

**Glen Canyon Dam Adaptive Management Work Group**  
**Agenda Item Information**  
**August 24-25, 2010**

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Agenda Item

Basin Hydrology and Operations

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Action Requested

√ Information item only.

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Presenters

Rick Clayton, Glen Canyon 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.

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 Water Year 2011

Adaptive Management Work Group  
August 24-25, 2010



U.S. Department of the Interior  
Bureau of Reclamation

Rick Clayton

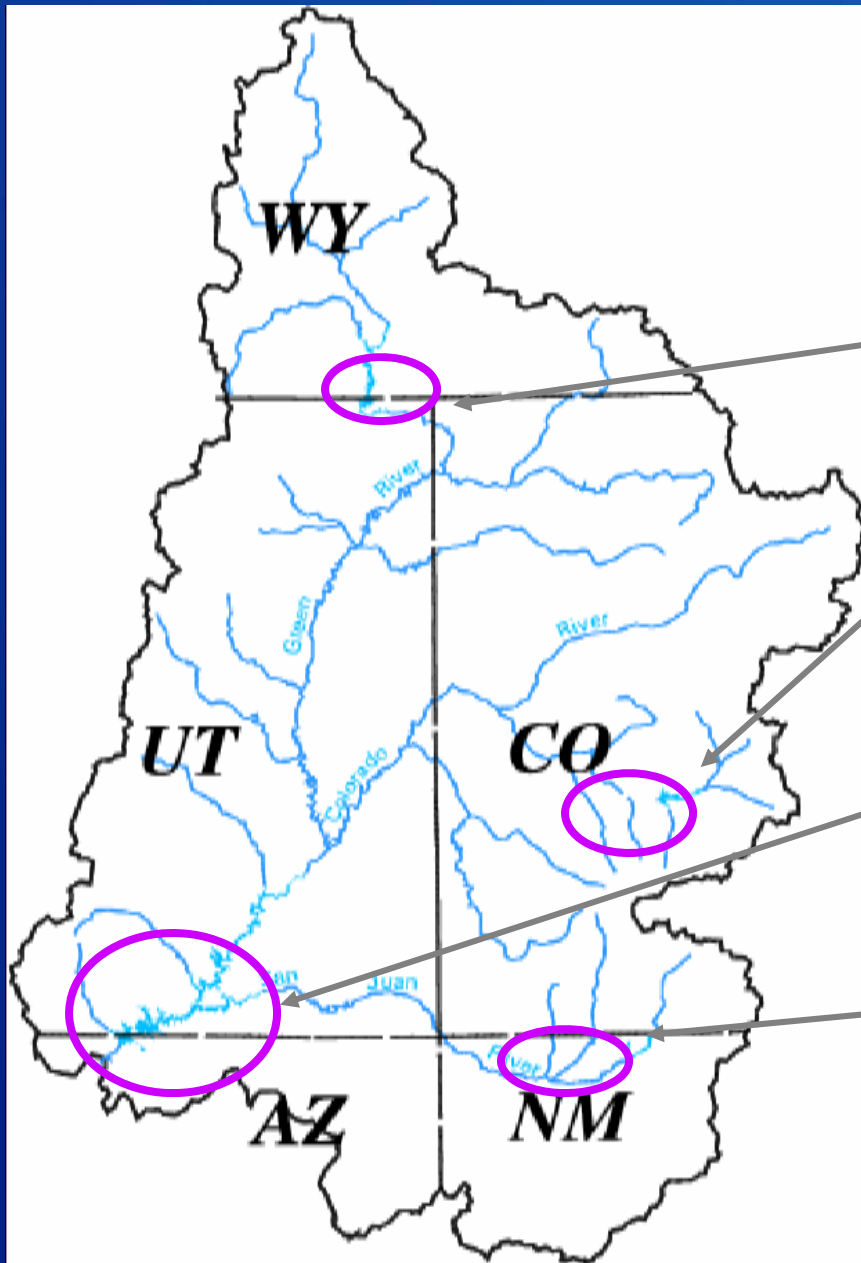
[rclayton@usbr.gov](mailto:rclayton@usbr.gov)

