

**Glen Canyon Dam Adaptive Management Work Group**  
**Agenda Item Information**  
**February 20-21, 2013**

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Agenda Item

Basin Hydrology and Operations

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Action Requested

✓ Information item only.

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Presenter

Katrina Grantz, Hydraulic Engineer, Bureau of Reclamation, Upper Colorado Region

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Previous Action Taken

N/A

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Relevant Science

N/A

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Background Information

The presentation is intended to provide pertinent information to AMWG members on current water supply and forecasted hydrologic conditions within the Upper Colorado River Basin. The presentation will focus on projected reservoir conditions and operations at Lake Powell/Glen Canyon Dam for the remainder of water year 2013 and provide a general outlook for 2014.

The presentation will cover the implementation of the *Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations of Lake Powell and Lake Mead* and the potential for equalization releases from Lake Powell in water year 2014. Such information is provided to assist the AMWG in developing recommendations to the Secretary on the operation of Glen Canyon Dam for water year 2014.

# RECLAMATION

*Managing Water in the West*

## Upper Basin Hydrology and Projected Operations 2013

Adaptive Management Work Group  
February 20-21, 2013



U.S. Department of the Interior  
Bureau of Reclamation

# Lake Powell & Lake Mead

## Operational Diagrams for 2013 (projected in Aug 2012)

Lake Powell			Lake Mead		
Elevation (feet)	Operations According to Interim Guidelines	Live Storage (MAF)	Elevation (feet)	Operations According to Interim Guidelines	Live Storage (MAF)
3,700	Equalization Tier Equalize, Avoid Spills or Release 8.23 MAF	24.3	1,220	Flood Control, 70R or ICS Surplus	25.9
3,636 - 3,666 (2008-2026)		15.5 - 19.3 (2008-2026)	1,200		22.9
	<b>Upper Elevation Balancing Tier<sup>1</sup></b>			Domestic or ICS Surplus	
<b>3,615</b> <b>1/1/13</b> <b>Projection</b>	Release 8.23 MAF; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 MAF	<b>13.2</b> <b>1/1/13</b> <b>Projection</b>	1,145		15.9
			<b>1,119</b> <b>1/1/13</b> <b>Projection</b>	<b>Normal Operations or ICS Surplus</b>	<b>13.5</b> <b>1/1/13</b> <b>Projection</b>
3,575		9.5	1,075		9.4
	<b>Mid-Elevation Release Tier</b>			Shortage 333 KAF <sup>2</sup>	
	Release 7.48 MAF; if Lake Mead < 1,025 feet, Release 8.23 MAF;		1,050		7.5
3,525		5.9		Shortage 417 KAF <sup>2</sup>	
	<b>Lower Elevation Balancing Tier</b>		1,025		5.8
	Balance contents with a min/max release of 7.0 and 9.5 MAF			Shortage 500 KAF <sup>2</sup> and Consultation <sup>3</sup>	
3,490		4.0	1,000		4.3
3,370		0	895		0

<sup>1</sup> Subject to April adjustments that may result in balancing releases or releases according to the Equalization Tier.

<sup>2</sup> These are amounts of shortage (i.e., reduced deliveries in the United States).

<sup>3</sup> If Lake Mead falls below elevation 1,025 ft, the Department will initiate efforts to develop additional guidelines for shortages at lower Lake Mead elevations.

# RECLAMATION

# WY2013 Operations under Interim Guidelines

as projected in August 2012 24-Month Study

Scenario	Initial Operational Tier	Projected Annual Release Volume
Minimum Probable	Upper Elevation Balancing	8.23 maf
Most Probable	Upper Elevation Balancing	8.23 maf
Maximum Probable	Upper Elevation Balancing*	11.21 maf

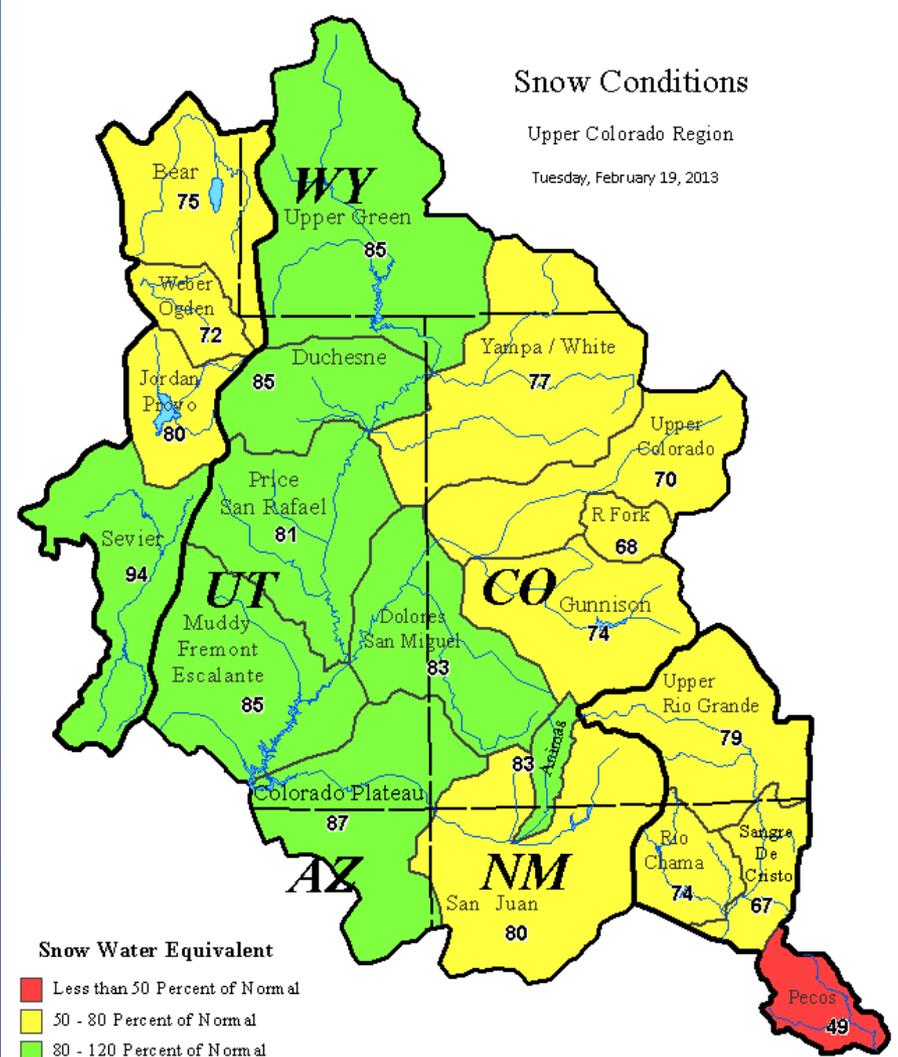
\* Upper Elevation Balancing with a projected April adjustment to equalization with Lake Powell September 30, 2013 elevation governing.



