

**Glen Canyon Dam Adaptive Management Work Group**  
**Agenda Item Information**  
**February 9-10, 2011**

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Agenda Item

Basin Hydrology and Operations

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Action Requested

✓ Information item only.

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Presenters

Heather Patno, Flaming Gorge Dam Hydraulic Engineer, Water Resources Group, Upper Colorado Region, Bureau of Reclamation

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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 during water year 2011 and provide a general outlook for 2012.

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 2011. Such information is provided to assist the AMWG in developing recommendations to the Secretary on the operation of Glen Canyon Dam, particularly when such recommendations are near-term in nature.

# RECLAMATION

*Managing Water in the West*

## Upper Basin Hydrology and Projected Operations 2011

Adaptive Management Work Group  
February 9-10, 2011

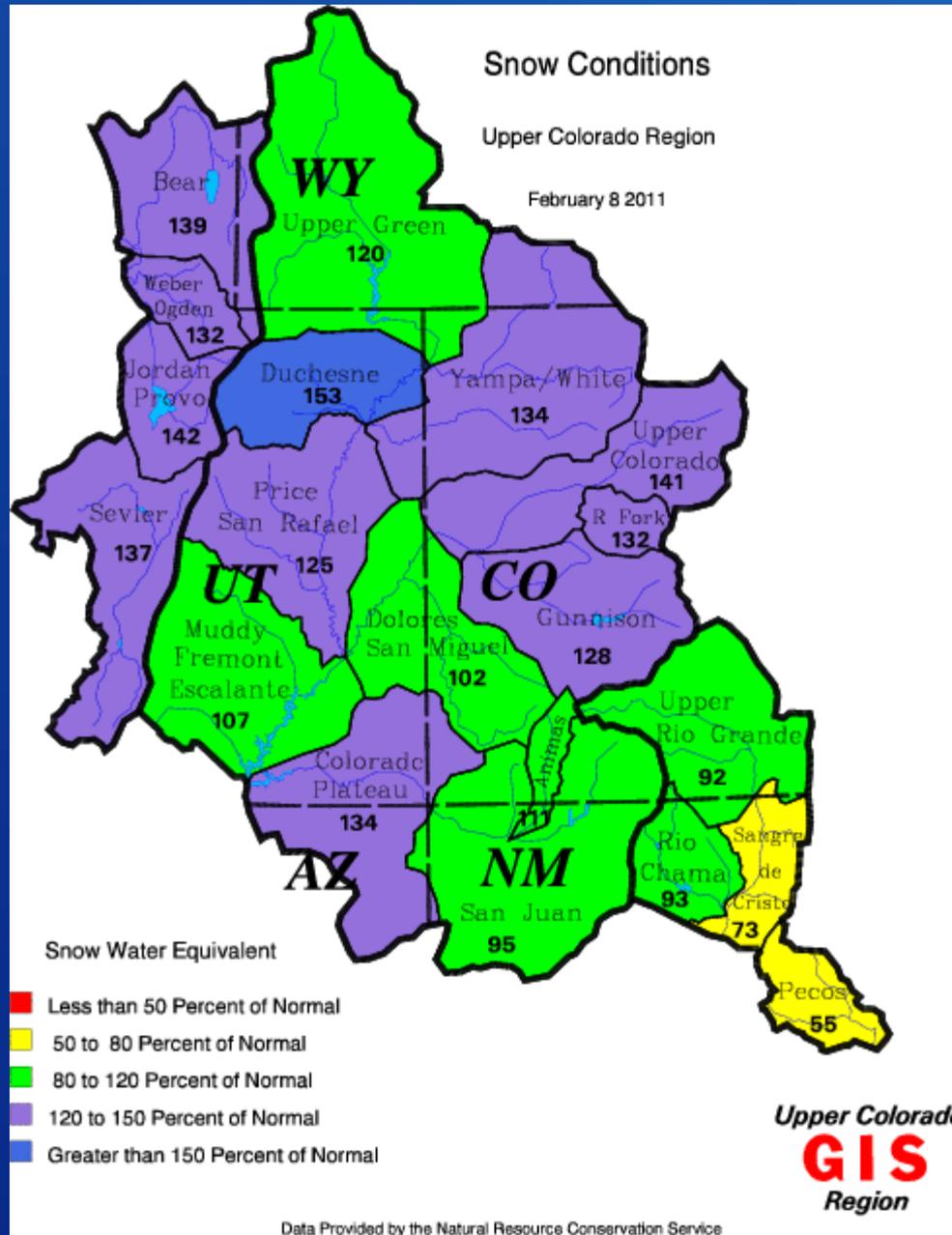


U.S. Department of the Interior  
Bureau of Reclamation

# Snow Conditions

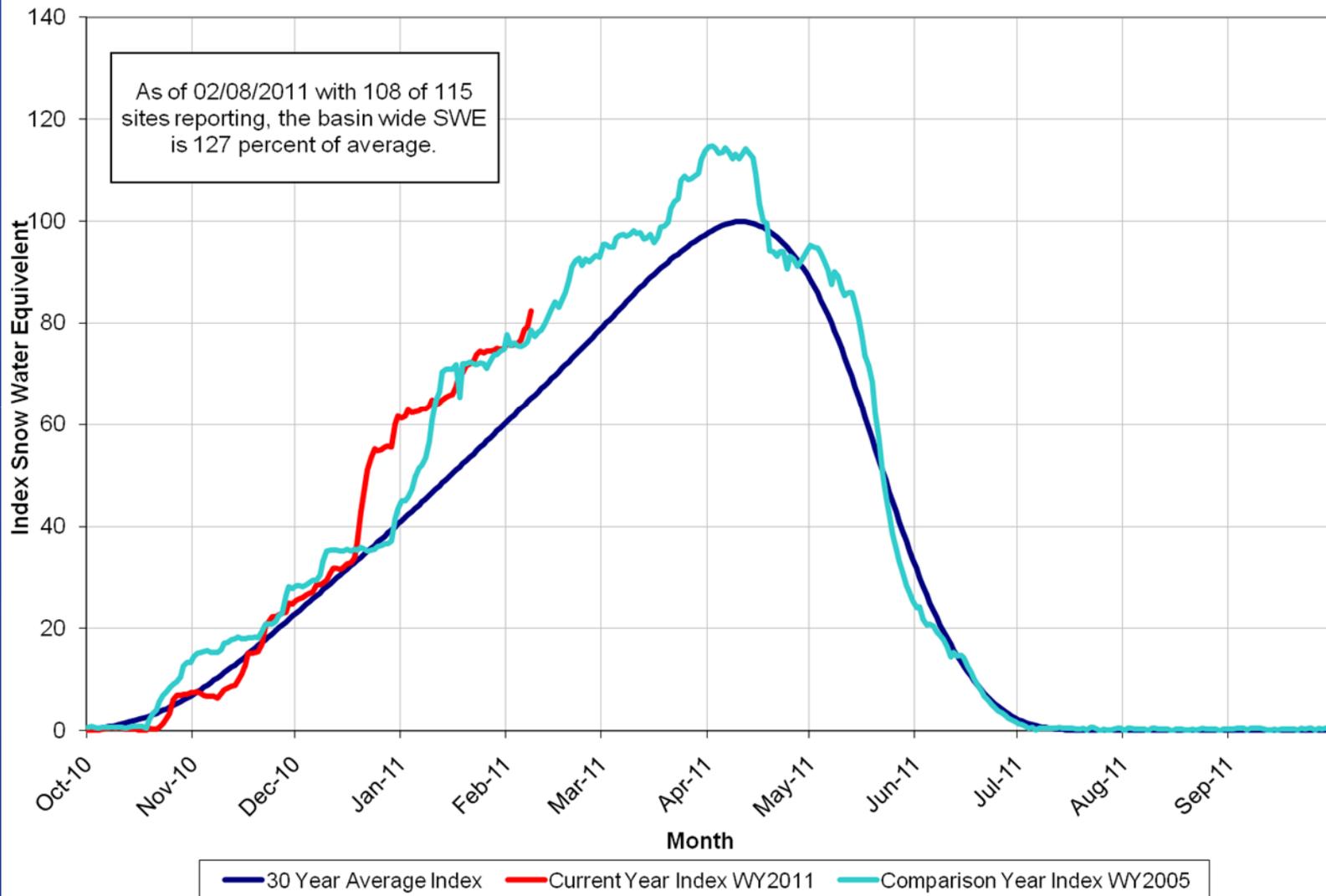
Upper Colorado Region

February 8 2011

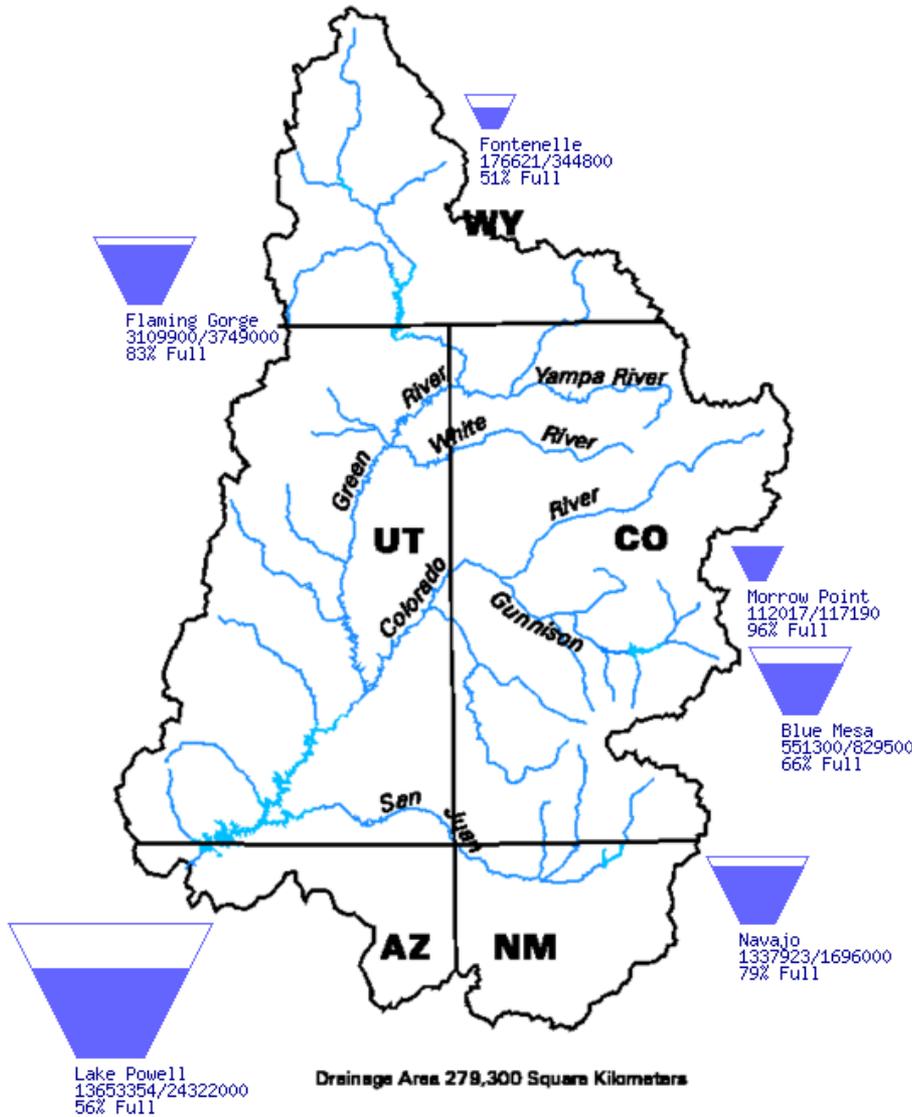


# RECLAMATION

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

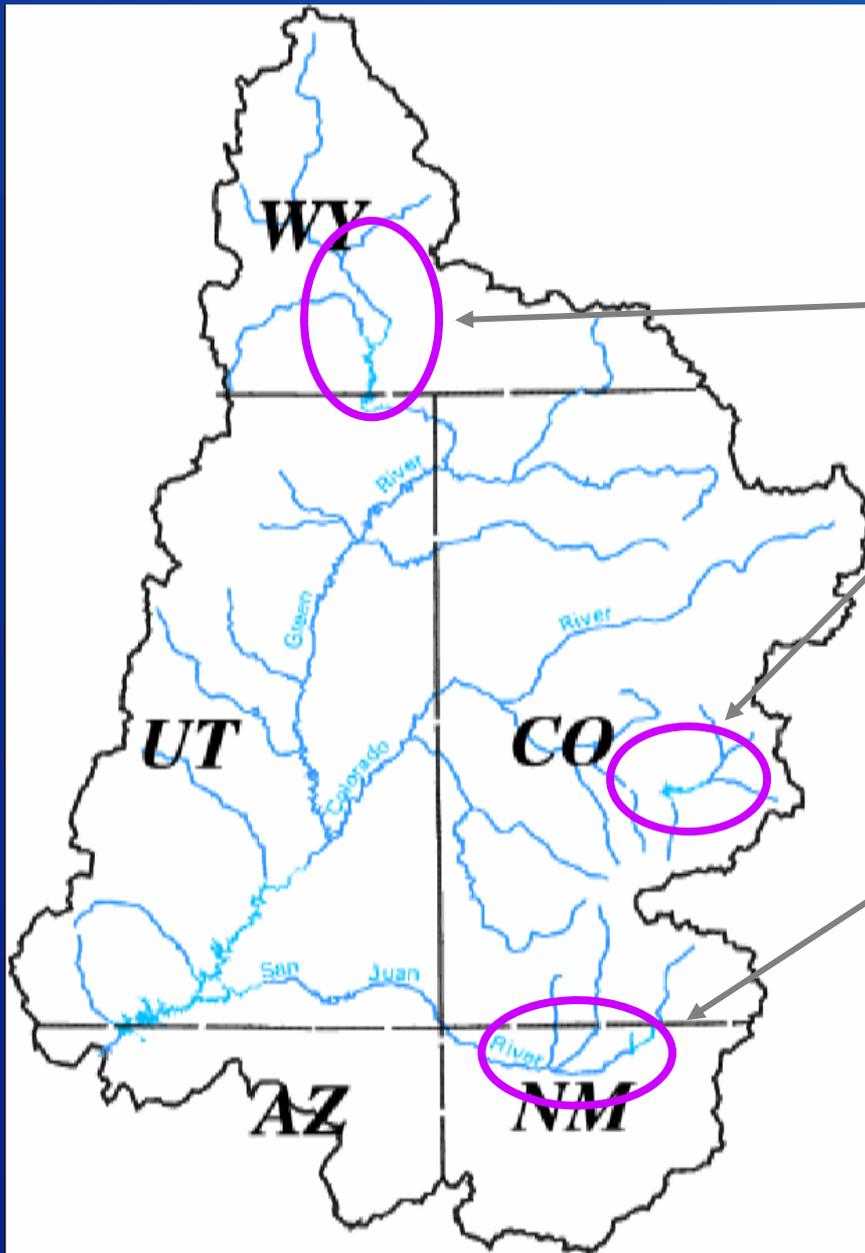


# Upper Colorado River Drainage Basin



# Projected Upper Basin Operations

January 24-Month Study (Most Probable)