(801)524-3710

Hydraulic Engineer/Glen Canyon  
Reclamation/UC Region  
Resource Management Division  
Water Resources Group

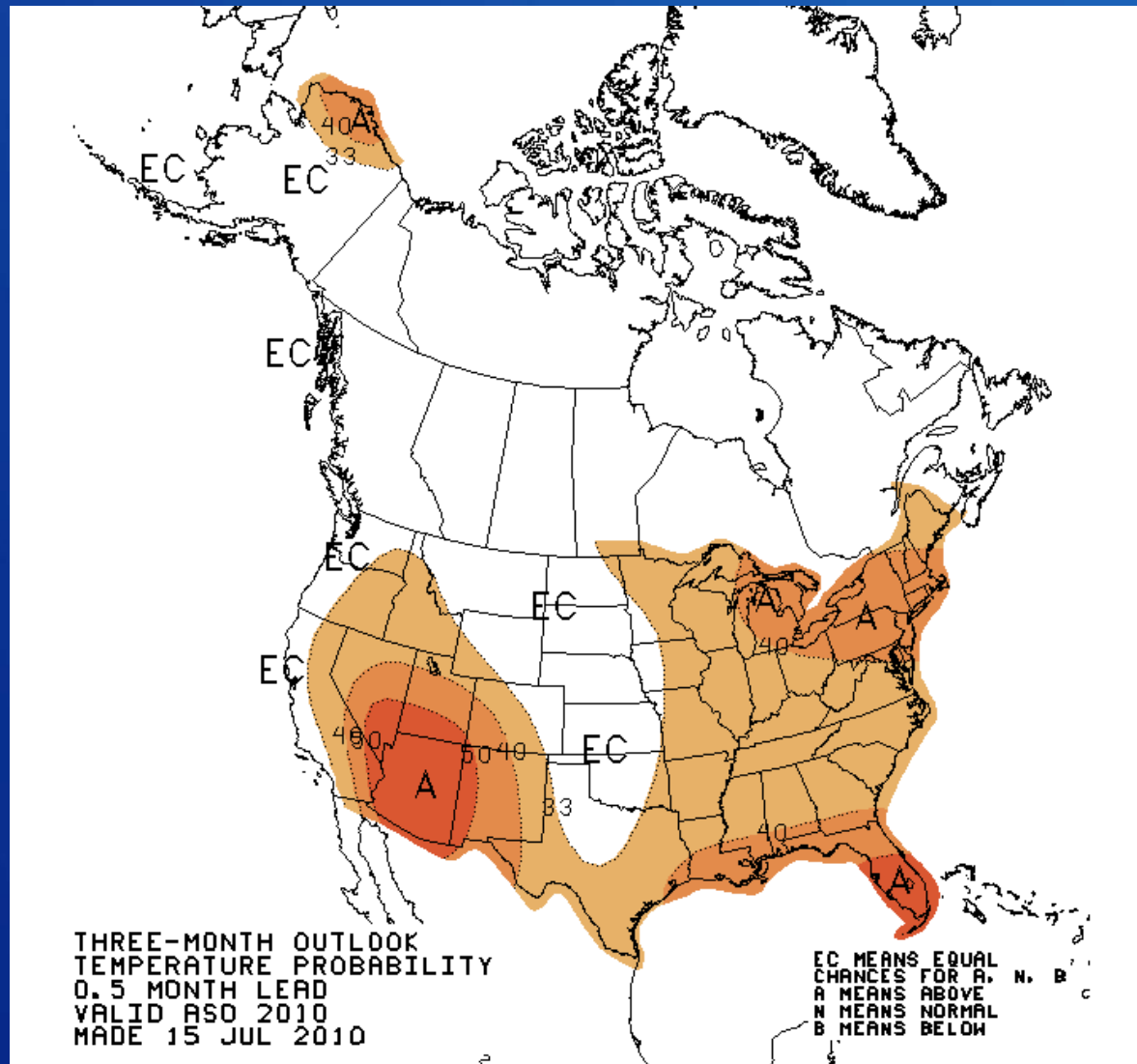
RECLAMATION

# Projected CRSP Storage Water Year 2011 Storage Levels (Initial/Final)



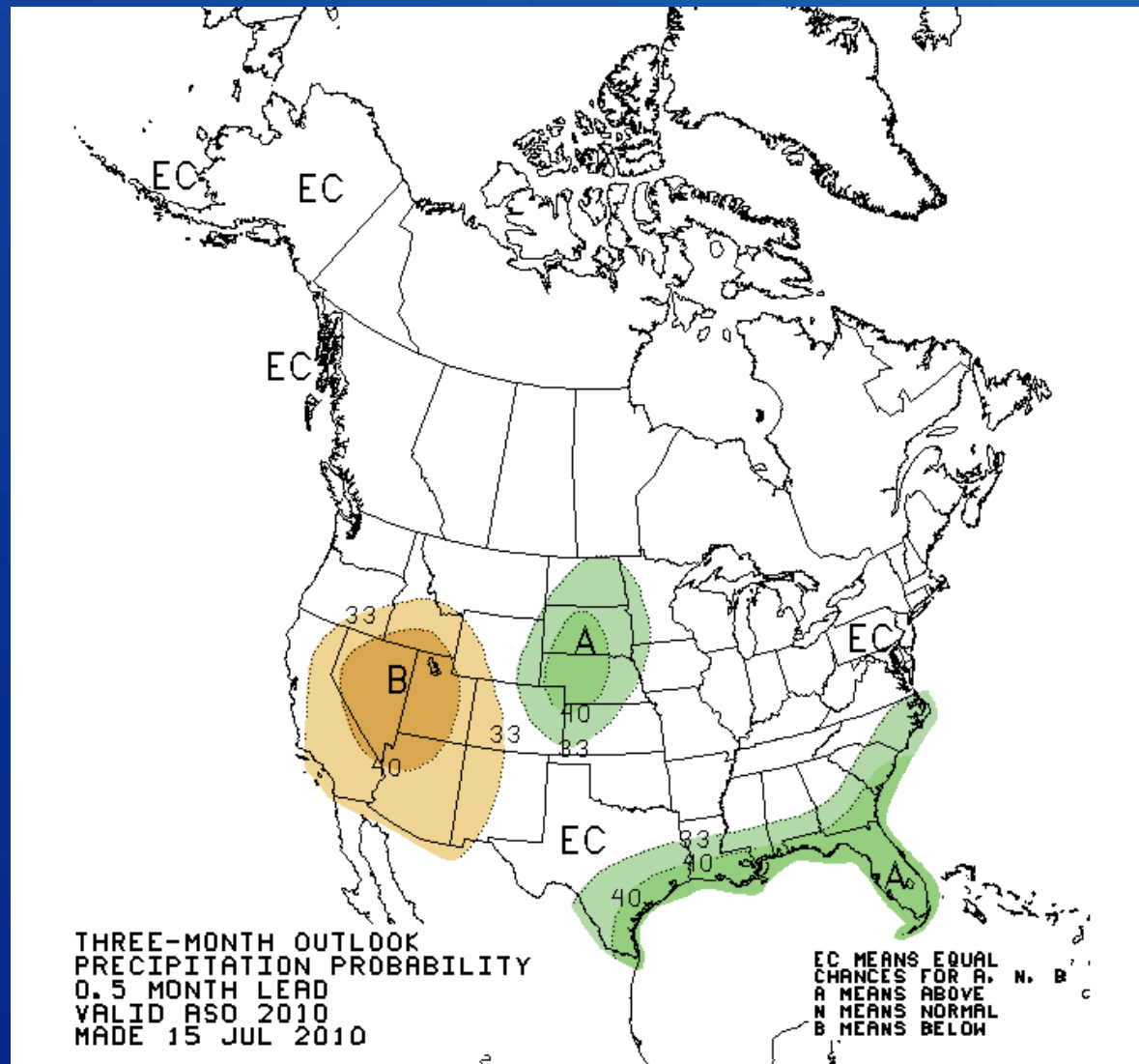
Flaming Gorge	84.8% (3.18 maf)
	87.8% (3.29 maf)
Blue Mesa	77.2% (0.64 maf)
	80.1% (0.67maf)
Lake Powell	63.6% (15.48 maf)
	57.9% (14.08 maf)
Navajo	83.1% (1.41 maf)
	80.7% (1.37 maf)