# Snow Conditions

Upper Colorado Region

Tuesday, February 19, 2013



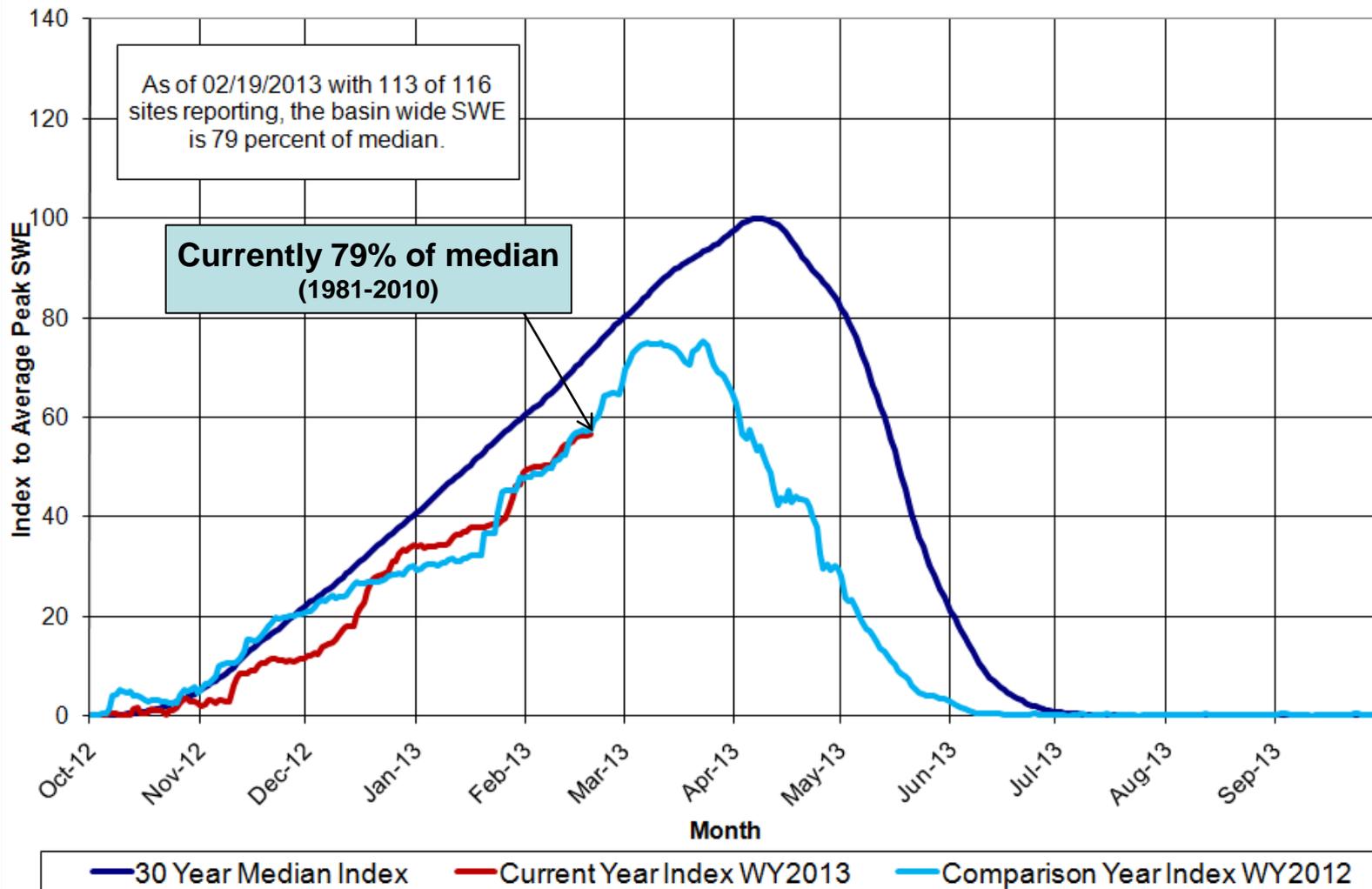
### Snow Water Equivalent

- Less than 50 Percent of Normal
- 50 - 80 Percent of Normal
- 80 - 120 Percent of Normal
- 120 - 150 Percent of Normal
- Greater than 150 Percent of Normal

