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# Glen Canyon Monthly Operations Call

## Basin Hydrology and Operations

May 20, 2021

# Background

This briefing is being provided consistent with the provision in Section 1.1 of the LTEMP ROD which states:

“Annually, Reclamation will develop a hydrograph based on the characteristics above. Reclamation will seek consensus on the annual hydrograph through monthly operational coordination calls with governmental entities, and regular meetings of the GCDAMP Technical Working Group (TWG) and AMWG.

Reclamation will conduct monthly Glen Canyon Dam operational coordination meetings or calls with the DOI bureaus (USGS, NPS, FWS, and BIA), WAPA, and representatives from the Basin States and UCRC. The purpose of these meetings or calls is for the participants to share and seek information on Glen Canyon Dam operations. One liaison from each Basin State and from the UCRC may participate in the monthly operational coordination meetings or calls.”

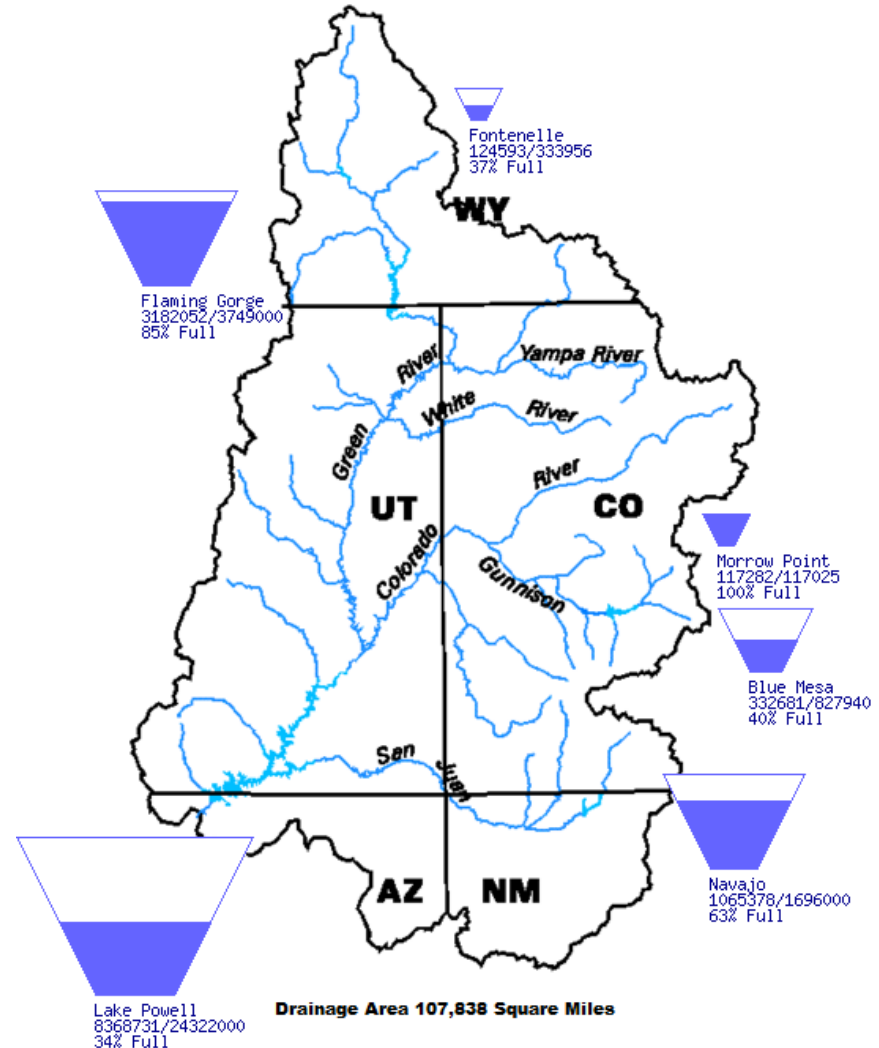


# Upper Basin Storage (as of May 17, 2021)

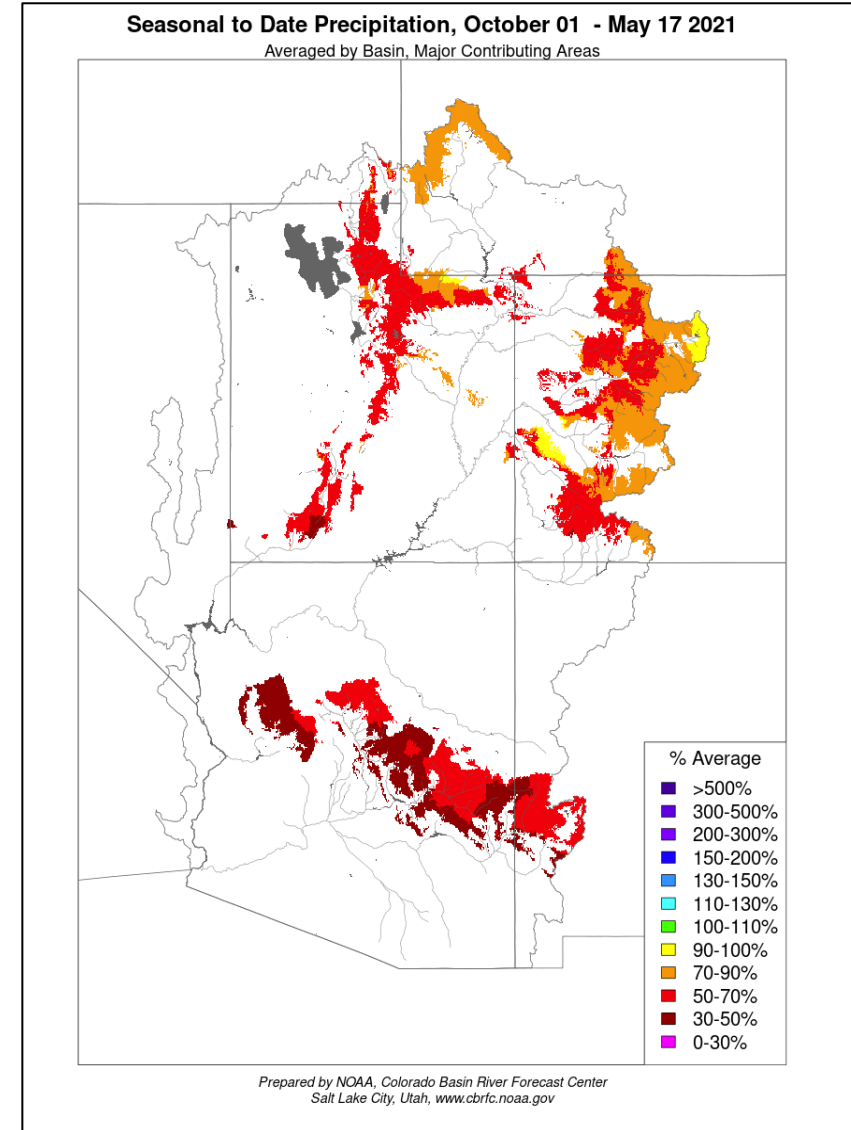
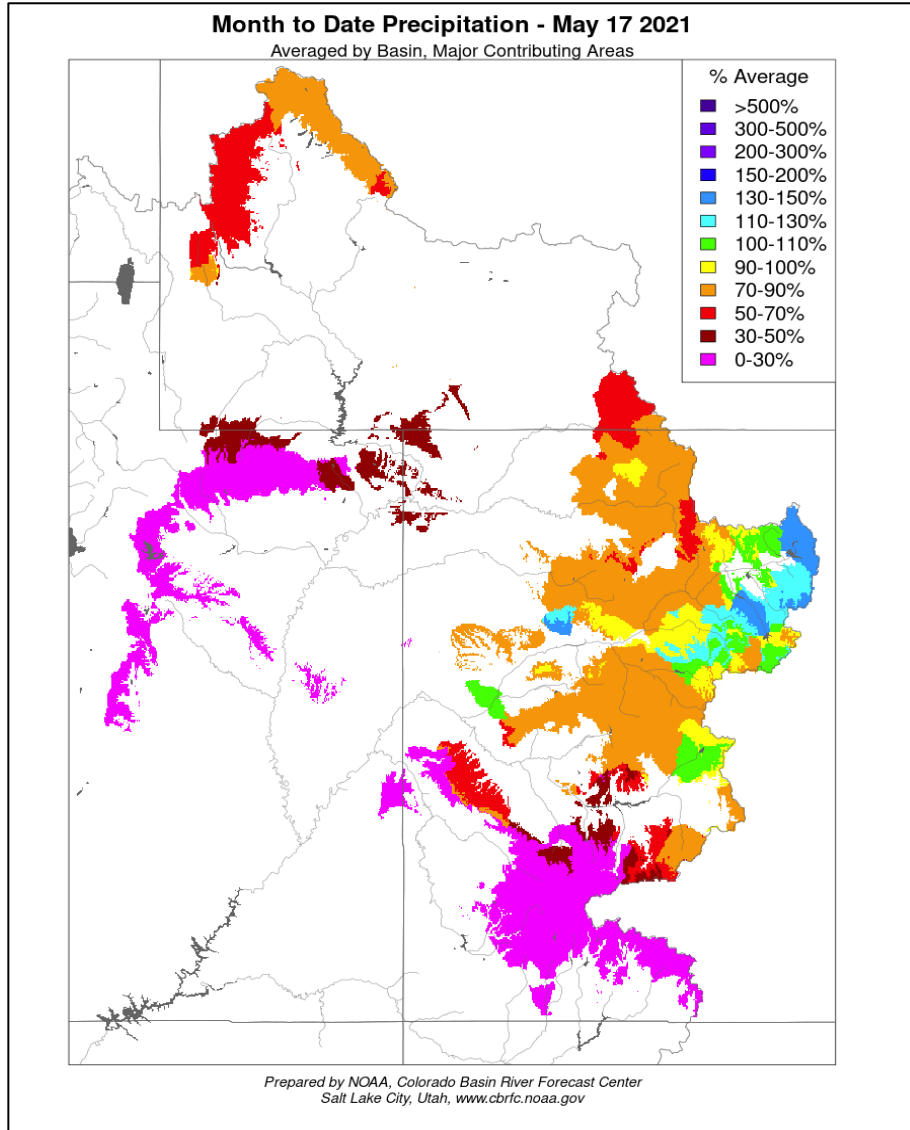
Data Current as of:  
05/16/2021

