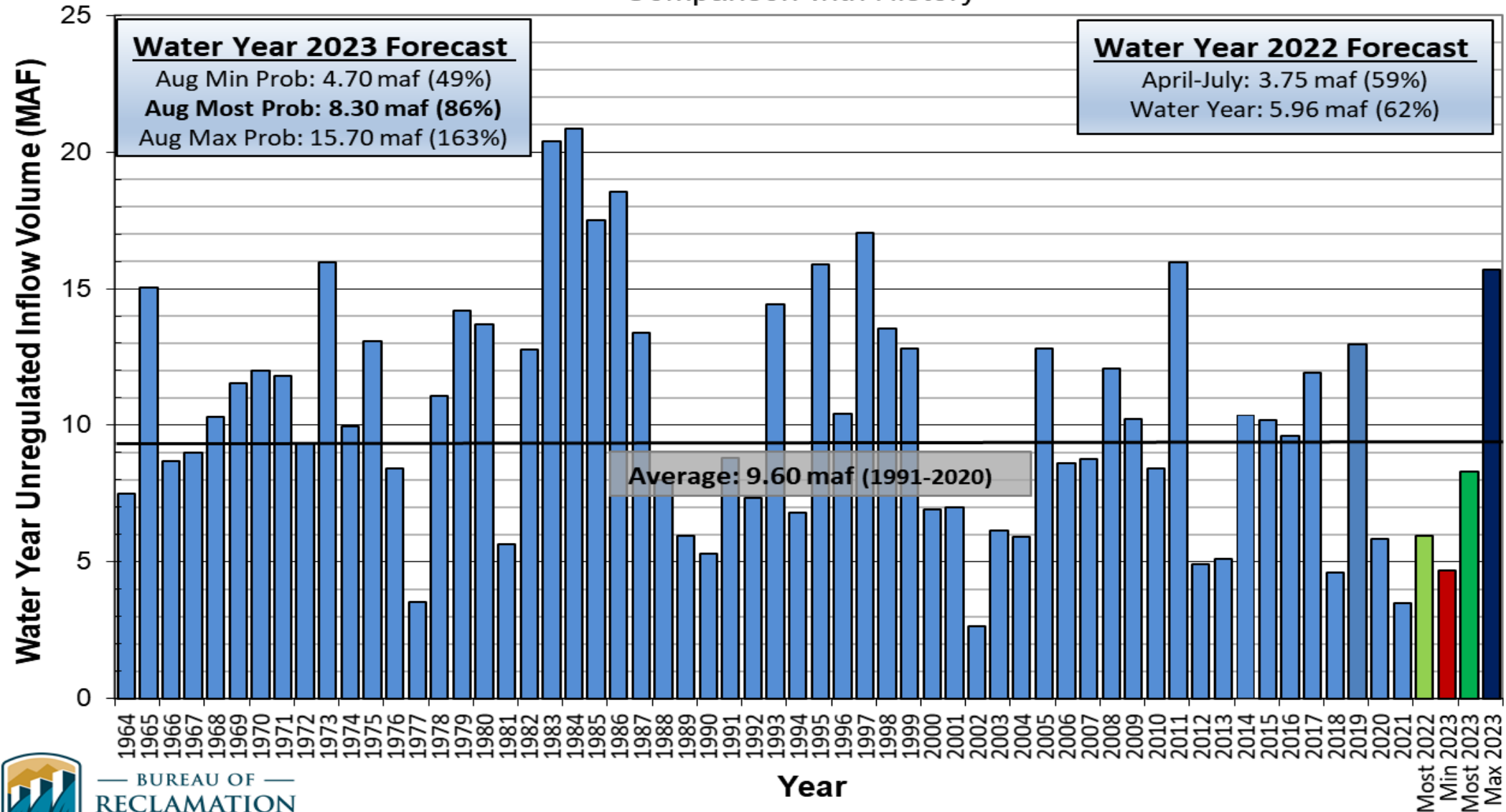
¹Averages are based on the 1991 through 2020 period of record.