Upper Colorado  
**GIS**  
Region

Data Provided by the Natural Resource Conservation Service

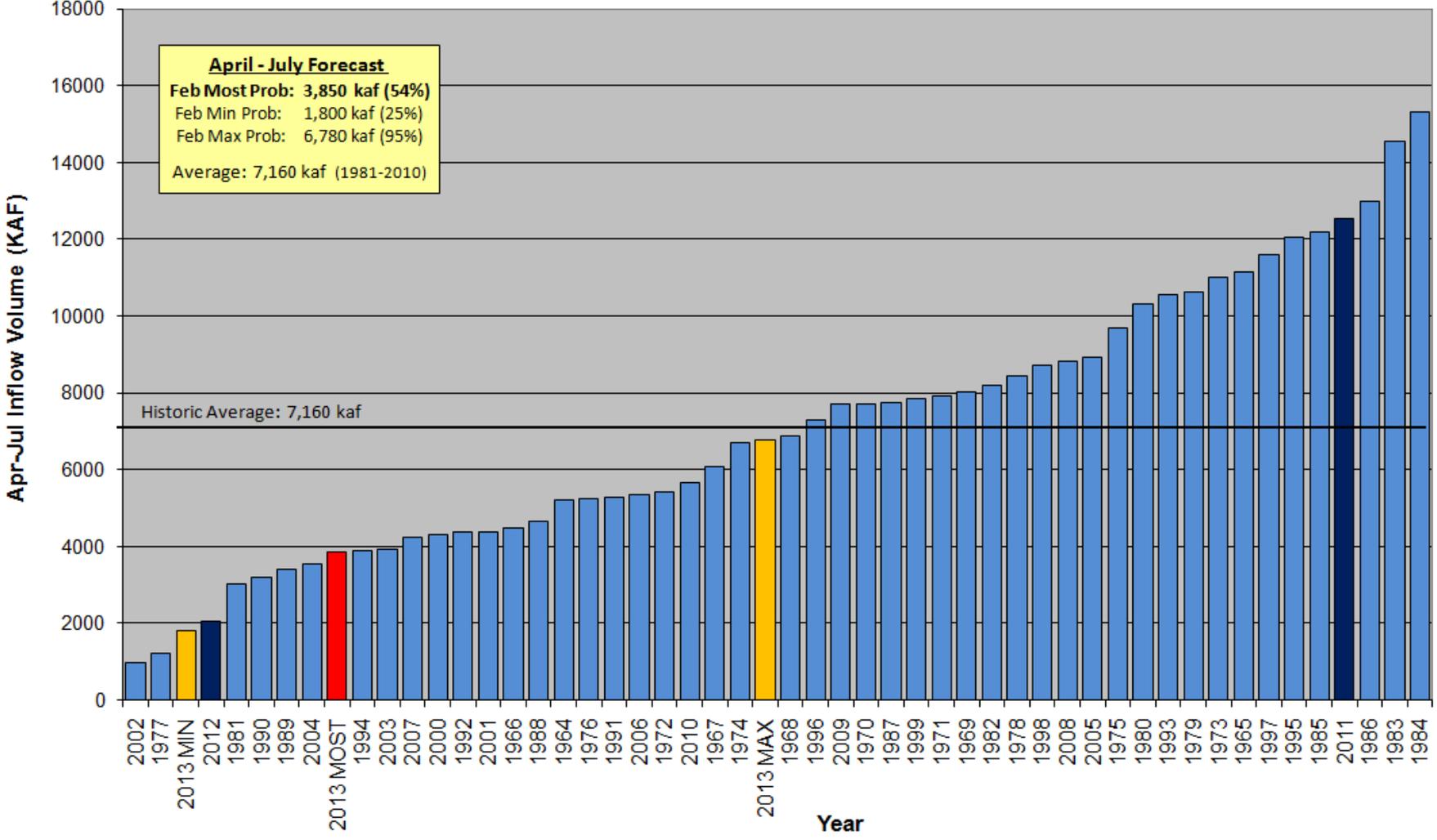
## Upper Colorado River Basin Snotel Tracking Aggregate of 115 Snotel Sites above Lake Powell



Data Provided by the Natural Resource Conservation Service

# Powell Unregulated Inflow

Apr-Jul 2013 Forecast (Feb 1)  
Comparison with History



# WY2013 Operations under Interim Guidelines

as projected in January and February 2013 24-Month Studies

Scenario	Initial Operational Tier	Projected Annual Release Volume
Minimum Probable <sup>1</sup>	Upper Elevation Balancing	8.23 maf
Most Probable <sup>2</sup>	Upper Elevation Balancing	8.23 maf
Maximum Probable <sup>1</sup>	Upper Elevation Balancing	8.23 maf

Currently, no inflow scenario projects an April adjustment to equalization

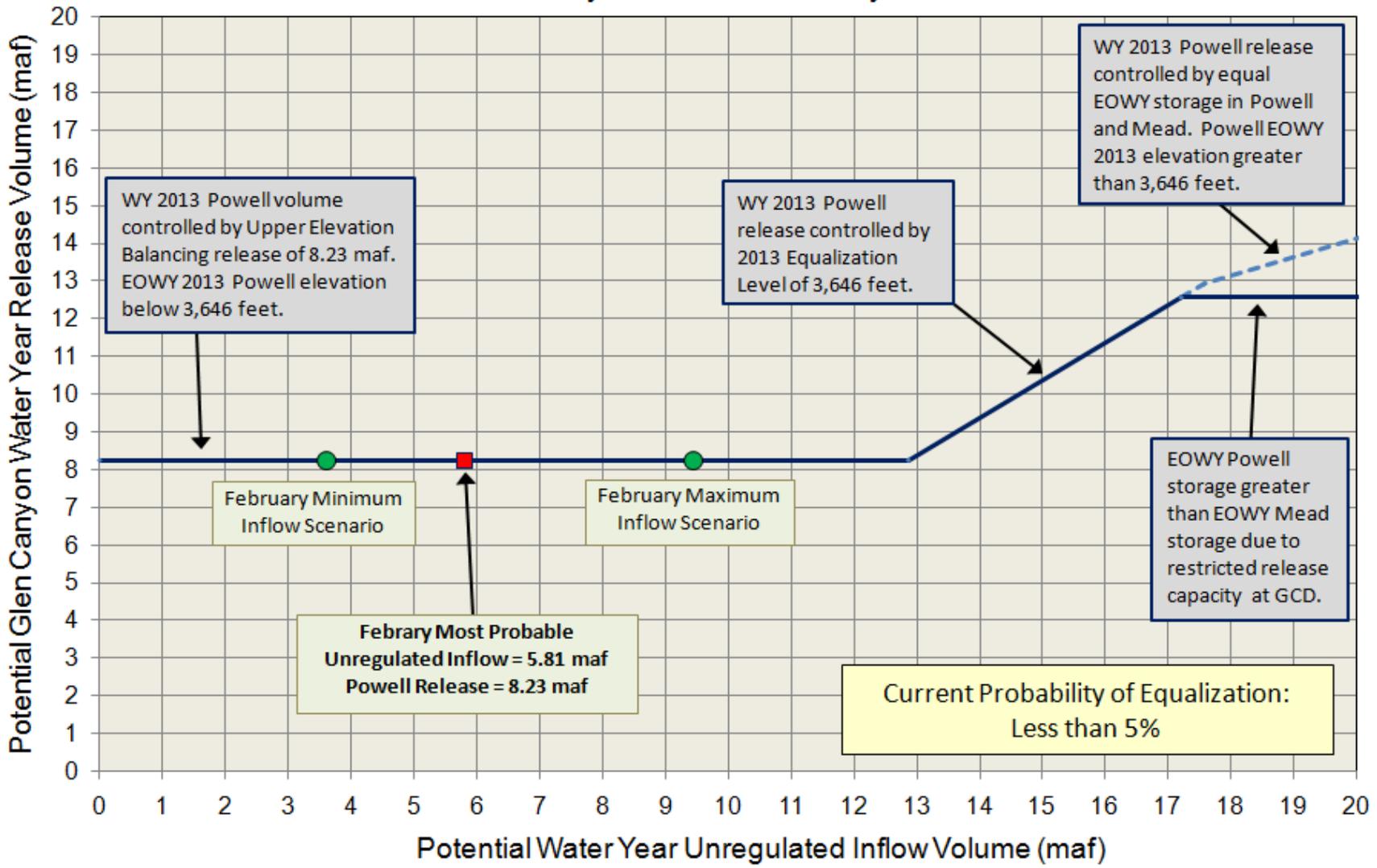
<sup>1</sup> Based on January 24-Month Study