## Upper Colorado River Drainage Basin

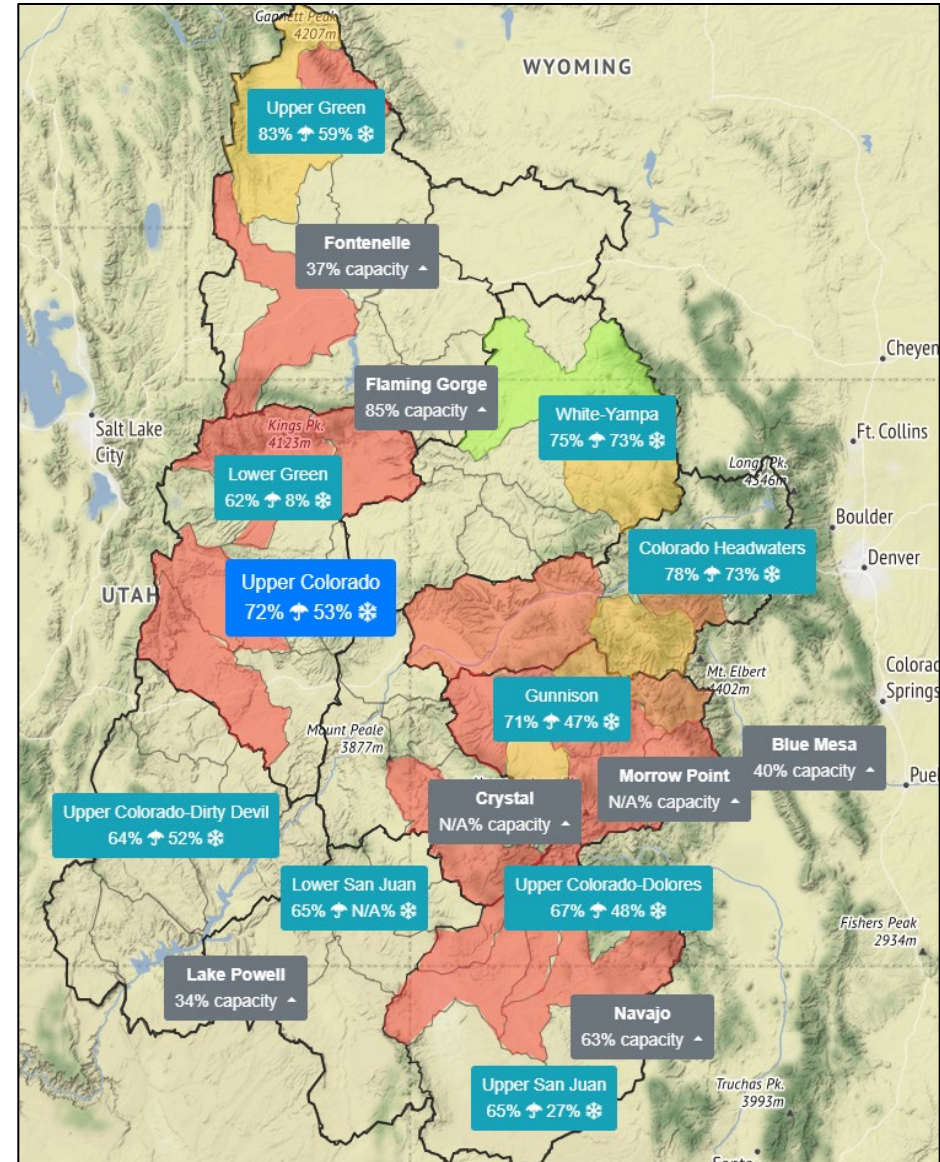
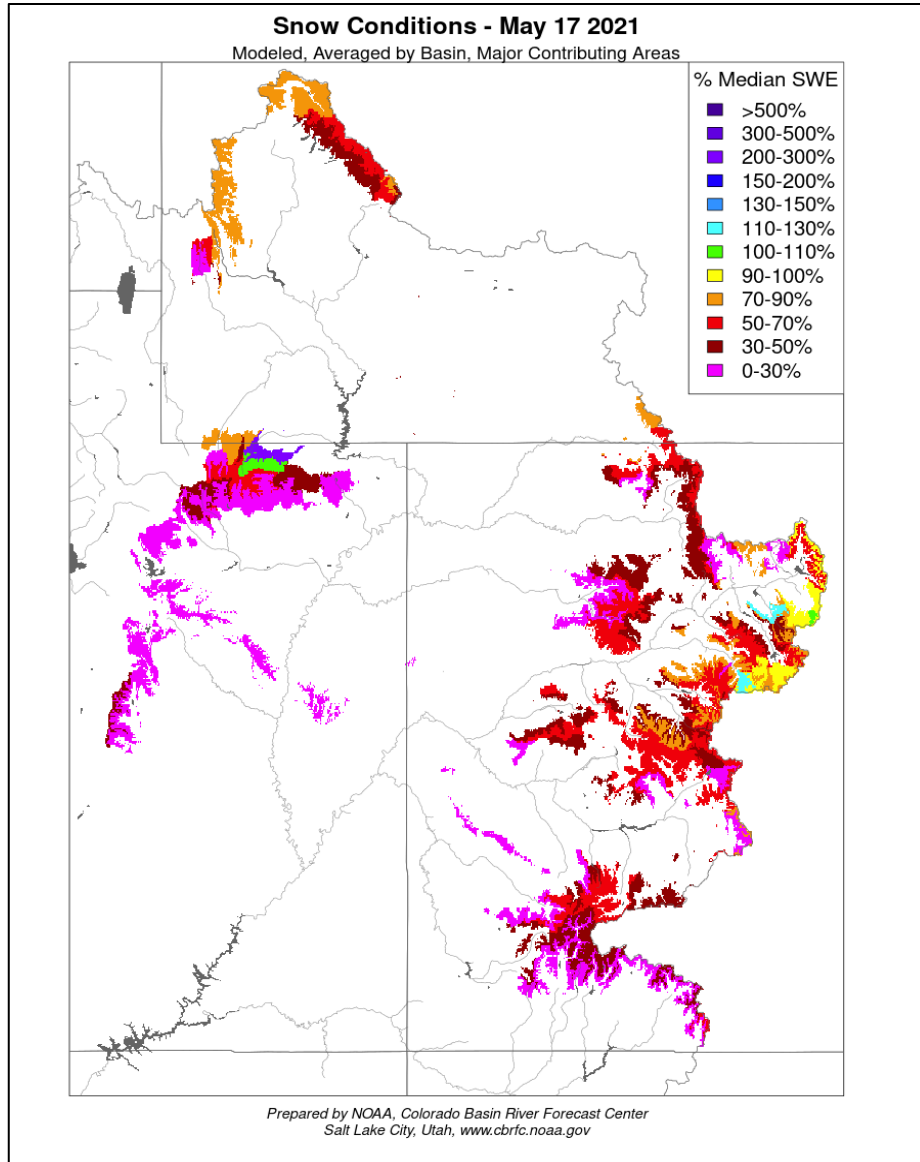
Reservoir	Percent Current Live Storage	Current Live Storage (maf)	Live Storage Capacity (maf)	Elevation (feet)
Fontenelle	37	.125	.334	6,472.89
Flaming Gorge	85	3.18	3.75	6,025.59
Blue Mesa	40	0.333	.828	7,454.17
Navajo	63	1.07	1.70	6,035.54
Lake Powell	34	8.37	24.32	3,560.60
UC System Storage	42	13.21	31.09	



# Seasonal and Monthly Precipitation

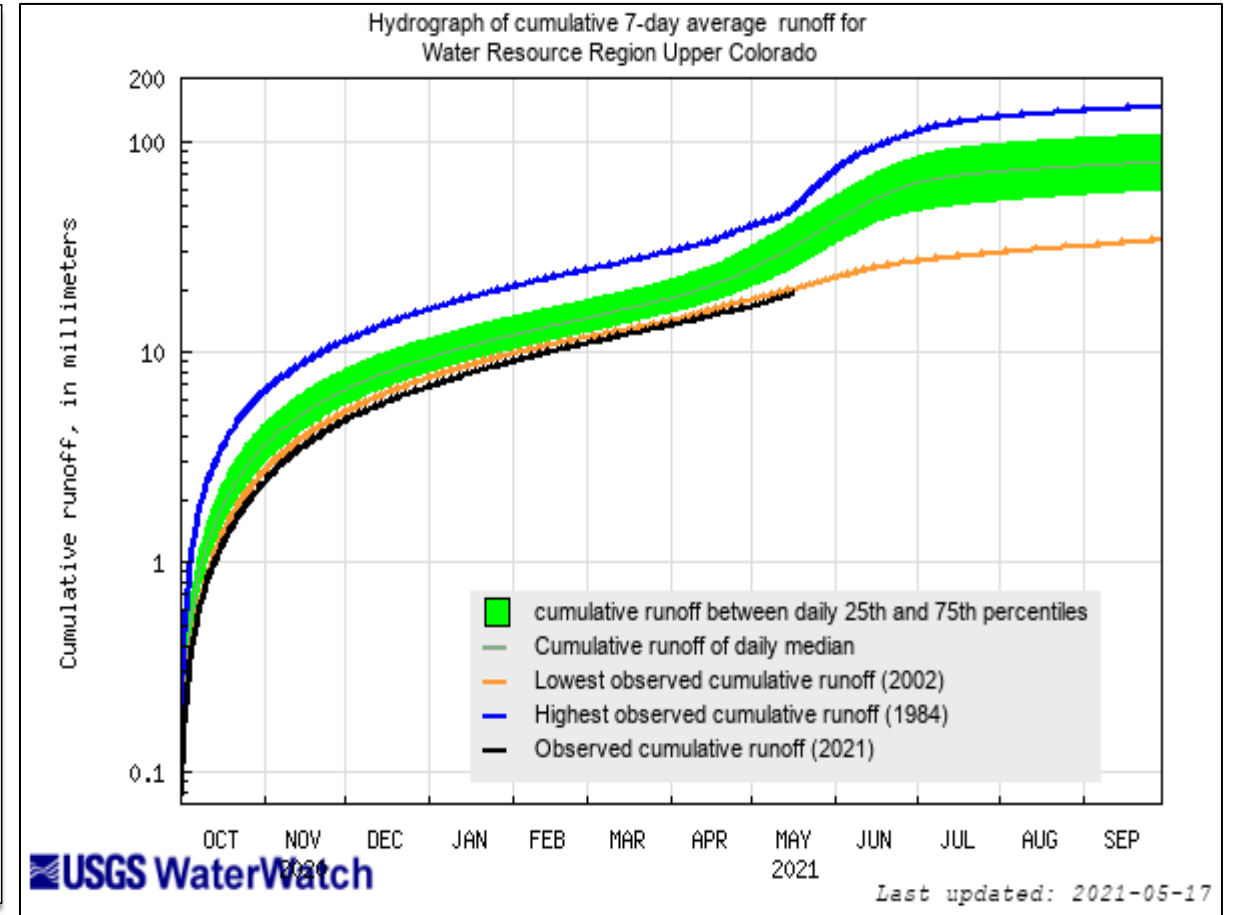
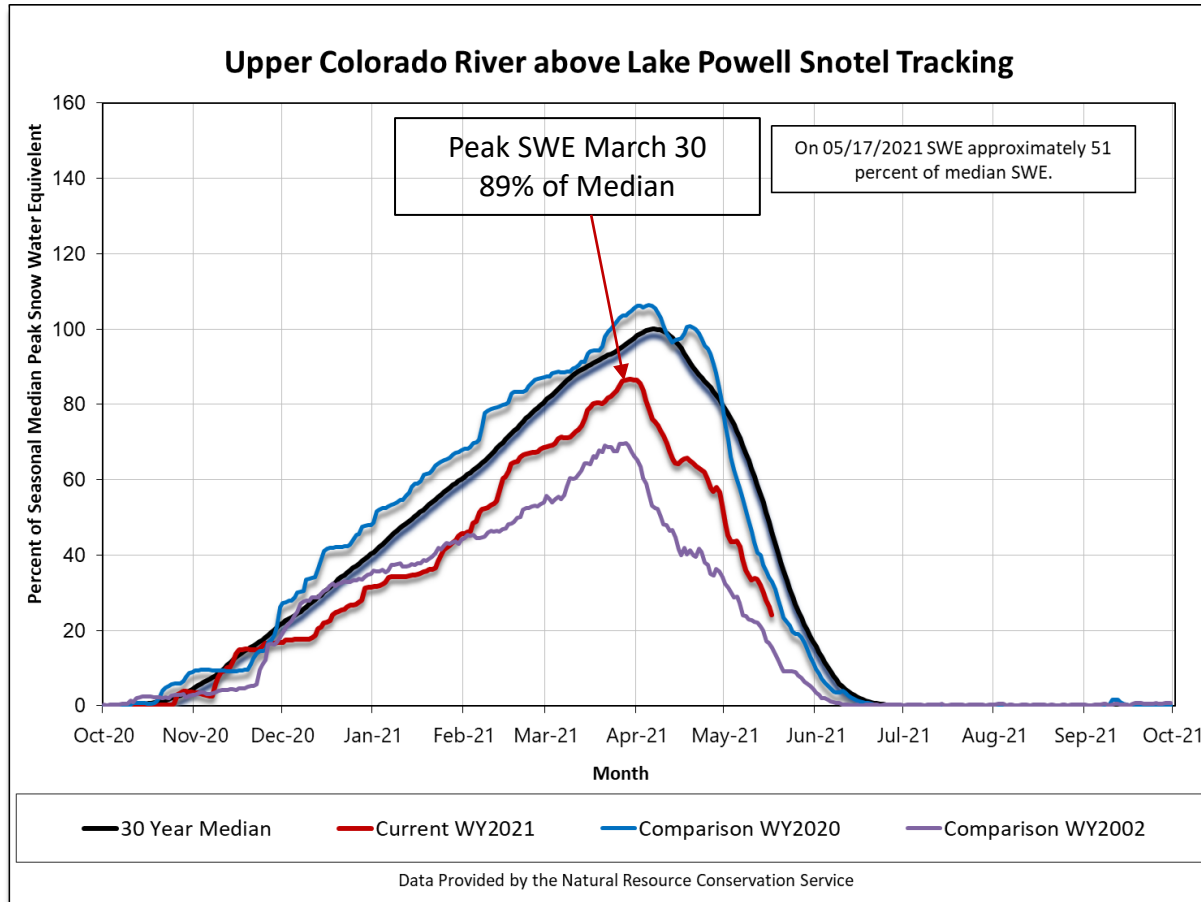