Lake Powell Unregulated Inflow

Water Year 2022 and 2023 Forecast *(issued August 2)*

Comparison with History



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Upper Basin Drought Response Actions

- The Bureau of Reclamation announced on May 3, 2022, two separate urgent drought response actions that will help prop up Lake Powell by nearly 1 million acre-feet (maf) of water over the next 12 months (May 2022 through April 2023). To protect Lake Powell, more water will flow into the lake from upstream reservoirs and less water will be released downstream:
 - Under a Drought Contingency Plan adopted in 2022, approximately 500 thousand acre-feet (kaf) of water will come from Flaming Gorge Reservoir, located approximately 455 river miles upstream of Lake Powell (2022 Plan).
 - For more information: <https://www.usbr.gov/uc/DocLibrary/Plans/20220429-2022DroughtResponseOperationsPlan-ApprovalMemo-508-DOI.pdf>.
 - Another 480 kaf will be left in Lake Powell by reducing Glen Canyon Dam's annual release volume from 7.48 maf to 7.00 maf (GC Operational Adjustment), in accordance with Sections 6 and 7.D of the 2007 Interim Guidelines.
 - For more information: <https://www.usbr.gov/uc/DocLibrary/Plans/20220503-2022DROA-GlenCanyonDamOperationsDecisionLetter-508-DOI.pdf>



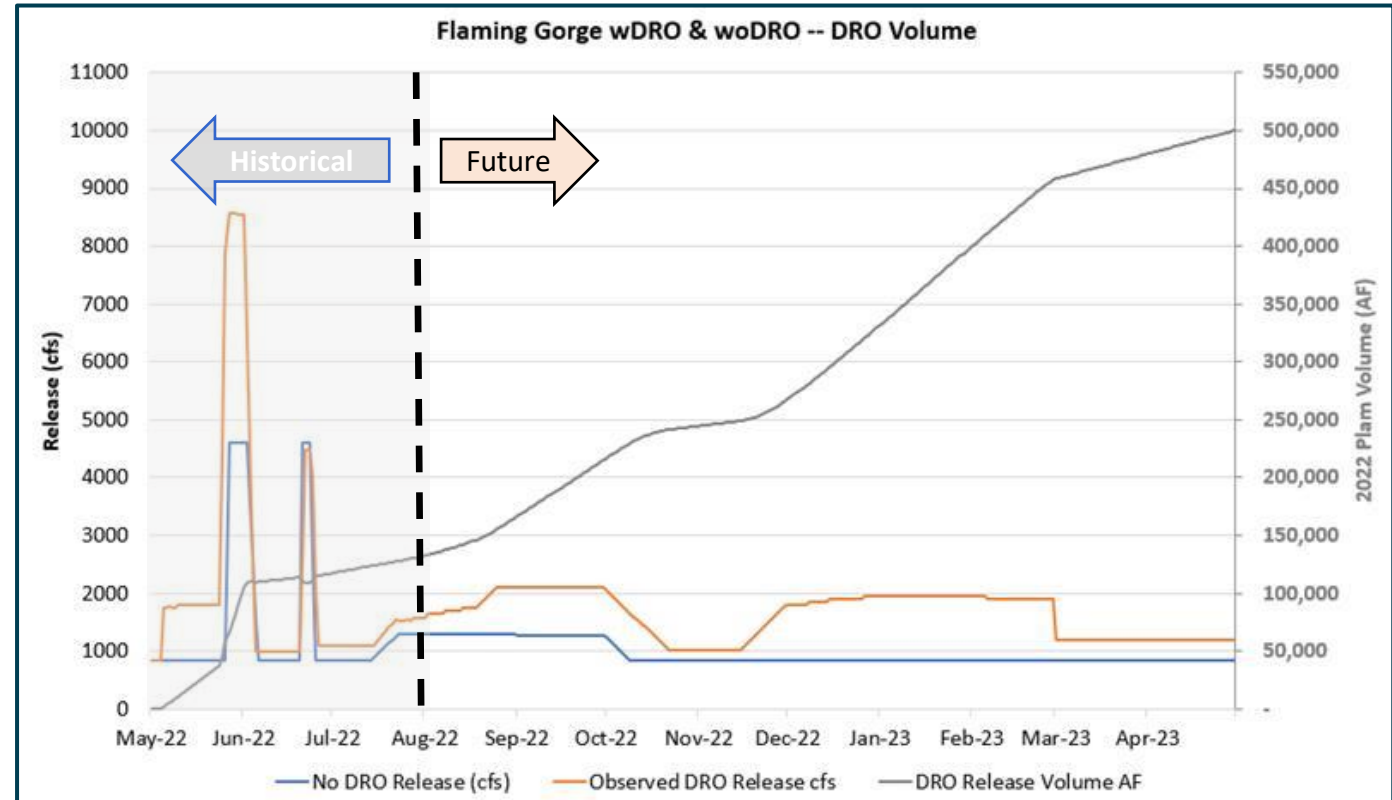
Drought Response Operations Agreement (DROA)

DROA Volumes Released¹

Reservoir	2021 DROA Volume (kaf)	2022 DROA Volume (kaf)	Total DROA Volume (kaf)
Flaming Gorge	125	500	625
Blue Mesa	36	0	36
Navajo	0	0	0
Volume in Powell	161	500	661

¹DROA operational year is from May through April.

