RECLAMATION

Managing Water in the West

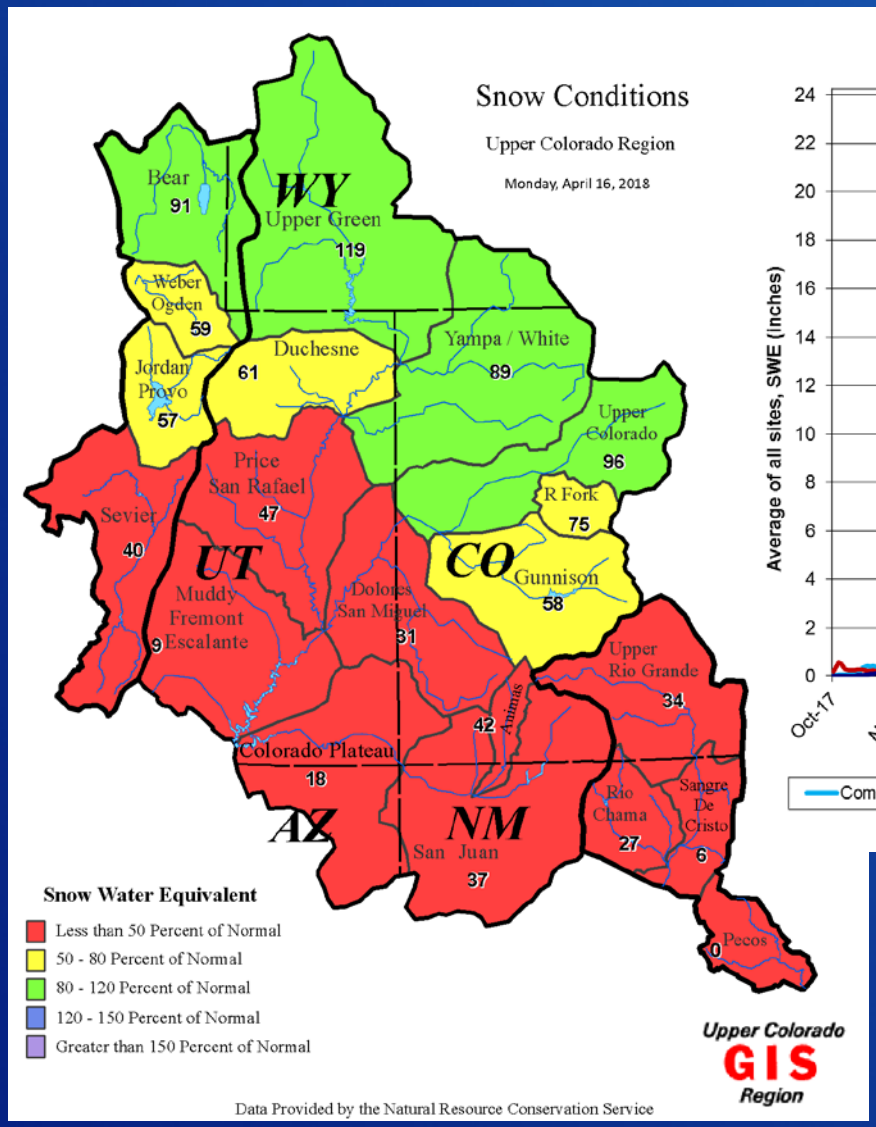
Basin Hydrology, Water Years 2018-2019 Operations