# Seasonal Snow Conditions and Basin SWE





# Current SWE and February WY2021 Forecast



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



# Most Probable May Midmonth Spring and WY 2021 Forecast

April – July 2021  
Forecasted Unregulated Inflow  
as of May 17, 2021

Reservoir	Unregulated Inflow (kaf)	Difference from May FF (kaf)	Percent of Average <sup>1</sup>
Fontenelle	380	-35	48
Flaming Gorge	450	-55	40
Blue Mesa	340	NA	50
Navajo	325	-15	42
Powell	1,850	-150	26

Water Year 2021  
Forecasted Unregulated Inflow  
as of May 17, 2021

Reservoir	Unregulated Inflow (kaf)	Percent of Average <sup>1</sup>
Fontenelle	695	55
Flaming Gorge	591	48
Blue Mesa	540	57
Navajo	448	42
Powell	3,487	32

Powell April Forecast 4,897 kaf (45%) a decrease of 1,410 maf



# Upper Colorado Basin

## Projected Operations for Water Year 2021 Based on April 2021 Modeling





# Most Probable May Final Spring Forecast and WY 2021 Forecast

April – July 2021  
Forecasted Unregulated Inflow  
as of May 4, 2021

Reservoir	Unregulated Inflow (kaf)	Difference from April (kaf)	Percent of Average <sup>1</sup>
Fontenelle	380	-50	52
Flaming Gorge	450	-80	46
Blue Mesa	340	-100	50
Navajo	325	-70	44
Powell	2,000	-1200	28

Water Year 2021  
Forecasted Unregulated Inflow  
as of May 5, 2021

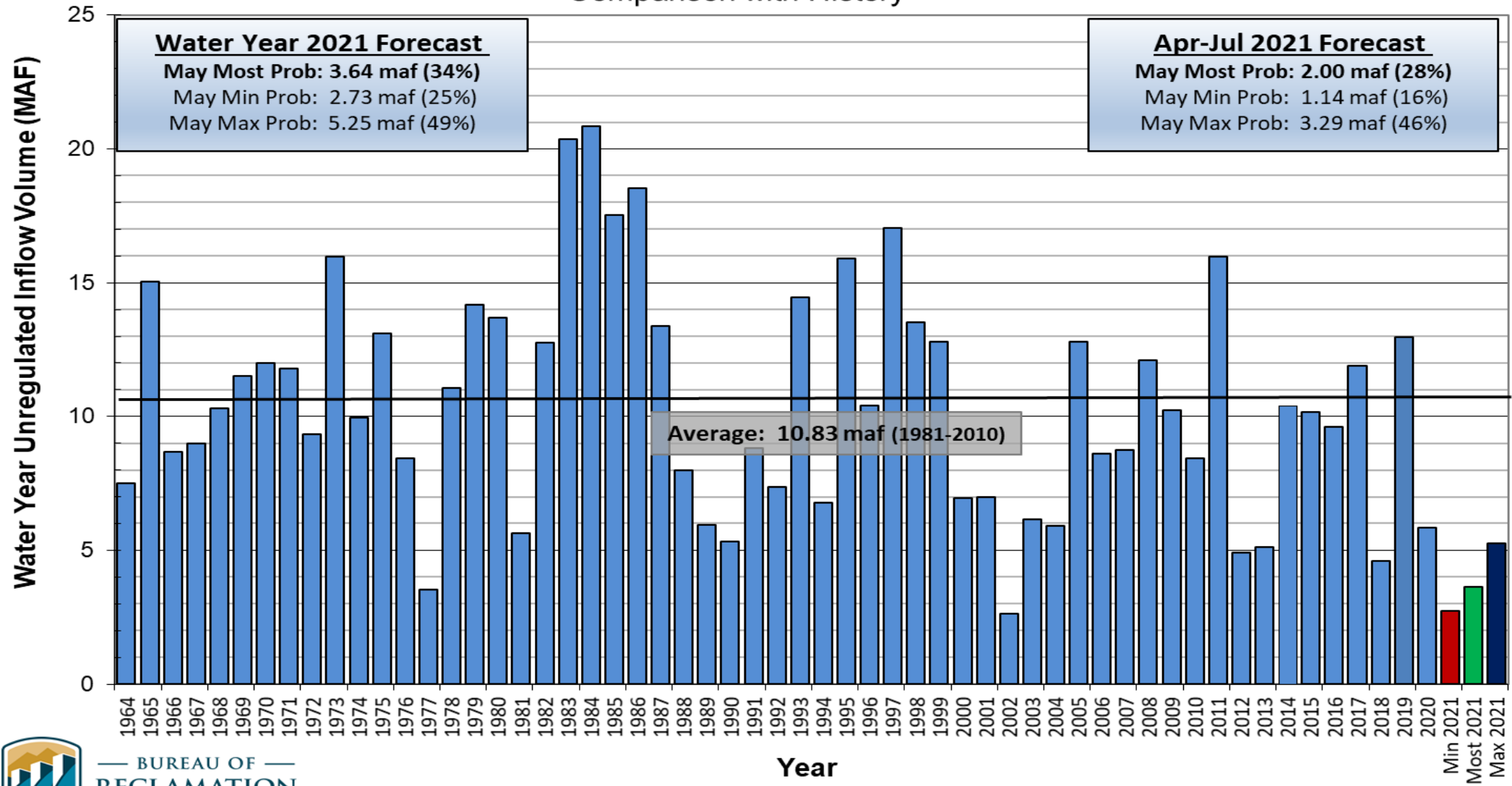
Reservoir	Unregulated Inflow (kaf)	Difference from April (kaf)	Percent of Average <sup>1</sup>
Fontenelle	630	-61	58
Flaming Gorge	744	-90	51
Blue Mesa	540	-104	57
Navajo	440	-74	41
Powell	3,636	-1,261	34



# Lake Powell Unregulated Inflow

## Water Year 2021 Forecast *(issued May 5)*

### Comparison with History



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# Drought Response Operations Agreement (DROA)

