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RECLAMATION

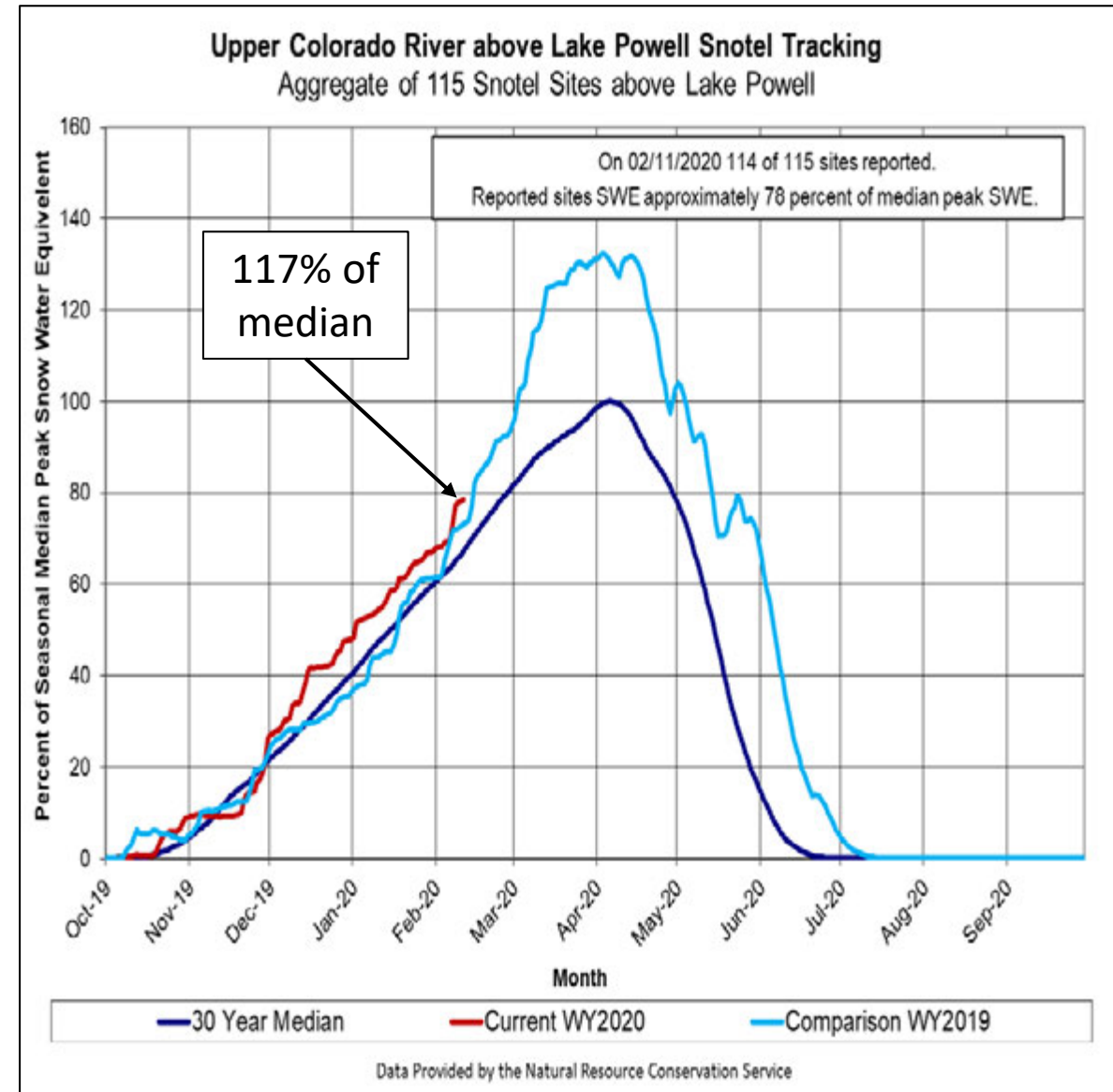
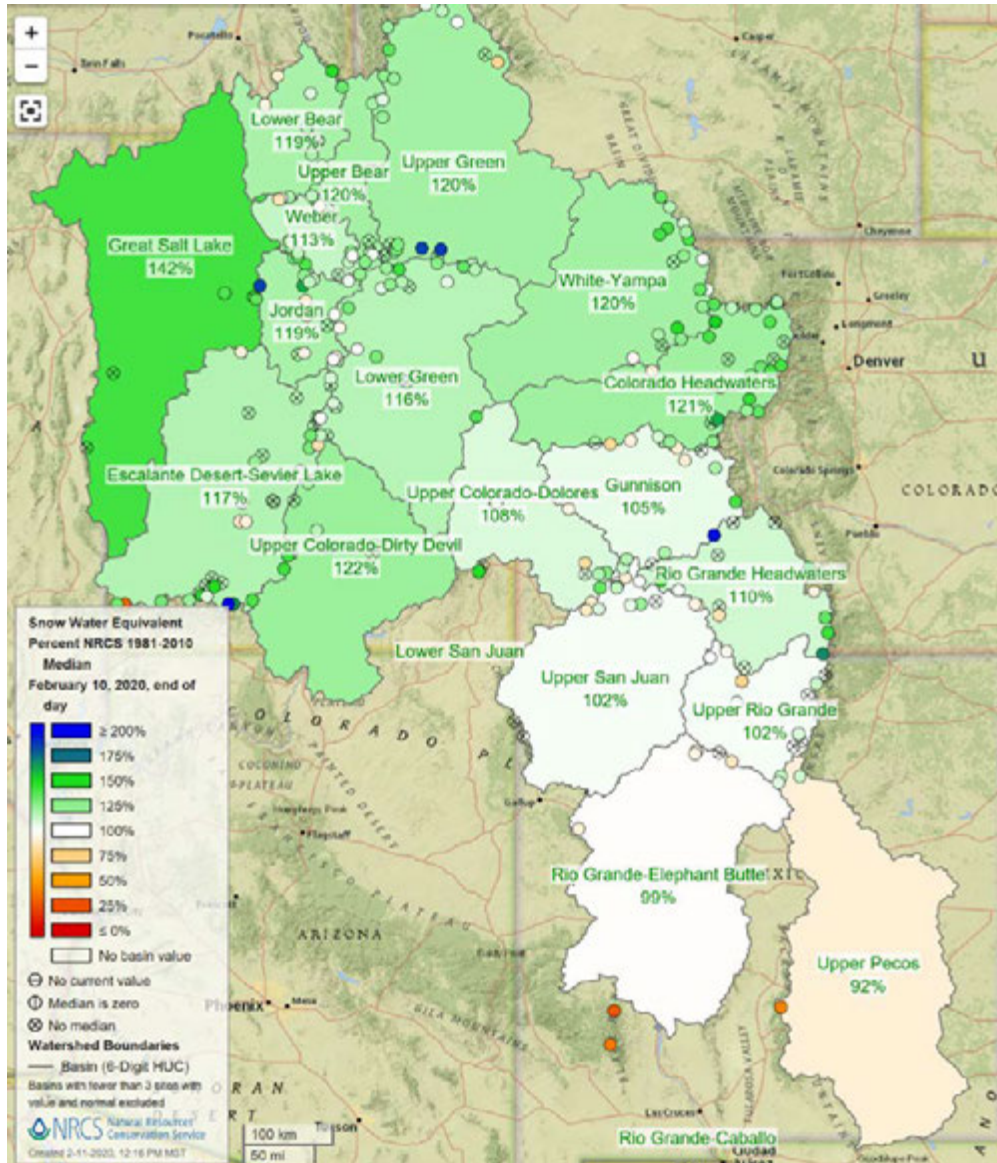
AMWG Hydrology, Operations and Reservoir Release