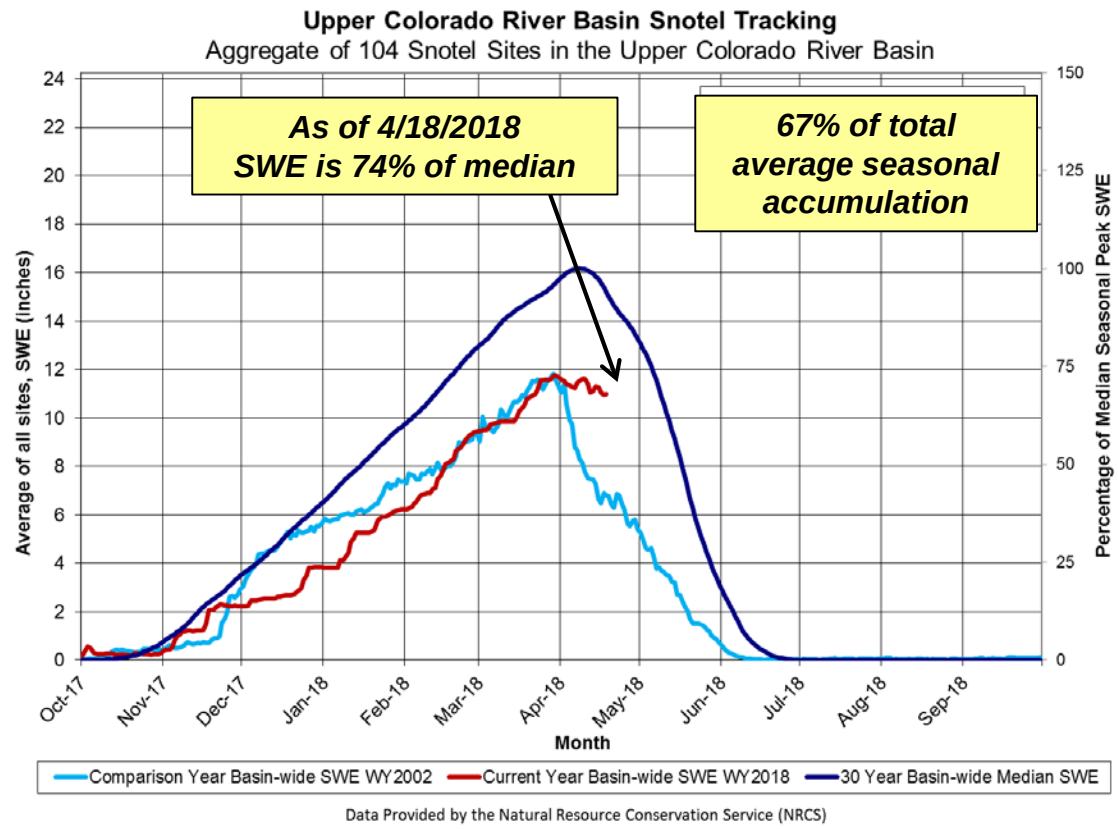
Glen Canyon Technical Work Group

January 25, 2018

U.S. Department of the Interior
Bureau of Reclamation

Snow Conditions





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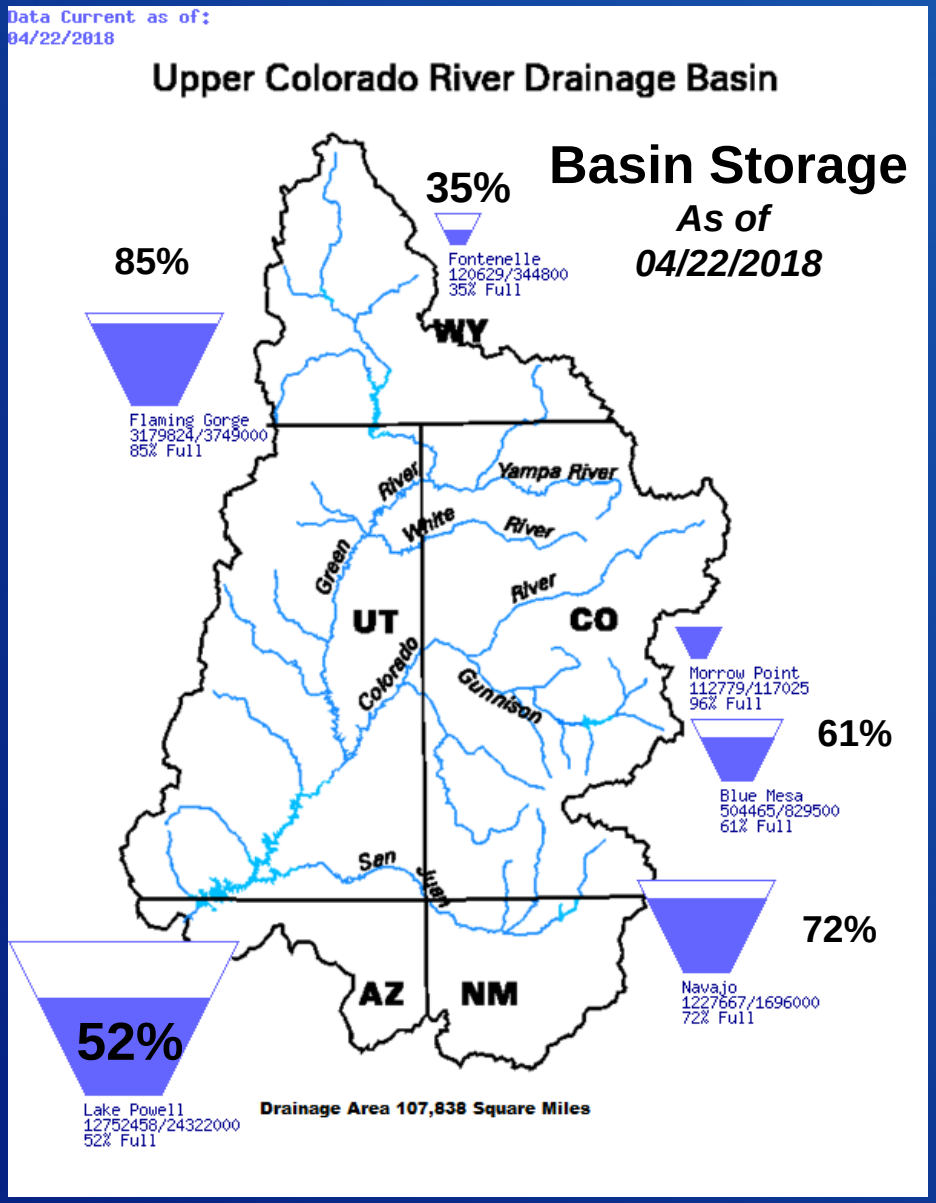
Upper Basin Storage



https://www.usbr.gov/uc/water/basin/index.html

April to July 2018 Forecasted Inflow
Issued April 16, 2018

Reservoir	Forecast (KAF)	Percent of Average[1]
Fontenelle	970	134%
Flaming Gorge	1,070	109%
Blue Mesa	360	53%
Navajo	220	30%
Powell	3,300	46%

[1] Percent of average based on 1981-2010 period.

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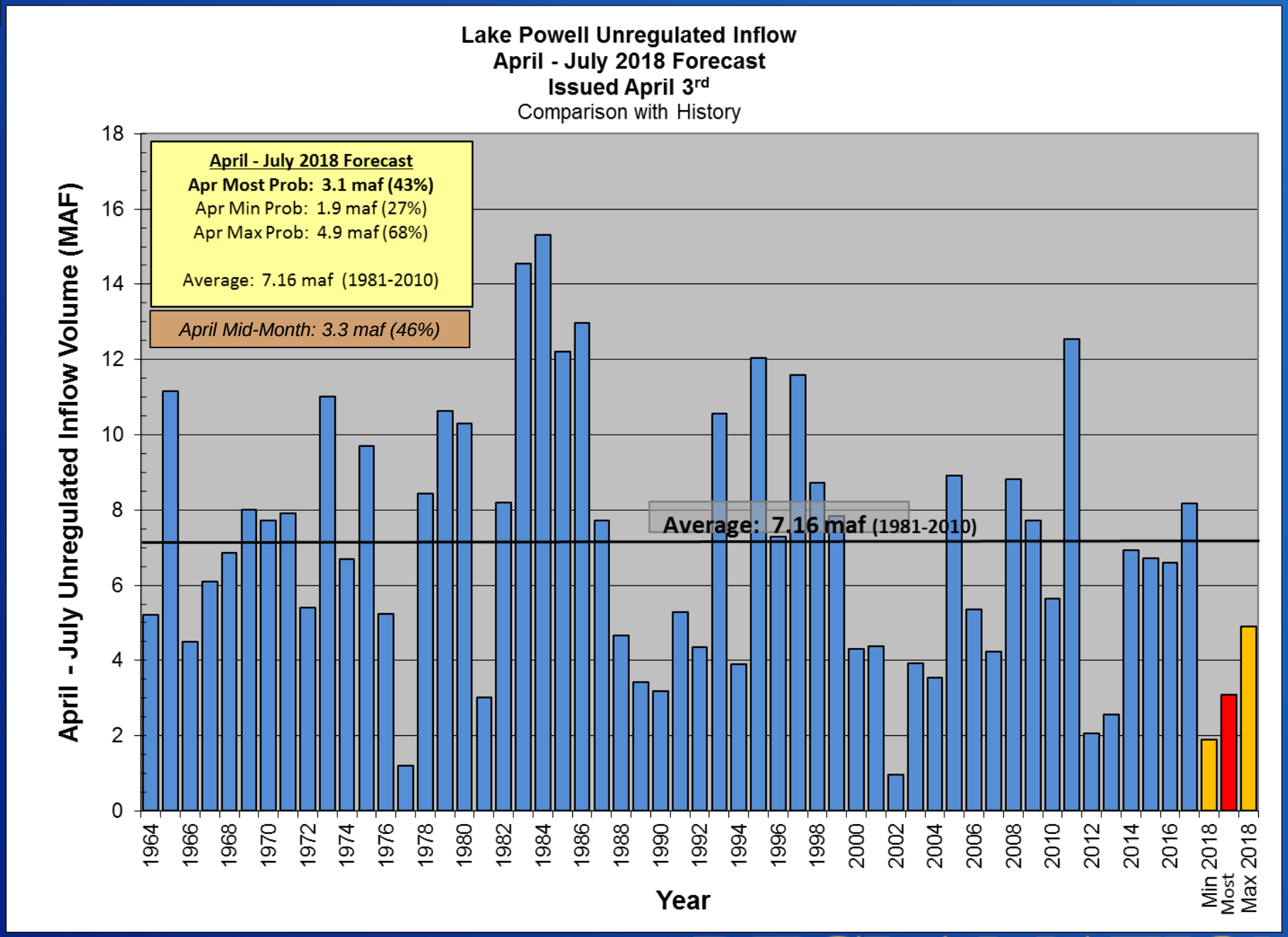