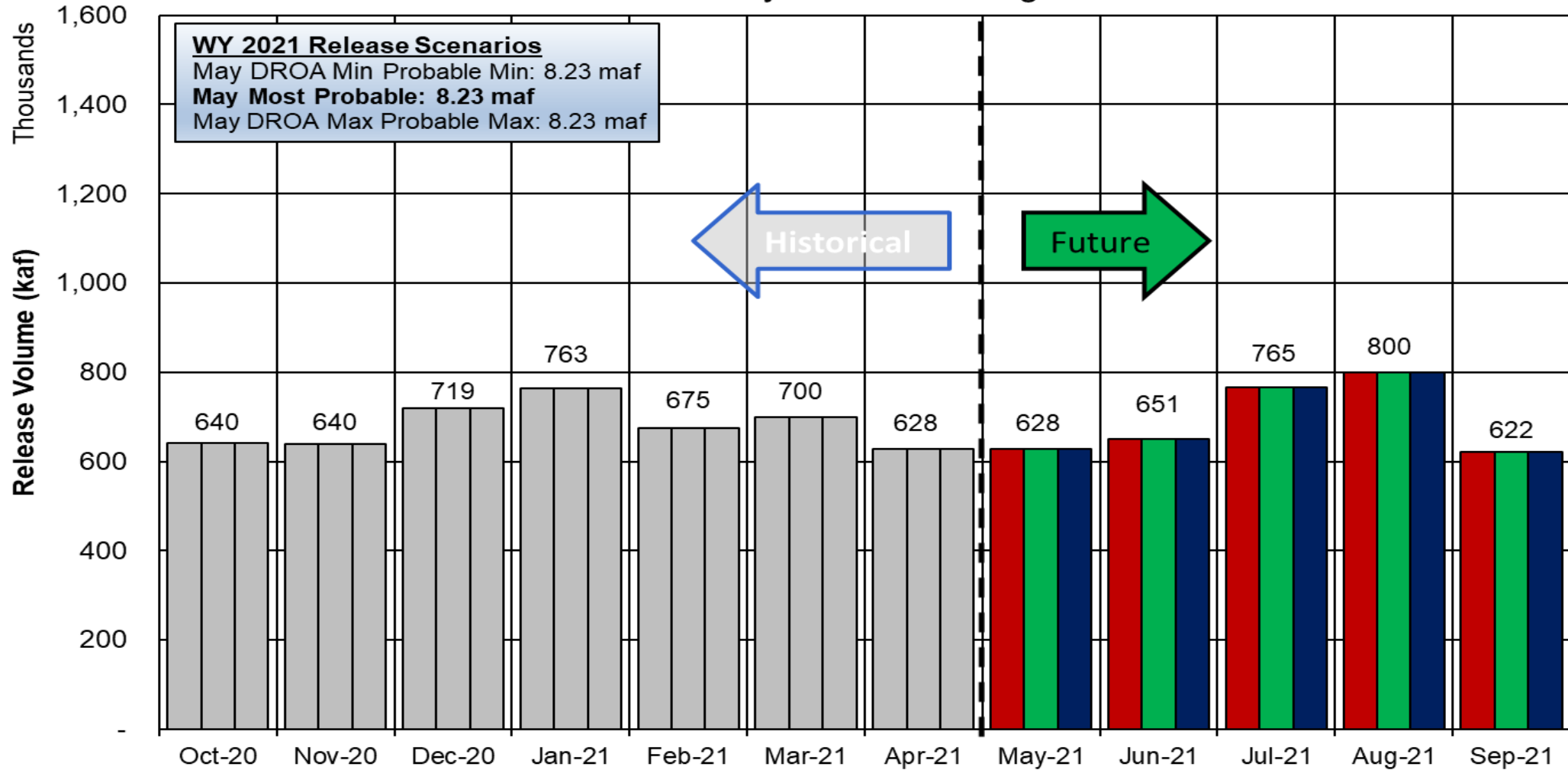
- Formal notification that the January 2021 Minimum Probable 24 Month Study (24-MS) run projected Powell to fall below 3,525 feet in 2022 was provided pursuant to the DROA.
  - February through April Minimum Probable 24-MS continued to indicate elevations below 3,525 feet in 2022.
- These minimum projections *do not* initiate immediate operational changes to Reclamation facilities.
- These minimum projections *do* initiate enhanced monitoring and coordination under the DROA.
- These minimum projections *do* initiate monthly analysis of min/most/max with the parties specified in the DROA.
- The DROA enhanced monitoring and coordination will continue until either:
  - (i) The minimum probable projected elevation remains above 3,525 feet for 24 months; or
  - (ii) the process moves to the next step when the Most Probable 24-MS projects Powell elevations below 3,525 feet and a specific Drought Response Operations Plan is developed.



# Potential Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2021

Based on May 2021 Modeling



**WY 2021 Release Scenarios**  
 May DROA Min Probable Min: 8.23 maf  
 May Most Probable: 8.23 maf  
 May DROA Max Probable Max: 8.23 maf

← Historical

Future →



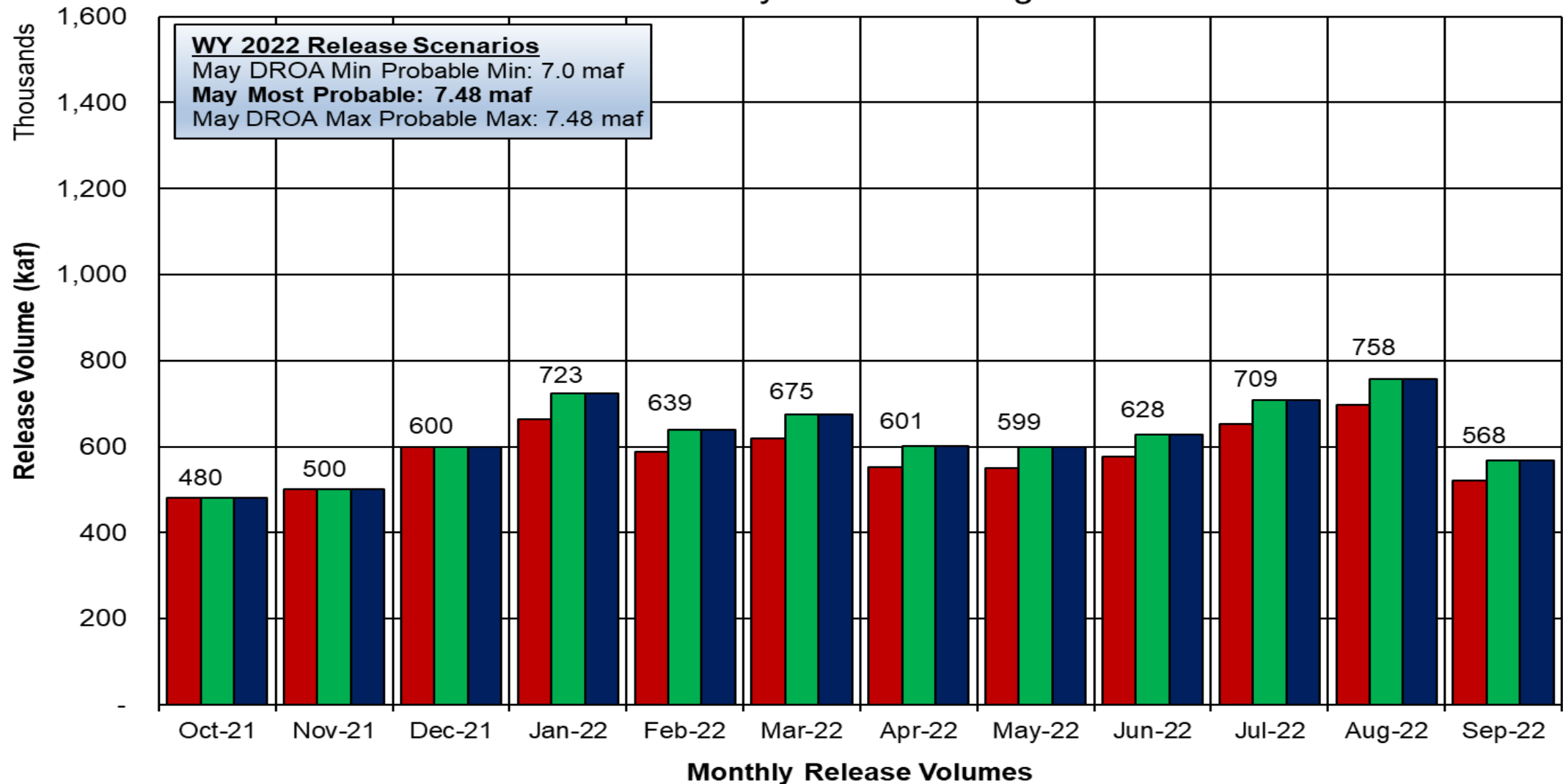
■ May DROA Min Probable    ■ May Most Probable    ■ May DROA Max Probable



# Potential Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2022

Based on May 2021 Modeling



**WY 2022 Release Scenarios**  
 May DROA Min Probable Min: 7.0 maf  
**May Most Probable: 7.48 maf**  
 May DROA Max Probable Max: 7.48 maf



■ May DROA Min Probable   
 ■ May Most Probable   
 ■ May DROA Max Probable

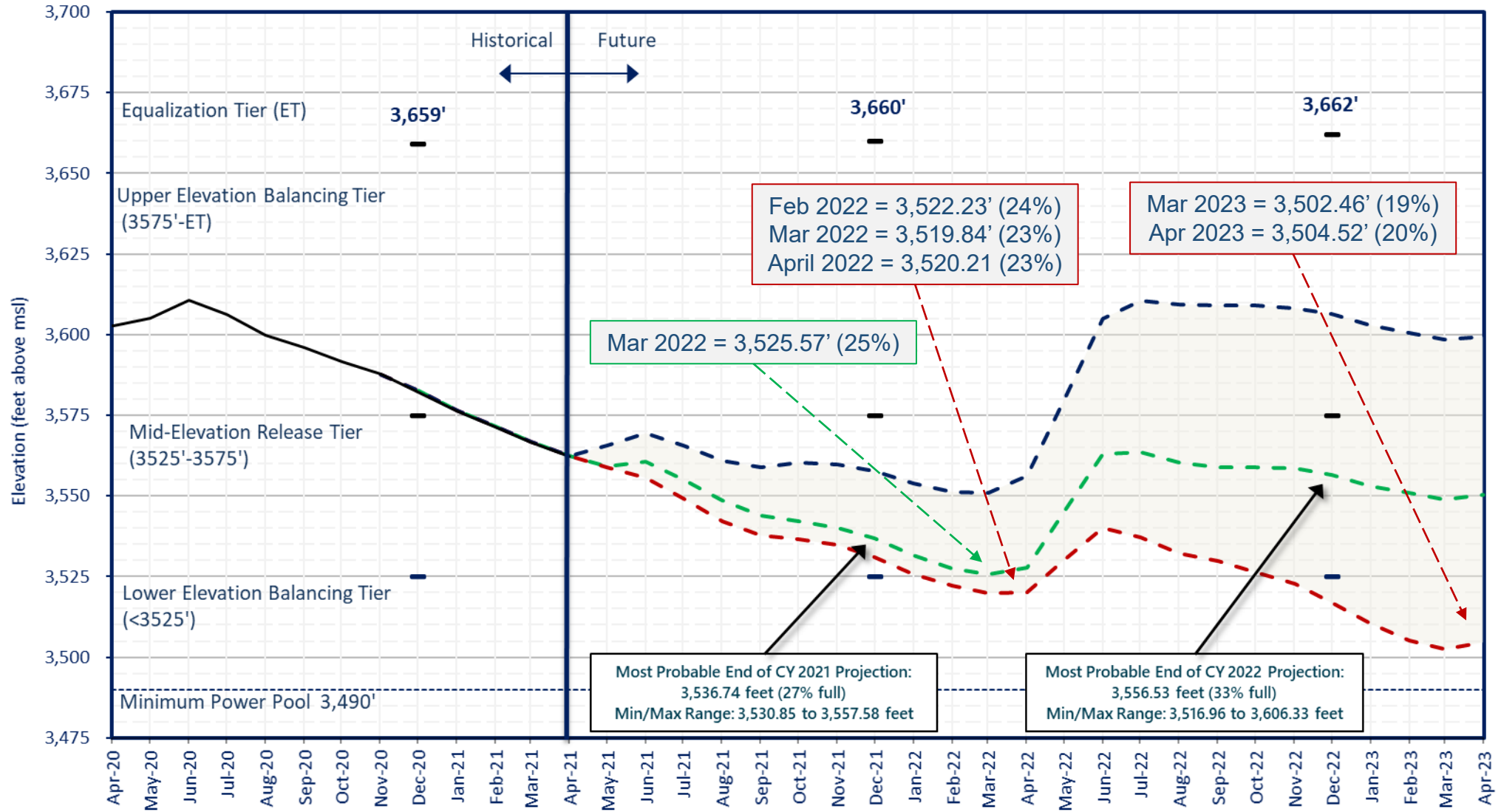
The Drought Response Operations Agreement (DROA) can be found here: <https://www.usbr.gov/dcp/finaldocs.html>





