BUREAU OF RECLAMATION

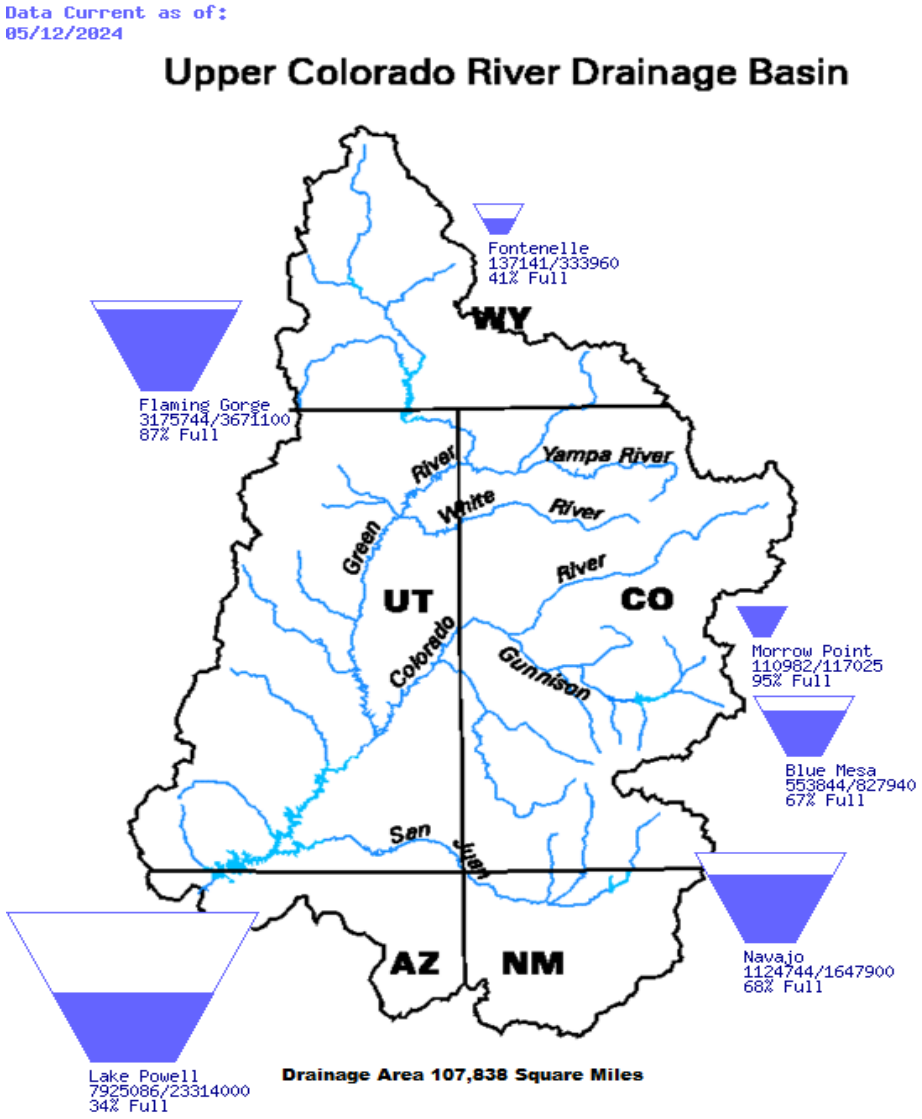
Glen Canyon Adaptive Management Program

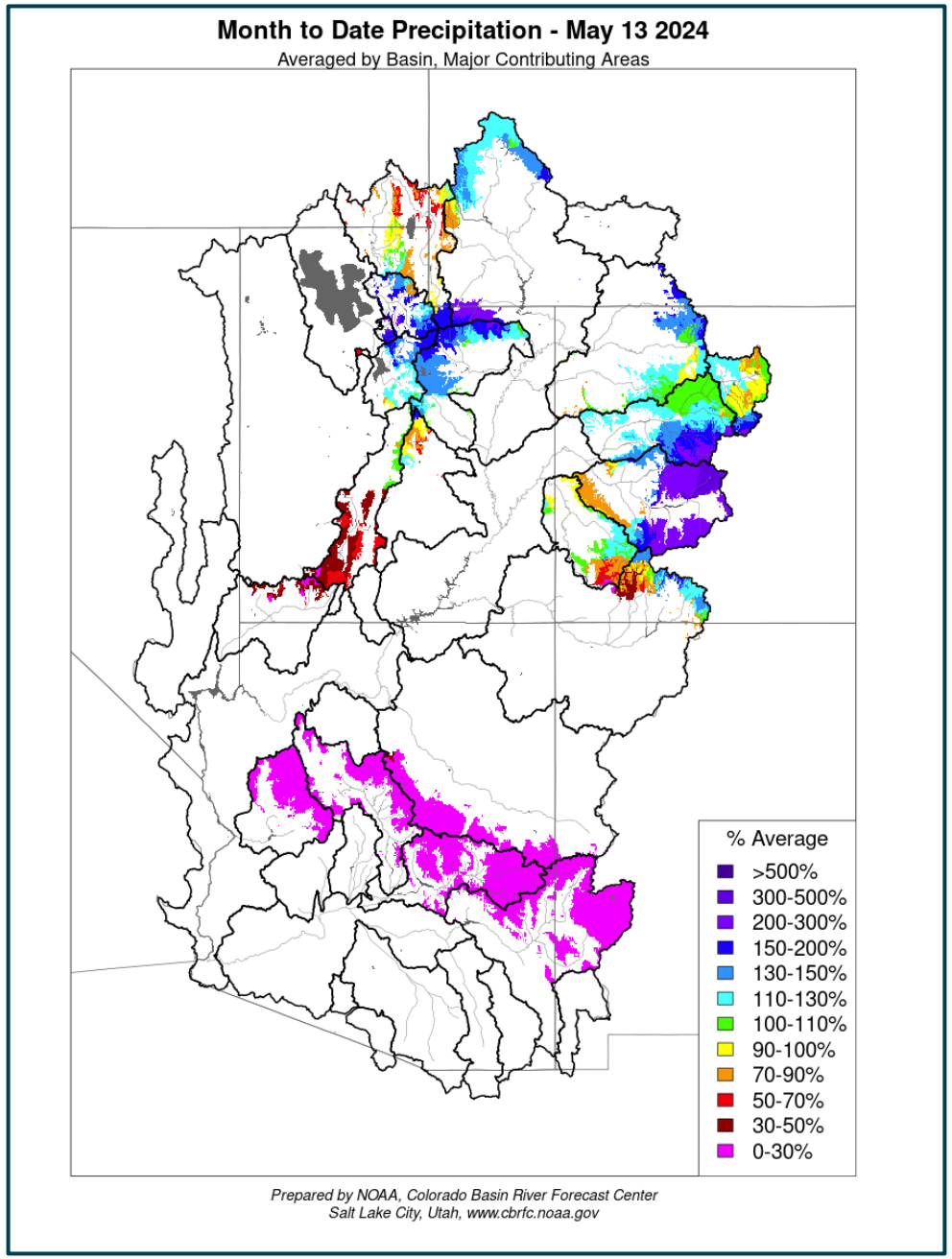
Basin Hydrology and Operations

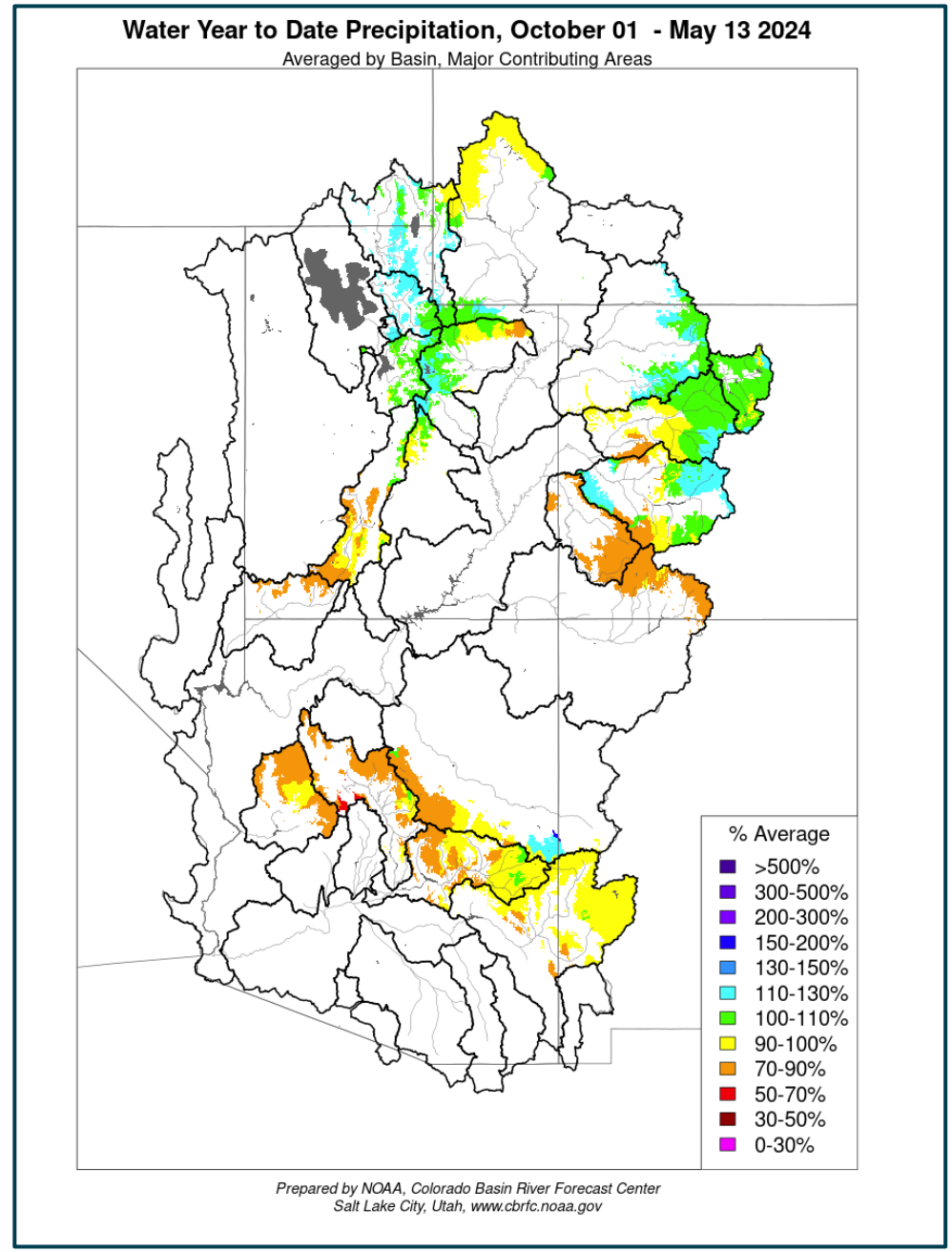
May 15, 2024

Upper Basin Storage (as of May 12, 2023)

