

# RECLAMATION

*Managing Water in the West*

## 2015 Colorado River Annual Operating Plan

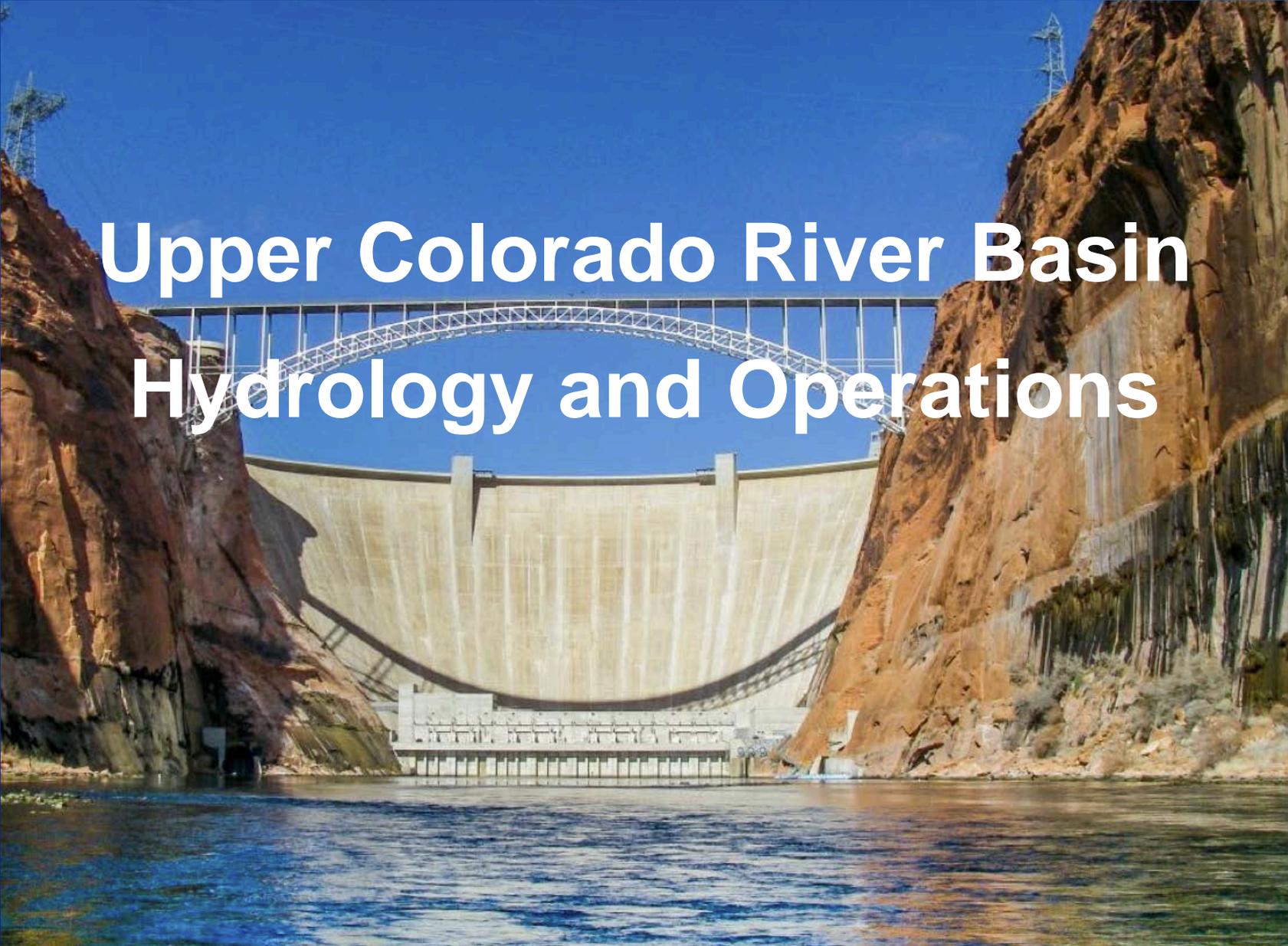
Colorado River Management Work Group  
Final Consultation  
September 4, 2014



U.S. Department of the Interior  
Bureau of Reclamation

# 2015 Colorado River AOP Final Consultation Meeting

- Welcome and Introductions – *Malcolm Wilson / Terry Fulp*
- Upper Basin Hydrology and Operations – *Katrina Grantz*
- Lower Basin Hydrology and Operations – *Dan Bunk*
- 2015 AOP Review Process – *Malcolm Wilson / Chris Cutler*
- Review of Draft 2015 AOP – *CRMWG*
- Conclusion and Wrap-up