## Green River at Flaming Gorge Reservoir

Apr-July Unreg Inflow = 1200 kaf (101% avg)  
Release = 567 kaf

## Gunnison River at Crystal Reservoir

Apr-July Unreg Inflow = 995 kaf (109% avg)  
Release = 629 kaf

## San Juan River at Navajo Reservoir

Apr-July Unreg Inflow = 830 kaf (106% avg)  
Release = 483 kaf

RECLAMATION

# Projected Upper Basin Operations

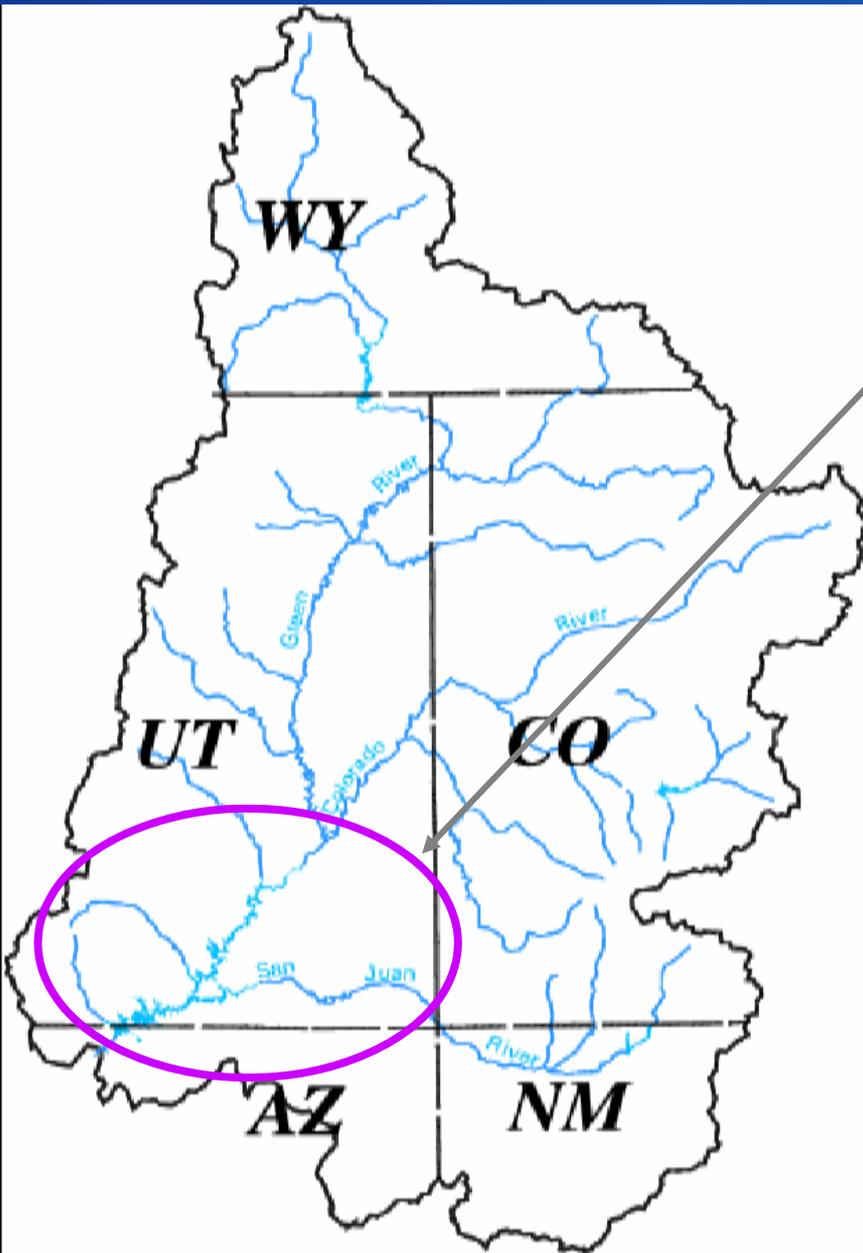
January 24-Month Study (Most Probable)

## Colorado River at Lake Powell

Apr-July Unreg Inflow = 9.5 maf (120% avg)

Observed Inflow = 8.4 maf

Release = 4.37 maf



RECLAMATION

# Lake Powell & Lake Mead

## Operational Diagrams for 2011 August 24-Month Study

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	<b>Equalization Tier</b> Equalize, Avoid Spills or Release 8.23 MAF	24.3	1,220	<b>Flood Control, 70R or ICS Surplus</b>	25.9
3,636 - 3,666 (2008-2026)		15.5 - 19.3 (2008-2026)	1,200		22.9
<b>3,629</b>				<b>Domestic or ICS Surplus</b>	
<b>Projection for 1/1/11</b>	<b>Upper Elevation Balancing Tier<sup>1</sup></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>Projection for 1/1/11</b>	1,145		15.9
3,575		9.5	<b>1,086</b>	<b>Normal Operations or ICS Surplus</b>	<b>10.3</b>
			<b>Projection for 1/1/11</b>		<b>Projection for 1/1/11</b>
	<b>Mid-Elevation Release Tier</b> Release 7.48 MAF; if Lake Mead < 1,025 feet, Release 8.23 MAF;			<b>Shortage 333 KAF<sup>2</sup></b>	
3,525		5.9	1,050		7.5
				<b>Shortage 417 KAF<sup>2</sup></b>	
3,490	<b>Lower Elevation Balancing Tier</b> Balance contents with a min/max release of 7.0 and 9.5 MAF	4.0	1,025		5.8
				<b>Shortage 500 KAF<sup>2</sup> and Consultation<sup>3</sup></b>	
3,370		0	1,000		4.3
			895		0