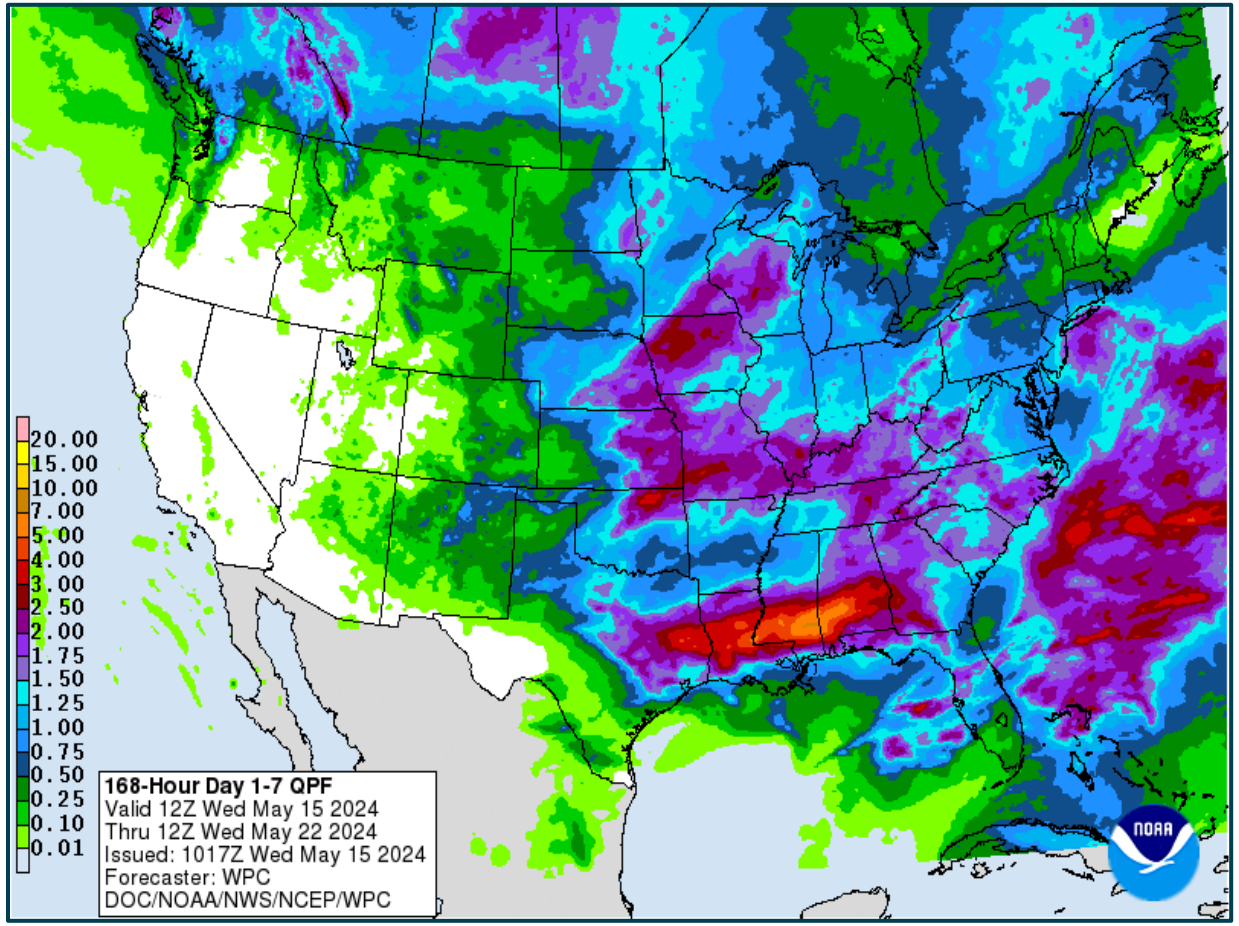
Reservoir	Percent Current Live Storage	Current Live Storage (maf)	Live Storage Capacity (maf)	Elevation (feet)
Fontenelle	33	0.14	0.33	6,475.69
Flaming Gorge	87	3.67	3.67	6,027.61
Blue Mesa	67	0.55	0.83	7,486.92
Navajo	68	1.12	1.65	6,045.92
Lake Powell	34	7.93	23.31	3,561.94
UC System Storage	44	13.04	29.93	

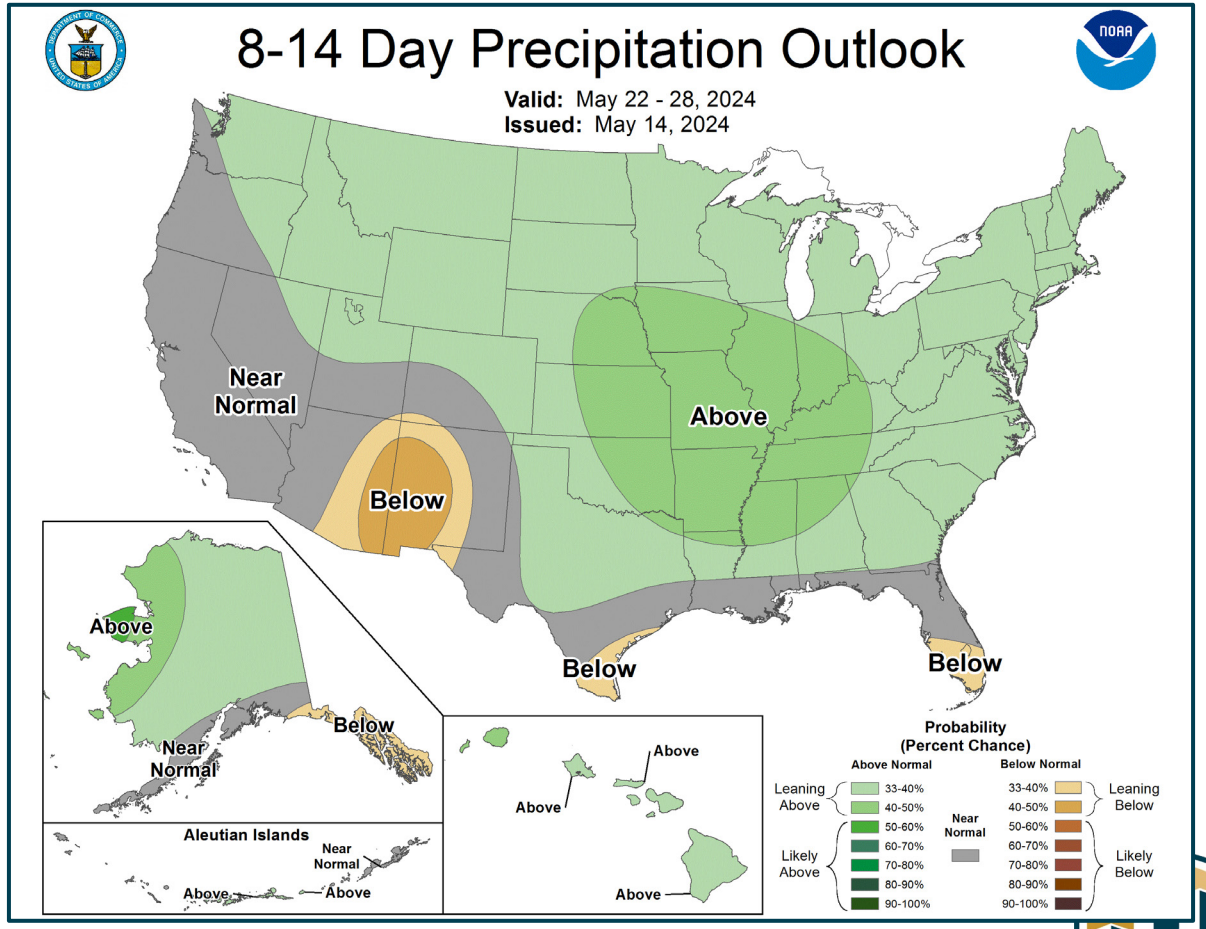



Month to Date Precipitation - May 13 2024
Averaged by Basin, Major Contributing Areas
% Average
>500%
300-500%
200-300%
150-200%
130-150%
110-130%
100-110%
90-100%
70-90%
50-70%
30-50%
0-30%
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