Flaming Gorge 2022 Plan





August 24-Month Study Projections Upper Colorado Basin Region Operations



Timing of Operational Decisions

- August 24-Month Study projections of January 1 elevations sets the operating tiers for Lake Powell and Lake Mead



Lake Powell & Lake Mead Operational Table

Lake Powell Operational Tier Determination Run (aka "Exhibit Run") with an 8.23 maf Release^{1,2}

Lake Powell			Lake Mead		
Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) ¹	Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) ¹
3,700	Equalization Tier Equalize, avoid spills or release 8.23 maf	24.3	1,220	Flood Control Surplus or Quantified Surplus Condition Deliver > 7.5 maf	25.9
3,636 - 3,666 (2008-2026)	Upper Elevation Balancing Tier ³ Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	15.5 - 19.3 (2008-2026)	1,200 (approx.) ²	Domestic Surplus or ICS Surplus Condition Deliver > 7.5 maf	22.9 (approx.) ²
3,575	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5	1,145	Normal or ICS Surplus Condition Deliver ≥ 7.5 maf	15.9
3,525	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf	5.9	1,105	Shortage Condition Deliver 7.167 ⁴ maf	11.9
3,490		4.0	1,075	Shortage Condition Deliver 7.083 ⁵ maf	9.4
3,370		0	1,050	Shortage Condition Deliver 7.0 ⁶ maf Further measures may be undertaken ⁷	7.5
			1,025		5.8
			1,000		4.3
			895		0

**3,505.66 ft
Jan 1, 2023
Projection**

Diagram not to scale

¹ Acronym for million acre-feet

² This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.

³ Subject to April adjustments which may result in a release according to the Equalization Tier

⁴ Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

⁵ Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

⁶ Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

⁷ Whenever Lake Mead is below elevation 1,025 feet, the Secretary shall consider whether hydrologic conditions together with anticipated deliveries to the Lower Division States and Mexico is likely to cause the elevation at Lake Mead to fall below 1,000 feet. Such consideration, in consultation with the Basin States, may result in the undertaking of further measures, consistent with applicable Federal law.

¹ Lake Powell and Lake Mead operational tier determinations are based on August 2021 24-Month Study projections will be documented in the draft 2023 AOP.

² The operating determination for WY 2023 is based on a projected elevation "as if" the 0.48 maf were delivered to Lake Mead with a Glen Canyon Dam release pattern of 8.23 maf.