# Lake Powell End of Month Elevations

Projections from the May 2021 24-Month Study Inflow Scenarios



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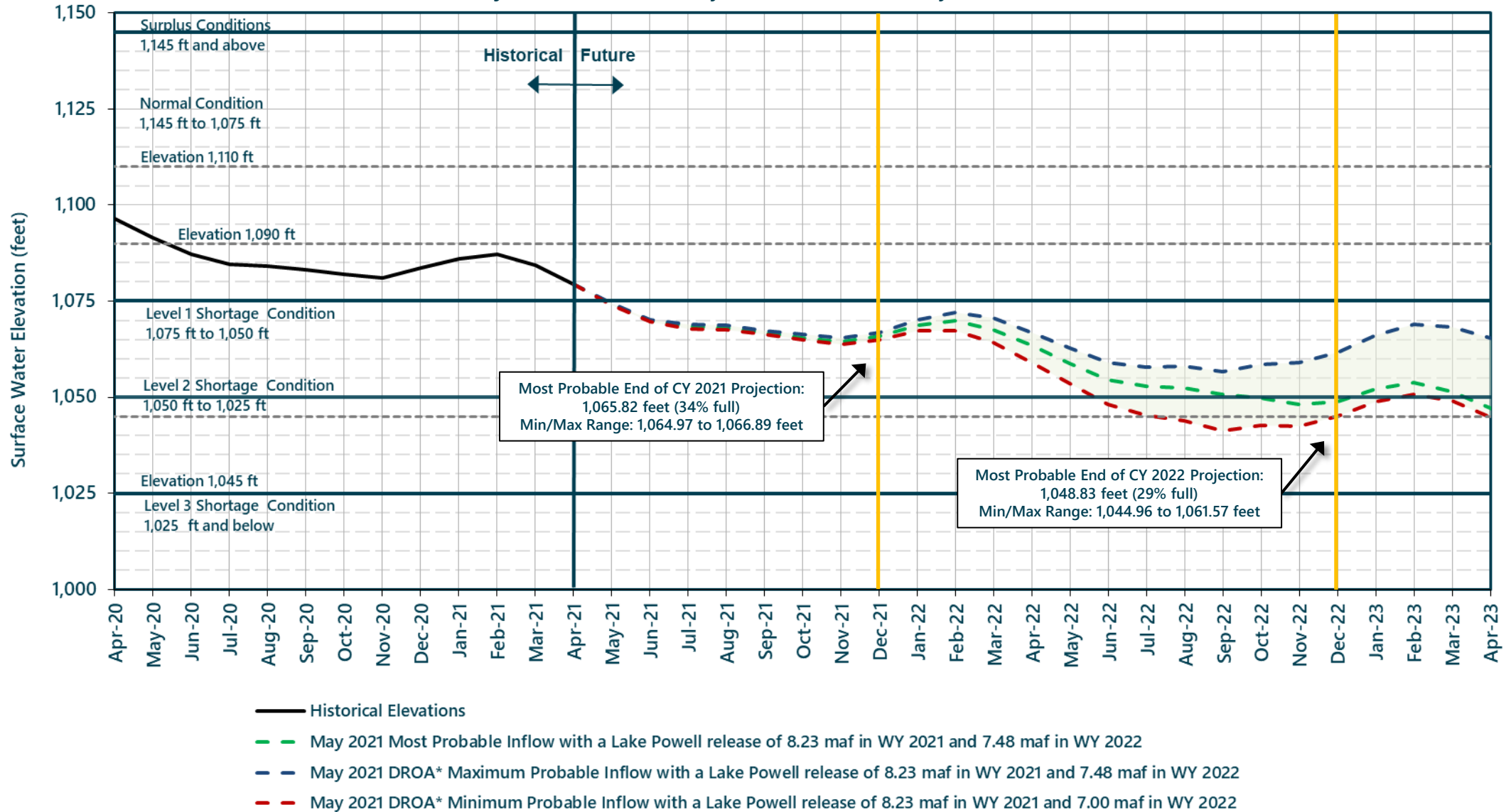
- May 2021 Most Probable - Lake Powell release of 8.23 maf in WY2021 and 7.48 maf in WY2022
- May 2021 DROA\* Minimum Probable - Lake Powell release of 8.23 maf in WY2021 and 7.0 maf in WY2022
- May 2021 DROA\* Maximum Probable - Lake Powell release of 8.23 maf in WY2021 and 7.48 maf in WY2022
- Historical Elevations

\*The Drought Response Operations Agreement (DROA) can be found here: <https://www.usbr.gov/dcp/finaldocs.html>



# Lake Mead End of Month Elevations

Projections from the May 2021 24-Month Study Inflow Scenarios



\*The Drought Response Operations Agreement (DROA) can be found online at: <https://www.usbr.gov/dcp/finaldocs.html>.



# Glen Canyon Dam Power Plant Unit Outage Schedule for 2021

Unit Number	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021		
1	[Outage]												[Outage]	
2	[Outage]												[Outage]	
3	[Outage]												[Outage]	
4	[Outage]												[Outage]	
5		[Outage]						[Outage]						
6		[Outage]												
7	[Outage]						[Outage]							
8							[Outage]							
Units Available	5	5/4	6	6	6	6/4	4	5	6	6	6	4		
Capacity (cfs)	16,400	16,400/ 12,200	19,800	19,600	19,500	19,400 (20,150) <sup>4</sup>	19,200	15,700	19,100	19,200	19,000	11,900	MAY MOST <sup>3</sup>	
Capacity (kaf/month)	1,040	1,140	1,250	1,220	1,080	1,540	1,140	1,050	1,140	1,180	1,170	1,000	MAY MOST	
Max (kaf) <sup>2</sup>	640	640	720	763	675	700	628	628	651	765	800	622	8.23	
Most (kaf) <sup>1</sup>	640	640	720	763	675	700	628	628	651	765	800	622	8.23	
Min (kaf) <sup>2</sup>	640	640	720	760	680	700	628	628	651	765	800	622	8.23	
										(updated 05-18-2021)				

1 Projected release, based on May 2021 Most Probable Inflow Projections and 24-Month Study model runs.

2 Projected release, based on May 2021 DROA Min and Max Probable Inflow Projections and 24-Month Study model runs. The Drought Response Operations Agreement (DROA) can be found here: <https://www.usbr.gov/dcp/finaldocs.html>.

3 Dependent upon availability to shift contingency reserves, which will increase capacity by 30-40MW (3%) at current efficiency.

4 Increased capacity available from shifting contingency reserves for Spring Disturbance Flow.



# Glen Canyon Dam Power Plant Unit Outage Schedule for 2022

Unit Number	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sep 2022
1	■											■
2	■											■
3	■			■	■							
4	■			■	■			■				
5					■	■	■	■	■	■		
6					■	■	■	■	■	■		
7		■			■							
8				■	■							
Units Available	4/6	6/5	5/6	6/4	4	6	6	5	6	6	8	6
Capacity (cfs)	11,800	15,200	15,100	11,600	11,500	18,100	18,100	14,800	18,700	19,200	26,300	19,200
Capacity (kaf/month)	940	1,000	1,070	1,120	710	1,110	1,070	940	1,110	1,210	1,620	1,200
Max (kaf) <sup>2</sup>	480	500	600	723	639	675	601	599	628	709	758	568
Most (kaf) <sup>1</sup>	480	500	600	723	639	675	601	599	628	709	758	568
Min (kaf) <sup>2</sup>	480	500	600	664	587	620	552	550	577	652	696	522

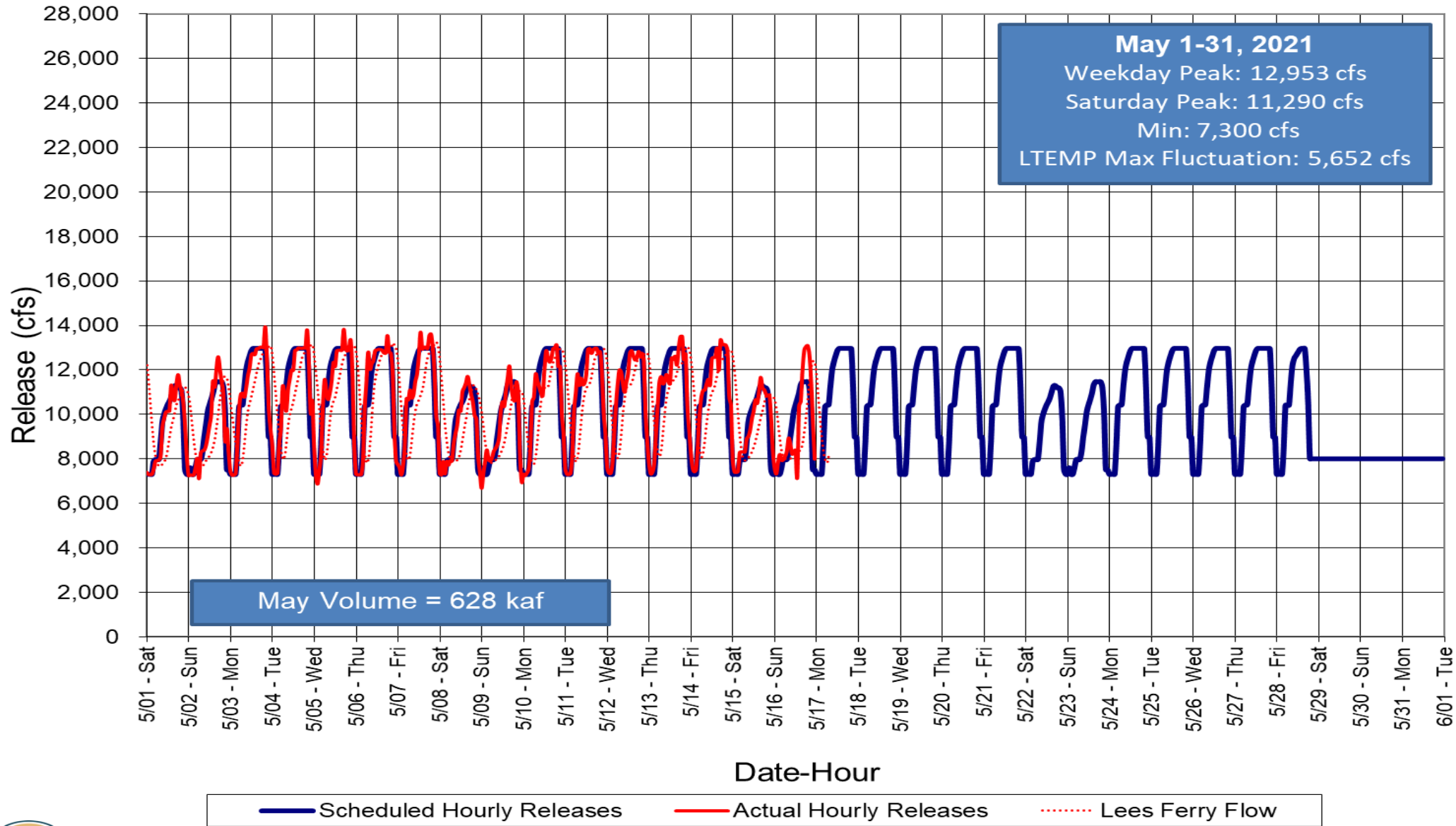
MAY MOST<sup>3</sup>  
MAY MOST  
7.48  
7.48  
7.0

(updated 05-18-2021)

1 Projected release, based on May 2021 Most Probable Inflow Projections and 24-Month Study model runs.  
2 Projected release, based on May 2021 DROA Min and Max Probable Inflow Projections and 24-Month Study model runs. The Drought Response Operations Agreement (DROA) can be found here: <https://www.usbr.gov/dcp/finaldocs.html>.  
3 Dependent upon availability to shift contingency reserves, which will increase capacity by 30-40MW (3%) at current efficiency.