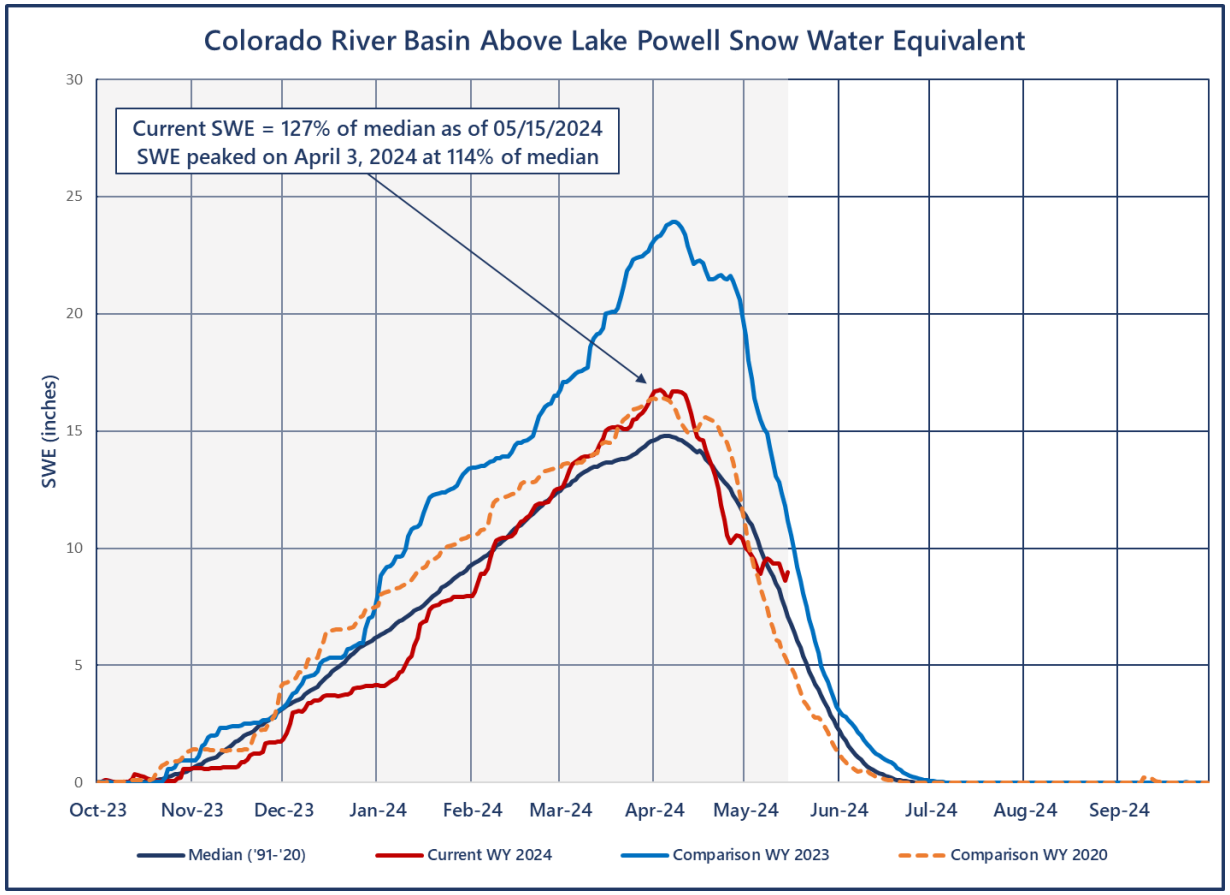

Water Year to Date Precipitation, October 01 - May 13 2024
Averaged by Basin, Major Contributing Areas
% Average
>500%
300-500%
200-300%
150-200%
130-150%
110-130%
100-110%
90-100%
70-90%
50-70%
30-50%
0-30%
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

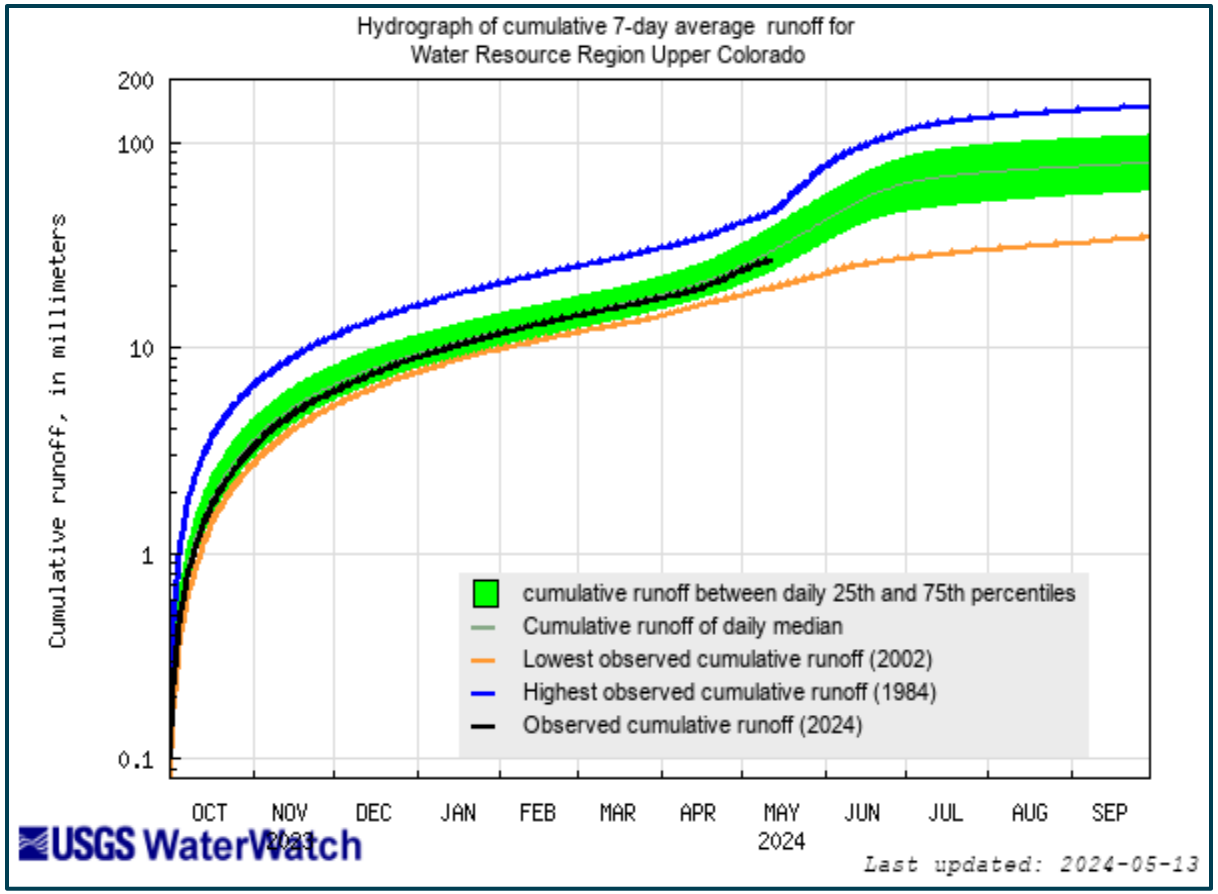
Weather Prediction Center and Climate Prediction Center Precipitation Forecasts





Upper Colorado SWE and Observed Inflows





https://waterwatch.usgs.gov/index.php

Most Probable May Forecast
Water Year 2024

April – July 2024
Forecasted Unregulated Inflow

as of May 3, 2024

Reservoir	Inflow (kaf)	Change from Apr	Percent of Avg[1]
Fontenelle	600	-110	82
Flaming Gorge	800	-160	83
Blue Mesa	570	-30	90
Navajo	420	0	67
Powell	5,100	-600	80

Water Year 2024
Unregulated Inflow Forecast

as of May 3, 2024

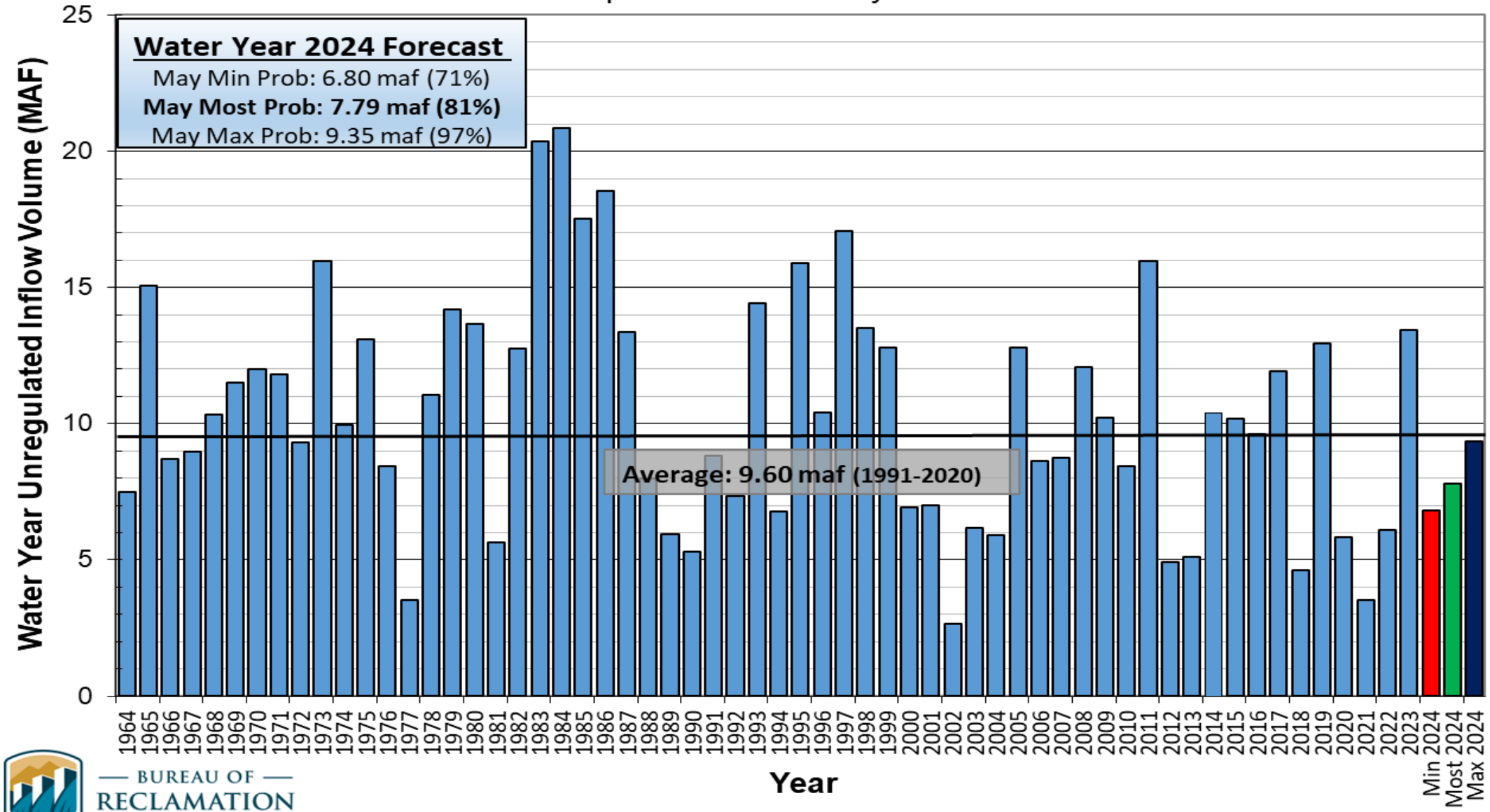
Reservoir	Inflow (kaf)	Change from Apr	Percent of Avg[1]
Fontenelle	936	-120	87
Flaming Gorge	1,274	-170	90
Blue Mesa	812	-30	90
Navajo	564	0	62
Powell	7,792	-599	81