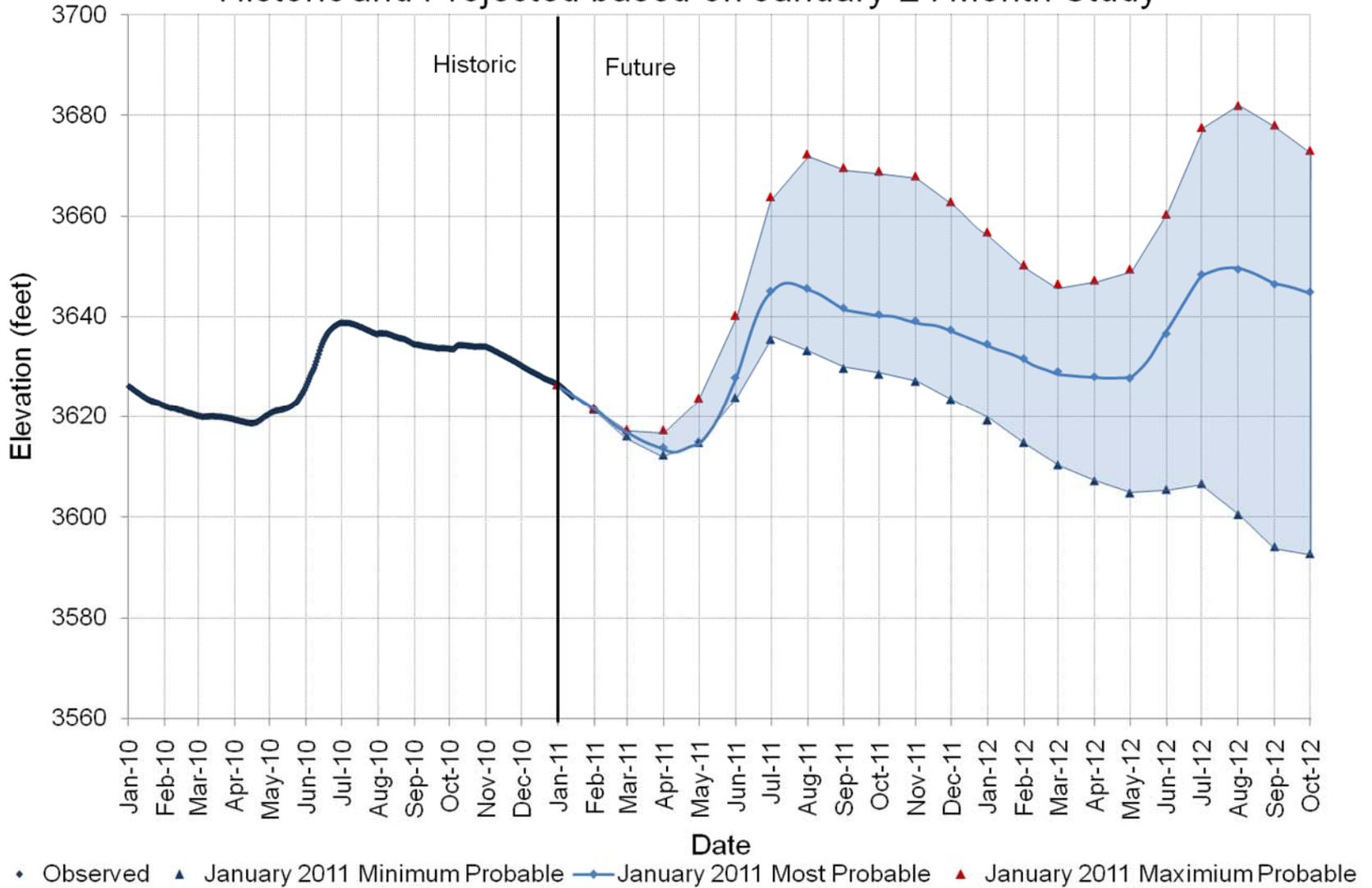
<sup>1</sup> Subject to April adjustments that may result in balancing releases or releases according to the Equalization Tier.

<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.