RECLAMATION

Lake Powell 2018 Operating Tier
Upper Elevation Balancing

- Tier was set in August 2017
  - 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 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)
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

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August determination

April determination

B. Upper Elevation Balancing Tier

1. In Water Years when the projected January 1 Lake Powell elevation is below the elevation stated in the Lake Powell Equalization Elevation Table and at or above 3,575 feet, the Secretary shall release 8.23 maf from Lake Powell if the projected January 1 Lake Mead elevation is at or above 1,075 feet.

2. If the projected January 1 Lake Powell elevation is below the elevation stated in the Lake Powell Equalization Elevation Table and at or above 3,575 feet and the projected January 1 Lake Mead elevation is below 1,075 feet, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf and not less than 7.0 maf from Lake Powell in the Water Year.

3. When operating in the Upper Elevation Balancing Tier, if the April 24-Month Study projects the September 30 Lake Powell elevation to be greater than the elevation in the Lake Powell Equalization Elevation Table, the Equalization Tier will govern the operation of Lake Powell for the remainder of the Water Year (through September).

4. When operating under Section 6.B.1, if the April 24-Month Study projects the September 30 Lake Mead elevation to be below 1,075 feet and the September 30 Lake Powell elevation to be at or above 3,575 feet, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf and not less than 8.23 maf from Lake Powell in the Water Year.

5. When Lake Powell is projected to be operating under Section 6.B.2. and more than 8.23 maf is projected to be released from Lake Powell during the upcoming Water Year, the Secretary shall recalculate the August 24-Month Study projection of the January 1 Lake Mead elevation to include releases above 8.23 maf that are scheduled to be released from Lake Powell during the months of October, November, and December of the upcoming Water Year, for the purposes of determining Normal or Shortage conditions pursuant to Sections 2.A. or 2.D. of these Guidelines.

Water Year 2018 Operations: April 2018 24-Month Study
Upper Elevation Balancing

April 2018 24-Month Study EXHIBIT run

SCT Powell.sct

File Edit Slots Aggregation View Config DMI Run Scripts Diagnostics Go To

Series Slots | Edit Series Slot List | Scalar Slots | Other Slots | Object Grid

Timestep	Day	Powell Unreg Inflow 1,000 acre-ft/month	**Powell Outflow 1,000 acre-ft/mon**	Powell Pool Elevation ft	Mead Pool Elevation ft	Powell Reg Inflo 1,000 ac
4/30/17	Sun	1,608.27	622.54	3,604.14	1,084.89	
5/31/17	Wed	2,377.23	652.40	3,619.09	1,081.56	
6/30/17	Fri	3,114.91	749.03	3,634.89	1,079.52	
7/31/17	Mon	1,073.16	850.14	3,634.69	1,079.03	
8/31/17	Thu	445.55	900.12	3,630.88	1,081.44	
9/30/17	Sat	195.54	663.07	3,628.31	1,082.05	
10/31/17	Tue	448.62	640.16	3,627.09	1,082.30	
11/30/17	Thu	386.93	630.07	3,625.29	1,080.95	
12/31/17	Sun	298.94	739.55	3,622.85	1,082.52	
1/31/18	Wed	261.68	860.33	3,619.14	1,087.50	
2/28/18	Wed	269.47	729.77	3,616.02	1,088.21	
3/31/18	Sat	331.88	799.98	3,612.23	1,088.11	
4/30/18	Mon	450.00	705.00	3,609.65	1,084.68	
5/31/18	Thu	850.00	705.00	3,609.08	1,080.91	
6/30/18	Sat	1,250.00	560.00	3,612.31	1,076.12	
7/31/18	Tue	550.00	660.00	3,610.65	1,073.56	
8/31/18	Fri	270.00	630.00	[illegible]	[illegible]	
9/30/18	Sun	250.00	570.14	3,605.64	1,070.07	
10/31/18	Wed	379.89	640.00	3,603.39	1,070.80	
11/30/18	Fri	411.82	640.00	3,601.18	1,069.60	
12/31/18	Mon	362.53	720.00	3,598.03	1,070.27	
1/31/19	Thu	361.18	860.00	3,593.58	1,073.73	
2/28/19	Thu	392.99	750.00	3,590.21	1,075.36	
3/31/19	Sun	665.38	800.00	3,587.87	1,073.28	
4/30/19	Tue	1,055.51	710.00	3,589.18	1,069.80	
5/31/19	Fri	2,342.99	710.00	3,601.65	1,066.91	
6/30/19	Sun	2,666.05	750.00	3,613.99	1,064.31	
7/31/19	Wed	1,090.84	850.00	3,614.82	1,064.54	
8/31/19	Sat	499.88	900.00	3,611.81	1,066.40	
9/30/19	Mon	408.21	670.00	3,610.32	1,066.30	

Powell.Outflow -- Volume: 8.23000 [1,000,000 acre-ft]

12 values: Sum 8,230.00 -- Ave 685.83 -- Med 682.50 -- Min 560.00 -- Max 860.33 -- Range 300.33 [1000 acre-ft/mc

With an 8.23maf release pattern for WY2018, September 30, 2018 projected elevations are:

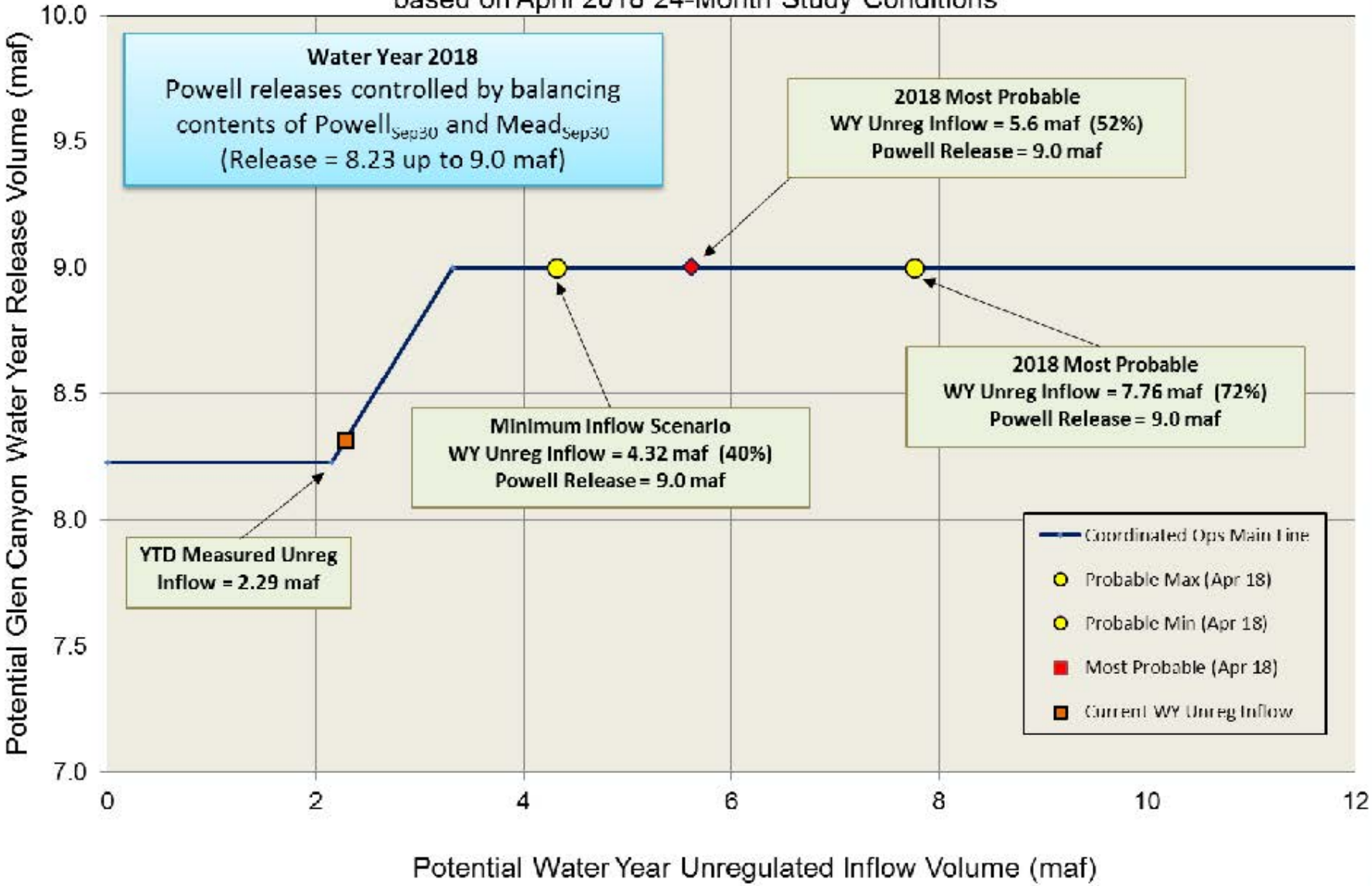
Powell: 3605.64 (i.e, above 3575 ft)
Mead: 1070.80 (i.e, below 1075 ft)

Therefore, Powell's <u>April adjustment</u> is to Balancing, with releases not more than 9.0 maf and not less than 8.23 maf in the Water Year.

RECLAMATION

Potential Lake Powell Release Scenarios

Water Year 2018 Release Volume as a Function of Unregulated Inflow Volume based on April 2018 24-Month Study Conditions