Interim Guidelines Section 6.D.1

D. Lower Elevation Balancing Tier

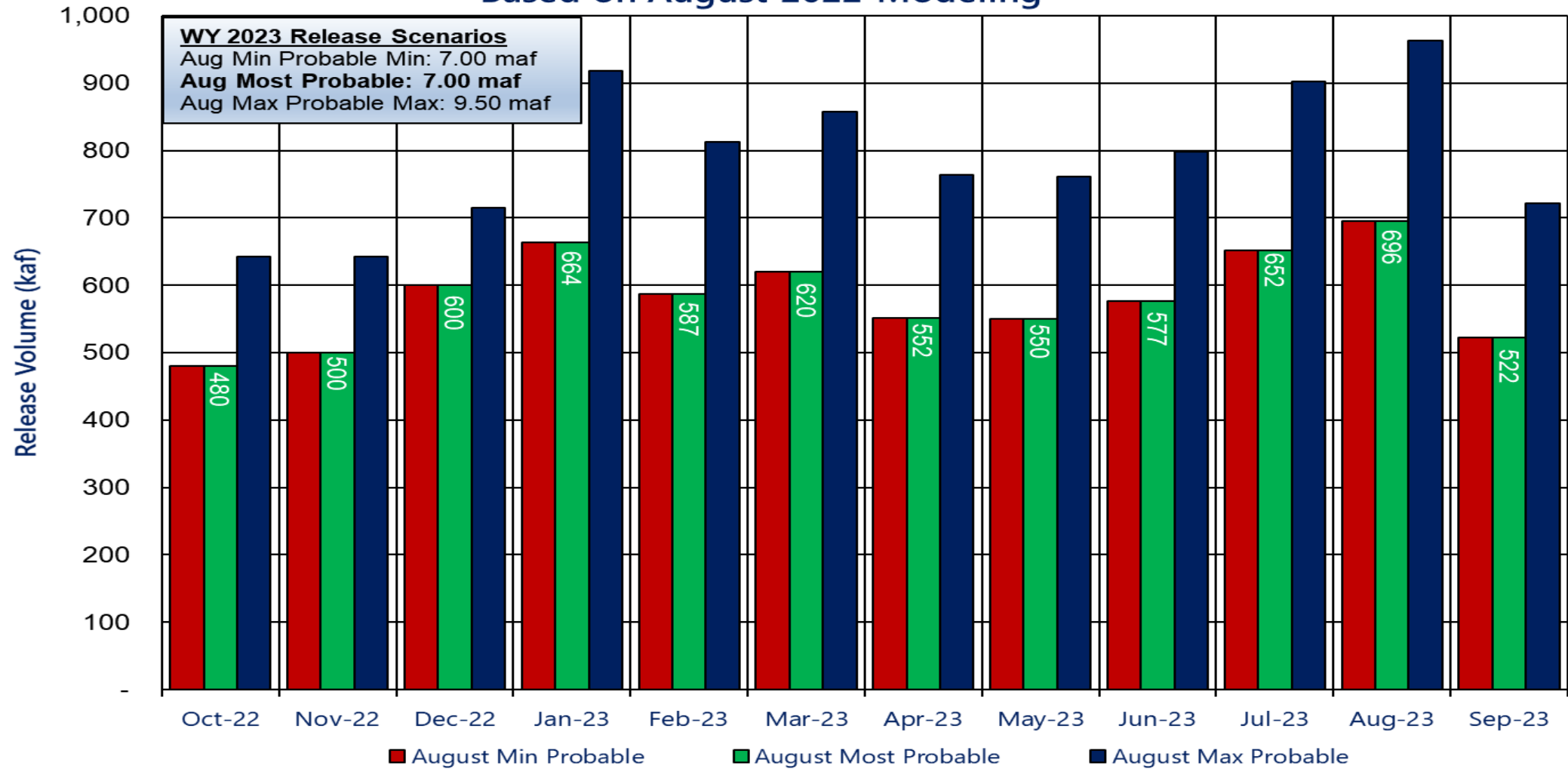
1. In Water Years when the projected January 1 Lake Powell elevation is below 3,525 feet, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.5 maf and not less than 7.0 maf from Lake Powell in the Water Year.
- Consistent with the provisions of the 2007 Interim Guidelines, and to preserve the benefits to Glen Canyon Dam facilities from 2022 Operations into 2023 and 2024, Reclamation will consult with the Basin States on monthly and annual operations. Reclamation will also ensure all appropriate consultation with Basin Tribes, the Republic of Mexico, other federal agencies, water users and non-governmental organizations with respect to implementation of these monthly and annual operations.
 - The Glen Canyon Dam annual release has initially been set to 7.00 maf, and in April 2023 Reclamation will evaluate hydrologic conditions to determine if balancing releases may be appropriate under the conditions established in the 2007 Interim Guidelines;
 - Balancing releases will be limited (with a minimum of 7.00 maf) to protect Lake Powell from declining below elevation 3,525 feet at the end of December 2023;
 - Balancing releases will take into account operational neutrality of the 0.480 maf that was retained in Lake Powell under the May 2022 action 1. Any Lake Powell balancing release volume will be calculated as if the 0.480 maf had been delivered to Lake Mead in WY 2022; and
 - The modeling approach for WY 2023 will apply to 2024.