February 12, 2020

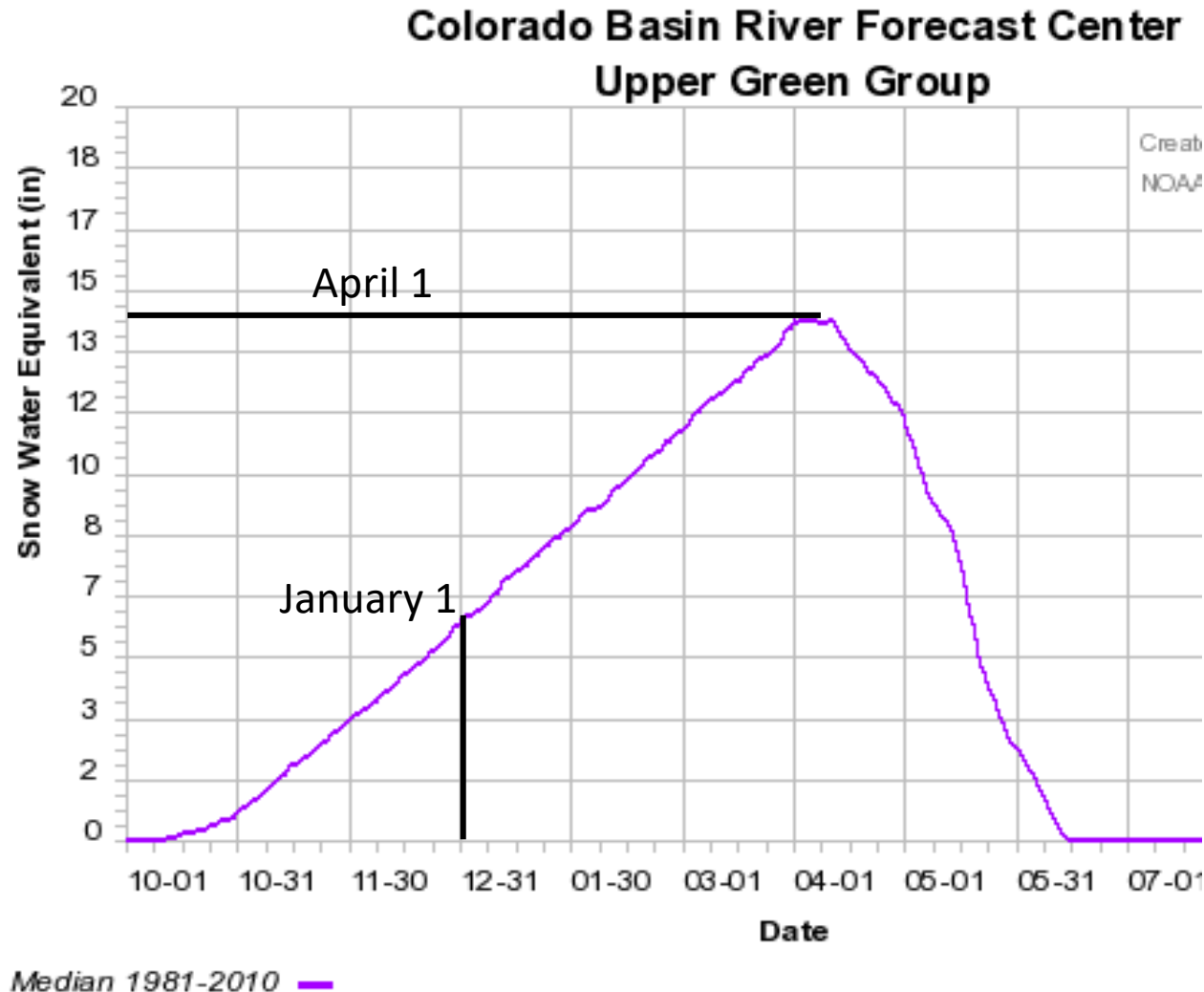
Heather E. Patno

Hydraulic Engineer

Upper Basin Snowpack



Forecast Development



January 1st Forecast

- **What we know:**
 - About 40% snowpack accumulation
 - Fall Soil Moisture conditions
- **What we don't know:**
 - Jan-May weather
 - About 60% of the snowpack accumulation

April 1st Forecast

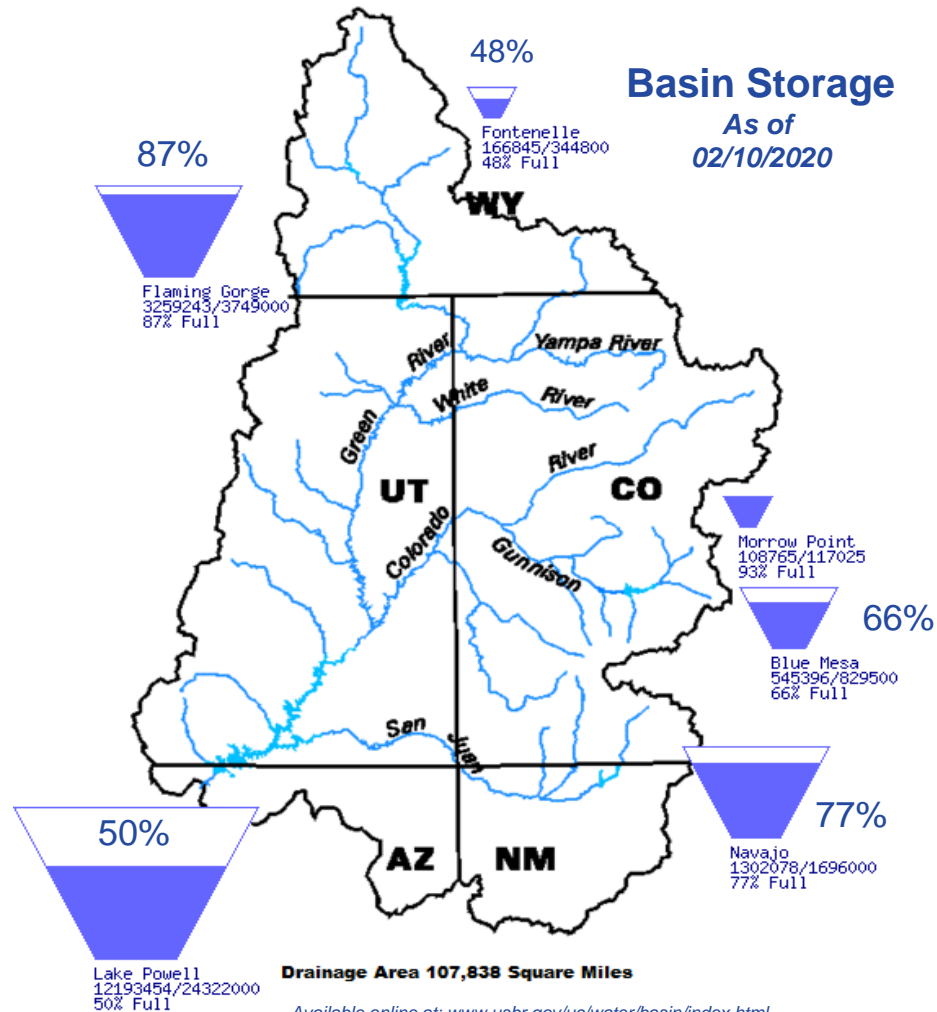
- **What we know:**
 - About 98% of the snowpack accumulation
 - Dec-March weather
- **What we don't know:**
 - April-May weather
 - Snowmelt pattern



Upper Basin Storage and Inflow

Data Current as of:
02/10/2020

Upper Colorado River Drainage Basin



Water Year 2020 Forecasted Unregulated Inflow Issued February 4, 2020

Reservoir	Forecast (kaf)	Percent of Average ¹
Fontenelle	971	90
Flaming Gorge	1,339	92
Blue Mesa	819	86
Navajo	682	63
Powell	8,644	80

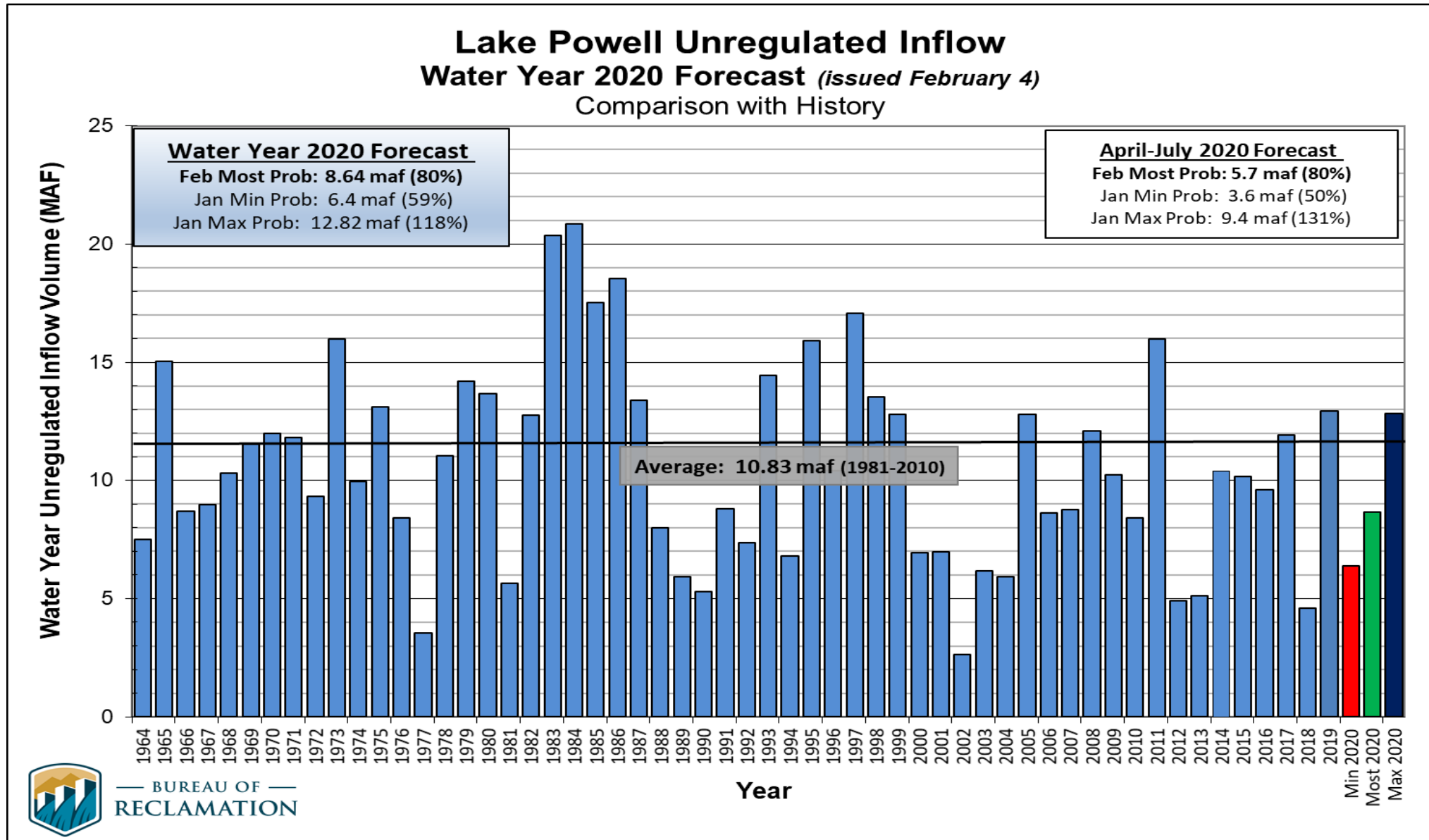
April-July 2020 Forecasted Unregulated Inflow

Reservoir	Forecast (kaf)	Percent of Average ¹
Fontenelle	620	85
Flaming Gorge	870	89
Blue Mesa	560	83
Navajo	500	68
Powell	5,700	80

¹ Percent of average based on the period of record from 1981-2010.