# Climate Prediction Center Outlook (Aug-Oct) - Temp



# RECLAMATION

# Climate Prediction Center Outlook (Aug-Oct) - Precip



# Annual Operating Plan

## Lake Powell Unregulated Inflow Scenarios

Scenario	2010 AOP WY 2010	2011 AOP WY 2011 <small>Developed August 2010</small>
Minimum Probable	5.00 maf (42 %)	4.85 maf (40 %)
Most Probable	11.00 maf (91 %)	10.75 maf (89 %)
Maximum Probable	18.00 maf (149 %)	17.10 maf (142 %)

# Lake Powell & Lake Mead Operational Diagrams for 2011

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> <i>1/1/11 Projection</i>	<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>14.7</b> <i>1/1/11 Projection</i>	1,145	<b>Domestic or ICS Surplus</b>	15.9
3,575		9.5	<b>1,086</b> <i>1/1/11 Projection</i>	<b>Normal Operations or ICS Surplus</b>	<b>10.3</b> <i>1/1/11 Projection</i>
3,525	<b>Mid-Elevation Release Tier</b> Release 7.48 MAF; if Lake Mead < 1,025 feet, Release 8.23 MAF;	5.9	1,050	<b>Shortage 333 KAF<sup>2</sup></b>	7.5
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	<b>Shortage 417 KAF<sup>2</sup></b>	5.8
3,370		0	1,000	<b>Shortage 500 KAF<sup>2</sup> and Consultation<sup>3</sup></b>	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.