# Upper Colorado River Basin Hydrology and Operations

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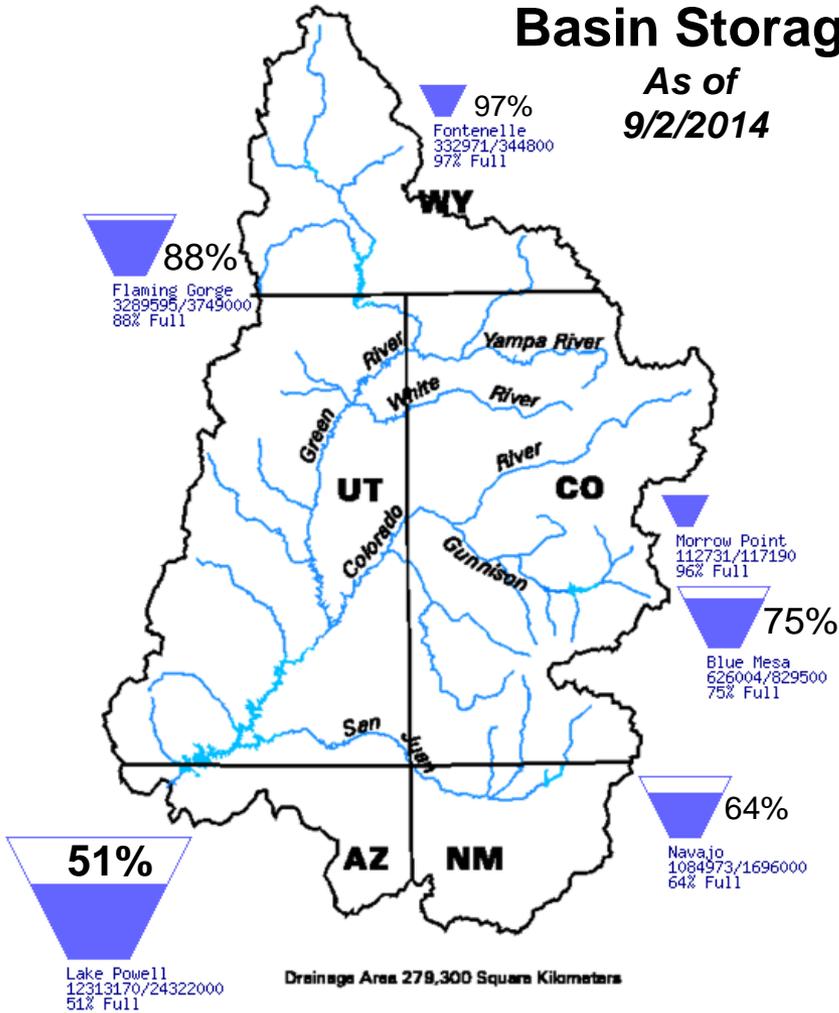
# Upper Basin Storage

Data Current as of:  
09/02/2014

## Upper Colorado River Drainage Basin

### Basin Storage

As of  
9/2/2014



## April to July Observed Unregulated Inflow

Reservoir	A-J Inflow Forecast (KAF)	Percent of Average <sup>1</sup>
Fontenelle	1,020	141%
Flaming Gorge	1,159	118%
Blue Mesa	849	126%
Navajo	428	58%
Powell	6,923	97%