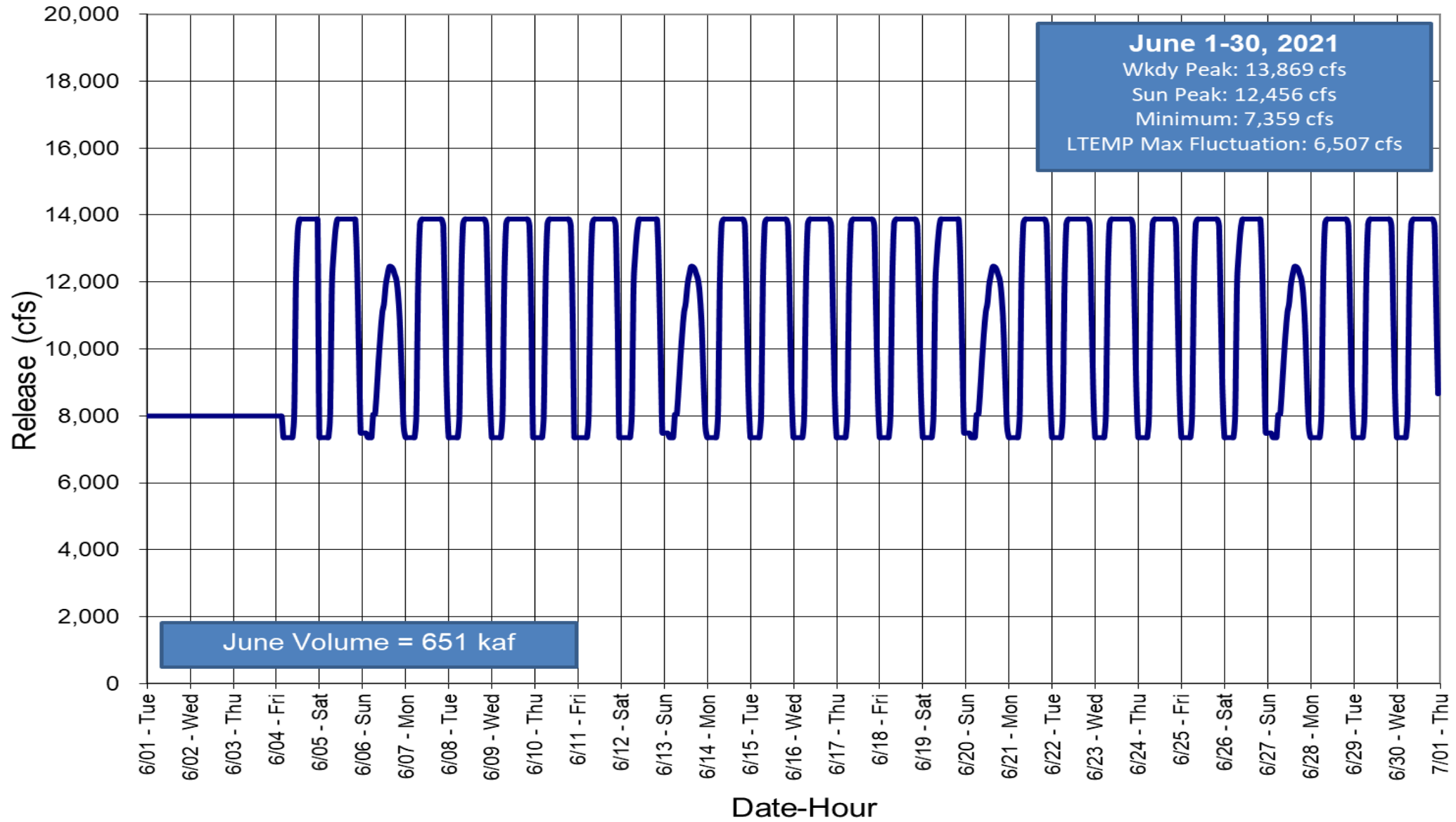


# Glen Canyon Dam Hourly Release Pattern May 2021





# Glen Canyon Dam Hourly Release Pattern June 2021



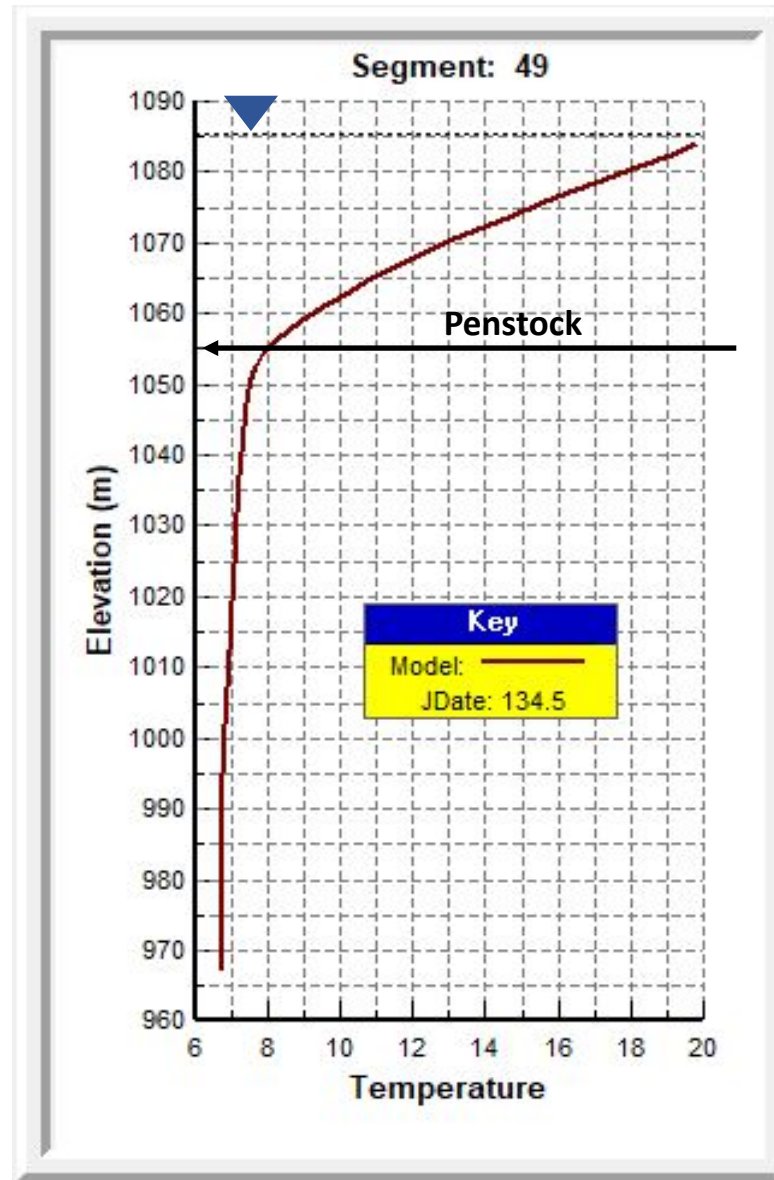
— Scheduled Hourly Releases    — Actual Hourly Releases    ..... Lees Ferry Flow