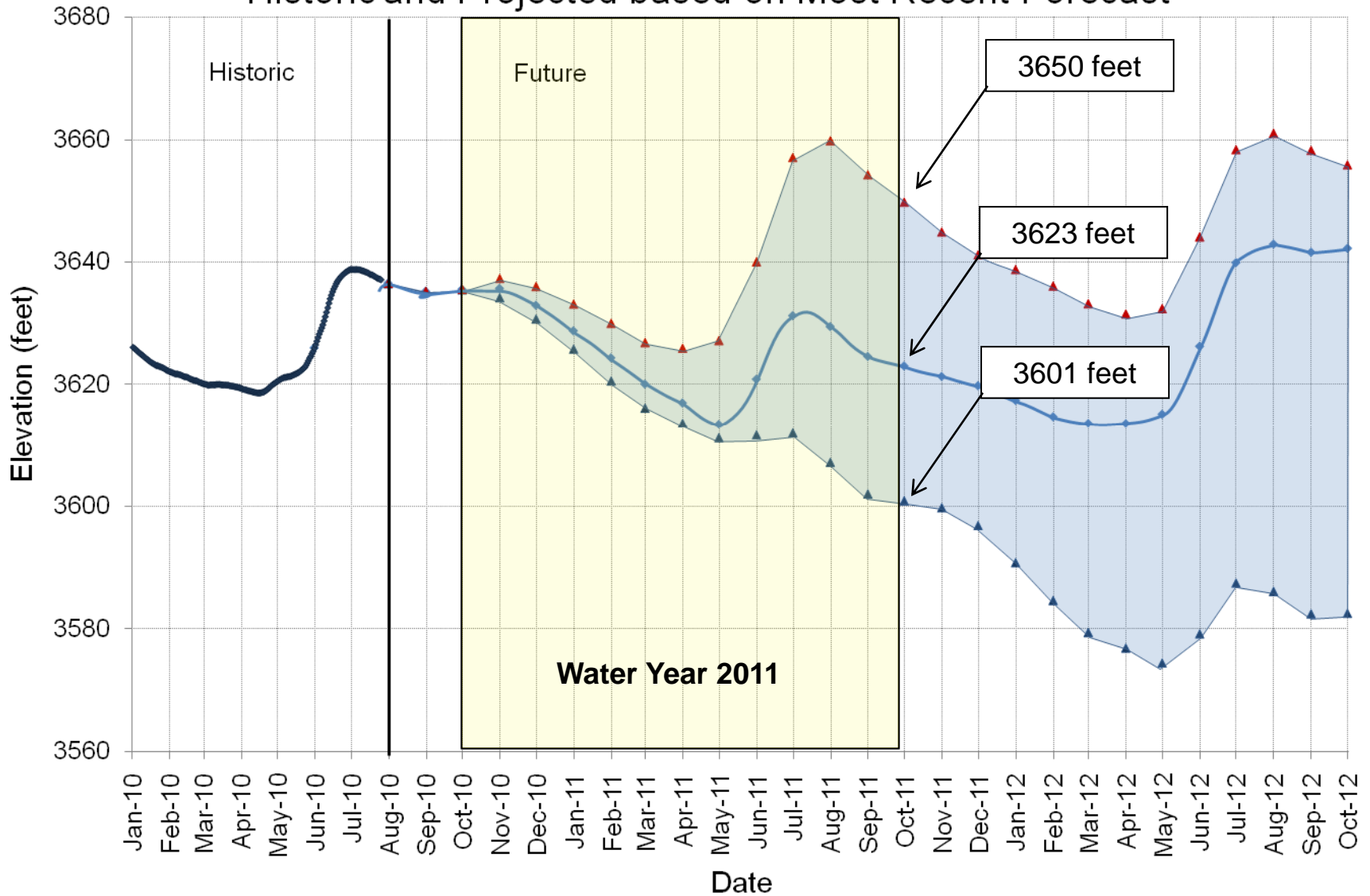
# Water Year 2011 Operations under Interim Guidelines

Scenario	Initial Operational Tier	April Adjustment	Projected Annual Release Volume
Minimum Probable	Upper Elevation Balancing	Balancing between 8.23 and 9.0 maf	9.0 maf
Most Probable		Equalization controlled by Powell EOWY Elevation 3623'	11.6 maf
Maximum Probable		Equalization controlled by Powell/Mead Equal Volumes	14.1* maf

\*The actual volume to achieve Equalization by September 30<sup>th</sup> would be ~15.0 maf. The annual volume projected is limited by estimated powerplant capacity releases restricted by scheduled unit maintenance

# Lake Powell Elevations

Historic and Projected based on Most Recent Forecast



• Observed    ▲ August Minimum Probable    ◆ August Most Probable    ▲ August Maximum Probable