Potential Lake Powell Monthly Release Volume Distribution

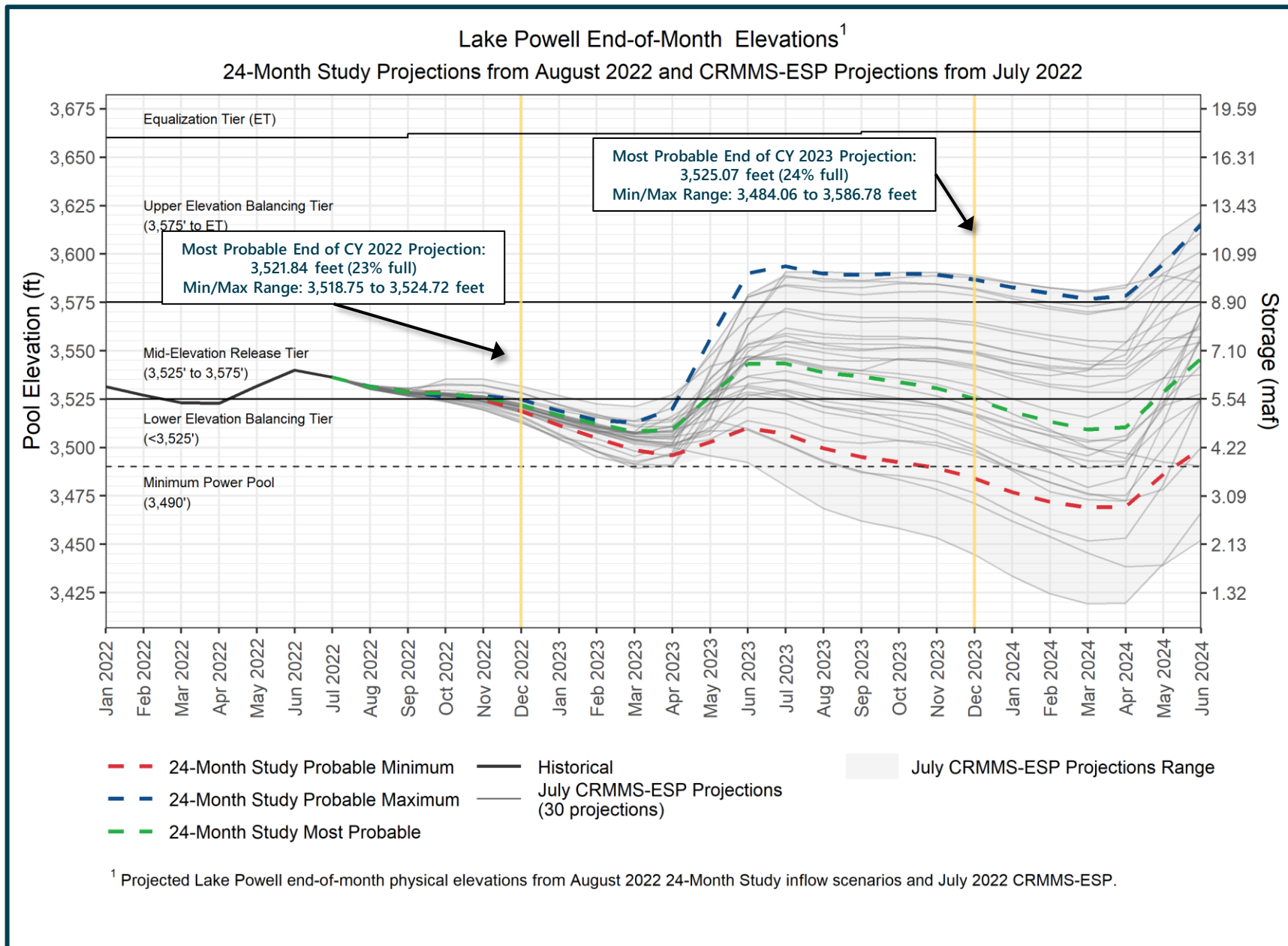
Release Scenarios for Water Year 2023

Based on August 2022 Modeling



Consistent with the provisions of the 2007 Interim Guidelines, and to preserve the benefits to Glen Canyon Dam facilities from 2022 Operations into 2023 and 2024, Reclamation will consult with the Basin States on monthly and annual operations. Reclamation will also ensure all appropriate consultation with Basin Tribes, the Republic of Mexico, other federal agencies, water users and non-governmental organizations with respect to implementation of these monthly and annual operations.





The chart above displays projected “physical” elevations for Lake Powell. Based on August 2022 24-Month Study modeling, Lake Powell’s elevation is projected to be less than 3,525 feet and the operating tier for water year 2023 is the Lower Elevation Balancing Tier.