# Water Quality

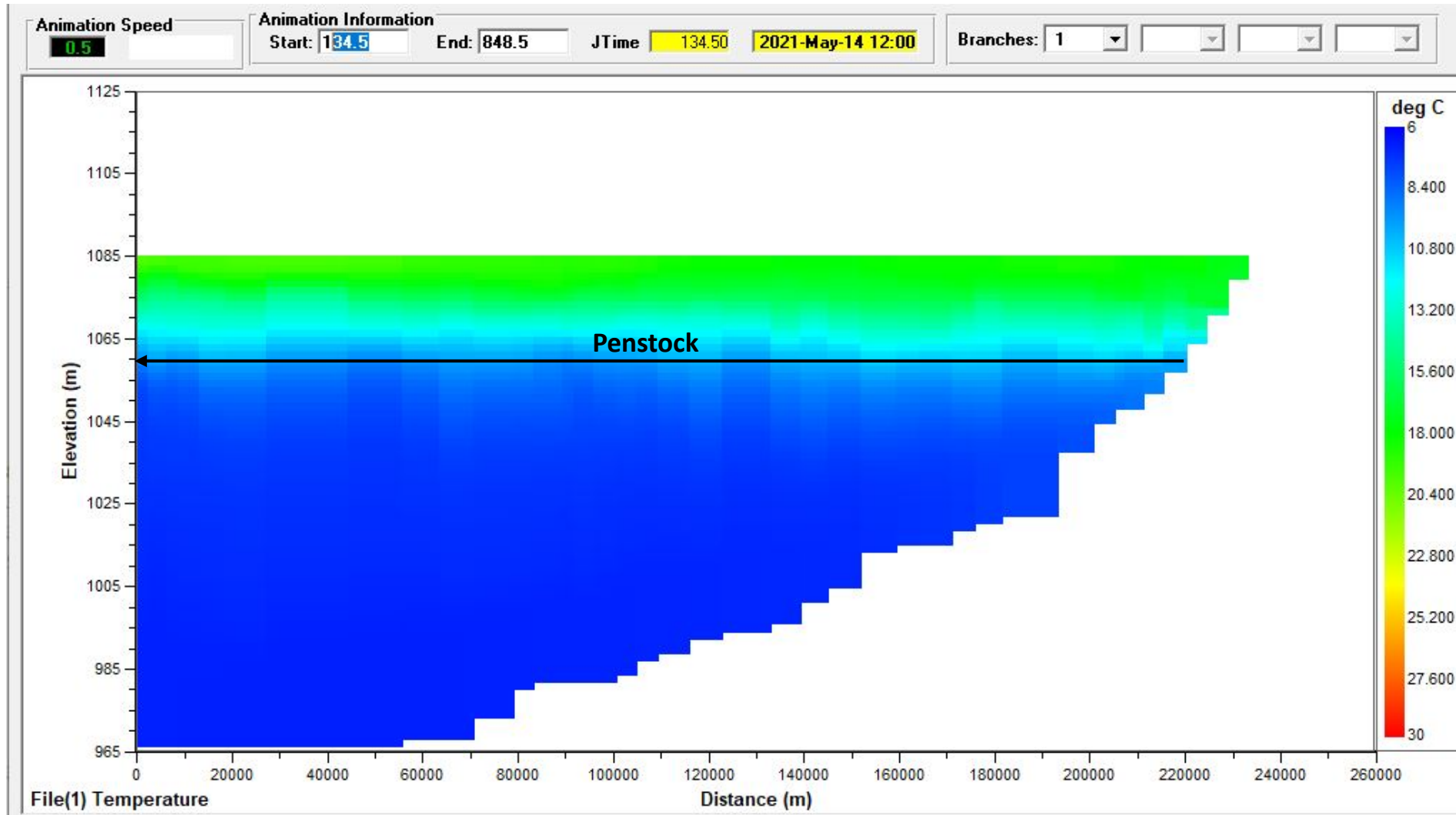


Temperature Profile of Lake Powell near Glen Canyon Dam  
5/14/2021

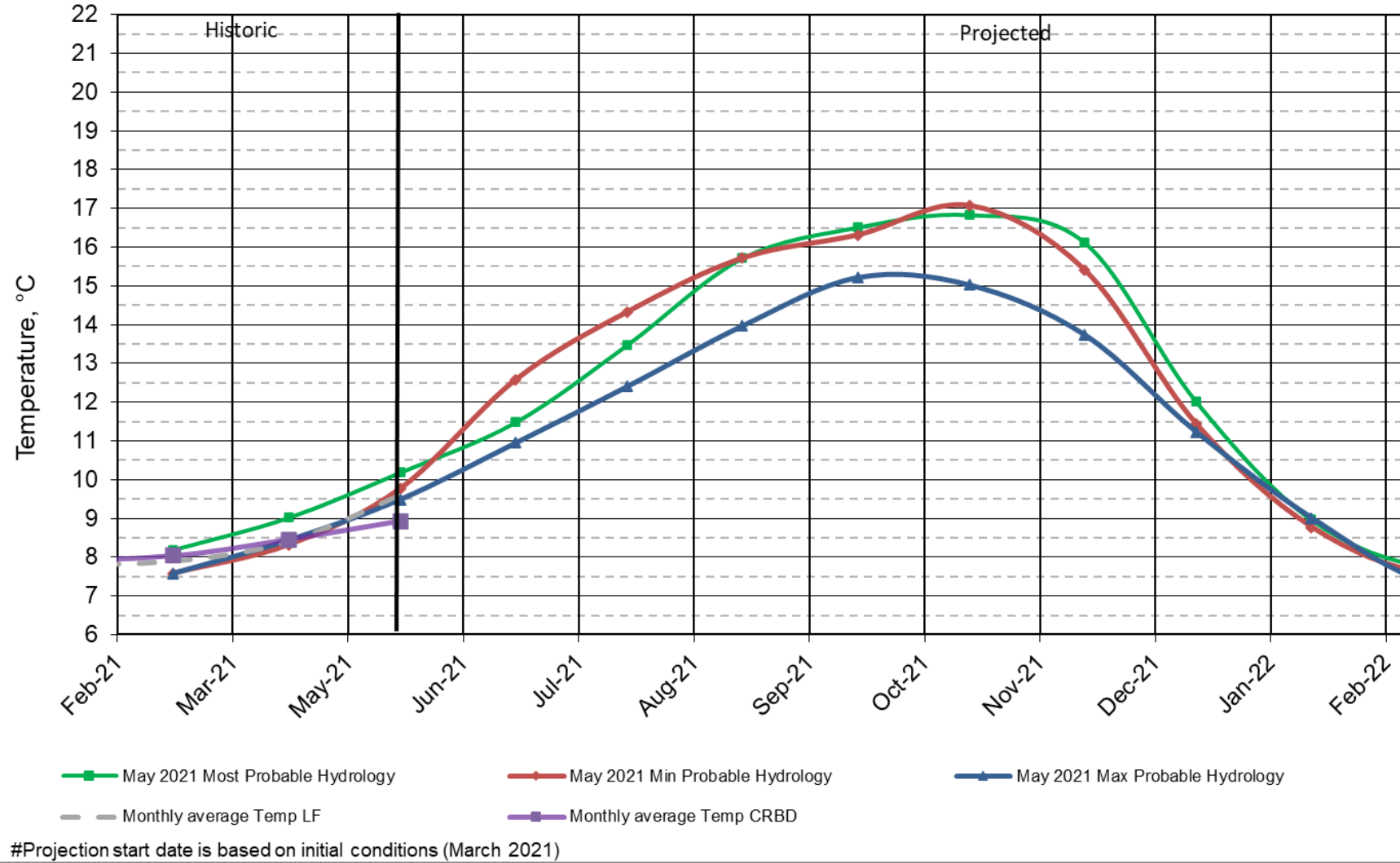


# Cross Sectional Temperature Profile of Lake Powell

5/14/2021

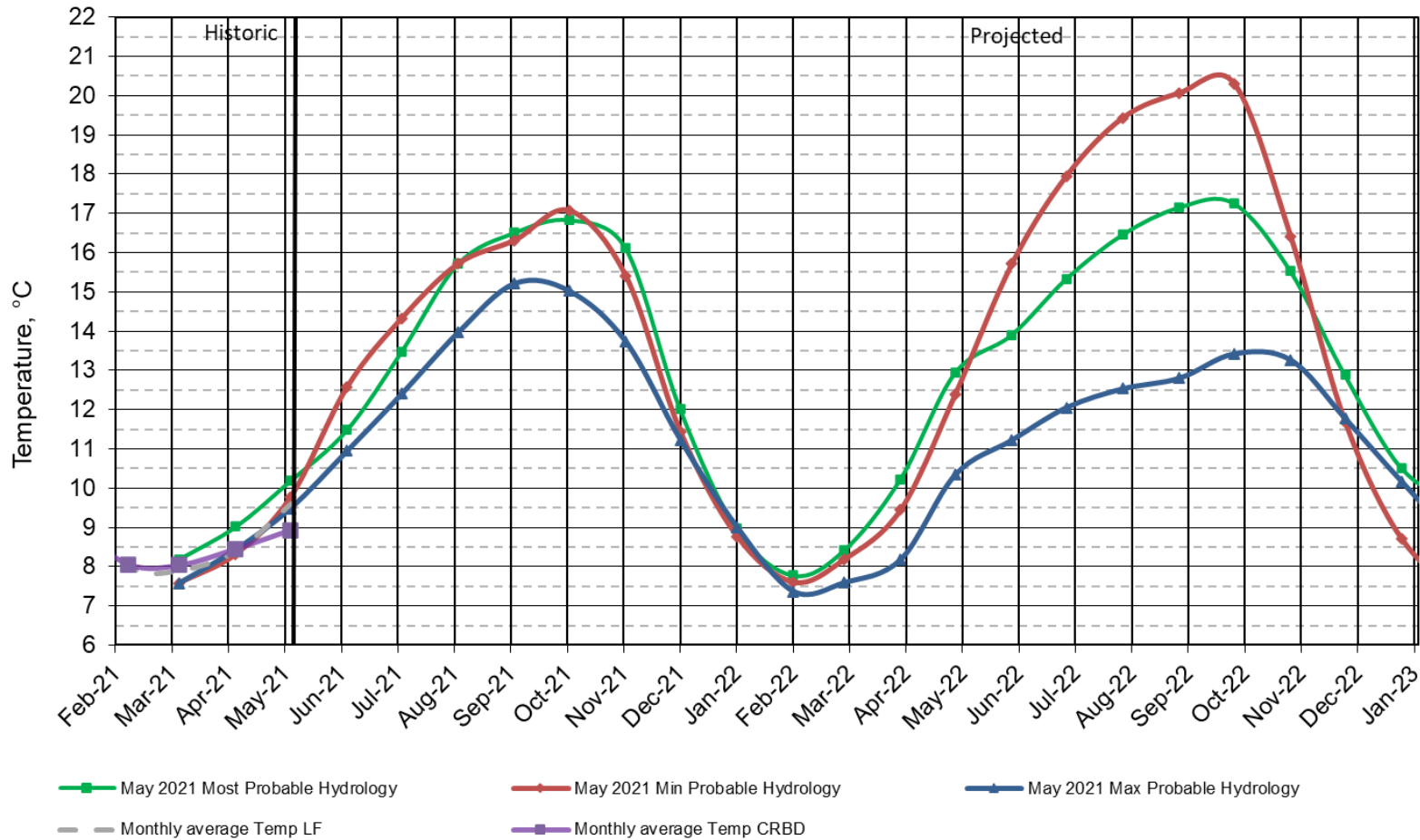


## Lake Powell Release Temperature Projected Temperature based on May 2021 Forecast



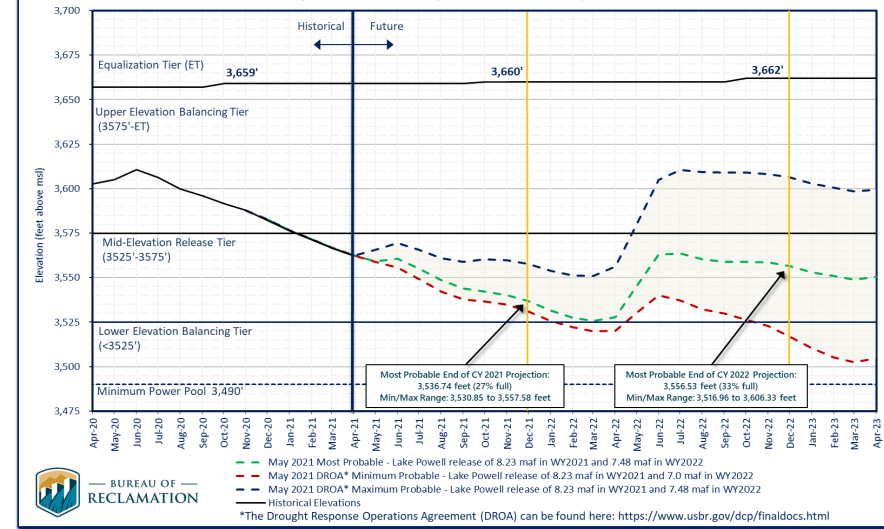


## Lake Powell Release Temperature Projected Temperature based on May 2021 Forecast

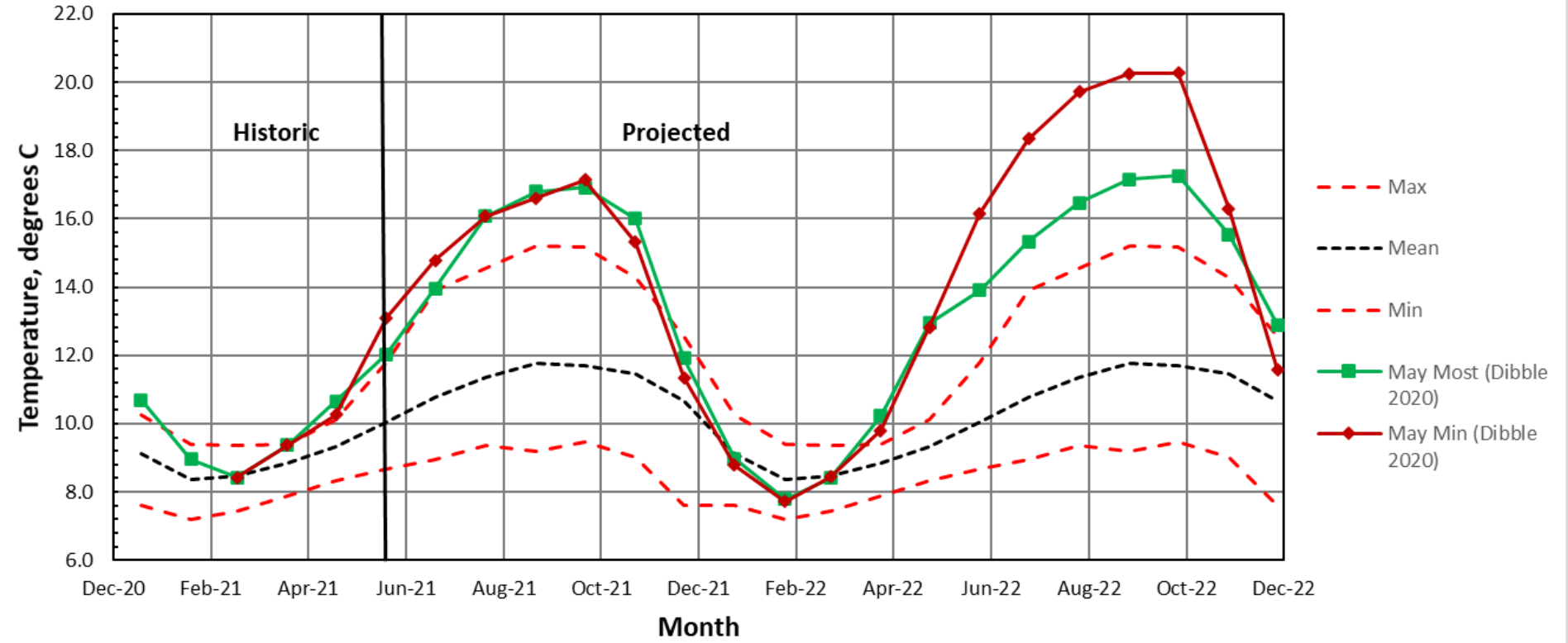