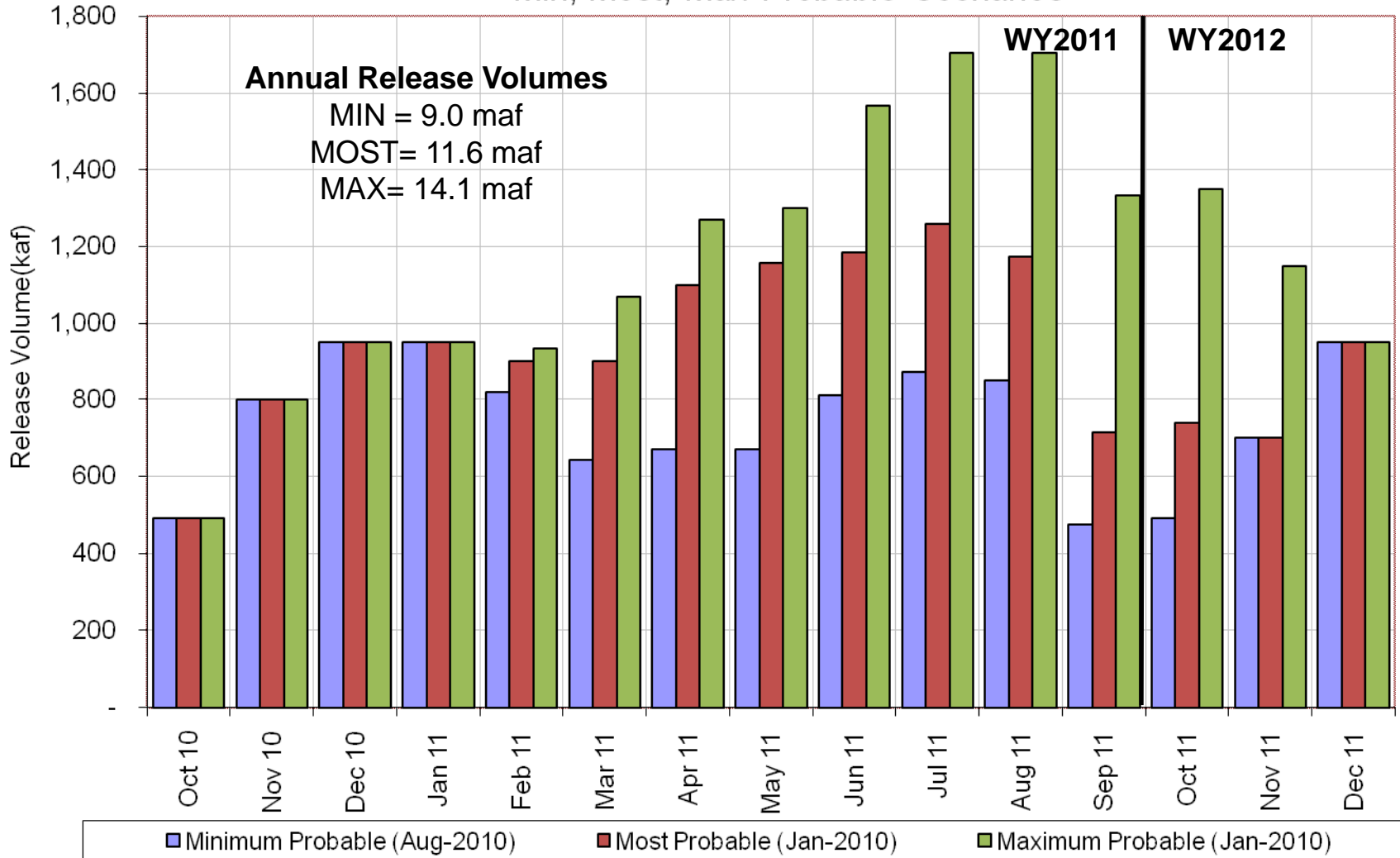
## Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2011 (updated 8-12-2010)

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 (Restricted)												
7												
8												
Units Available	4.5	6	6.5	6.5	4.5	4.5	6	6	7	7.5	7.5	5.5
Capacity (kaf)	1111	1205	1445	1445	953	1094	1271	1300	1566	1705	1705	1334
Max (kaf)	492	800	950	950	935	1070	1271	1300	1566	1705	1705	1334
Most (kaf)	492	800	950	950	900	900	1100	1156	1185	1260	1175	714
Min (kaf)	492	800	950	950	820	642	700	700	800	840	830	476