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

Lake Powell Unregulated Inflow

Water Year 2024 Forecast *(issued May 3)*

Comparison with History



BUREAU OF RECLAMATION

Upper Colorado Basin

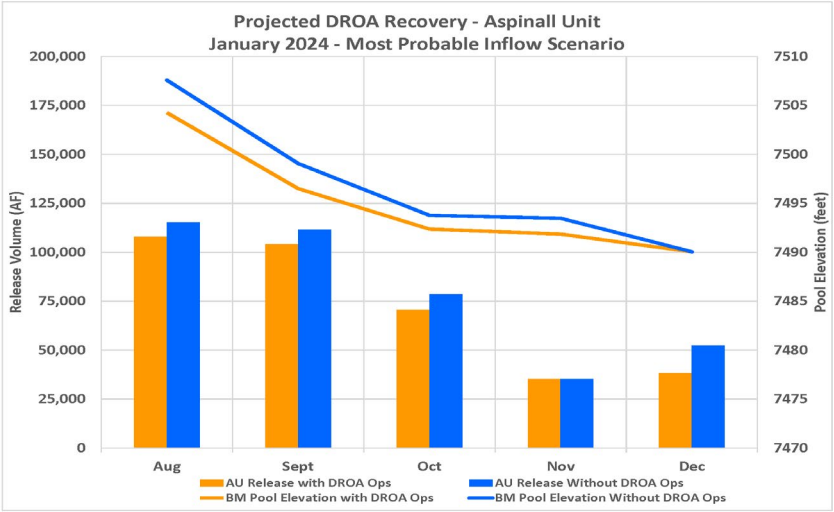
Hydrology and Operations Projections Based on April 2024 24-Month Study

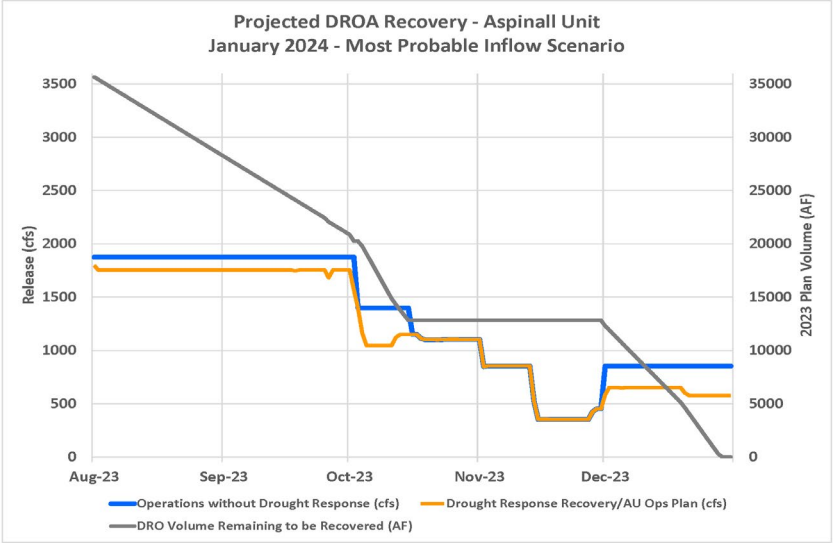
Upper Basin Reservoir Operations
Water Years 2024 and 2025

- Lake Powell will be operated consistent with the 2007 Interim Guidelines, the Upper Basin Drought Response Operations Agreement and Upper Basin Records of Decision
- Lake Powell WY 2024 will operate in the Mid-Elevation Release Tier where Lake Powell will release 7.48 maf
- 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.

DROA Recovery - BM

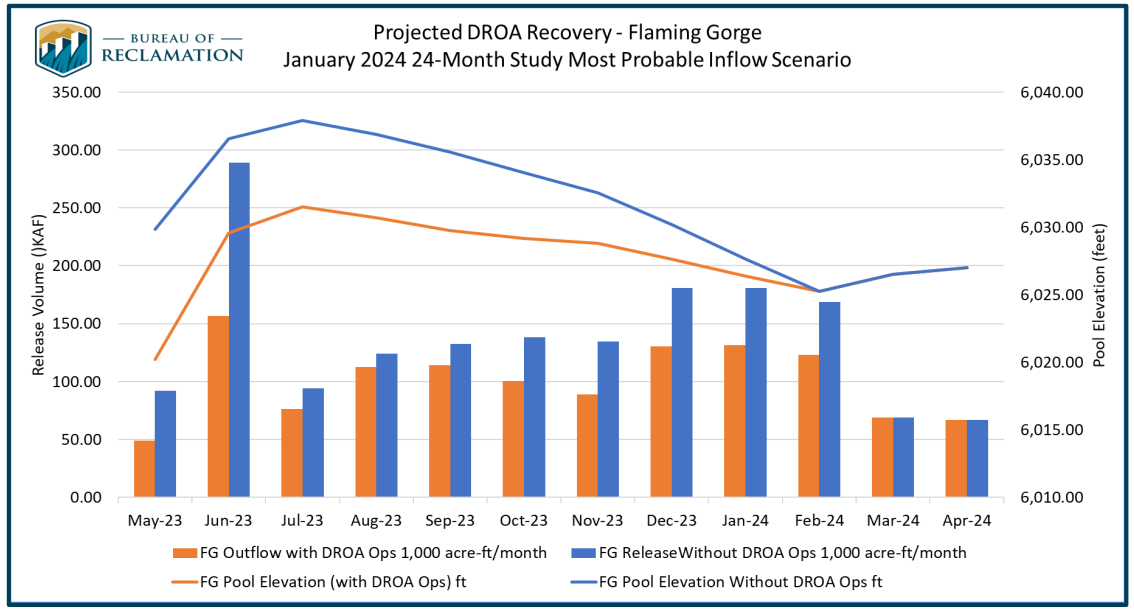
- Total DROA release - 36 kaf
- Incremental recovery achieved end of day 12/29/23.
- Icing target achieved at 7,490.05 feet on midnight 12/31/23.

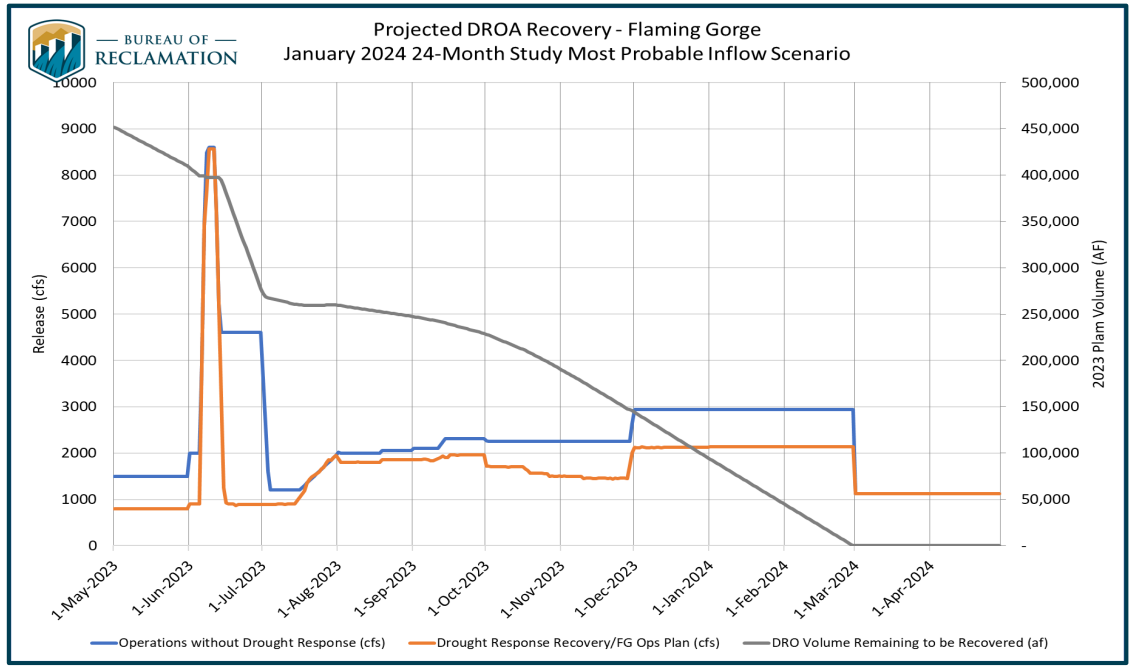




DROA Recovery - FG

- Total DROA release - 588 kaf
- Incremental recovery achieved end of day 2/28/24
- Reclamation achieved the May 1 Upper Limit Drawdown Level of 6,027 feet