<sup>2</sup> Based on February 24-Month Study

RECLAMATION

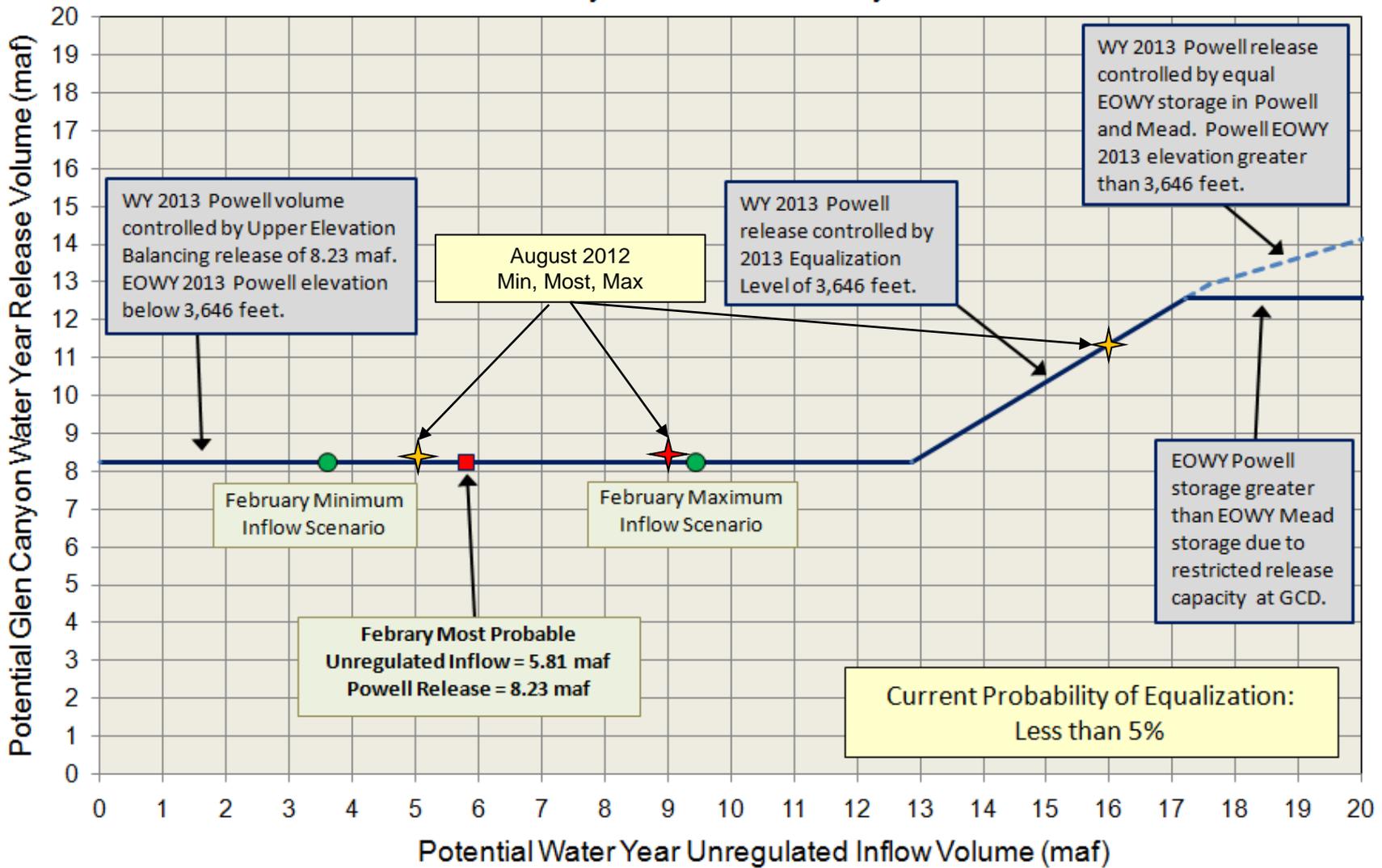
# Coordinated Operations of Lake Powell and Lake Mead

## Water Year 2013 Release Volume as a Function of Unregulated Inflow Volume based on February 2013 24-Month Study Conditions