Lake Powell Inflow



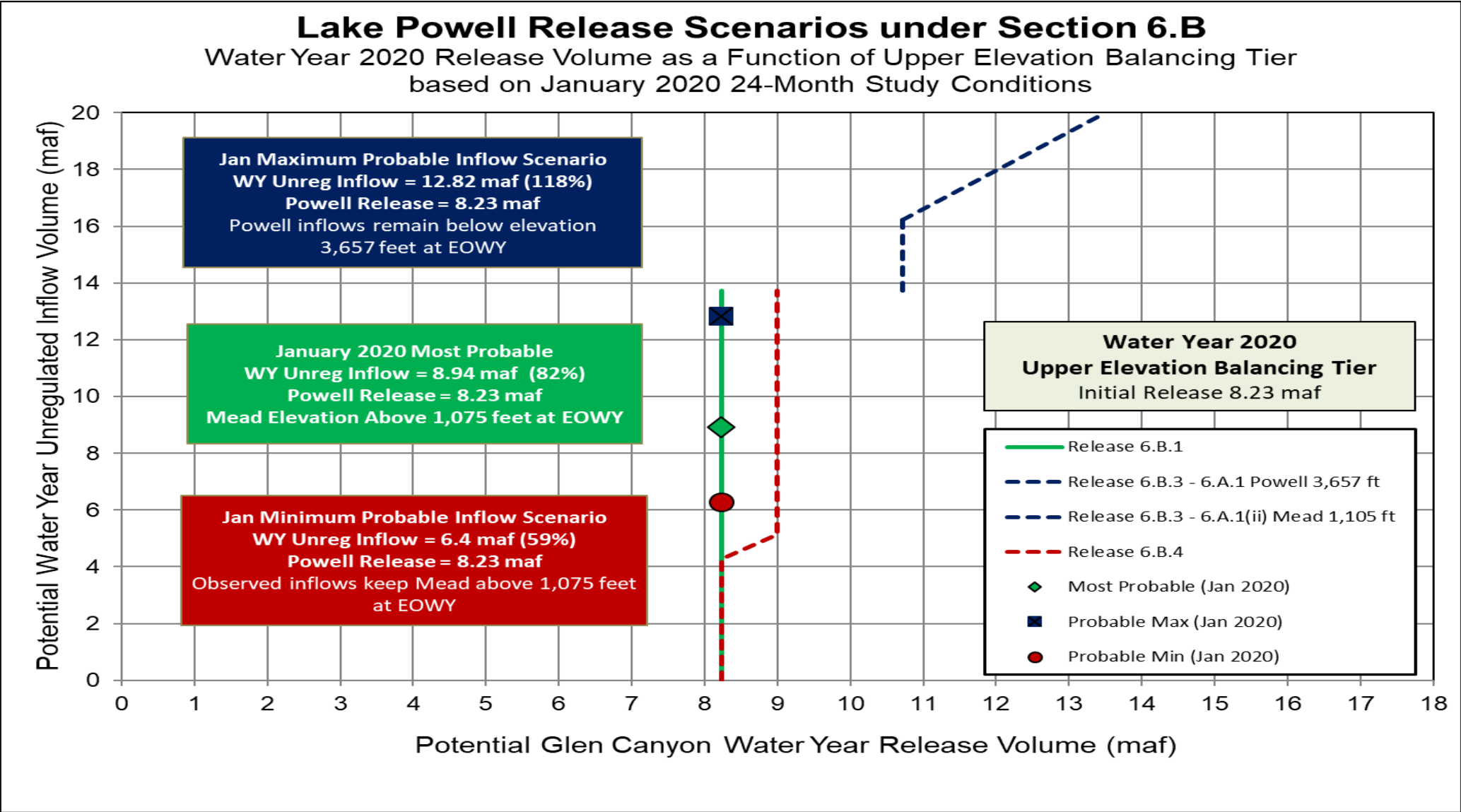
Lake Powell 2020 Operating Tier

- Tier was set in August 2019
 - Start with 8.23 maf release
- Use April 24-Month Study projections of end of water year storage to potentially adjust
 1. Stay with 8.23 maf
 2. Balancing: 8.23 – 9.0 maf
 3. Equalization: >8.23 maf

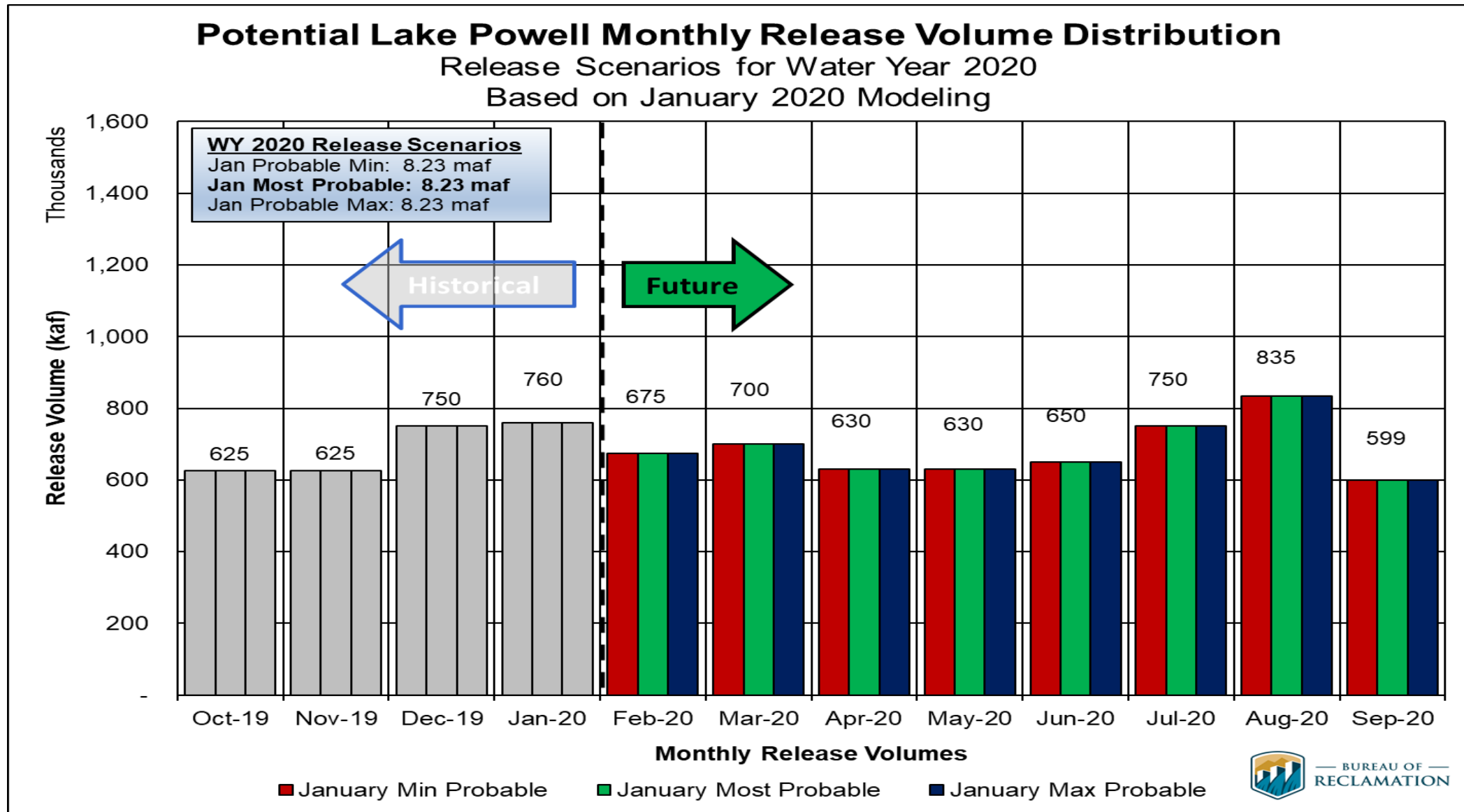
Lake Powell		
Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) ¹
3,700	Equalization Tier Equalize, avoid spills or release 8.23 maf	24.3
3,636 - 3,666 (2008-2026)	Upper Elevation Balancing Tier³ Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	15.5 - 19.3 (2008-2026)
3,575	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5
3,525	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf	5.9
3,490		4.0
3,370		0