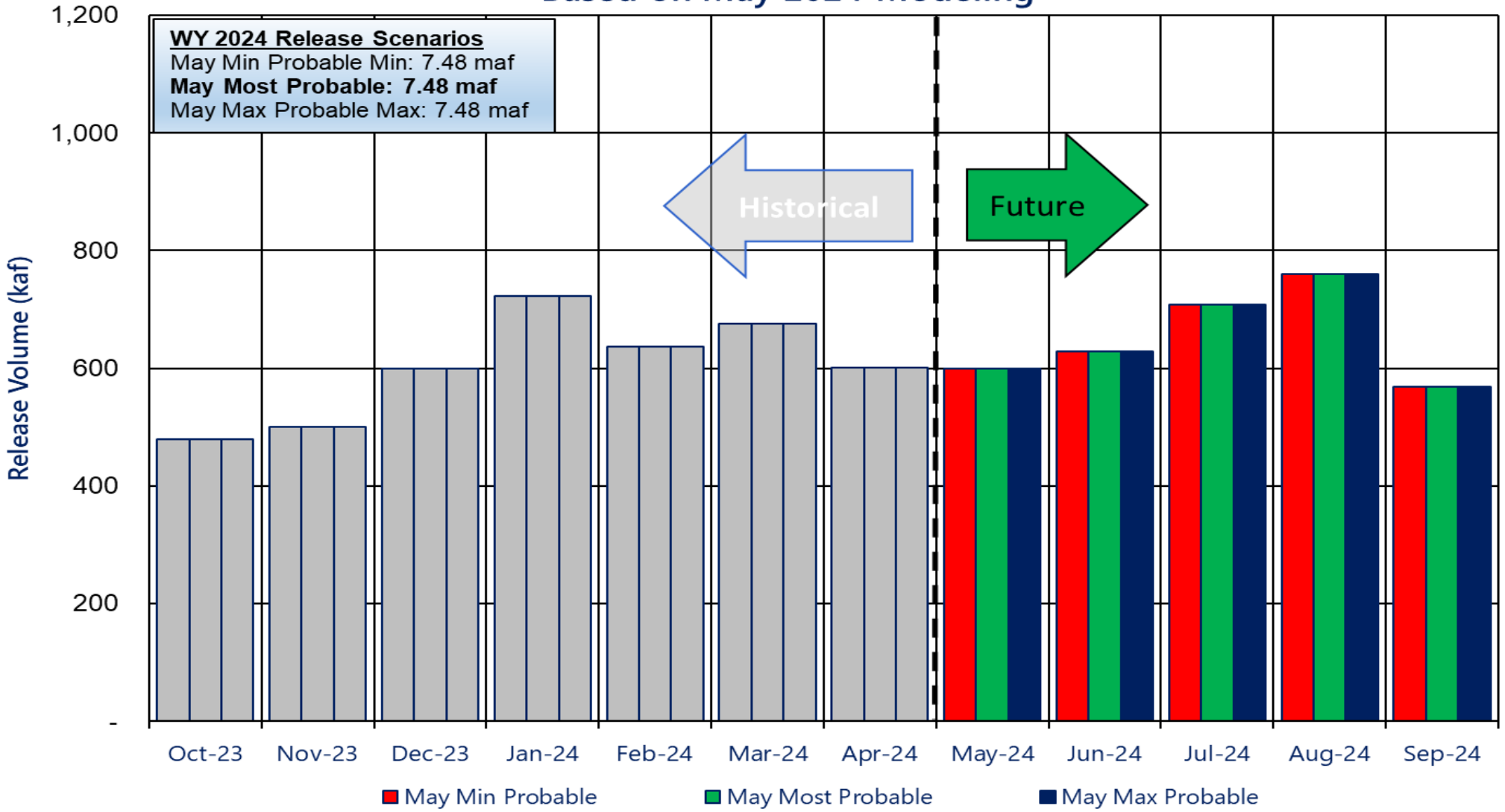




Potential Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2024

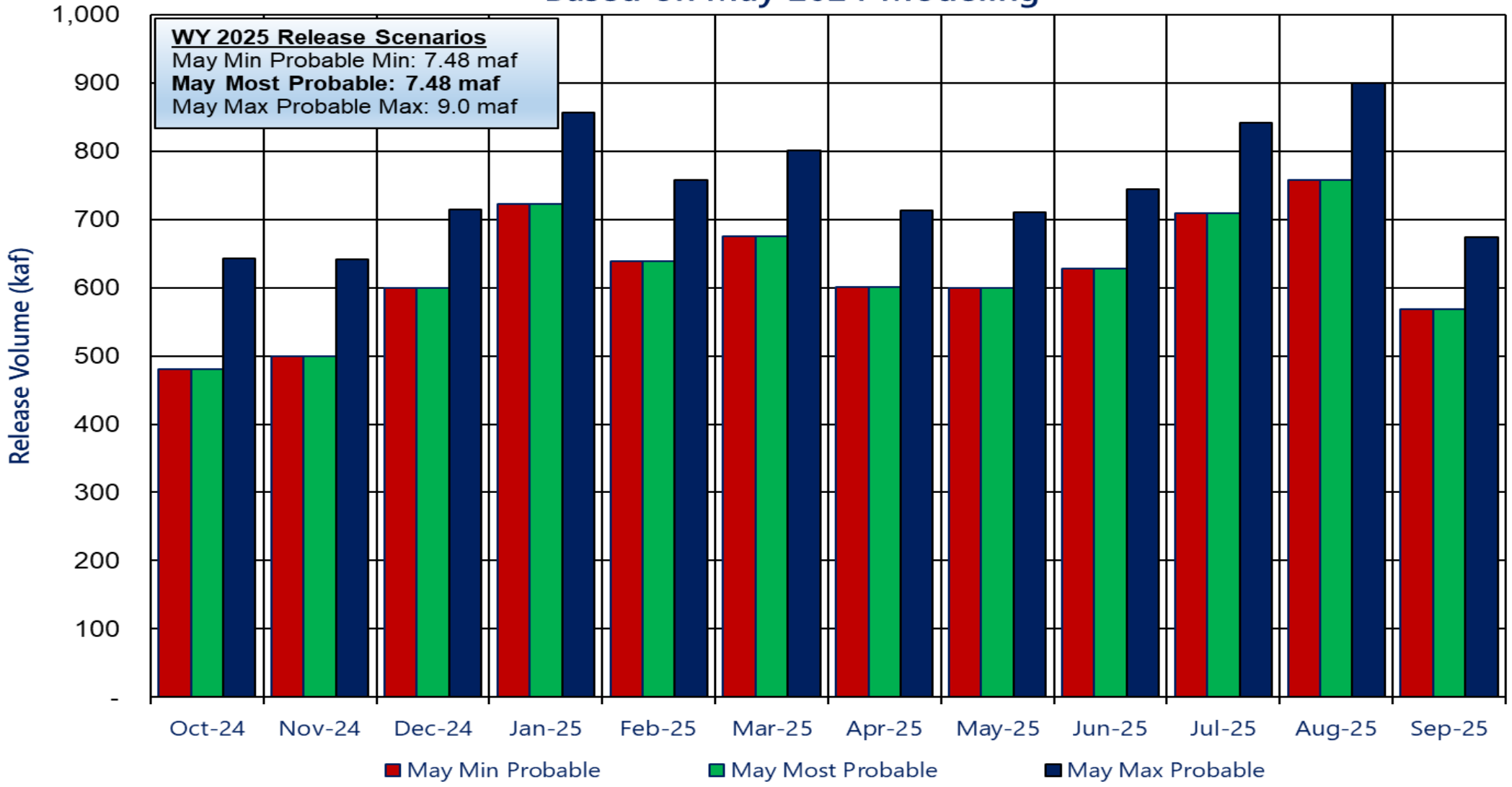
Based on May 2024 Modeling



Potential Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2025

Based on May 2024 Modeling

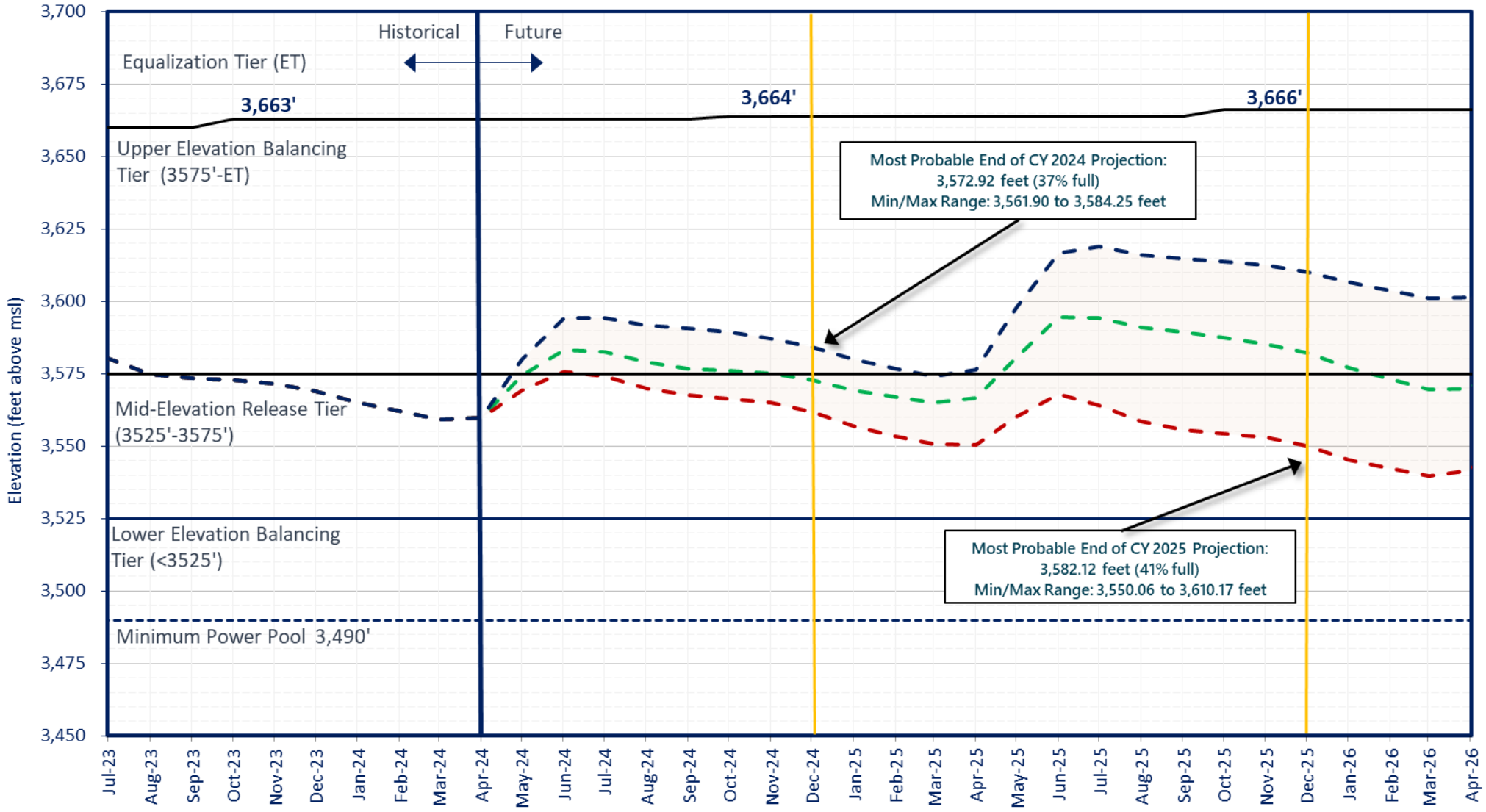


Reclamation Operational Modeling
Model Comparison

	Colorado River Mid-term Modeling System (CRMMS)		CRSS
	24-Month Study Mode (Manual Mode)	Ensemble Mode (Rule-based Mode)	
Primary Use	AOP tier determinations and projections of current conditions	Risk-based operational planning and analysis	Long-term planning, comparison of alternatives
Simulated Reservoir Operations	Operations input manually	Rule-driven operations	
Probabilistic or Deterministic	Deterministic – single hydrologic trace	Deterministic OR Probabilistic 30 (or more) hydrologic traces	Probabilistic – 100+ traces
Time Horizon (years)	1 - 2	1 - 5	1 - 50
Upper Basin Inflow	Unregulated forecast, 1 trace	Unregulated ESP forecast, 30 traces	Natural flow; historical, paleo, or climate change hydrology
Upper Basin Demands	Implicit, in unregulated inflow forecast		Explicit, 2016 UCRC assumptions
Lower Basin Demands	Official approved or operational		Developed with LB users