<sup>1</sup> 1981-2010 period

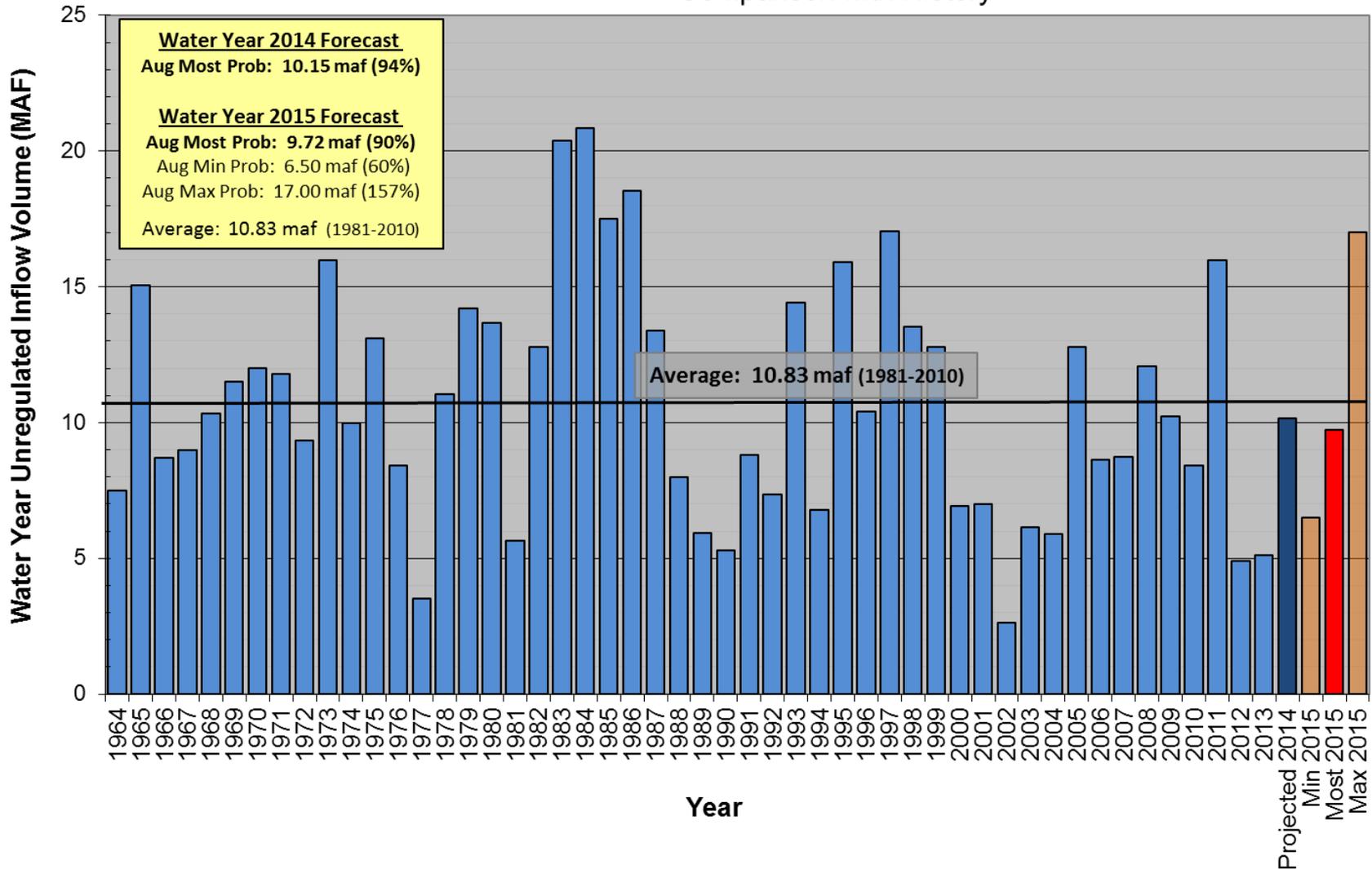
[http://www.usbr.gov/uc/water/basin/tc\\_cr.html](http://www.usbr.gov/uc/water/basin/tc_cr.html)

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# Lake Powell Unregulated Inflow

## Water Years 2014 and 2015 Forecast *(issued Aug 1)*

### Comparison with History



Observed April-July 2014: 6.92 maf (97%)

# Projected Operations Water Years 2014 and 2015

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# Lake Powell & Lake Mead Operational Table

## Operational Tiers for Water Year/Calendar Year 2014

Lake Powell			Lake Mead		
Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) <sup>1</sup>	Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) <sup>1</sup>
3,700	<b>Equalization Tier</b> Equalize, avoid spills or release 8.23 maf	24.3	1,220	<b>Flood Control Surplus or Quantified Surplus Condition</b> Deliver > 7.5 maf	25.9
3,636 - 3,666 (2008-2026)	<b>Upper Elevation Balancing Tier<sup>3</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	15.5 - 19.3 (2008-2026)	1,200 (approx.) <sup>2</sup>	<b>Domestic Surplus or ICS Surplus Condition</b> Deliver > 7.5 maf	22.9 (approx.) <sup>2</sup>
			1,145	<b>Normal or ICS Surplus Condition</b> Deliver ≥ 7.5 maf	15.9
3,575	<b>Mid-Elevation Release Tier</b> Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5	1,105		11.9
3,525		<b>Lower Elevation Balancing Tier</b> Balance contents with a min/max release of 7.0 and 9.5 maf	5.9	1,075	9.4
3,490	4.0		1,050	<b>Shortage Condition</b> Deliver 7.167 <sup>4</sup> maf	7.5
3,370	0	1,025	<b>Shortage Condition</b> Deliver 7.083 <sup>5</sup> maf	5.8	
			1,000	<b>Shortage Condition</b> Deliver 7.0 <sup>6</sup> maf Further measures may be undertaken <sup>7</sup>	4.3
			895		0

**Diagram not to scale**

<sup>1</sup> Acronym for million acre-feet

<sup>2</sup> This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.