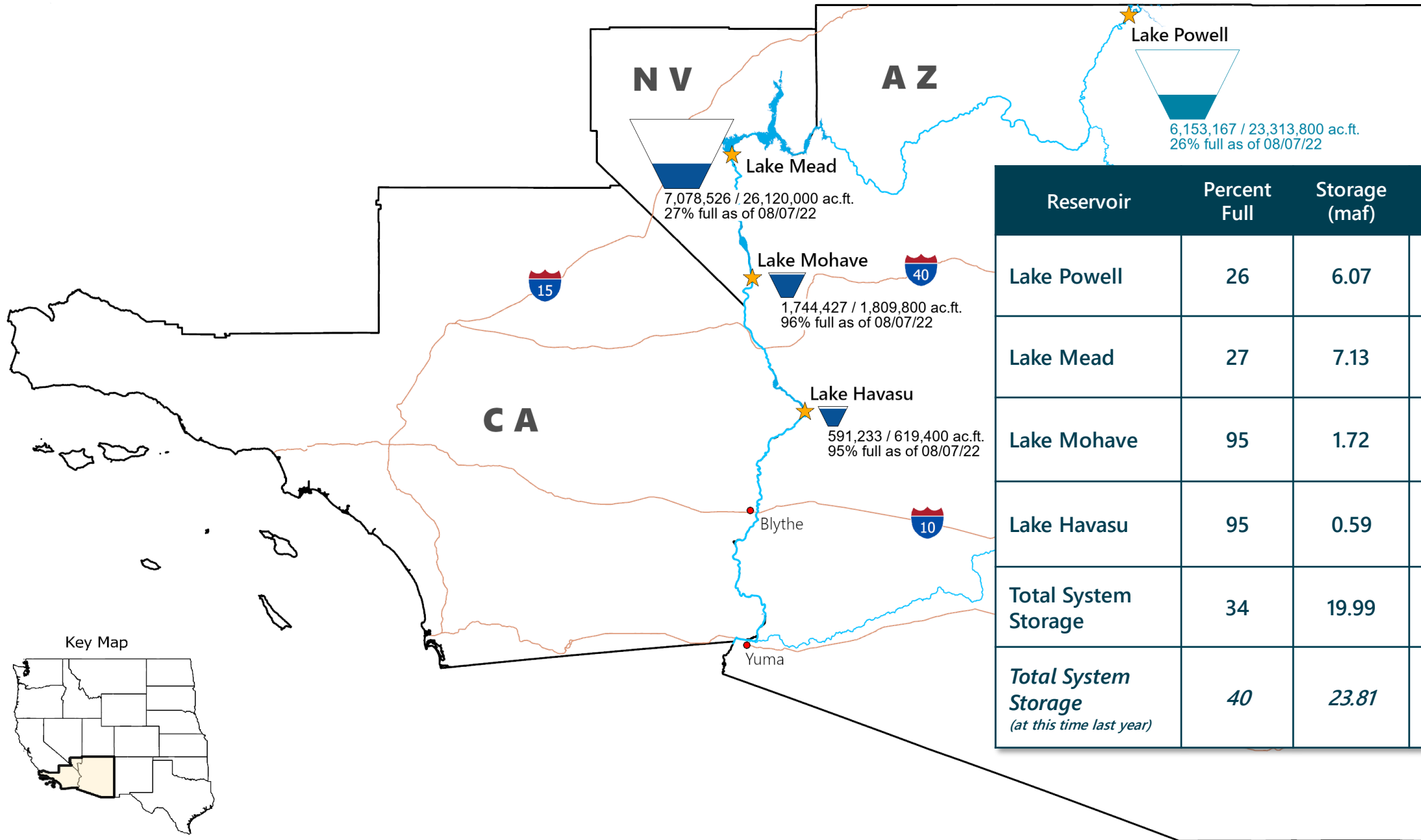




Lower Colorado Basin Hydrology and Operations



Lower Colorado Basin System Conditions (as of August 14, 2022)



Reservoir	Percent Full	Storage (maf)	Elevation (feet)
Lake Powell	26	6.07	3,533.93
Lake Mead	27	7.13	1,042.21
Lake Mohave	95	1.72	643.69
Lake Havasu	95	0.59	448.42
Total System Storage	34	19.99	-
<i>Total System Storage (at this time last year)</i>	<i>40</i>	<i>23.81</i>	-



Lower Basin Side Inflows – WY/CY 2022^{1,2,3}

Intervening Flow from Glen Canyon to Hoover Dam

Month in WY/CY 2022		5-Year Average Intervening Flow (kaf)	Observed Intervening Flow (kaf)	Observed Intervening Flow (% of Average)	Difference From 5-Year Average (kaf)
Observed	October 2021	69	80	116%	11
	November 2021	68	42	62%	-26
	December 2021	69	64	94%	-4
	January 2022	87	60	69%	-27
	February 2022	88	58	65%	-31
	March 2022	107	41	39%	-65
	April 2022	72	30	43%	-41
	May 2022	43	8	18%	-35
	June 2022	22	16	72%	-6
	July 2022	56	71	127%	15
Projected	August 2022	66			
	September 2022	62			
	October 2022	69			
	November 2022	68			
	December 2022	69			
	WY 2022 Totals	810	599	74%	-211
	CY 2022 Totals	810	619	76%	-191

¹ Values were computed with the LC's gain-loss model for the most recent 24-month study.

² Percents of average are based on the 5-year mean from 2017-2021.