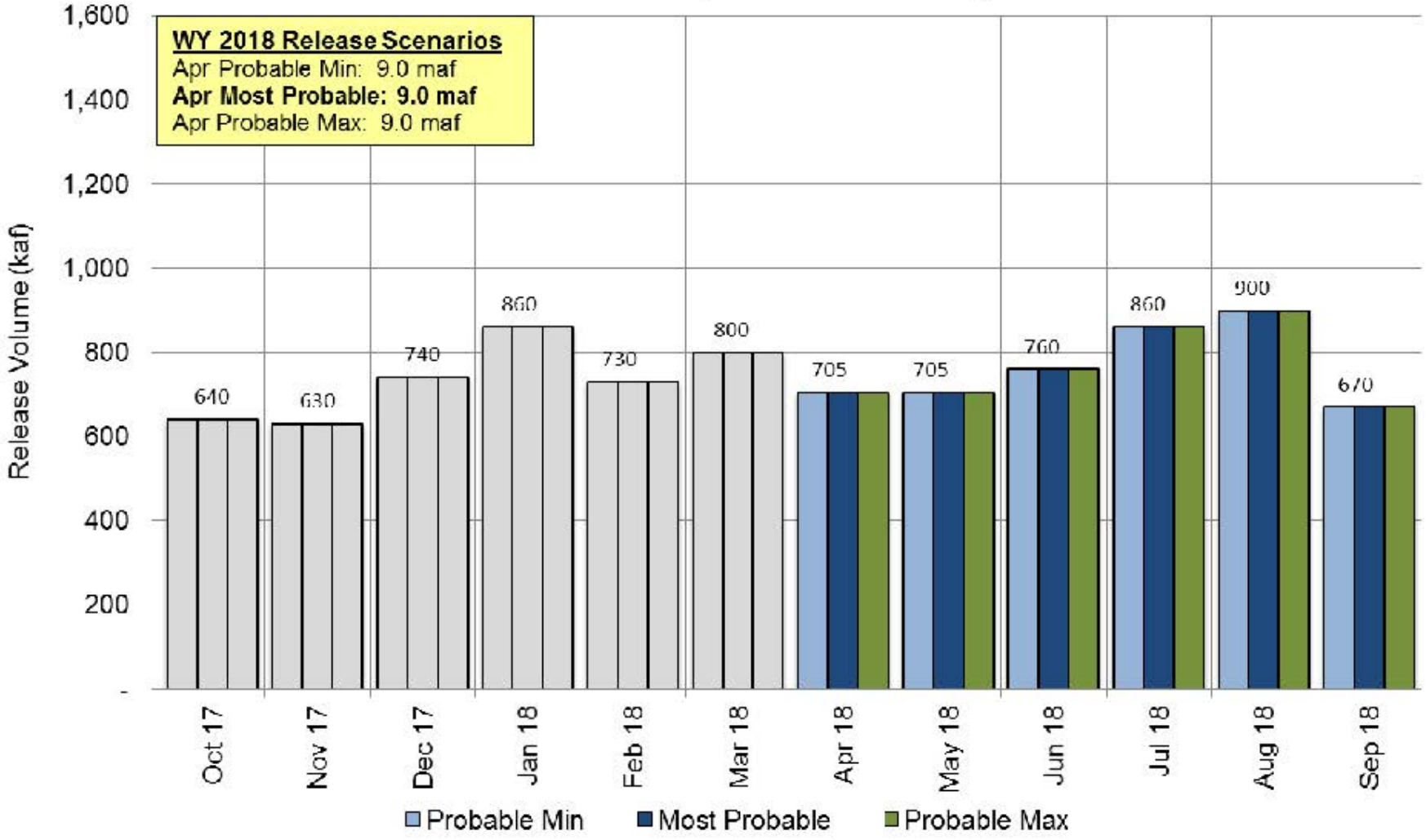


RECLAMATION

Projected Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2018

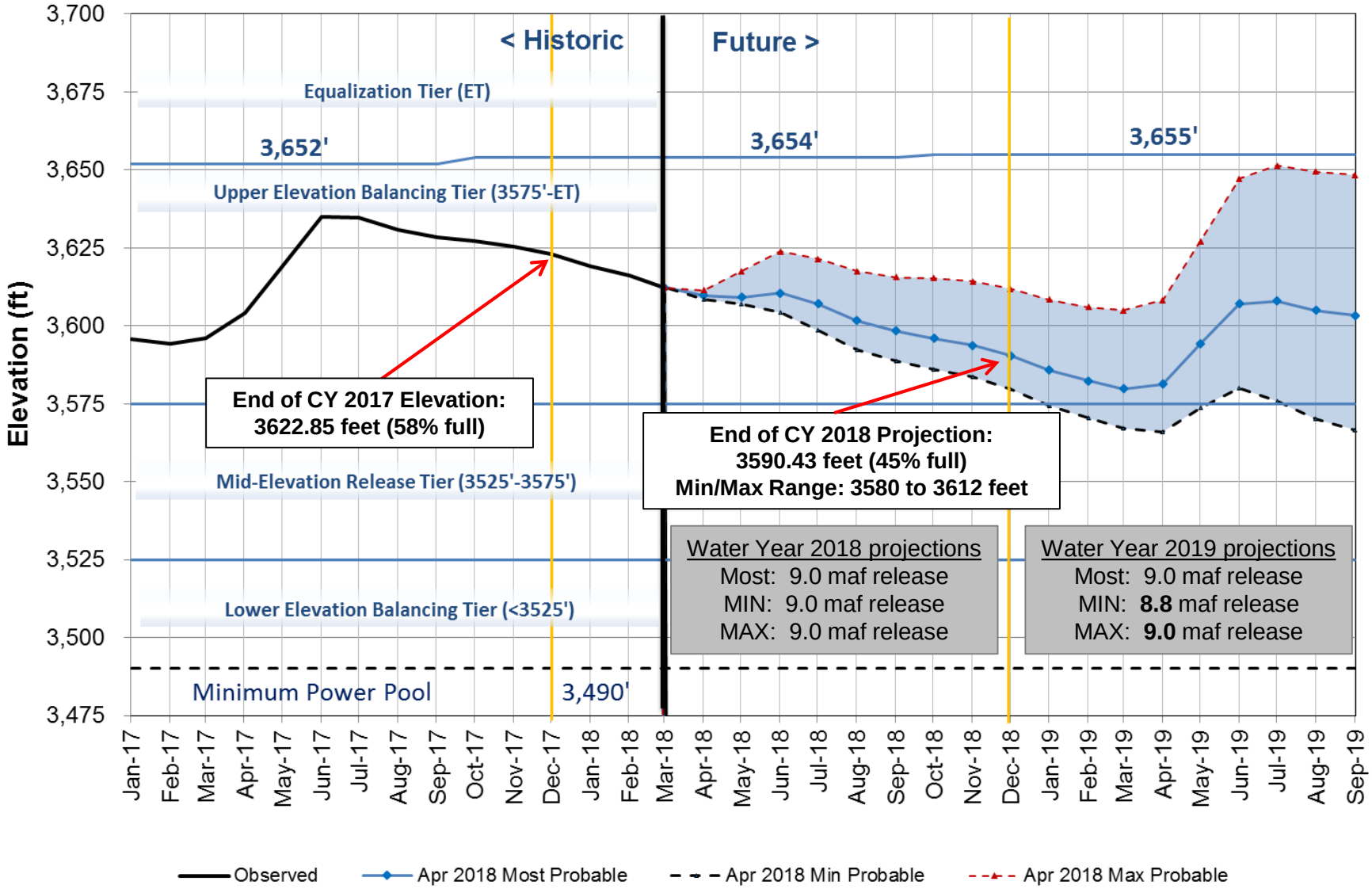
Based on April 2018 modeling



RECLAMATION

Lake Powell End of Month Elevations

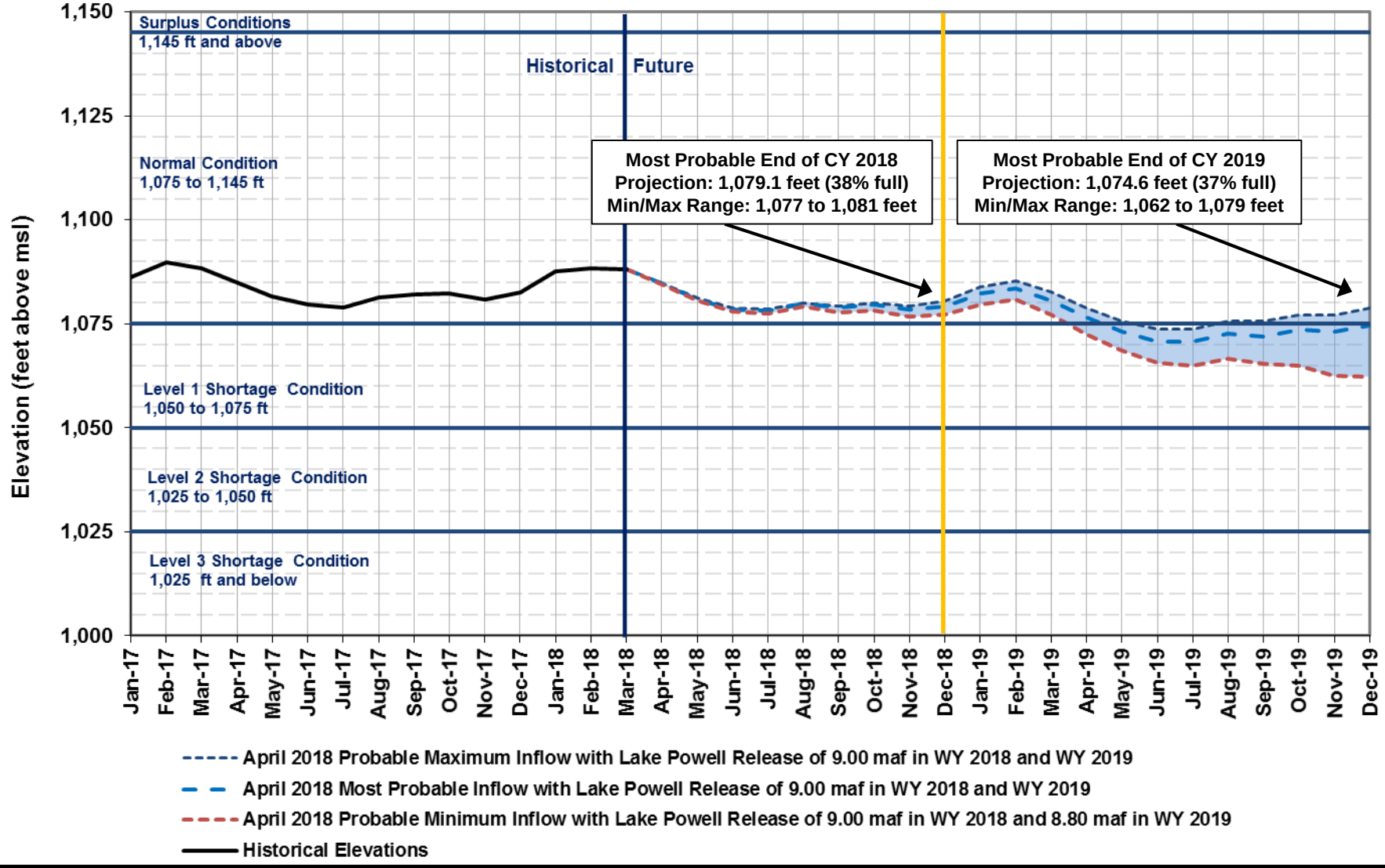
Historic and Projected based on April 2018 Modeling