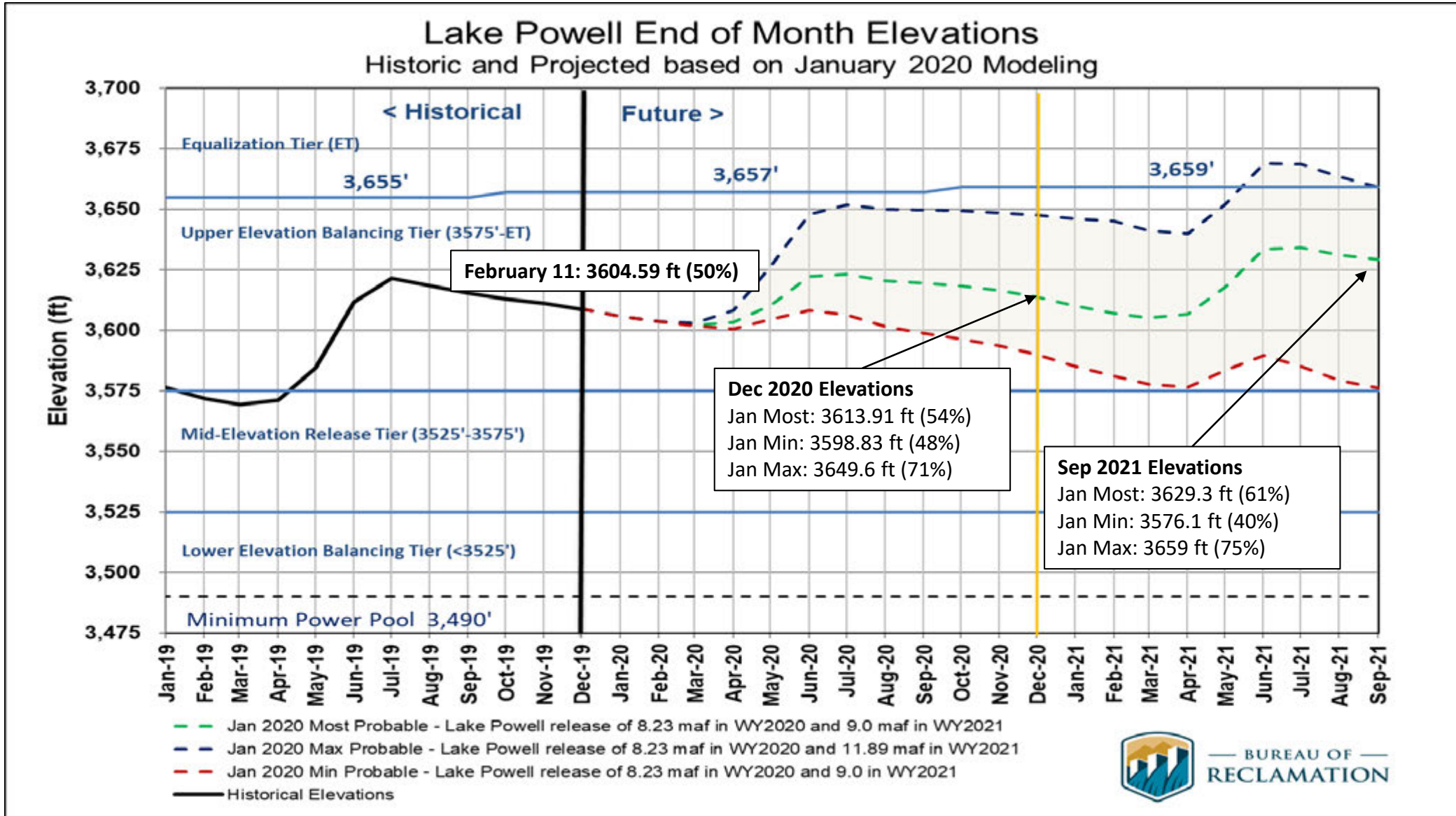
Release Scenarios under Interim Guidelines



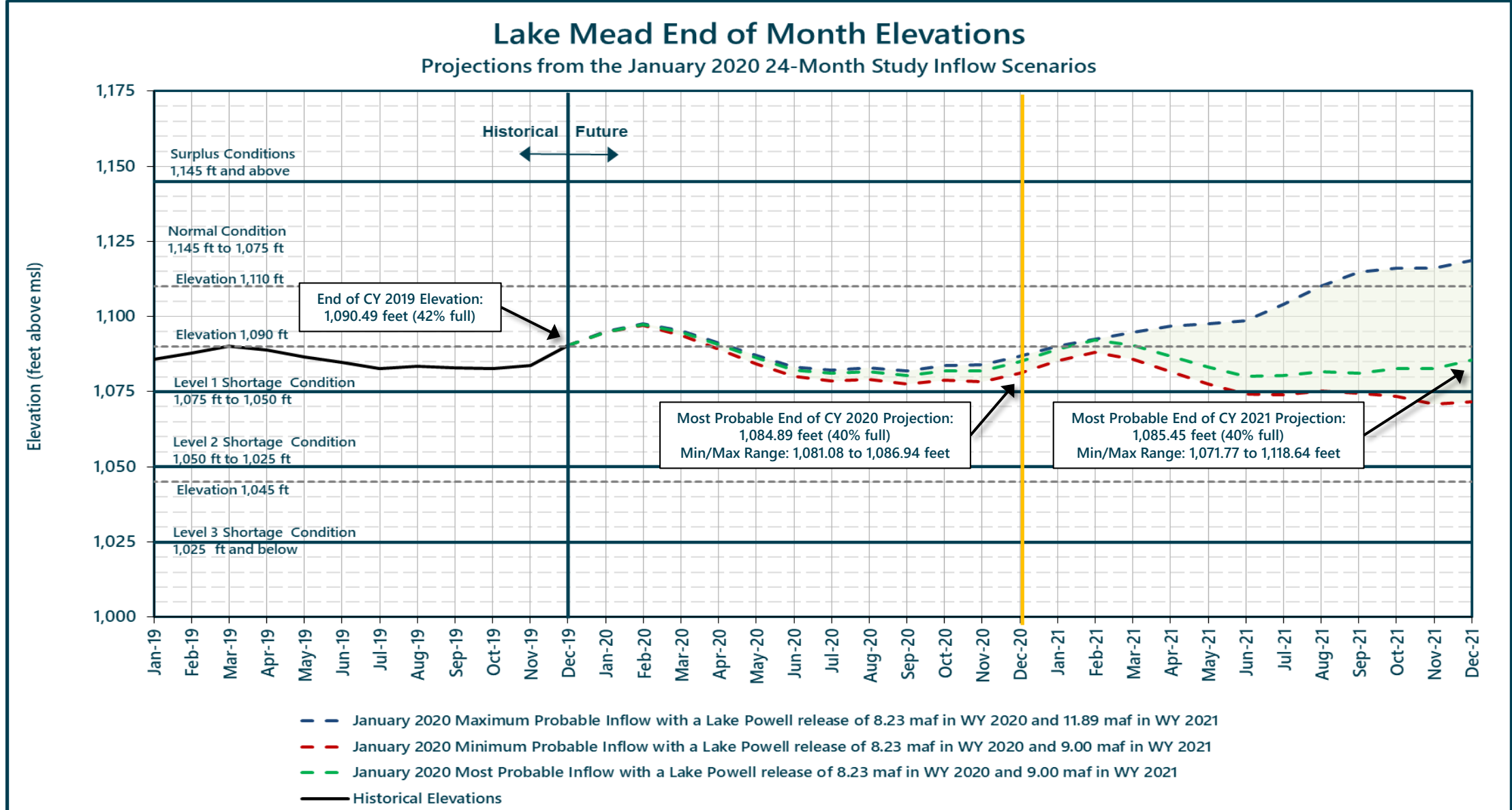
Powell Monthly Release Volumes



Powell Elevations



Mead Elevations



Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2020

Unit Number	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	
1													
2													
3													
4													
5													
6													
7													
8													
Units Available	5	6	6	6	6	5	8/6	6	6	6	6	6	
Capacity (cfs)	16,800	20,500	20,400	20,400	20,300	16,600	29,650*/20,300	20,500	20,700	20,750	20,700	20,700	JAN MOST
Capacity (kaf/month)	1,060	1,160	1,420	1,250	1,180	1,100	1,290	1,280	1,270	1,310	1,340	1,270	JAN MAX
Max (kaf) ¹	625	625	750	760	675	700	630	630	650	750	835	599	8.23
Most (kaf) ²	625	625	750	760	675	700	630	630	650	750	835	599	8.23
Min (kaf) ¹	625	625	750	760	675	700	630	630	650	750	835	599	8.23
										(updated 01-29-2020)			

- 1 Projected release, based on January 2020 MOST Probable Inflow Projections and 24-Month Study model runs
2 Projected release, based on January 2020 Min and Max Probable Inflow Projections and 24-Month Study model runs
3 *Dependent upon availability to shift regulation and reserves

Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 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												
2												
3												
4												
5												
6												
7												
8												
Units Available	6	6	6	6	6	6	6	6	7	8	8	6
Capacity (cfs)	20,650	20,600	20,550	20,450	20,400	20,350	20,400	20,650	24,800	28,650	28,550	20,900
Capacity (kaf/month)	1,310	1,270	1,340	1,310	1,180	1,150	1,200	1,460	1,670	1,820	1,810	1,360
Max (kaf) ¹	640	640	720	760	680	1,150	1,200	1,100	1,100	1,350	1,380	1,174
Most (kaf) ²	640	640	720	860	750	800	710	710	750	850	900	670
Min (kaf) ¹	640	640	720	860	750	800	710	710	750	850	900	670
										(updated 01-29-2020)		