<sup>3</sup> Subject to April adjustments which may result in a release according to the Equalization Tier

<sup>4</sup> Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

<sup>5</sup> Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

<sup>6</sup> Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

<sup>7</sup> Whenever Lake Mead is below elevation 1,025 feet, the Secretary shall consider whether hydrologic conditions together with anticipated deliveries to the Lower Division States and Mexico is likely to cause the elevation at Lake Mead to fall below 1,000 feet. Such consideration, in consultation with the Basin States, may result in the undertaking of further measures, consistent with applicable Federal law.

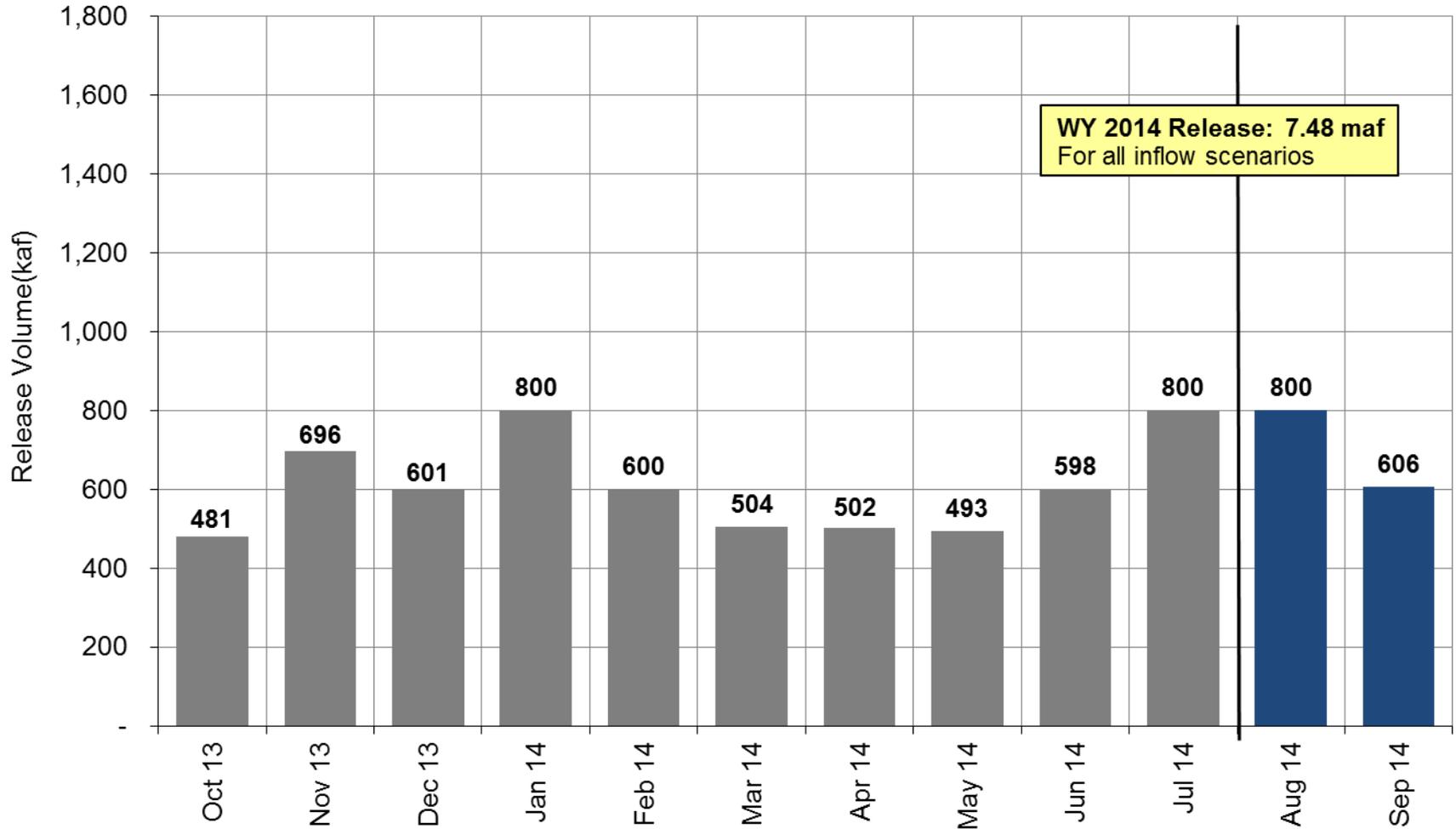
<sup>1</sup> Lake Powell and Lake Mead operational tier determinations were based on August 2013 24-Month Study projections and documented in the 2014 AOP.