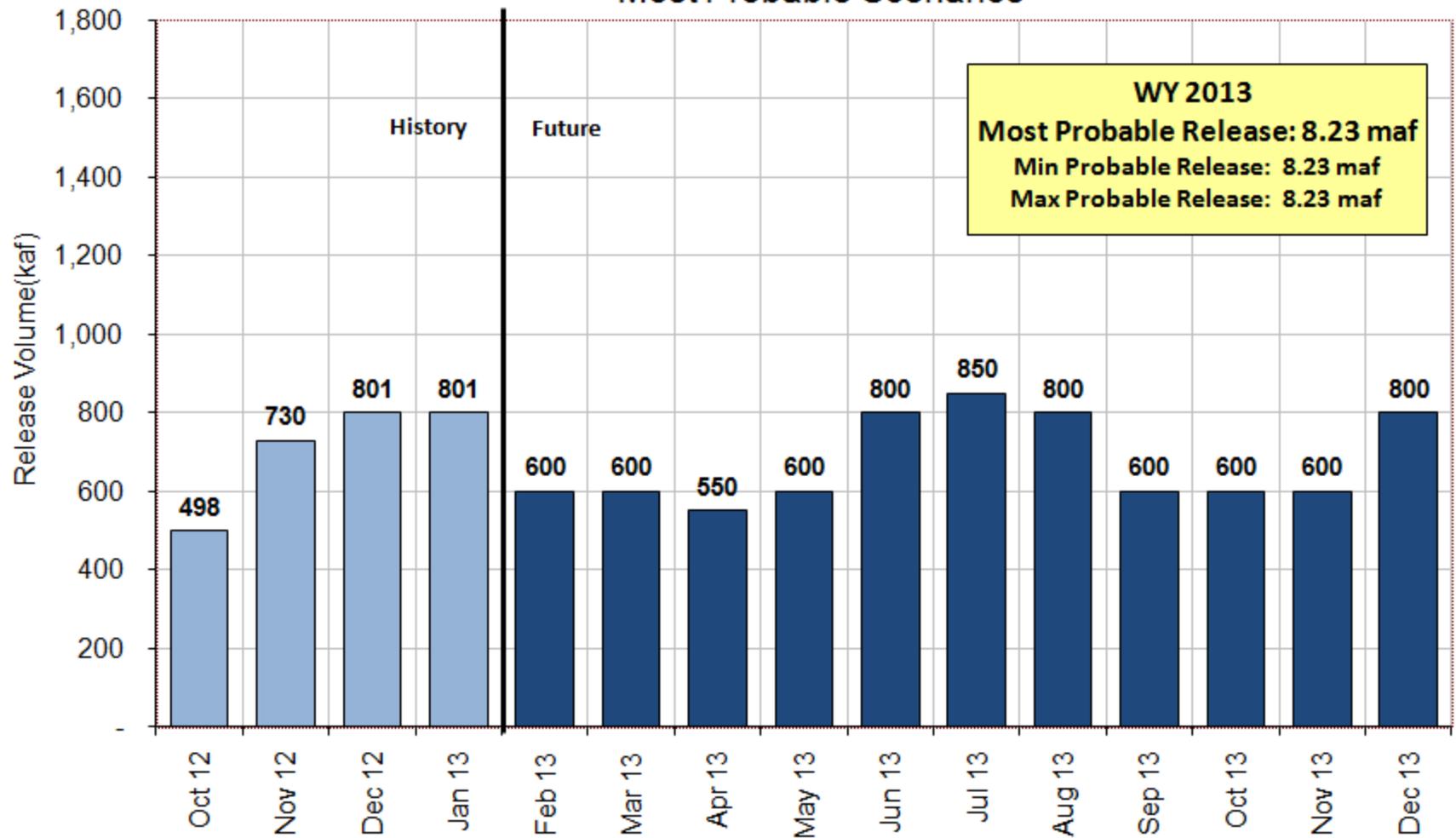
# Coordinated Operations of Lake Powell and Lake Mead

## Water Year 2013 Release Volume as a Function of Unregulated Inflow Volume based on February 2013 24-Month Study Conditions



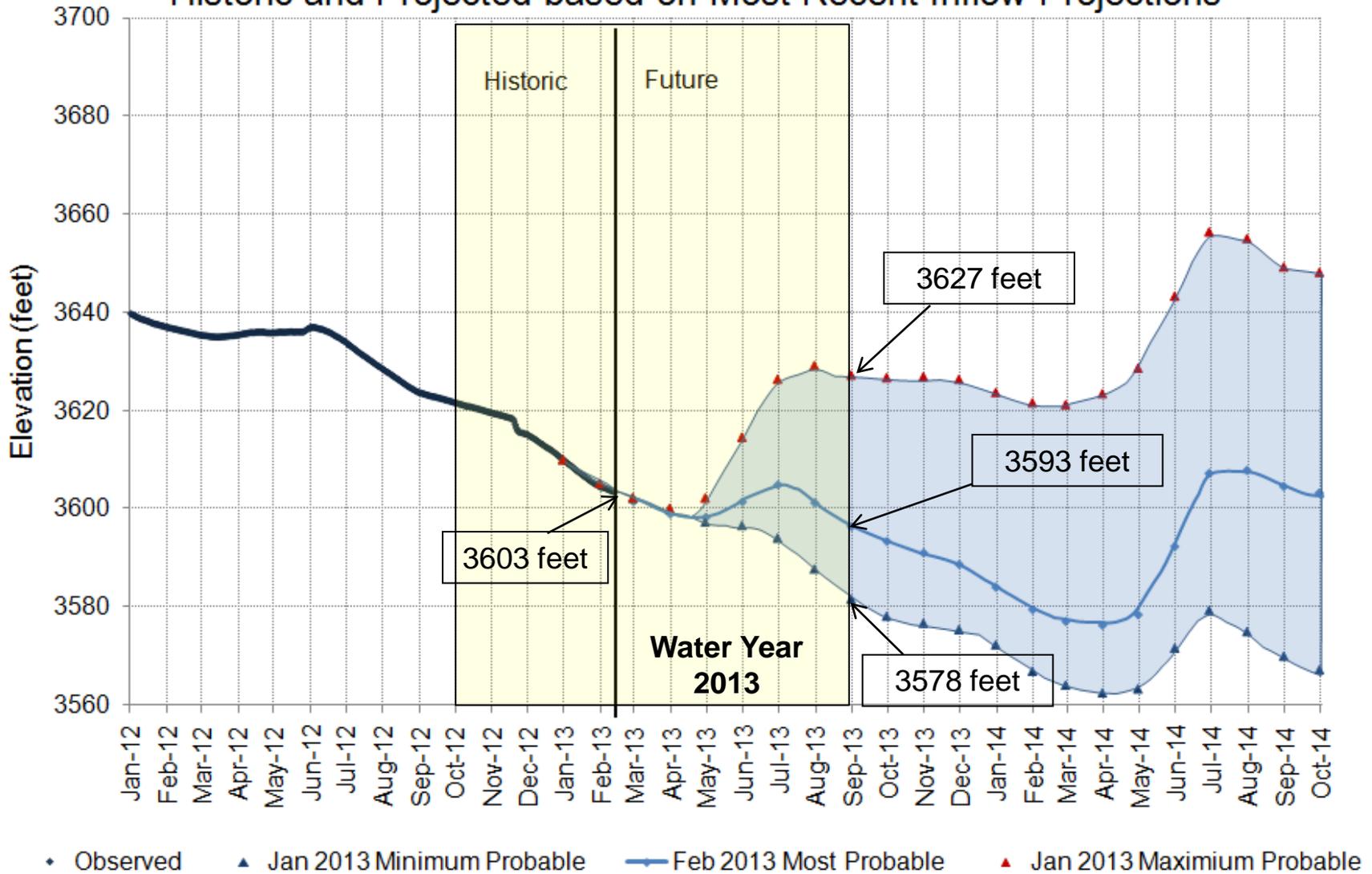
# Lake Powell Monthly Release Volume Distribution