JAN
MOST

JAN
MAX

11.89

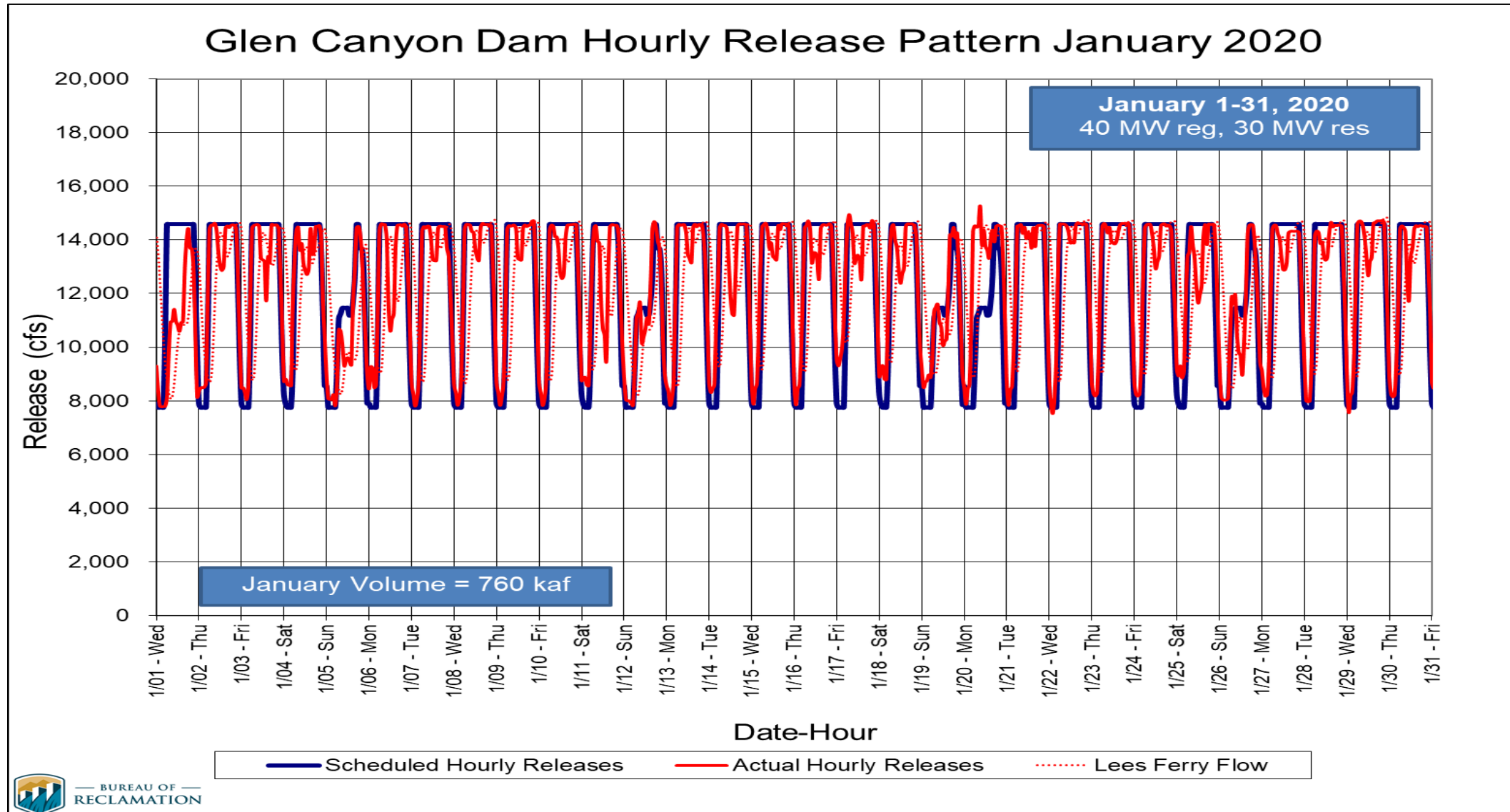
9.0

9.0

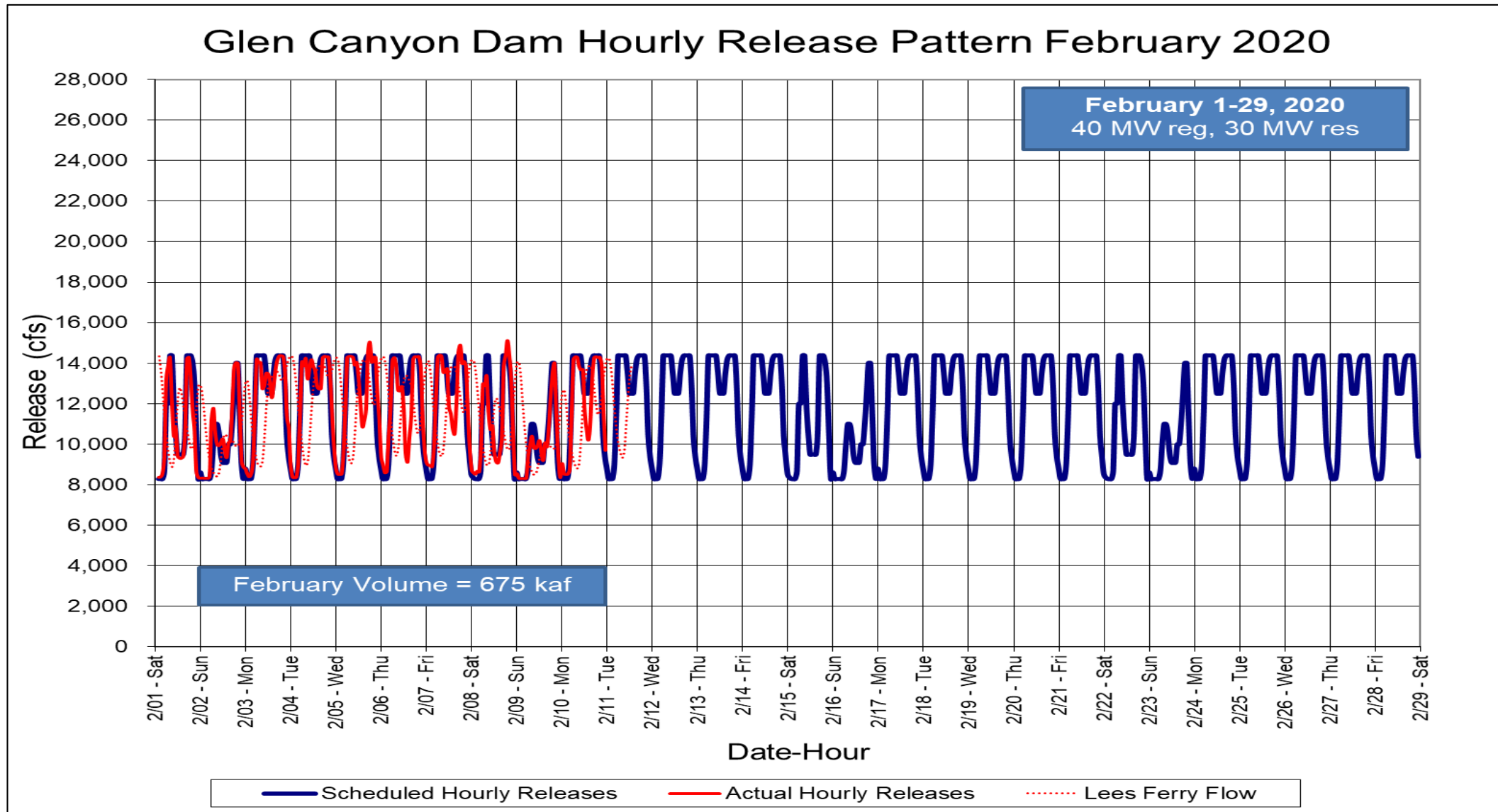
- 1 Projected release, based on January 2020 Most Probable Inflow Projections and 24-Month Study model runs
2 Projected release, based on January 2020 Min and Max Probable Inflow Projections and 24-Month Study model runs