RECLAMATION

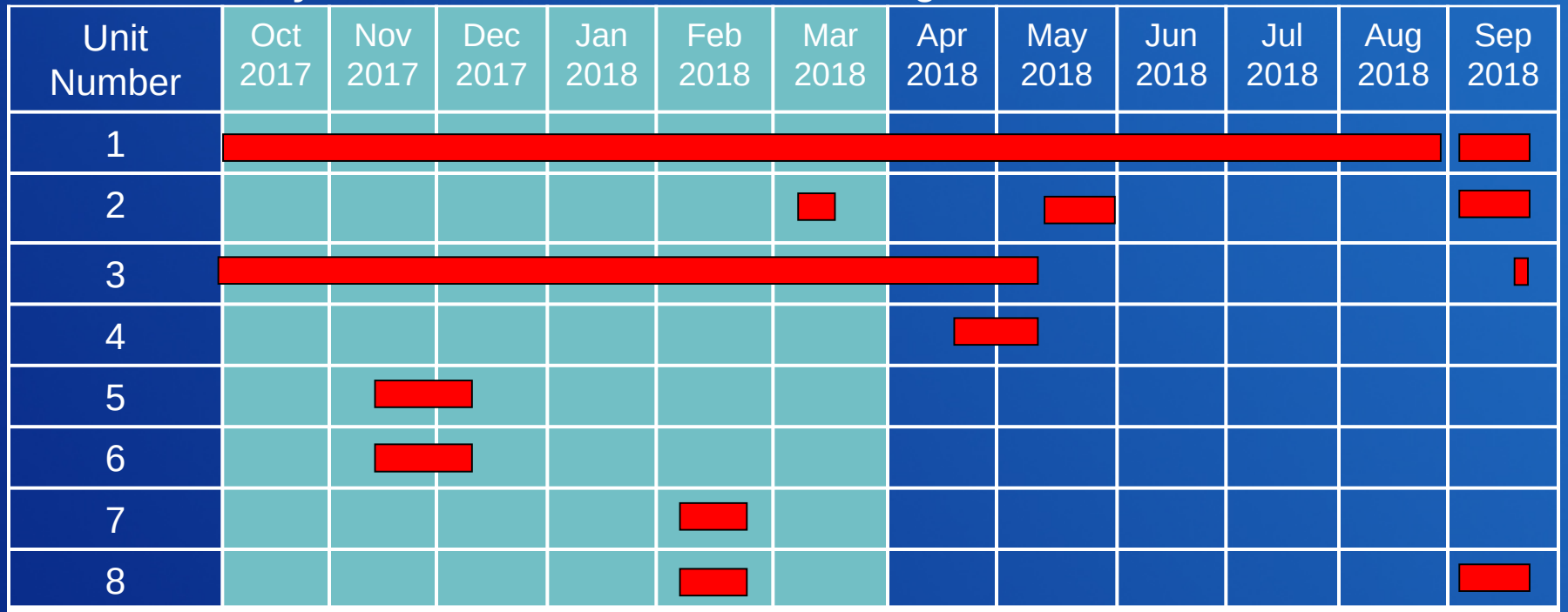
Lake Mead End of Month Elevations

Projections from April 2018 24-Month Study Inflow Scenarios



RECLAMATION

Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2018



Unit Number	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	
Units Available	6	6/4	4/6	6	4/6	5/6	5/6	5/6	7	7	7	5	
Capacity (cfs)	**21,000**	**13,200**	**13,200**	**20,600**	**13,000**	**12,000**	**15,700**	**15,700**	**22,600**	**22,600**	**22,600**	**12,100**	
Capacity (kaf/month)	1,290	970	1,170	1,260	780	1,060	1,130	1,340	1,340	1,390	1,390	1,130	
Max (kaf) [1]	667	630	740	860	730	800	705	705	760	860	900	670	**9.0**
Most (kaf) [2]	640	630	740	860	730	800	705	705	760	860	900	670	**9.0**
Min (kaf) [1]	630	630	740	860	750	780	683	700	760	860	900	670	**9.0**

(updated 4-11-2018)