Lake Powell End of Month Elevations

Projections from the May 2024 24-Month Study Inflow Scenarios

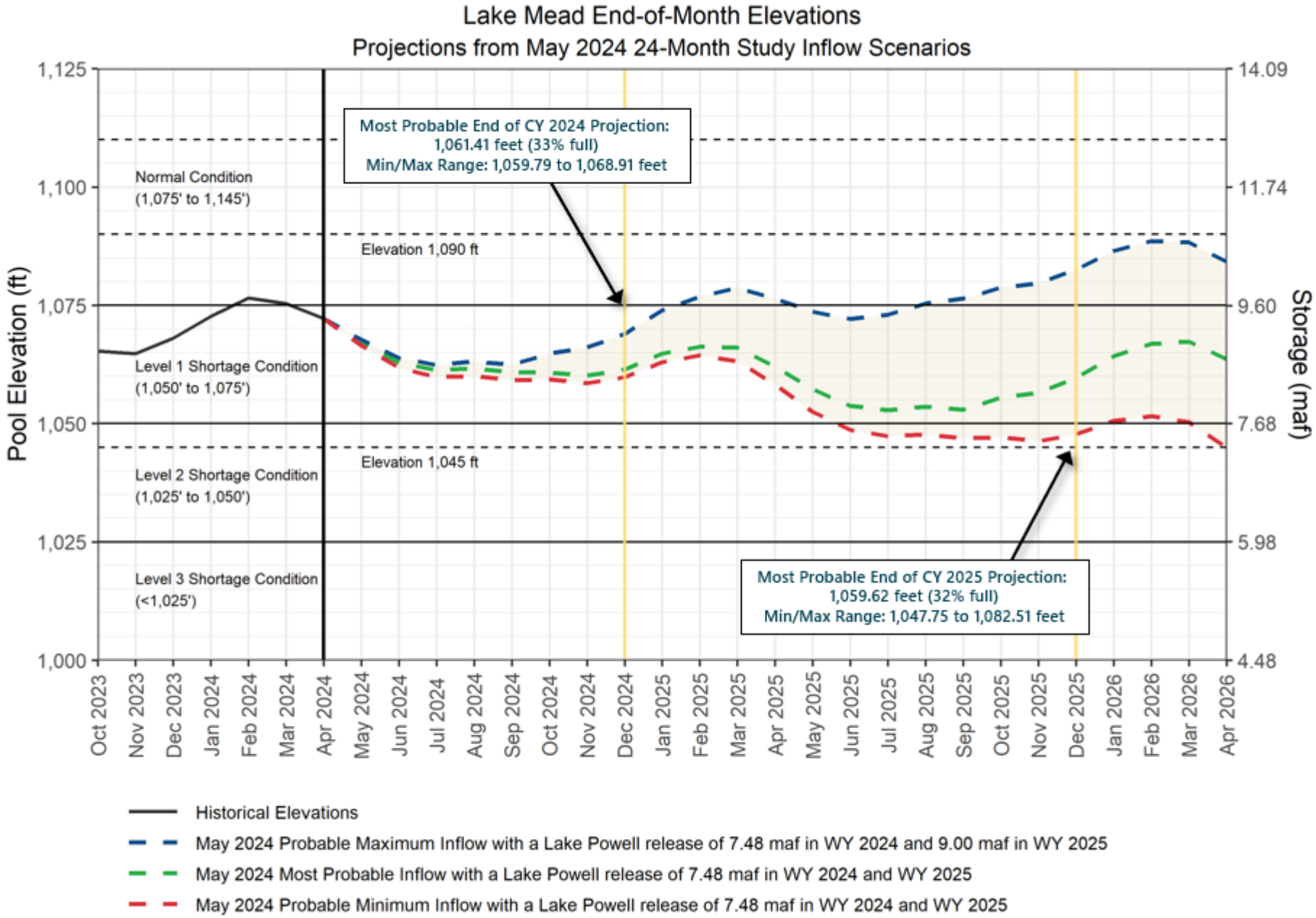


Historical Elevations

May 2024 Most Probable Inflow - Lake Powell release of 7.48 maf in WY2024 and WY2025

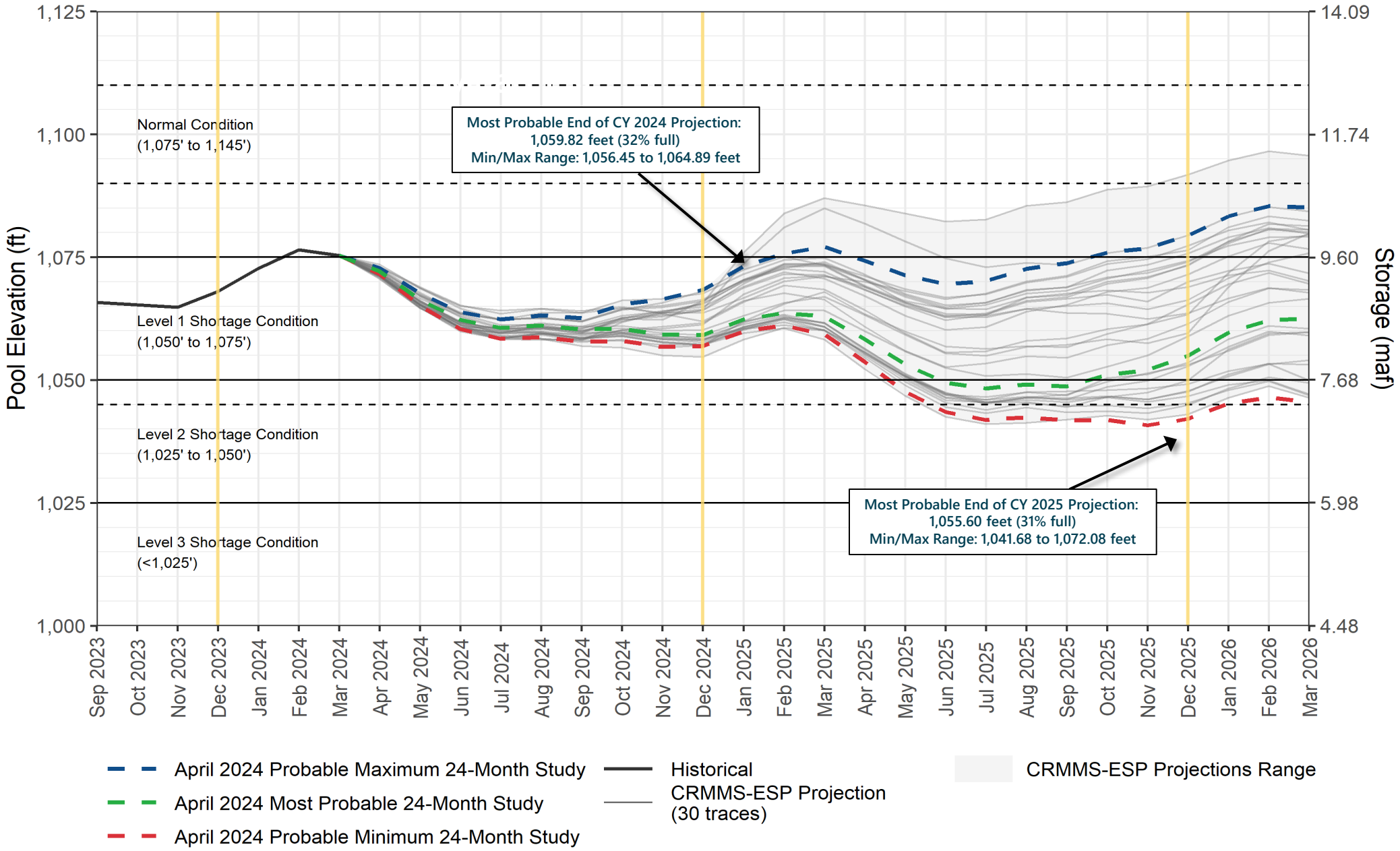
May 2024 Minimum Probable Inflow - Lake Powell release of 7.48 maf in WY2024 and WY2025

May 2024 Maximum Probable Inflow - Lake Powell release of 7.48 maf in WY2024 and 9.0 maf in WY2025


Lake Mead End-of-Month Elevations
Projections from May 2024 24-Month Study Inflow Scenarios
Pool Elevation (ft)
Storage (maf)
1,125
1,100
1,075
1,050
1,025
1,000
14.09
11.74
9.60
7.68
5.98
4.48
Normal Condition
(1,075' to 1,145')
Level 1 Shortage Condition
(1,050' to 1,075')
Level 2 Shortage Condition
(1,025' to 1,050')
Level 3 Shortage Condition
(<1,025')
Elevation 1,090 ft
Elevation 1,045 ft
Most Probable End of CY 2024 Projection:
1,061.41 feet (33% full)
Min/Max Range: 1,059.79 to 1,068.91 feet
Most Probable End of CY 2025 Projection:
1,059.62 feet (32% full)
Min/Max Range: 1,047.75 to 1,082.51 feet
Oct 2023
Nov 2023
Dec 2023
Jan 2024
Feb 2024
Mar 2024
Apr 2024
May 2024
Jun 2024
Jul 2024
Aug 2024
Sep 2024
Oct 2024
Nov 2024
Dec 2024
Jan 2025
Feb 2025
Mar 2025
Apr 2025
May 2025
Jun 2025
Jul 2025
Aug 2025
Sep 2025
Oct 2025
Nov 2025
Dec 2025
Jan 2026
Feb 2026
Mar 2026
Apr 2026
Historical Elevations
May 2024 Probable Maximum Inflow with a Lake Powell release of 7.48 maf in WY 2024 and 9.00 maf in WY 2025
May 2024 Most Probable Inflow with a Lake Powell release of 7.48 maf in WY 2024 and WY 2025
May 2024 Probable Minimum Inflow with a Lake Powell release of 7.48 maf in WY 2024 and WY 2025