³ Lake Mead's evaporation in the intervening flow mass balance incorporates evaporation coefficients developed by the USGS between 2010-2019. The study report can be found online at: <https://pubs.usgs.gov/of/2021/1022/ofr20211022.pdf>



Lake Powell & Lake Mead Operational Table

Lake Mead Operating Condition Determination for CY 2023^{1,2}

Lake Powell			Lake Mead		
Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) ¹	Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) ¹
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3,636 - 3,666 (2008-2026)	Upper Elevation Balancing Tier ³ Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	15.5 - 19.3 (2008-2026)	1,200 (approx.) ²	Domestic Surplus or ICS Surplus Condition Deliver > 7.5 maf	22.9 (approx.) ²
			1,145		15.9
3,575		9.5	1,105	Normal or ICS Surplus Condition Deliver ≥ 7.5 maf	11.9
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3,525	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	5.9	1,050	Shortage Condition Deliver 7.167 ⁴ maf	7.5
				Shortage Condition Deliver 7.083 ⁵ maf	
3,490		4.0	1,025		5.8
	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf		1,000	Shortage Condition Deliver 7.0 ⁶ maf Further measures may be undertaken ⁷	4.3
3,370		0	895		0

**1,047.61 ft
Jan 1, 2023
Projection**

Diagram not to scale

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¹ Lake Powell and Lake Mead operational tier determinations are based on August 2021 24-Month Study projections and will be documented in the draft 2023 AOP.

² The operating determination for WY 2023 is based on a projected elevation "as if" the 0.48 maf were delivered to Lake Mead with a Glen Canyon Dam release pattern of 7.00 maf.

Lower Basin Reservoir Operations

Calendar Year 2023

- Lake Mead will be operated consistent with the 2007 Interim Guidelines, the Lower Basin DCP, and Minute 323
- Lake Mead's projected end of calendar year (CY) 2022 "effective" elevation in the August 2022 24-Month Study determines Lake Mead's operating condition in CY 2023
 - Lake Mead will operate in a Shortage Condition in CY 2023 with reductions in accordance with the 2007 Interim Guidelines Section 2.D.1.b. and Minute 323
 - Water savings contributions required in accordance with the Lower Basin DCP and Minute 323
 - ICS and system conservation water are projected to be created
 - Delivery of ICS may be requested
- Lake Mohave and Lake Havasu will operate consistent with each reservoir's respective elevation guide curves



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

Total Volumes (kaf)

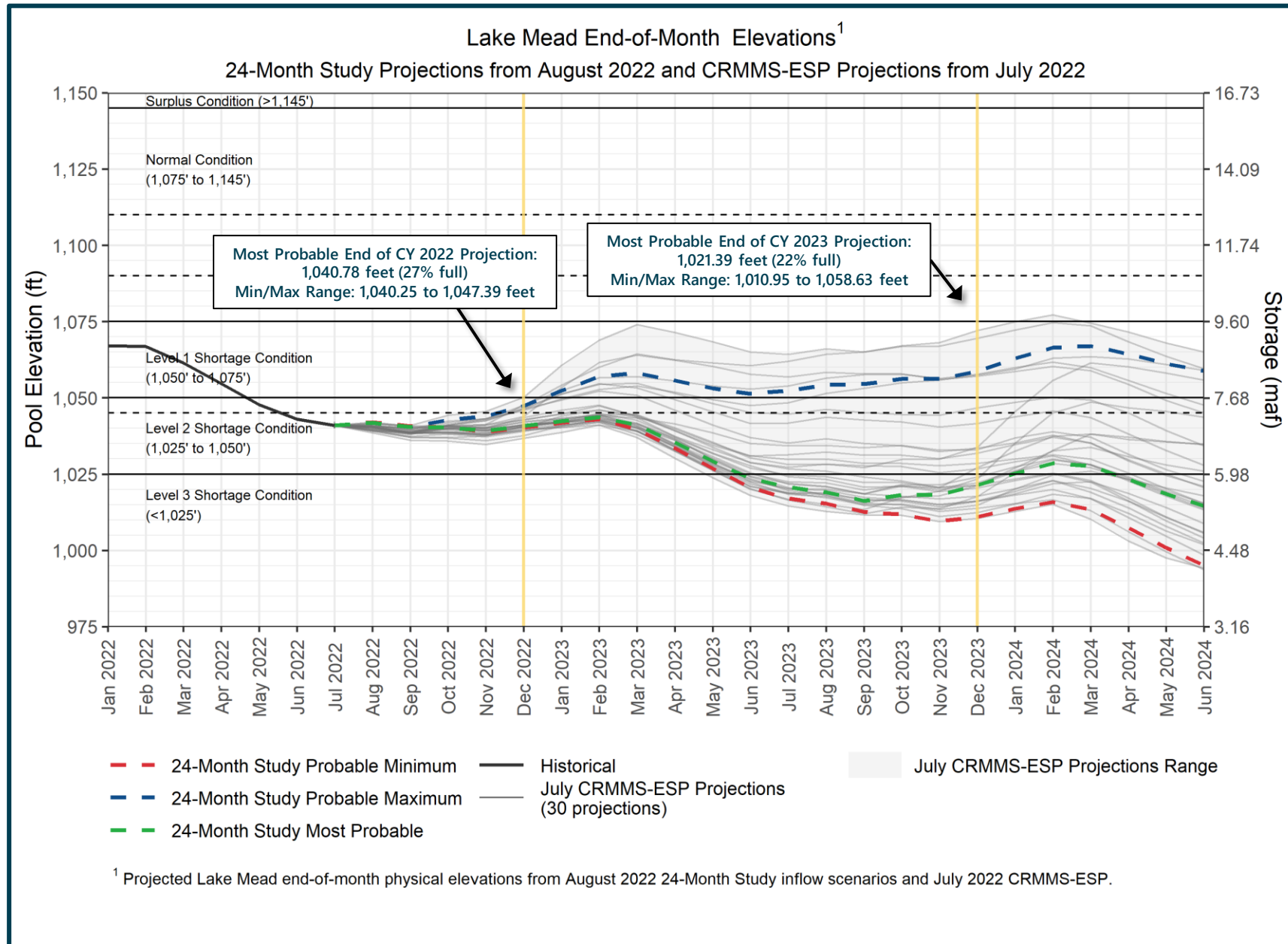
Lake Mead Elevation (feet msl)	2007 Interim Guidelines Shortages		Minute 323 Delivery Reductions	Total Combined Reductions	DCP Water Savings Contributions			Binational Water Scarcity Contingency Plan Savings	Combined Volumes by Country <i>US: (2007 Interim Guidelines Shortages + DCP Contributions)</i> <i>Mexico: (Minute 323 Delivery Reductions + Binational Water Scarcity Contingency Plan Savings)</i>					Total Combined Volumes
	AZ	NV	Mexico	<i>Lower Basin States + Mexico</i>	AZ	NV	CA	Mexico	AZ Total	NV Total	CA Total	<i>Lower Basin States Total</i>	<i>Mexico Total</i>	<i>Lower Basin States + Mexico</i>
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 Reductions +
Contributions