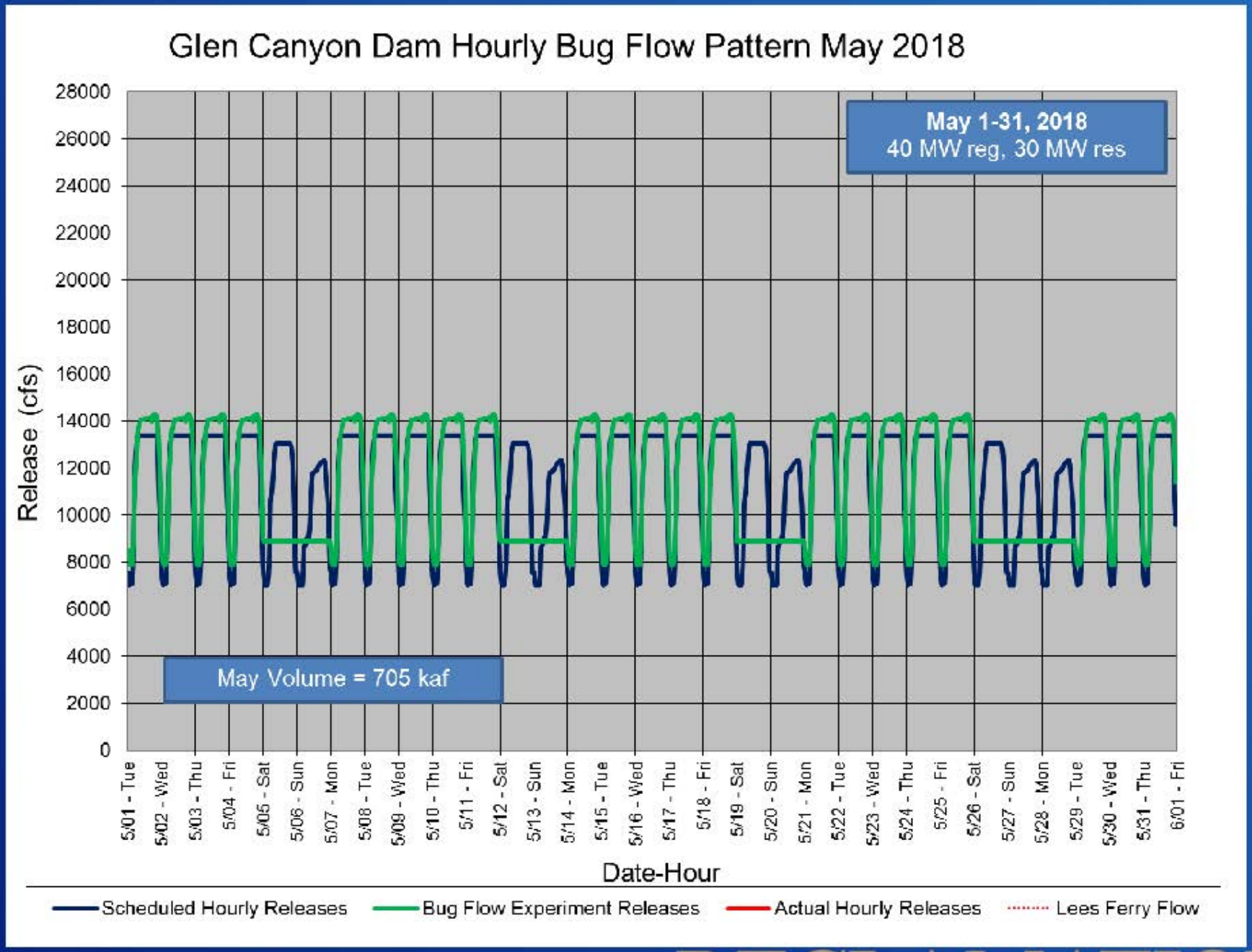
1 **Projected release, based on Apr 2018 Min and Max Probable Inflow Projections and 24-Month Study model runs**

2 **Projected release, based on Apr 2018 Most Probable Inflow Projections and 24-Month Study model runs**

RECLAMATION

Experimental Macroinvertebrate Production Flow (Bug Flow)

- Approved by Assistant Sec. Water & Science on April 13.
  - Experiment is for May through August
  - Steady weekend flows.
  - Normal hydropower production flows during week days.
  - No monthly or weekly volumes flow changes.
  - Week day fluctuating flows follow LTEMP guide lines.



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Water Year 2019 Projected Operations

RECLAMATION

Lake Powell 2019 Operating Tier Scenarios

Based on April 2018 modeling

Inflow Scenario	Operating Tier Release Volume
Minimum Probable	Upper Elevation Balancing 8.8 maf
Most Probable	Upper Elevation Balancing 9.0 maf
Maximum Probable	Upper Elevation Balancing 9.0 maf

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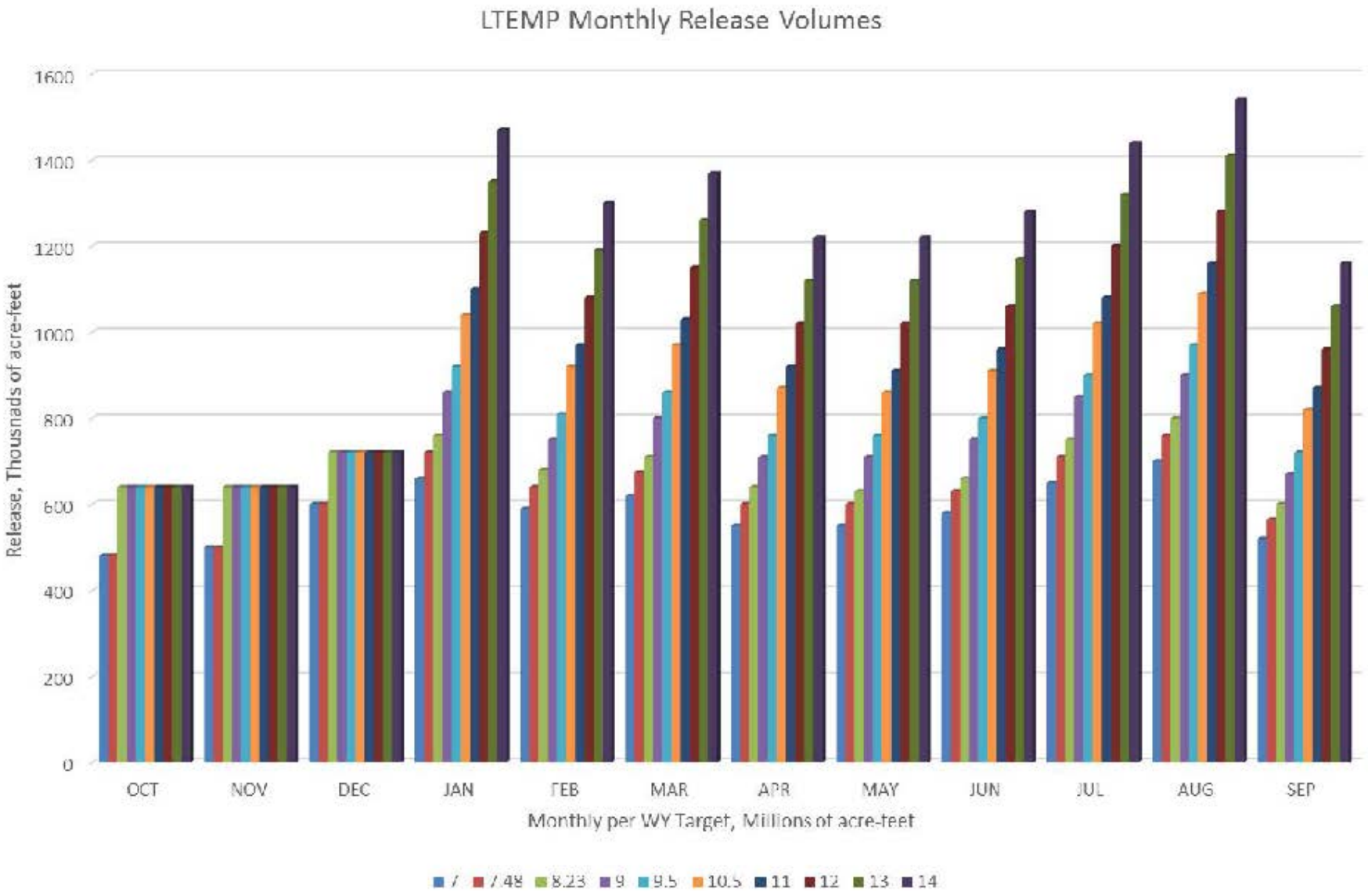