February 2013 24-Month Study  
Most Probable Scenarios



# Lake Powell Elevations

Historic and Projected based on Most Recent Inflow Projections



# Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2013

Unit Number	Oct 2012	Nov 2012	Dec 2012	Jan 2013	Feb 2013	Mar 2013	Apr 2013	May 2013	Jun 2013	Jul 2013	Aug 2013	Sep 2013
1												
2												
3												
4												
5												
6 (3/4 Unit)												
7												
8												
Units Available	5	8 7	7	7	5	6 7	7	6	7	7	7	6
Capacity (cfs)	19,500	25,200 21,700	21,800	21,600	14,800	18,000 21,600	21,600	18,000	21,600	21,600	21,600	18,000
Capacity (kaf/month)	1310	1380	1290	1290	920	1220	1290	1210	1290	1330	1330	1210
Max (kaf) <sup>1</sup>	--	--	--	--	600	600	550	600	800	850	800	600
Most (kaf) <sup>2</sup>	494	730	801	801	600	600	550	600	800	850	800	600
Min (kaf) <sup>1</sup>	--	--	--	--	600	600	550	600	800	850	800	600

<sup>1</sup> Based on Jan 2013 Min/Max probable 24-Month Study

<sup>2</sup> Based on Feb 2013 Most probable 24-Month Study.

(updated 2-19-2013)

# RECLAMATION

# Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2014

Unit Number	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014	Jul 2014	Aug 2014	Sep 2014
1												
2												
3												
4												
5												
6 (3/4 Unit)												
7												
8												
Units Available	5	7	7	7	5	6	6	5	6	6	6	5
Capacity (cfs)		21,600 <sup>3</sup>										
Capacity (kaf/month)												
Max (kaf) <sup>1</sup>	600	600	800	800	600	600	600	600	650	850	900	630
Most (kaf) <sup>2</sup>	600	600	800	800	600	600	600	600	650	850	900	630
Min (kaf) <sup>1</sup>	480	500	600	800	600	600	500	600	600	800	800	600

<sup>1</sup> Based on Jan 2013 Min/Max probable 24-Month Study

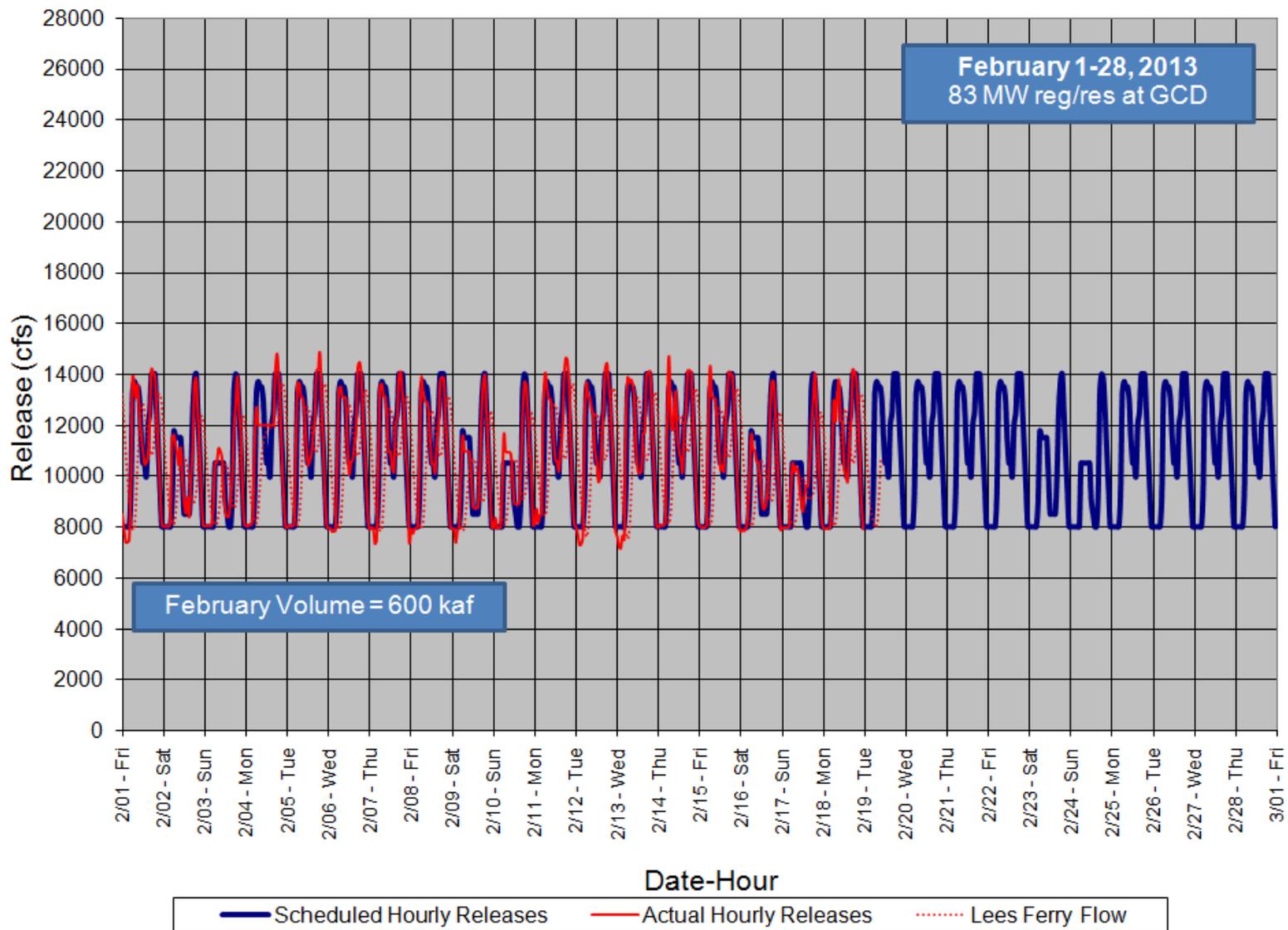
<sup>2</sup> Based on Feb 2013 Most probable 24-Month Study.