# Lake Powell Monthly Release Volume Distribution

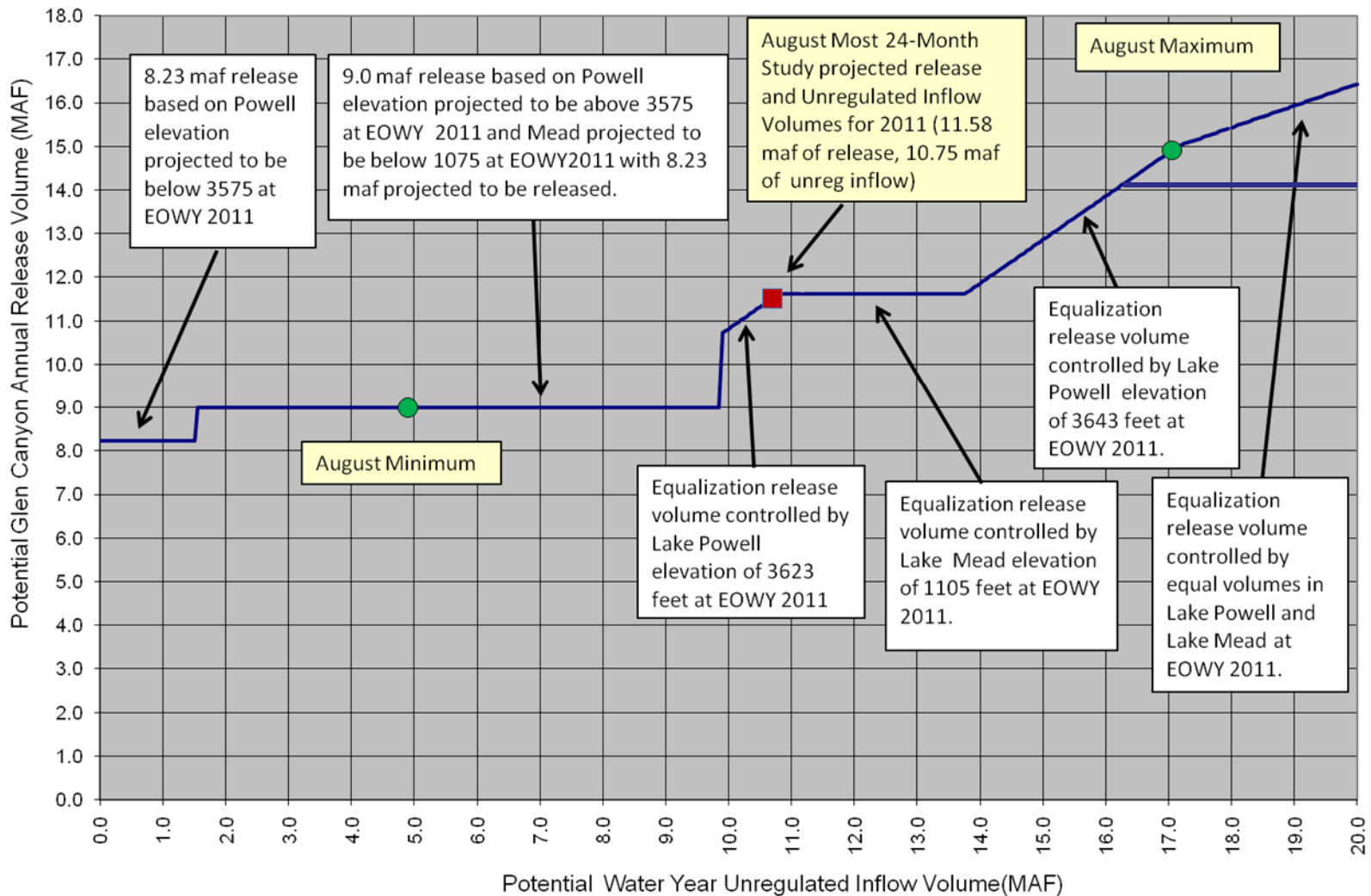
August 2010 24-Month Study

Min, Most, Max Probable Scenarios



# Coordinated Operation of Lake Powell and Lake Mead

## Potential Annual Release Volumes as a Function of Potential Unregulated Inflow Volume



Rick Clayton

[rclayton@usbr.gov](mailto:rclayton@usbr.gov)

(801)524-3710

Hydraulic Engineer/Glen Canyon  
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