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LTEMP Monthly Release Volumes

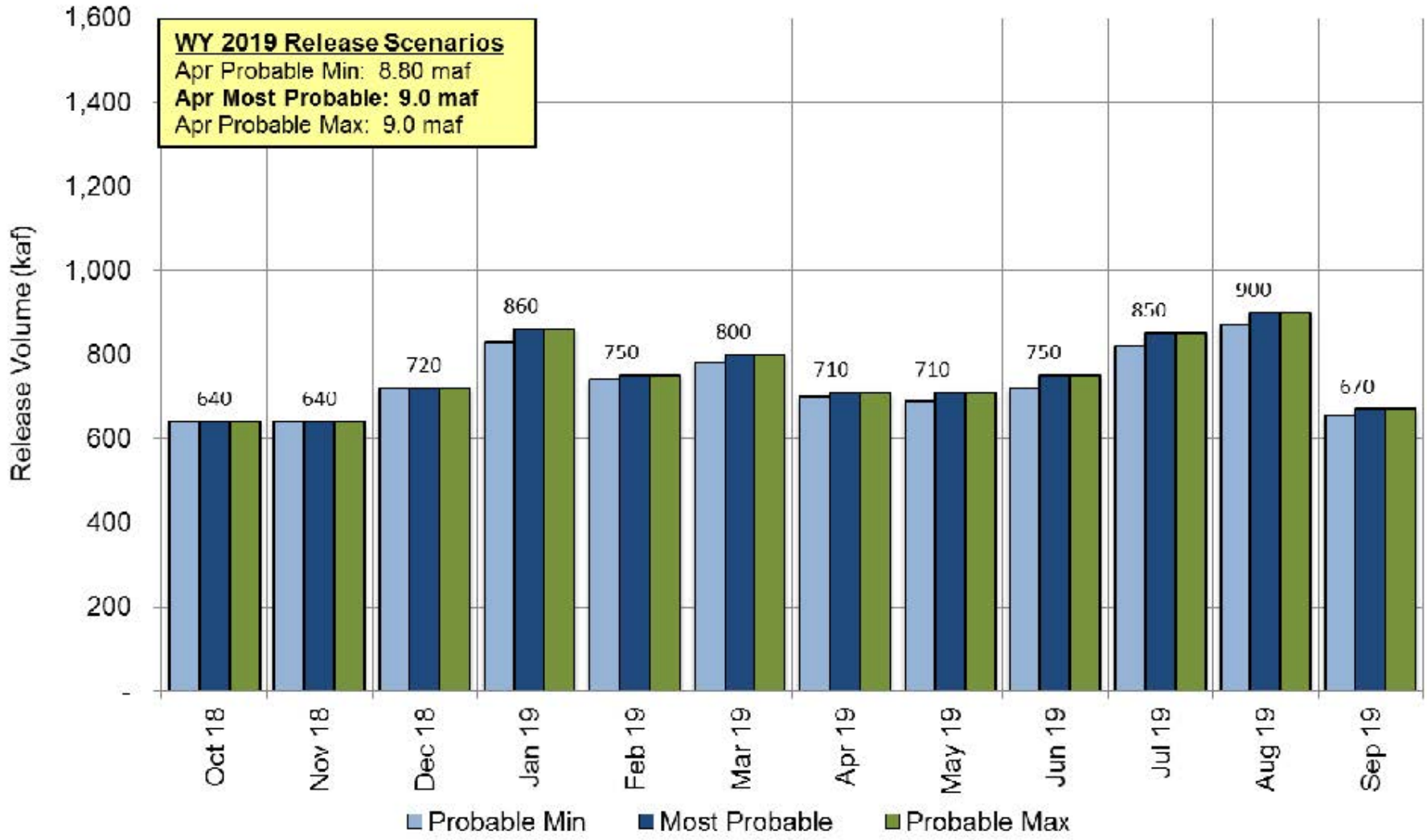
Month	7.00	7.48	8.23	9.00	9.50	10.50	11.00	12.00	13.00	14.00
OCT	480	480	640	640	640	640	640	640	640	640
NOV	500	500	640	640	640	640	640	640	640	640
DEC	600	600	720	720	720	720	720	720	720	720
JAN	660	720	760	860	920	1040	1100	1230	1350	1470
FEB	590	640	680	750	810	920	970	1080	1190	1300
MAR	620	675	710	800	860	970	1030	1150	1260	1370
APR	550	600	640	710	760	870	920	1020	1120	1220
MAY	550	600	630	710	760	860	910	1020	1120	1220
JUN	580	630	660	750	800	910	960	1060	1170	1280
JUL	650	710	750	850	900	1020	1080	1200	1320	1440
AUG	700	760	800	900	970	1090	1160	1280	1410	1540
SEP	520	565	600	670	720	820	870	960	1060	1160

RECLAMATION

Projected Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2019

Based on April 2018 modeling



RECLAMATION

Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2019

Unit Number	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	
1		Possible HFE											
2													
3													
4													
5													
6													
7													
8													
Units Available	6	8	6	6	6	4/6	6	7	8	8	8	6	
Capacity (cfs)	**19,100**	**26,100**	**19,100**	**19,100**	**19,100**	**12,200**	**19,000**	**22,700**	**26,100**	**26.100**	**26,100**	**19,100**	
Capacity (kaf/month)	1,240	1,550	1,200	1,170	1,060	1,140	1,190	1,480	1,550	1,600	1,600	1,180	
Max (kaf) [1]	640	640	720	860	750	800	710	710	750	850	900	670	**9.0**
Most (kaf) [2]	640	640	720	860	750	800	710	710	750	850	900	670	**9.0**
Min (kaf) [1]	640	640	720	830	740	780	700	690	720	820	870	655	**8.8**

(updated 4-11-2018)

1 **Projected release, based on Apr 2018 Min and Max Probable Inflow Projections and 24-Month Study model runs**

2 **Projected release, based on Apr 2018 Most Probable Inflow Projections and 24-Month Study model runs**

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Questions?

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Reclamation, Upper Colorado Region
Resource Management Division
Water Resources Group

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