#Projection start date is based on initial conditions (March 2021)

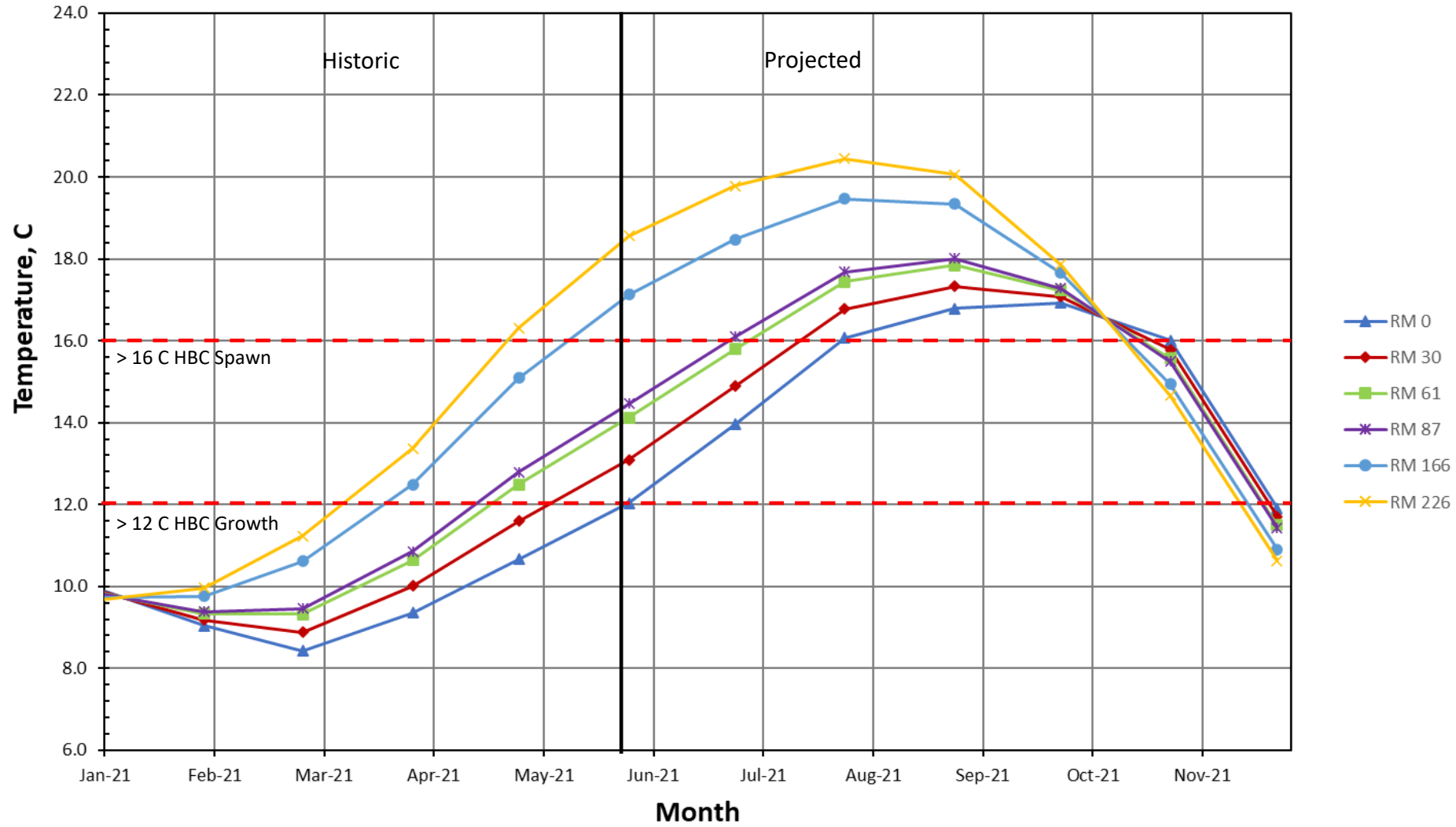
### Lake Powell End of Month Elevations Projections from the May 2021 24-Month Study Inflow Scenarios



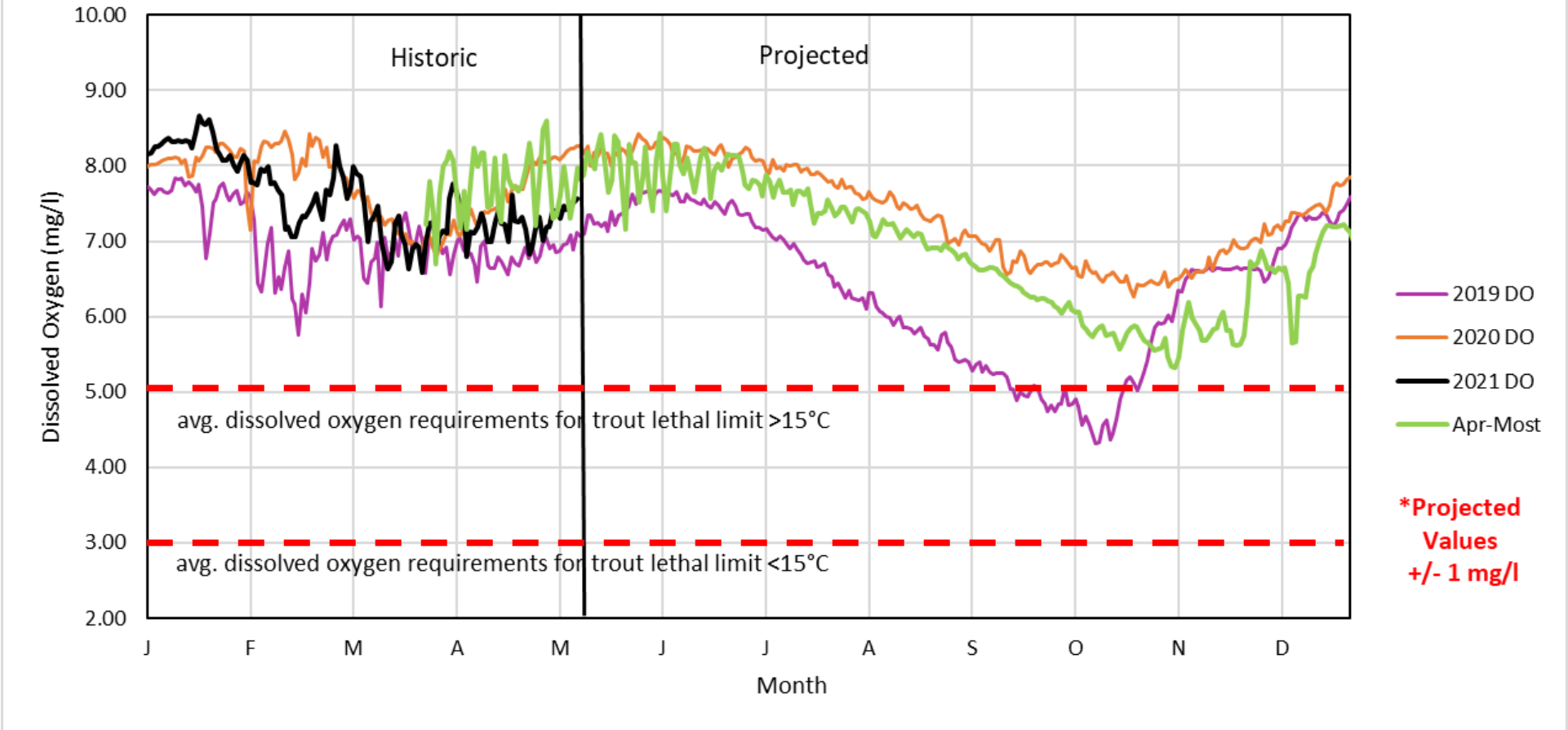
### Lees Ferry Gage USGS 0938000 Mean Monthly Temperatures



Colorado River, Grand Canyon Water Temperatures  
Projections based on May 2021, Most Probable Hydrology (Dibble 2020)



DO Concentration at Glen Canyon Dam years 2019, 2020, and 2021



# Questions/Discussion



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