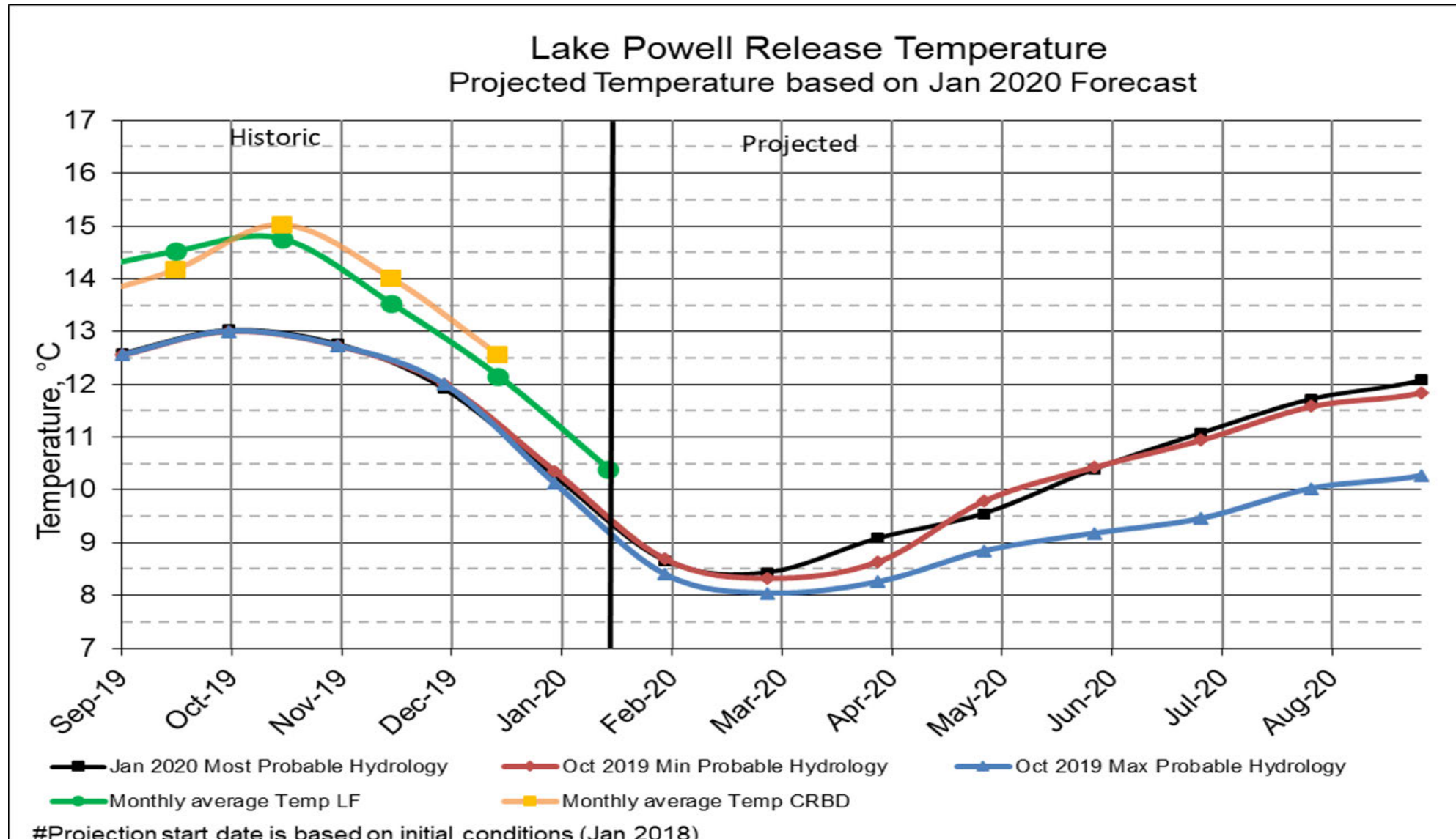
January 2020 Hourly Releases



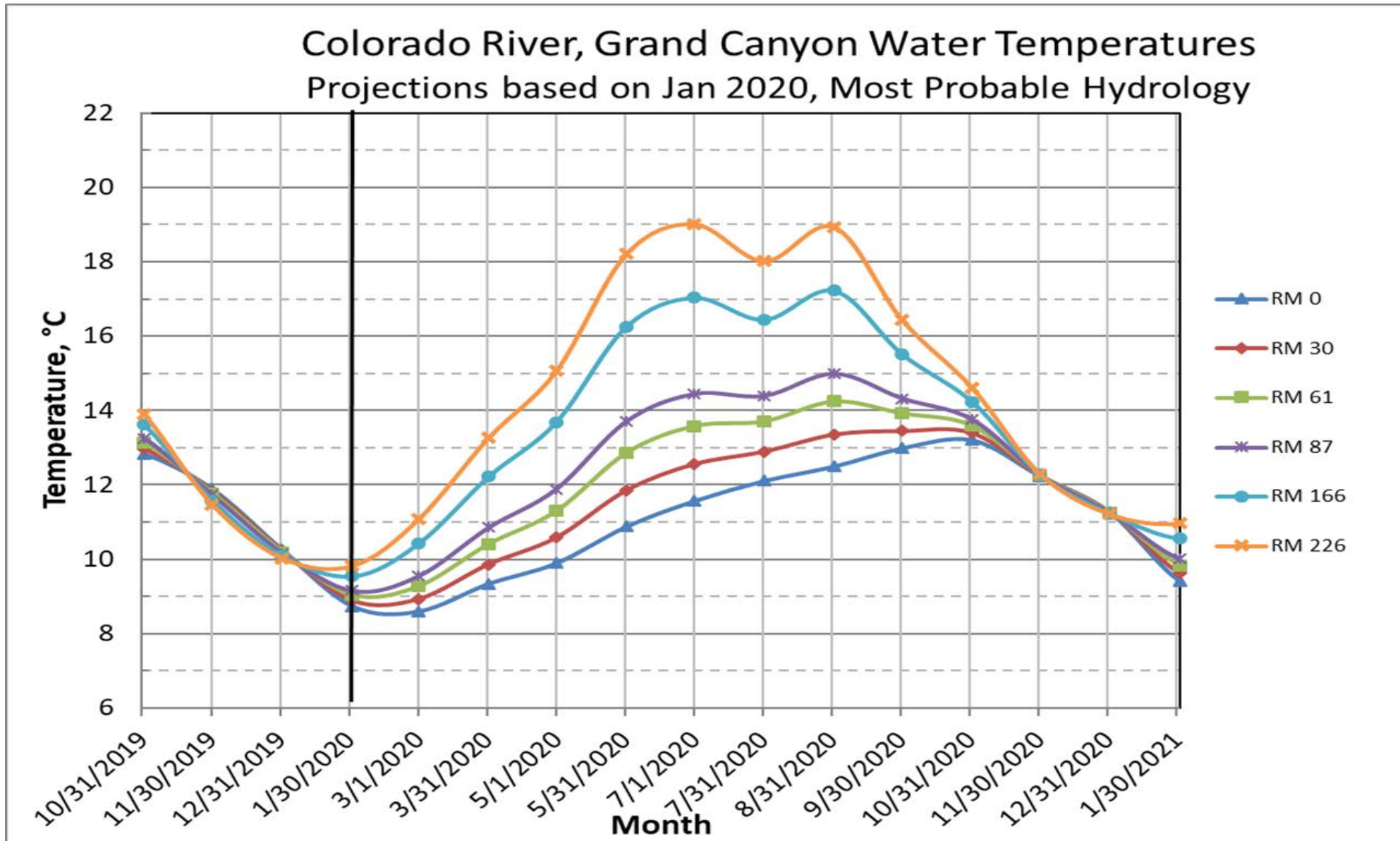
February 2020 Hourly Releases



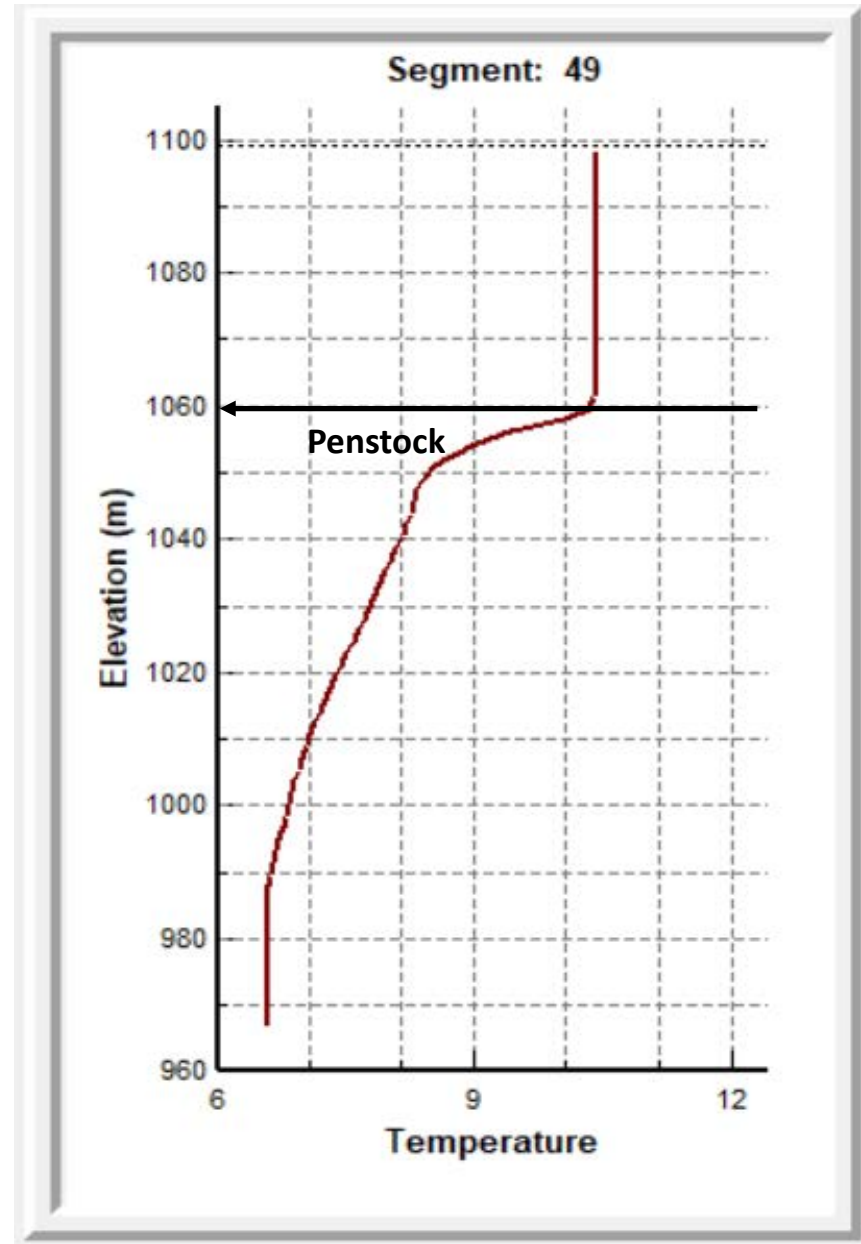
Lake Powell Release Temperatures