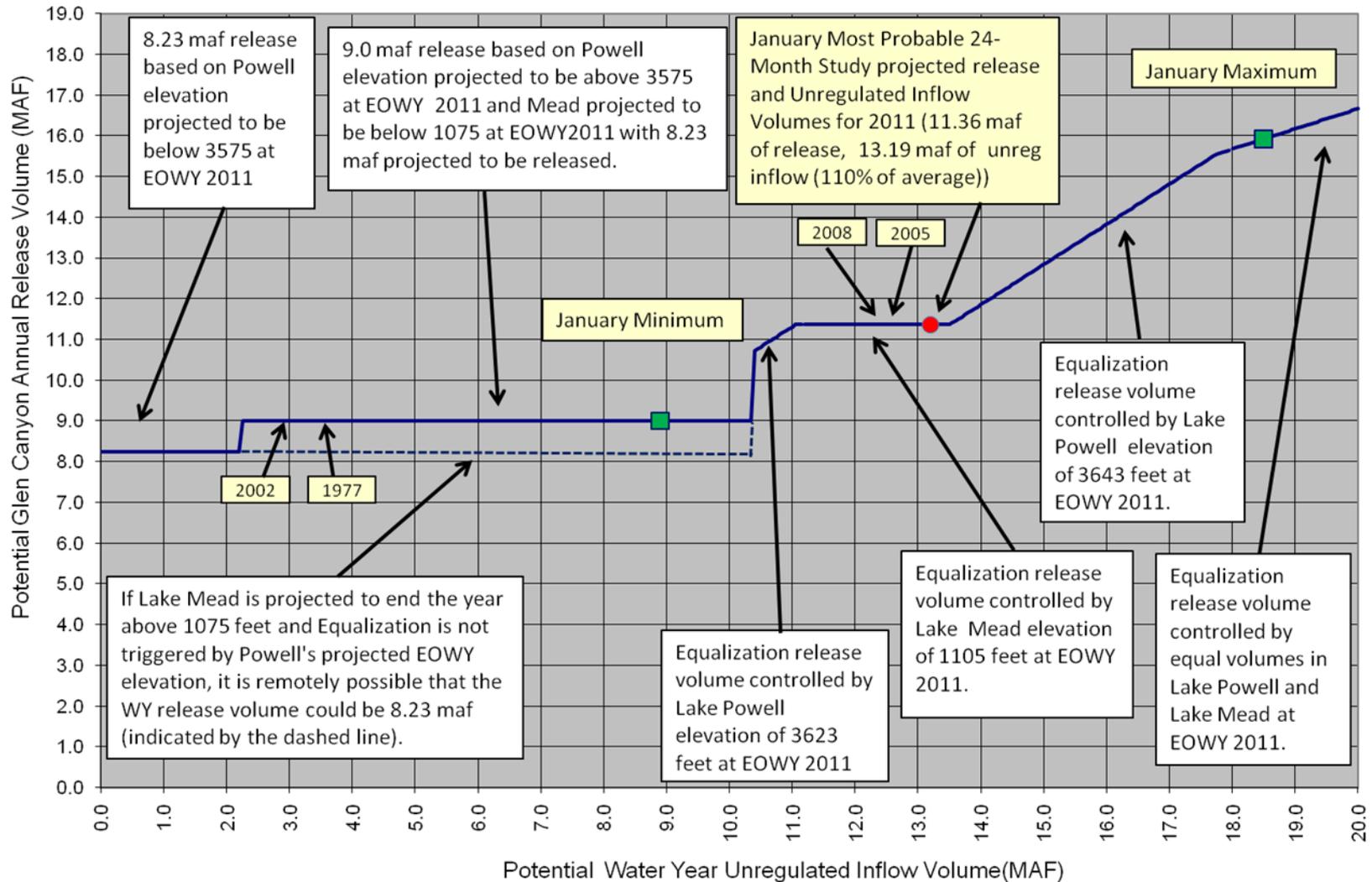
# Lake Powell Elevations

## Historic and Projected based on January-24 Month Study



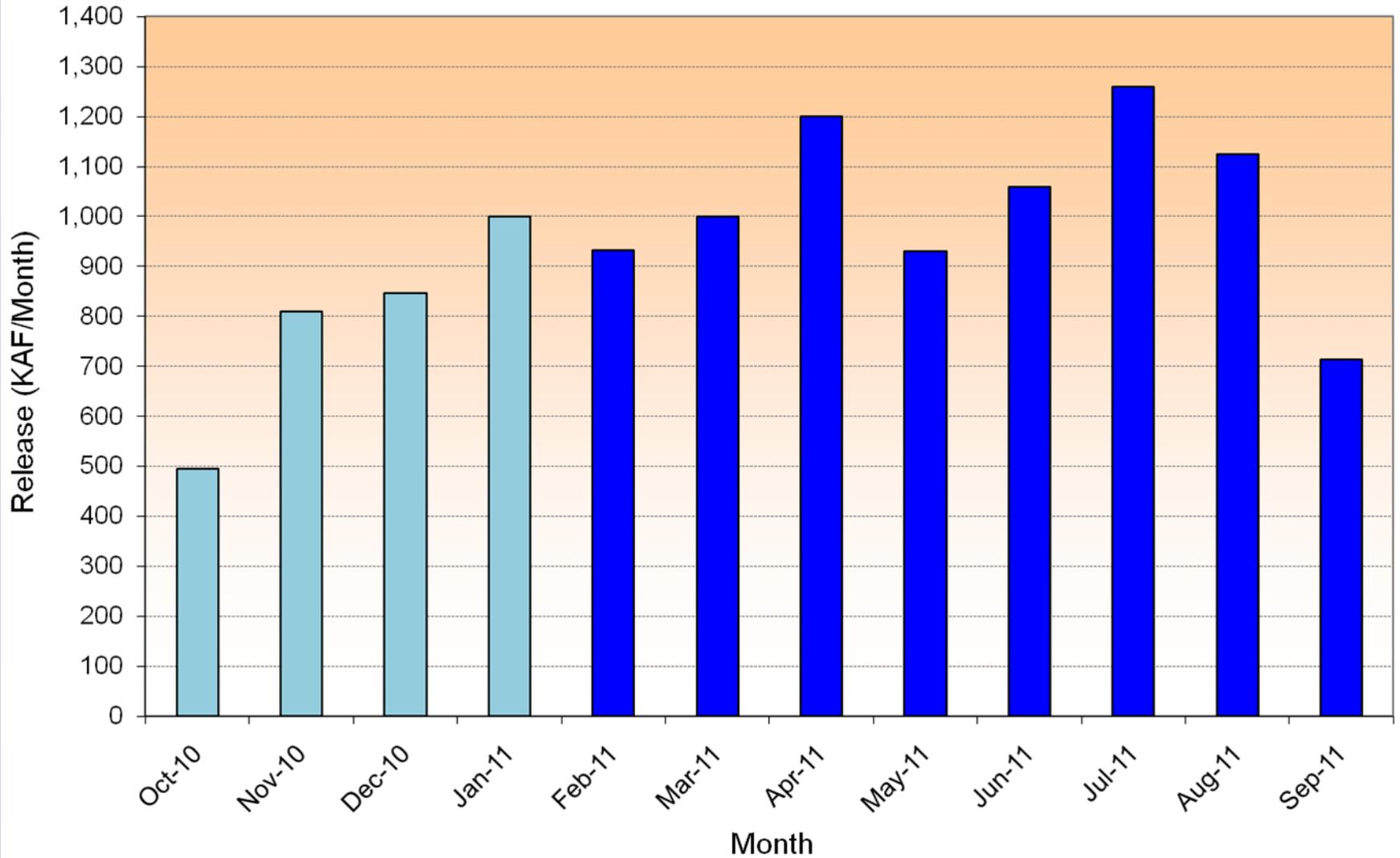
# Coordinated Operation of Lake Powell and Lake Mead