<sup>3</sup> Total release during a HFE = Capacity +15,000 cfs of bypass (e.g., Nov 2013 Total Possible Release = ~36,600 cfs)

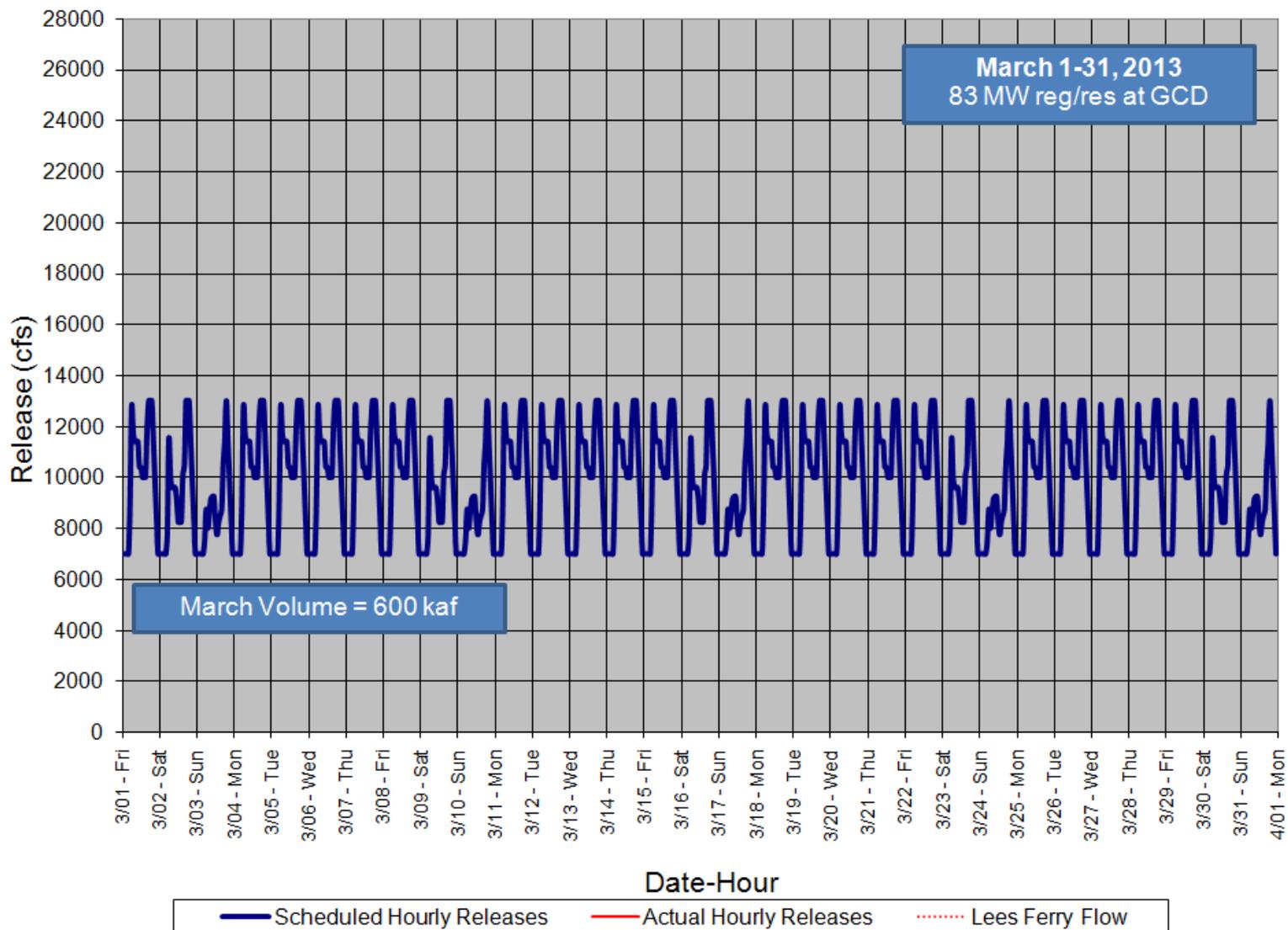
(updated 2-19-2013)