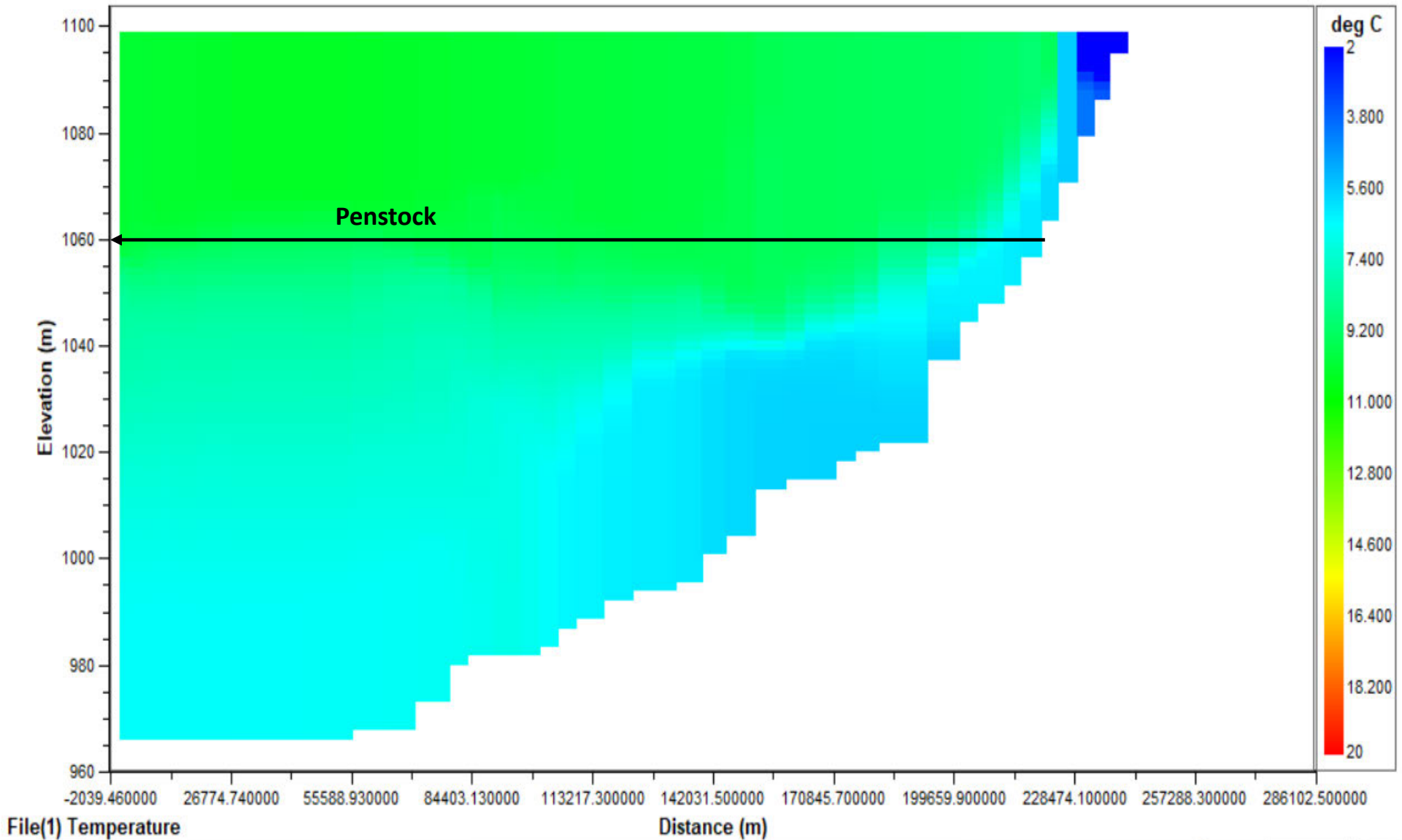
Glen Canyon Water Temperatures



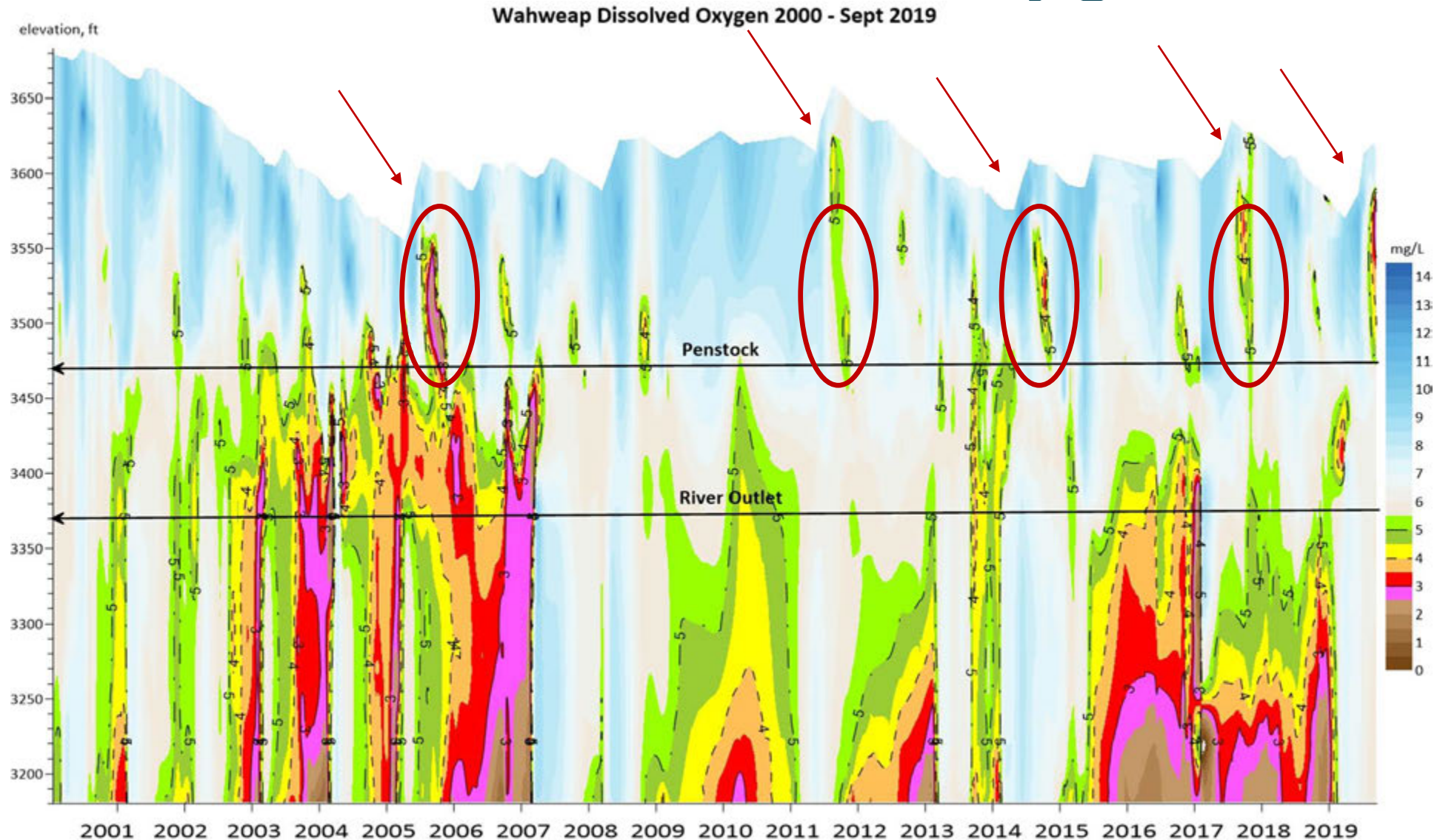
Lake Powell Temperature Profile



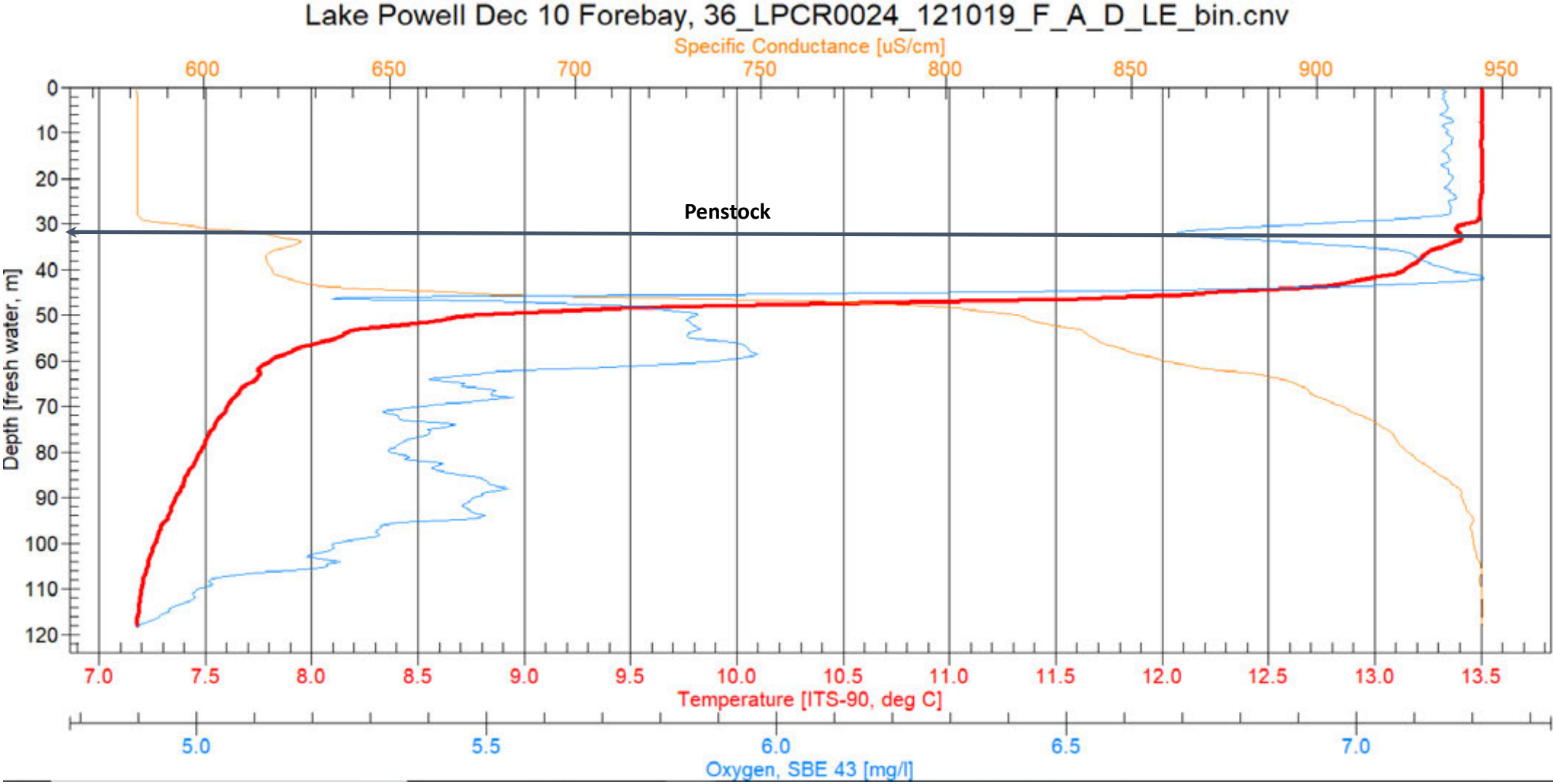
Lake Powell Reservoir Temperature Profile