Annual Release per Projected Unreg Inflow  
Based on January 2011 24-Month Study



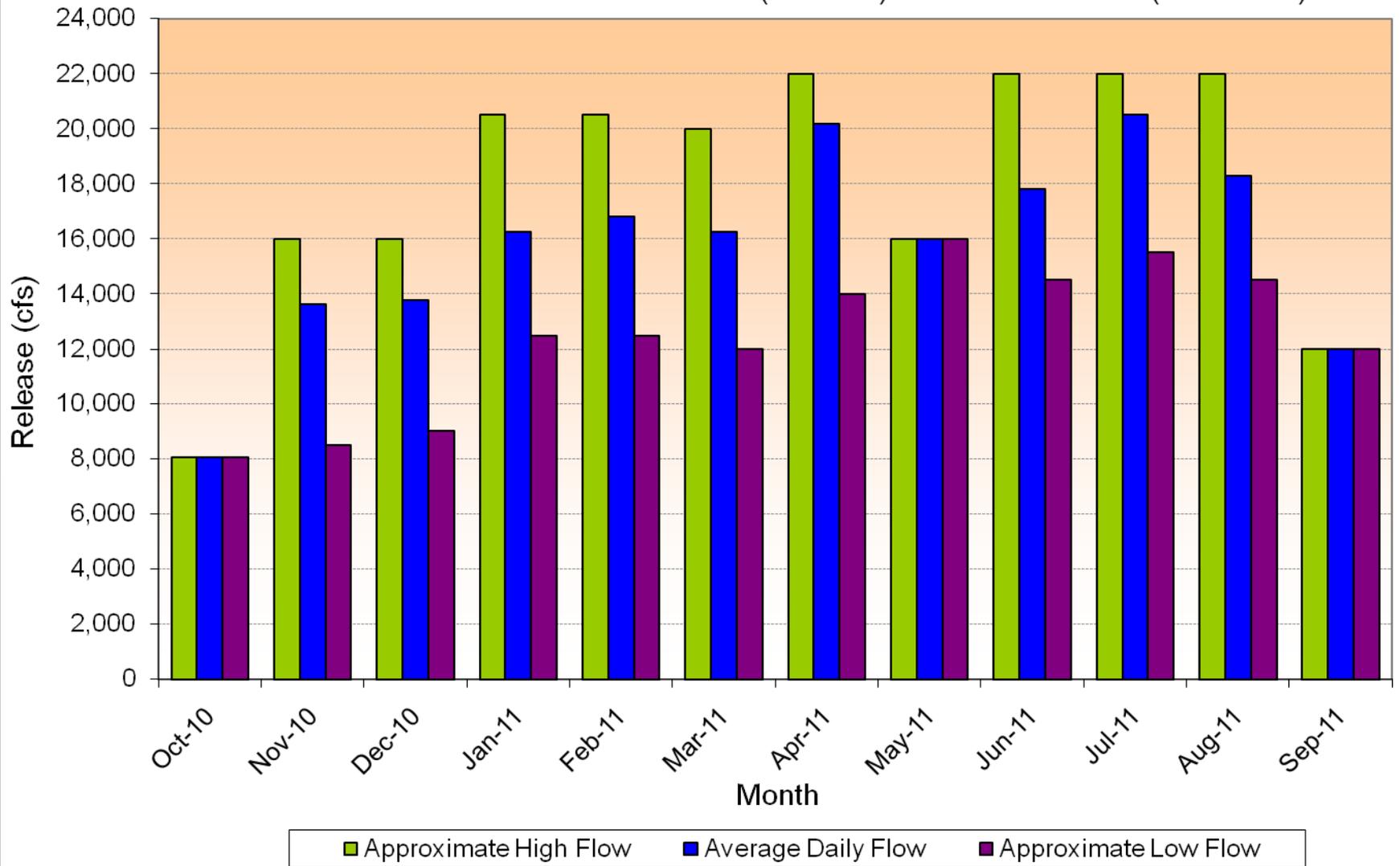
# Historic and Proposed WY 2011 Lake Powell Monthly Release Volumes