Lake Mead End-of-Month Elevations

CRMMS Projections from April 2024



Upper Colorado Basin

Hydropower Maintenance

Glen Canyon Dam Power Plant Unit Outage Schedule for 2024

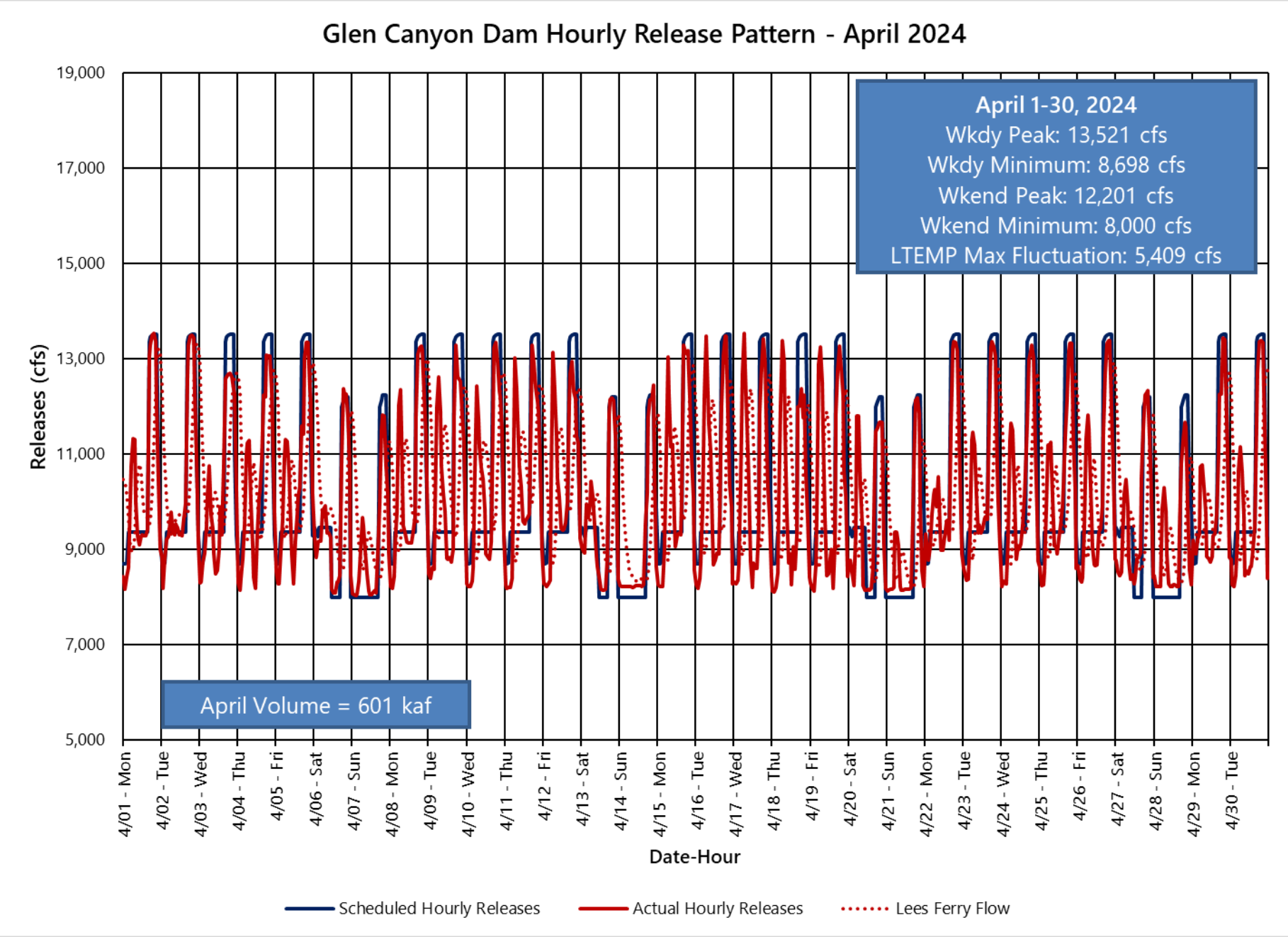
Unit Number	Oct 2023	Nov 2023	Dec 2023	Jan 2024	Feb 2024	Mar 2024	Apr 2024	May 2024	Jun 2024	Jul 2024	Aug 2024	Sep 2024	
1													
2													
3													
4													
5													
6													
7													
8													
Units Available	4	4	6	6	6	6	6	5	6	8	7	6	
Capacity (cfs)	12,400	19,450	19,400	19,300	19,200	19,100	19,100	15,900	29,900	27,200	23,400[3]	19,700	APR MOST[2]
Capacity (kaf/month)	770	1,030	1,190	1,190	1,100	1,220	1,280	1,100	1,520	1,670	1,580	1,200	APR MOST
Max (kaf) [1]	480	500	600	723	639	675	601	599	628	709	758	567	7.48 maf
Most (kaf) [1]	480	500	600	723	639	675	601	599	628	709	758	567	7.48 maf
Min (kaf) [1]	480	500	600	723	639	675	601	599	628	709	758	567	7.48 maf
										(updated 04-16-2024)			

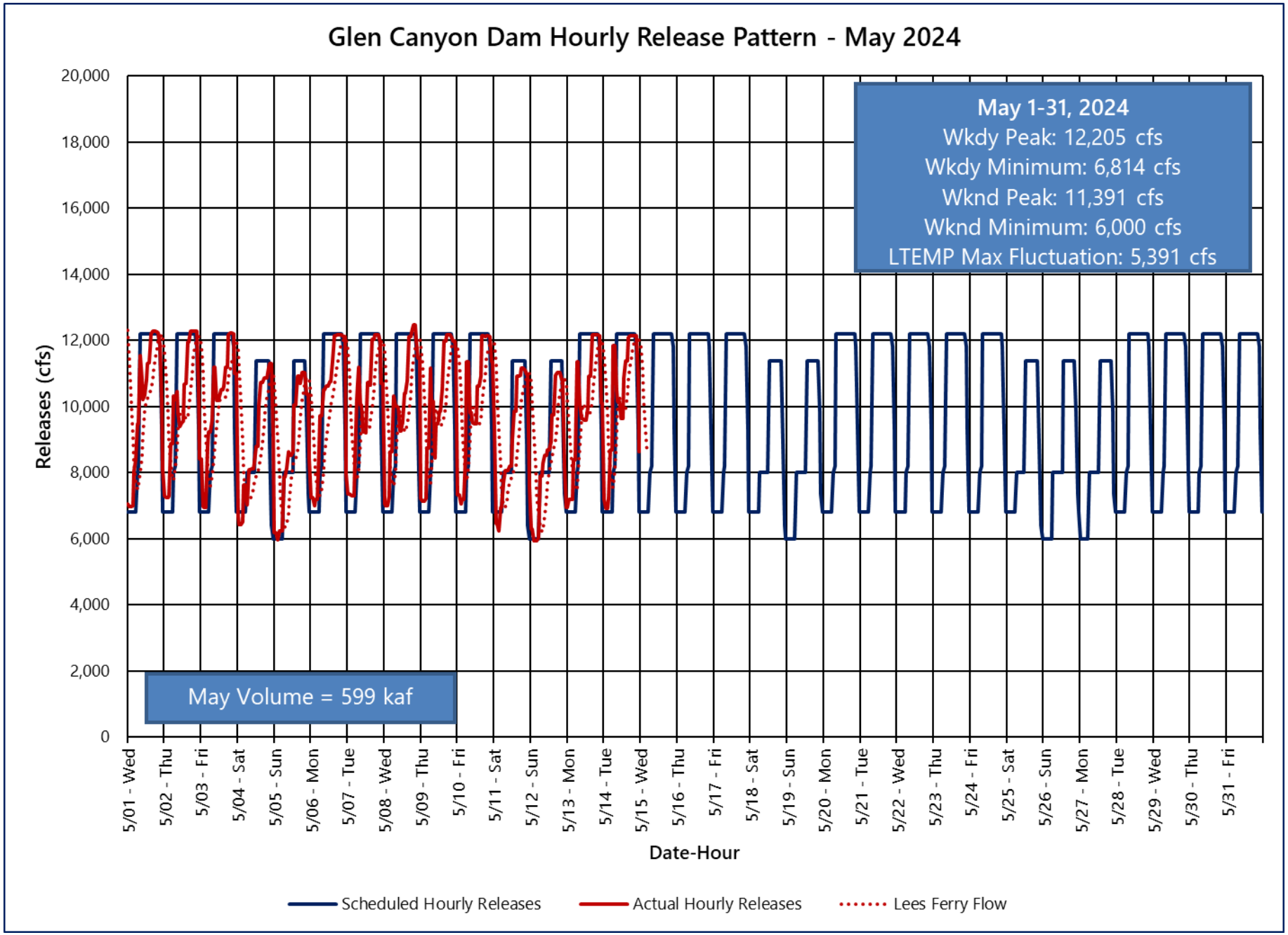
1 Projected release, based on April 2024 24MS for the minimum, most probable and the maximum probable 24-Month Study model runs.
2 Dependent upon availability to shift contingency regulation, which will increase capacity by 30-40MW (3%) at current efficiency.
3 NERC testing with occasional removal of penstock generating capacity.

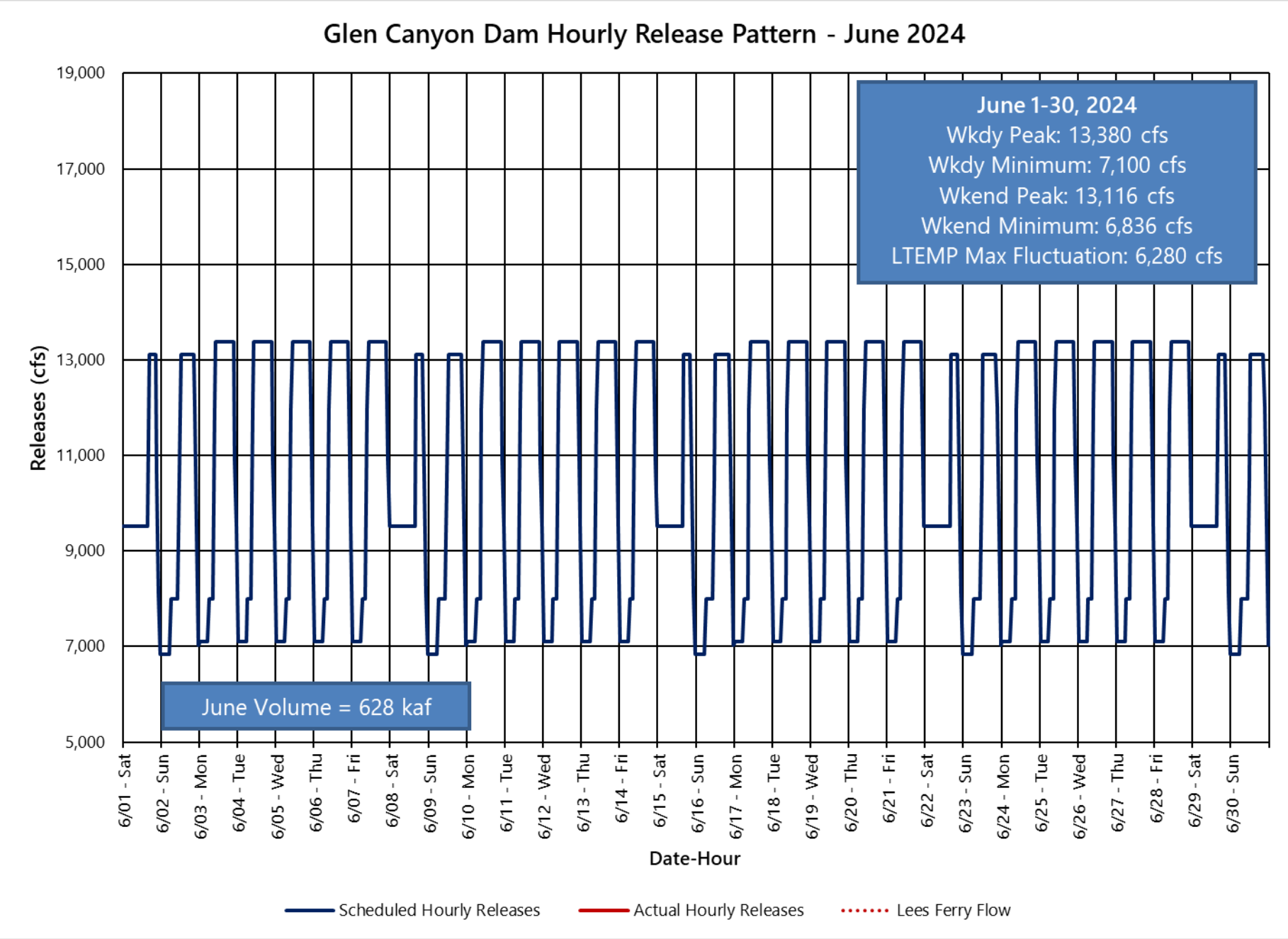
Glen Canyon Dam Power Plant Unit Outage Schedule for 2025