←
2022 Reductions +
Contributions

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.





The chart above displays projected “physical” elevations for Lake Mead. Based on August 2022 24-Month Study modeling, Lake Mead’s operating condition for calendar year 2023 is the Level 2 Shortage Condition within the 1,045 – 1,050 elevation band.

Lower Basin “500 Plus” Plan

- Memorandum of Understanding among the ADWR, CAWCD, MWD, CRCNV, SNWA, and Reclamation (signed December 15, 2021)
- Targets an additional 1 million acre-feet of conservation in 2022 and 2023, in addition to the requirements in the 2007 Interim Guidelines and Lower Basin DCP
- Plan is designed to avoid and protect against the elevation of Lake Mead declining to levels below 1,020 feet as contemplated in the Lower Basin DCP
- Sources of additional water conservation
 - Creation of ICS
 - Creation of system water
 - Decreasing ICS releases assumed in June 2021, 24-Month Study Most Probable projection
- Implementation details are being developed



Additional Water Modeled Under 500 Plus Plan

(as modeled in the August 2022 Most Probable 24-Month Study)

Conservation Activity (volumes in AF)	2021	2022 (Projected)	2023 (Projected)
CAP ICS delivery offset	6,147	19,604	-18,400
GRIC System Conservation	40,000	50,937	0
GRIC ICS creation	0	78,565	0
CRIT System Conservation <i>(in lieu of ICS)</i>	4,685	4,685	0
CAWCD System Conservation	0	35,506	0
YMIDD System Conservation	0	8,544	13,670
MVIDD System Conservation	0	9,592	9,592
MWD ICS delivery offset and/or creation	58,134	-4,578	-161,978
PVID System Conservation	12,305	50,800	58,000
SNWA ICS creation	12,832	15,000	15,000
Annual Total <i>(Non-Shortage/DCP)</i>	134,103	268,655	-84,116
Cumulative Total	134,103	402,758	318,642

- 2022 and 2023 volumes reflect executed agreements and/or 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 modeling.



Activities / Next Steps

- August 2022 24-Month Study was published and distributed before this webinar
- Updated 5-Year Outlook of Colorado River System Conditions will be available in late August
- 2023 Annual Operating Plan
 - Third Consultation - Wednesday, Sep 7, 2022 from 11:00 am to 2:00 pm PDT via webinar
 - Fourth Consultation - Wednesday, Oct 12, 2022 from 12:00 pm to 2:00 pm PDT via webinar



Questions / Discussion

For more information:

<https://www.usbr.gov/uc/water/>

<https://www.usbr.gov/lc/riverops.html>

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