Estimated based on Most Probable (Median) Inflow Scenario (Jan-2011)



# Proposed WY2011 Glen Canyon Dam Daily Release Regime

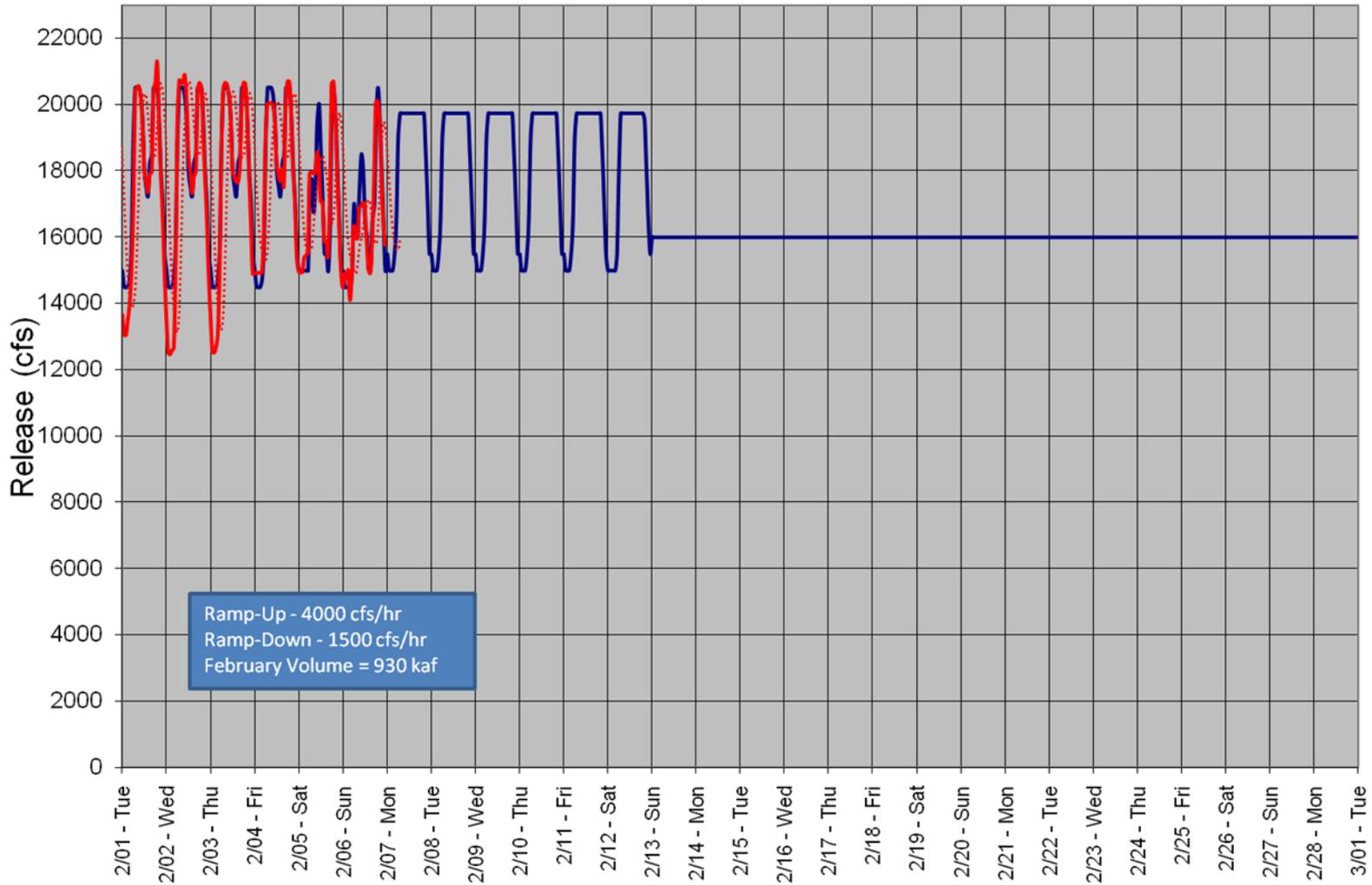
Estimated based on Most Probable (Median) Inflow Scenario (Jan 2011)



**Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2011  
(updated 2-2-2011)**

Unit Number	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	Jun 2011	Jul 2011	Aug 2011	Sep 2011
1												
2												
3												
4												
5												
6 (3/4 Unit)												
7												
8												
Units Available	4.75	5.75	6.75	6.75	4.75	4.75	6.75	4.75	6.75	6.75	6.75	4.75
Capacity (kaf)	990	1180	1350	1350	1000	1130	1310	970	1180	1350	1350	1030
Max (kaf)	495	810	847	997	933	1070	1280	970	1180	1350	1350	1030
Most (kaf)	495	810	847	997	933	1000	1200	930	1060	1260	1125	714
Min (kaf)	495	810	847	997	933	900	615	650	670	820	817	476

# Glen Canyon Dam Hourly Release Pattern FEB 2011



Ramp-Up - 4000 cfs/hr  
 Ramp-Down - 1500 cfs/hr  
 February Volume = 930 kaf

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

RECLAMATION