# RECLAMATION

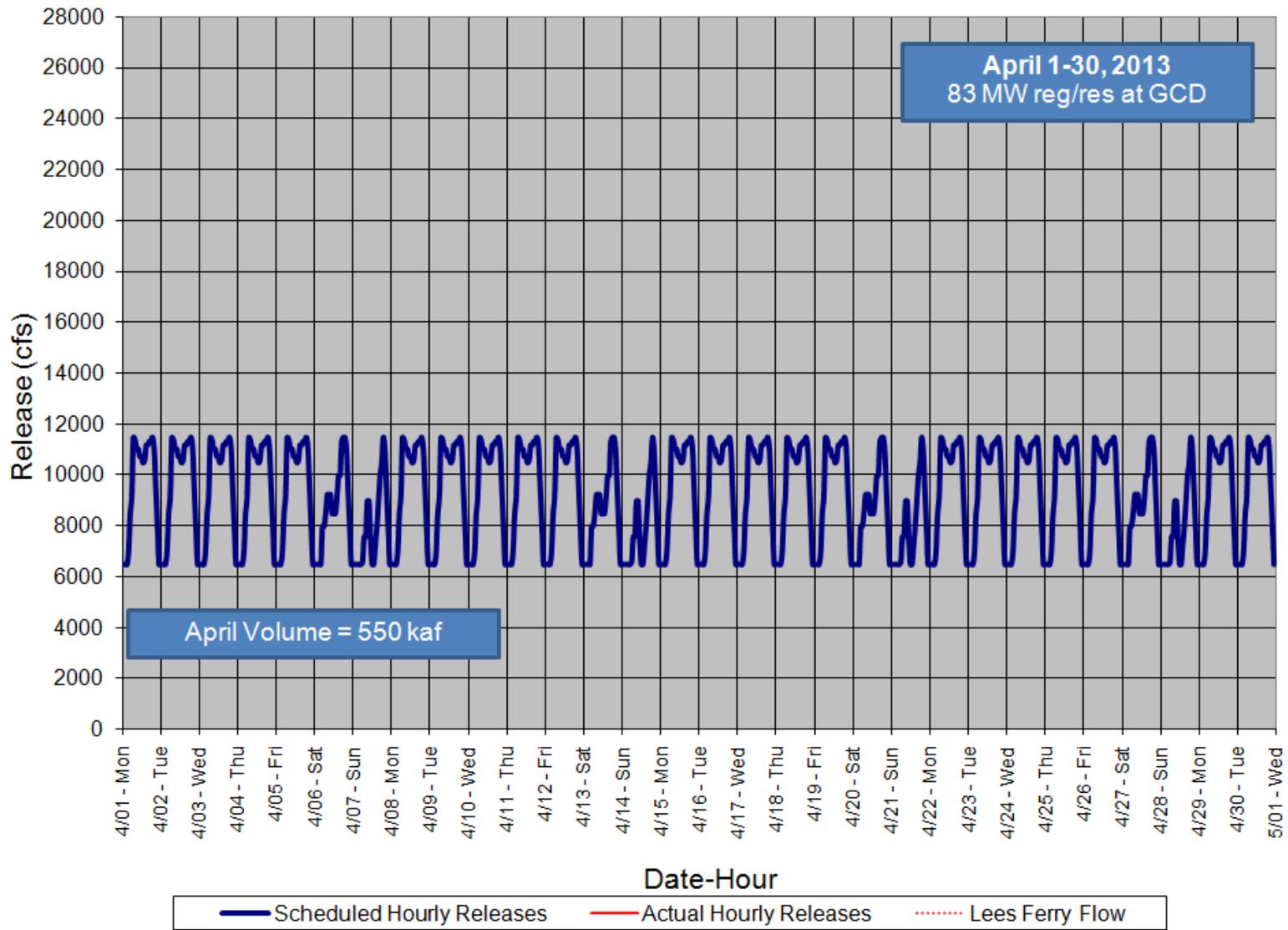
# Glen Canyon Dam Hourly Release Pattern FEB 2013



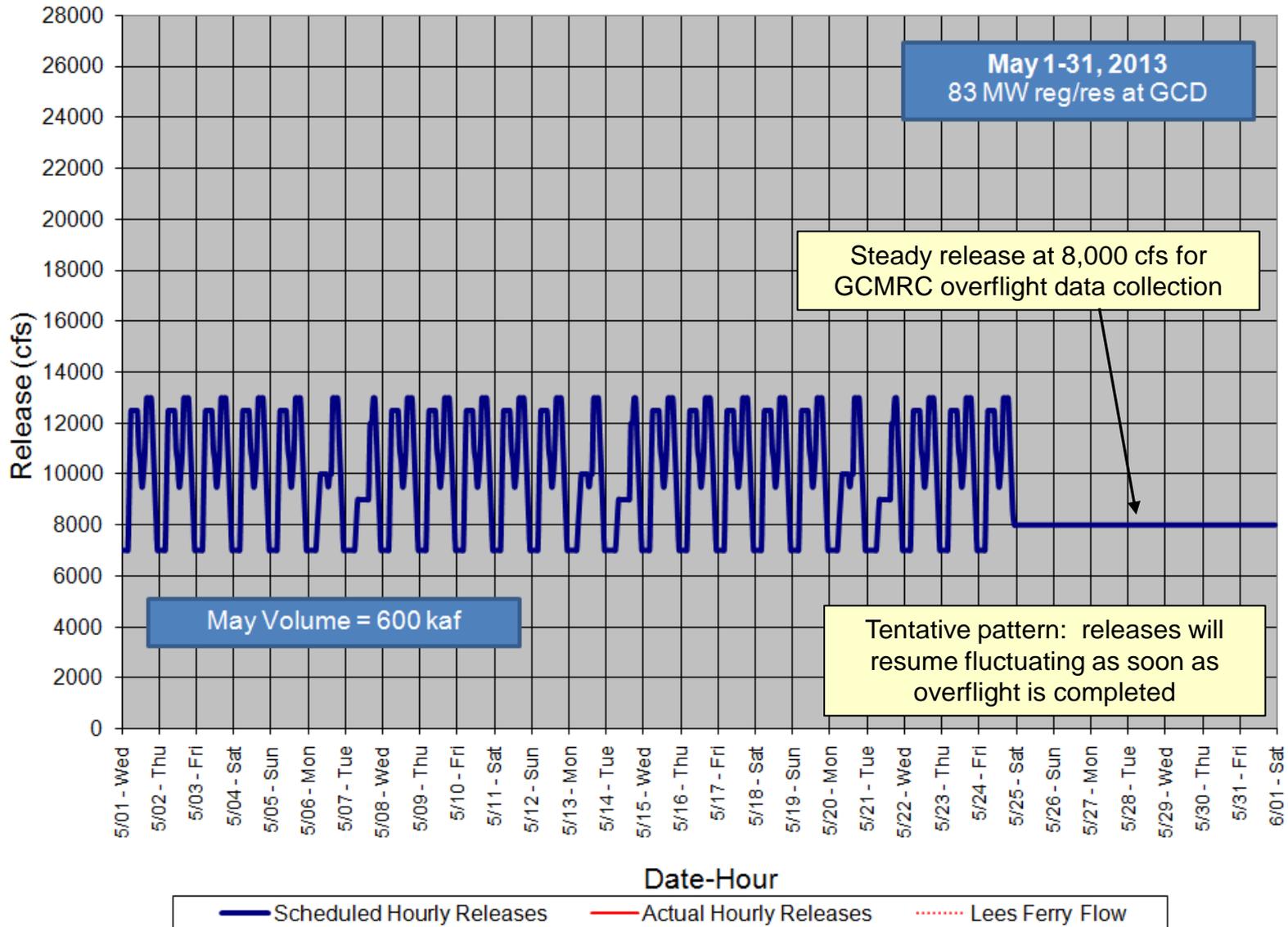
# Glen Canyon Dam Hourly Release Pattern MAR 2013



# Glen Canyon Dam Hourly Release Pattern APR 2013



# Glen Canyon Dam Hourly Release Pattern MAY 2013



# Questions

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