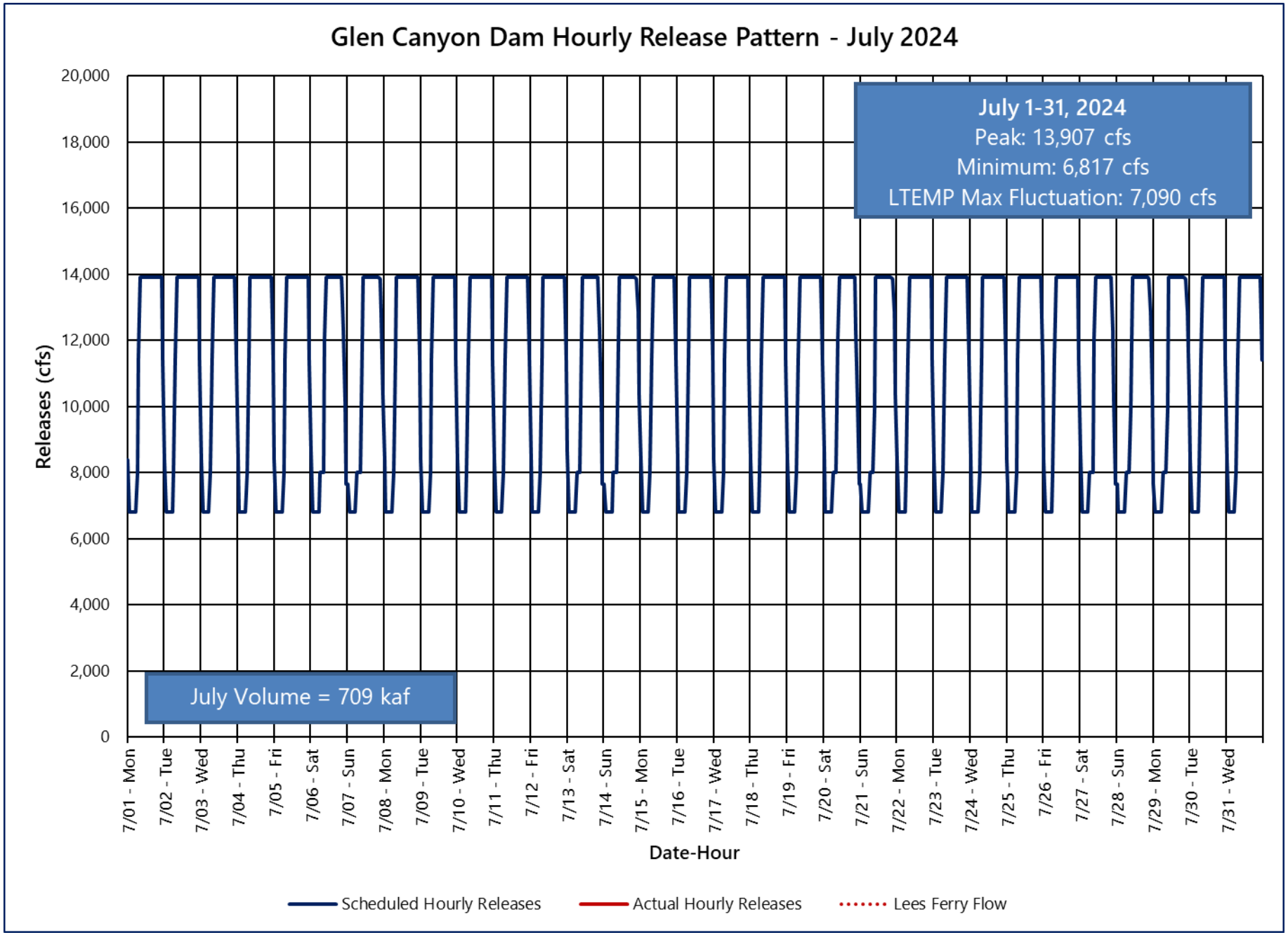
Unit Number	Oct 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025	Jun 2025	Jul 2025	Aug 2025	Sep 2025	
1													
2													
3													
4													
5													
6													
7													
8													
Units Available	5	6	8	6	6	6	7	8	8	8	8	6	
Capacity (cfs)	16,100/ 4,000[3]	19,700	27,000	19,700	19,700	19,700	23,350	27,000	27,000	27,000	26,700	19,700	APR MOST[2]
Capacity (kaf/month)	1,210	1,500	1,660	1,590	1,110	1,240	1,390	1,600	1,660	1,660	1,640	1,190	APR MOST
Max (kaf) [1]	643	642	715	857	758	801	713	710	745	842	900	674	9.00 maf
Most (kaf) [1]	480	500	600	723	639	675	601	599	628	709	758	568	7.48 maf
Min (kaf) [1]	480	500	600	723	639	675	601	599	628	709	758	568	7.48 maf
										(updated 04-16-2024)			

1 Projected release, based on April 2024 24MS for the minimum, most probable and the maximum probable 24-Month Study model runs.
2 Dependent upon availability to shift contingency regulation, which will increase capacity by 30-40MW (3%) at current efficiency.
3 Tailwater/Forebay inspection will require one day at 4,000 cfs and possibly two if necessary.


Glen Canyon Dam Hourly Release Pattern - April 2024
April 1-30, 2024
Wkdy Peak: 13,521 cfs
Wkdy Minimum: 8,698 cfs
Wkend Peak: 12,201 cfs
Wkend Minimum: 8,000 cfs
LTEMP Max Fluctuation: 5,409 cfs
April Volume = 601 kaf
Releases (cfs)
19,000
17,000
15,000
13,000
11,000
9,000
7,000
5,000
4/01 - Mon
4/02 - Tue
4/03 - Wed
4/04 - Thu
4/05 - Fri
4/06 - Sat
4/07 - Sun
4/08 - Mon
4/09 - Tue
4/10 - Wed
4/11 - Thu
4/12 - Fri
4/13 - Sat
4/14 - Sun
4/15 - Mon
4/16 - Tue
4/17 - Wed
4/18 - Thu
4/19 - Fri
4/20 - Sat
4/21 - Sun
4/22 - Mon
4/23 - Tue
4/24 - Wed
4/25 - Thu
4/26 - Fri
4/27 - Sat
4/28 - Sun
4/29 - Mon
4/30 - Tue
Date-Hour
Scheduled Hourly Releases
Actual Hourly Releases
Lees Ferry Flow


Glen Canyon Dam Hourly Release Pattern - May 2024
May 1-31, 2024
Wkdy Peak: 12,205 cfs
Wkdy Minimum: 6,814 cfs
Wknd Peak: 11,391 cfs
Wknd Minimum: 6,000 cfs
LTEMP Max Fluctuation: 5,391 cfs
May Volume = 599 kaf
Releases (cfs)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
5/01 - Wed
5/02 - Thu
5/03 - Fri
5/04 - Sat
5/05 - Sun
5/06 - Mon
5/07 - Tue
5/08 - Wed
5/09 - Thu
5/10 - Fri
5/11 - Sat
5/12 - Sun
5/13 - Mon
5/14 - Tue
5/15 - Wed
5/16 - Thu
5/17 - Fri
5/18 - Sat
5/19 - Sun
5/20 - Mon
5/21 - Tue
5/22 - Wed
5/23 - Thu
5/24 - Fri
5/25 - Sat
5/26 - Sun
5/27 - Mon
5/28 - Tue
5/29 - Wed
5/30 - Thu
5/31 - Fri
Date-Hour
Scheduled Hourly Releases
Actual Hourly Releases
Lees Ferry Flow


Glen Canyon Dam Hourly Release Pattern - June 2024
June 1-30, 2024
Wkdy Peak: 13,380 cfs
Wkdy Minimum: 7,100 cfs
Wkend Peak: 13,116 cfs
Wkend Minimum: 6,836 cfs
LTEMP Max Fluctuation: 6,280 cfs
June Volume = 628 kaf
Releases (cfs)
19,000
17,000
15,000
13,000
11,000
9,000
7,000
5,000
6/01 - Sat
6/02 - Sun
6/03 - Mon
6/04 - Tue
6/05 - Wed
6/06 - Thu
6/07 - Fri
6/08 - Sat
6/09 - Sun
6/10 - Mon
6/11 - Tue
6/12 - Wed
6/13 - Thu
6/14 - Fri
6/15 - Sat
6/16 - Sun
6/17 - Mon
6/18 - Tue
6/19 - Wed
6/20 - Thu
6/21 - Fri
6/22 - Sat
6/23 - Sun
6/24 - Mon
6/25 - Tue
6/26 - Wed
6/27 - Thu
6/28 - Fri
6/29 - Sat
6/30 - Sun
Date-Hour
Scheduled Hourly Releases
Actual Hourly Releases
Lees Ferry Flow


Glen Canyon Dam Hourly Release Pattern - July 2024
July 1-31, 2024
Peak: 13,907 cfs
Minimum: 6,817 cfs
LTEMP Max Fluctuation: 7,090 cfs
July Volume = 709 kaf
Releases (cfs)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
7/01 - Mon
7/02 - Tue
7/03 - Wed
7/04 - Thu
7/05 - Fri
7/06 - Sat
7/07 - Sun
7/08 - Mon
7/09 - Tue
7/10 - Wed
7/11 - Thu
7/12 - Fri
7/13 - Sat
7/14 - Sun
7/15 - Mon
7/16 - Tue
7/17 - Wed
7/18 - Thu
7/19 - Fri
7/20 - Sat
7/21 - Sun
7/22 - Mon
7/23 - Tue
7/24 - Wed
7/25 - Thu
7/26 - Fri
7/27 - Sat
7/28 - Sun
7/29 - Mon
7/30 - Tue
7/31 - Wed
Date-Hour
Scheduled Hourly Releases
Actual Hourly Releases
Lees Ferry Flow


Questions?
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RECLAMATION