Historical Dissolved Oxygen

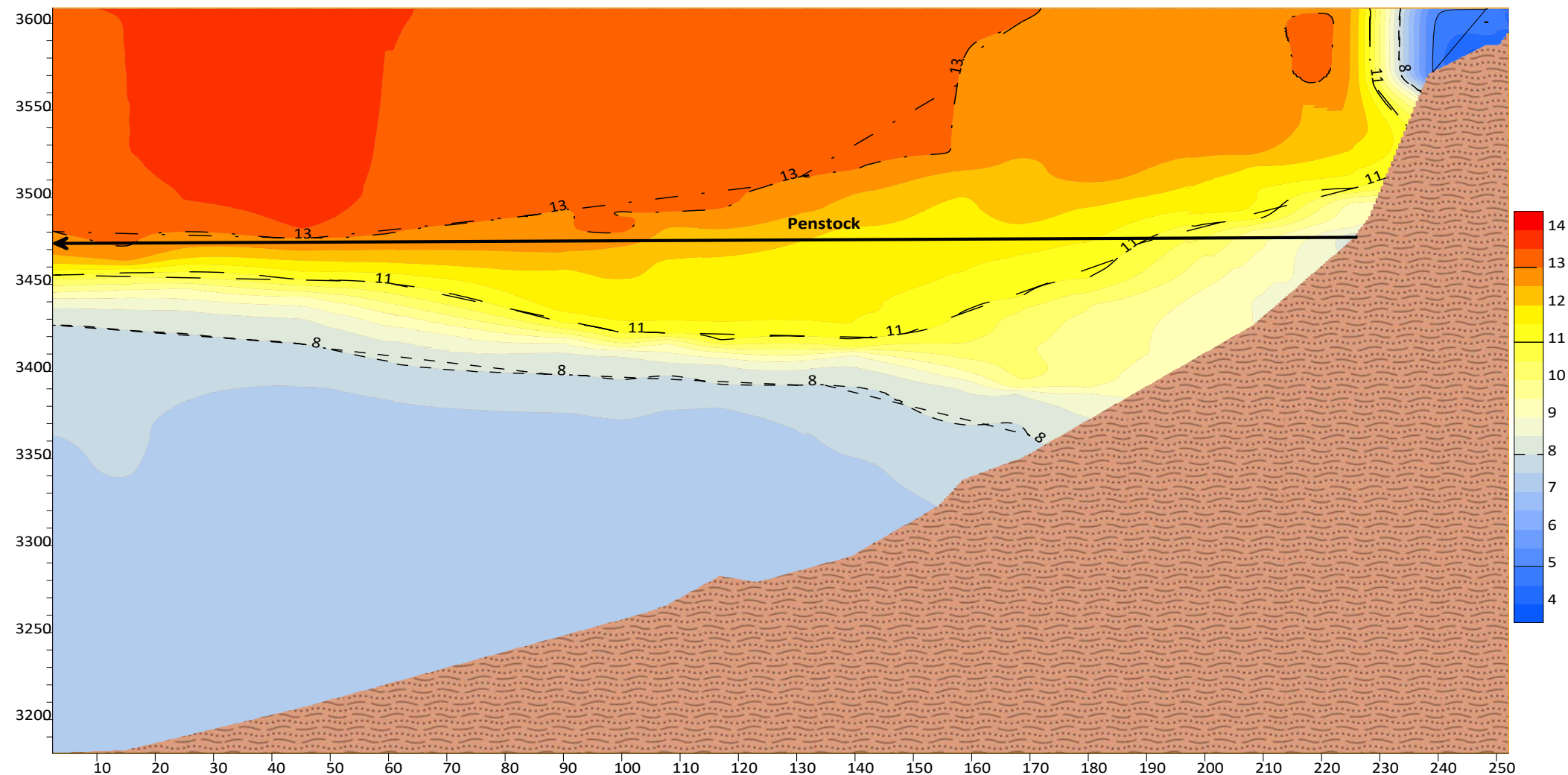


Powell December Forebay Information



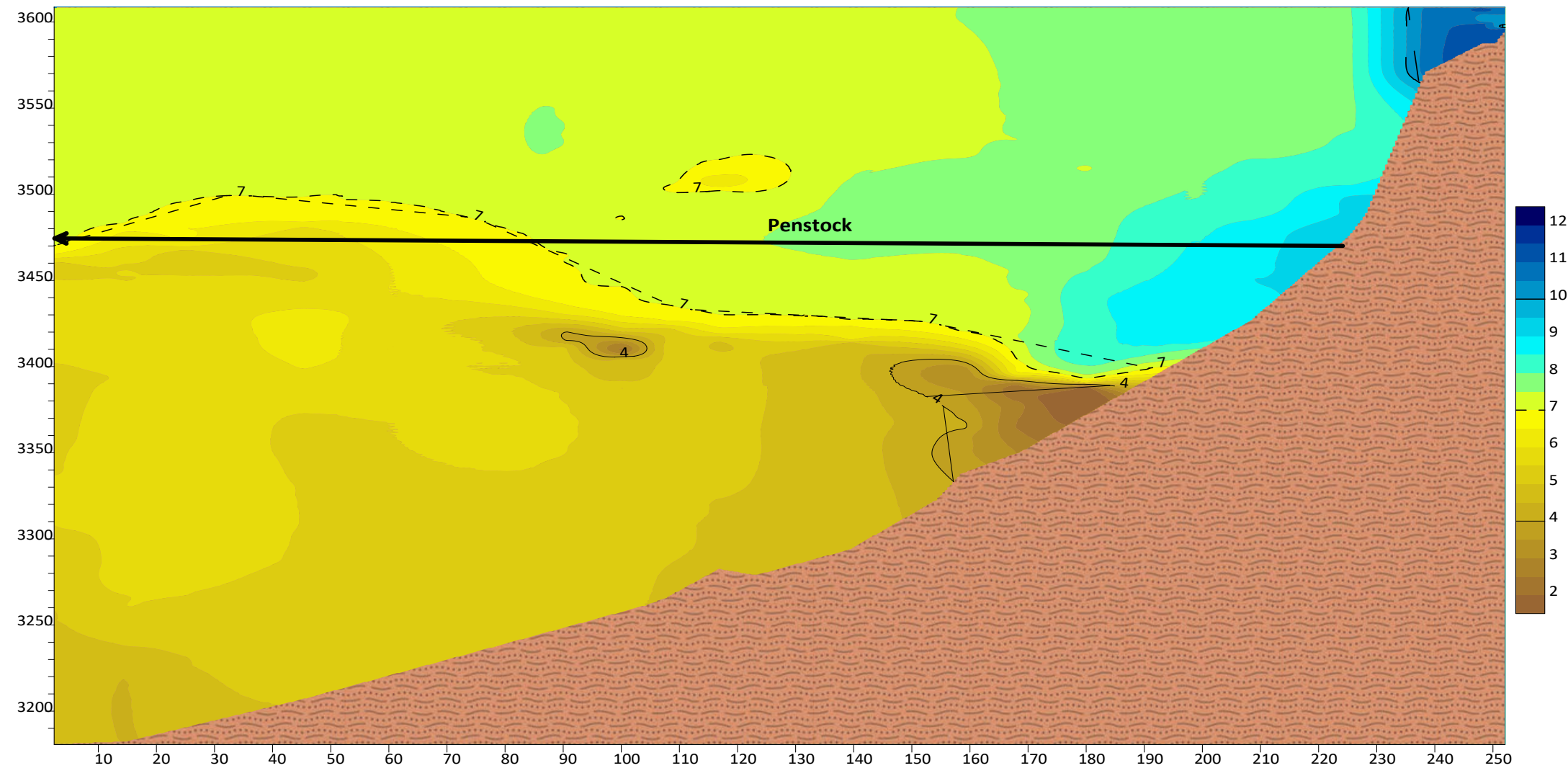
Powell Reservoir Temperature Profile for December

Lake Powell Temperature Dec 10-13 2019



Powell Reservoir Dissolved Oxygen Profile for December

Lake Powell Dec 10 - 13 2019 Dissolved Oxygen



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