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# Projected Lake Powell Monthly Release Volume Distribution

August 2014 Release Projections

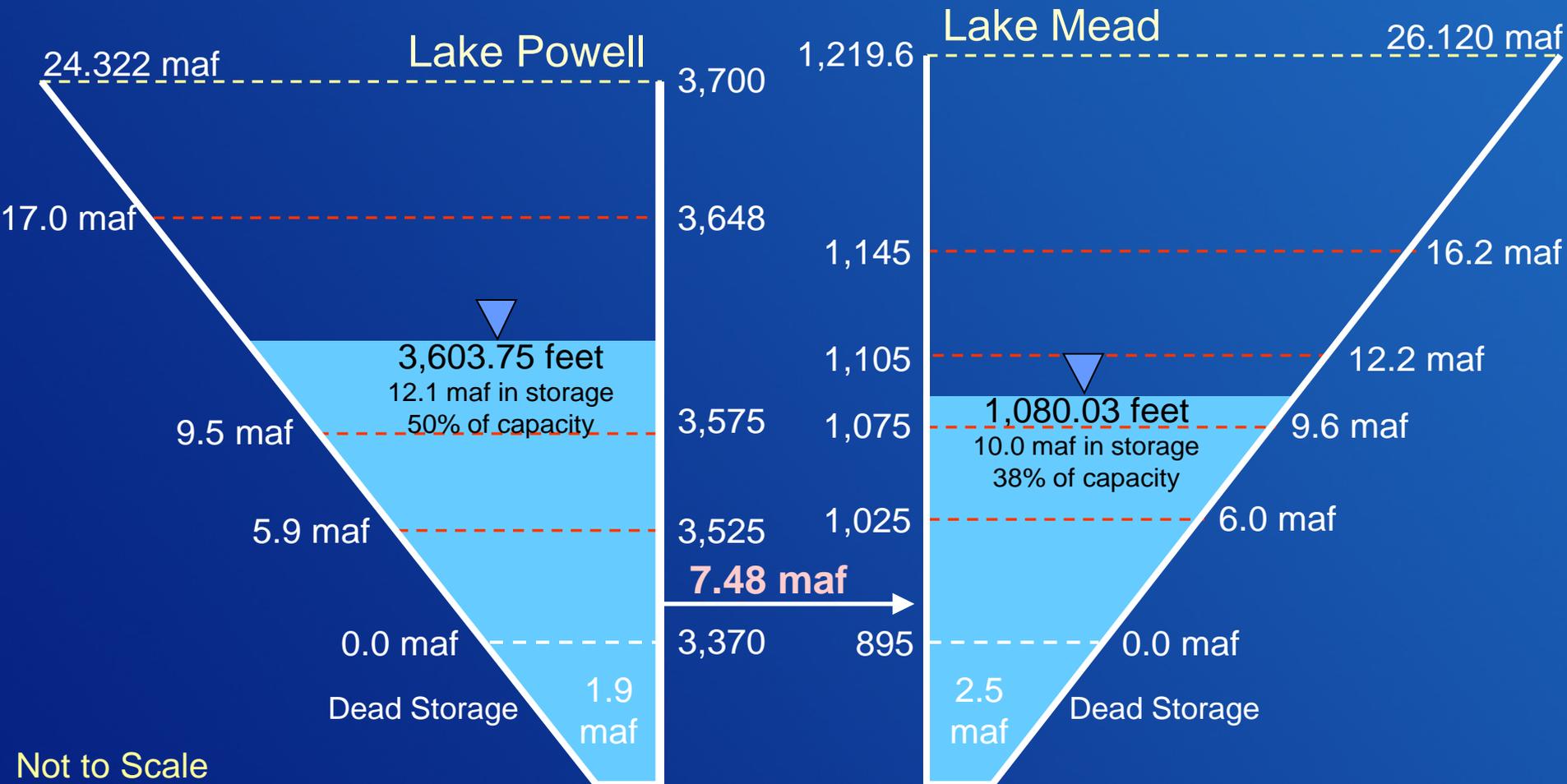
Water Year 2014



# End of Water Year 2014 Projections

August 2014 24-Month Study Most Probable Inflow Scenario<sup>1</sup>

Projected WY Unregulated Inflow into Powell = 10.15 maf (94% of average)

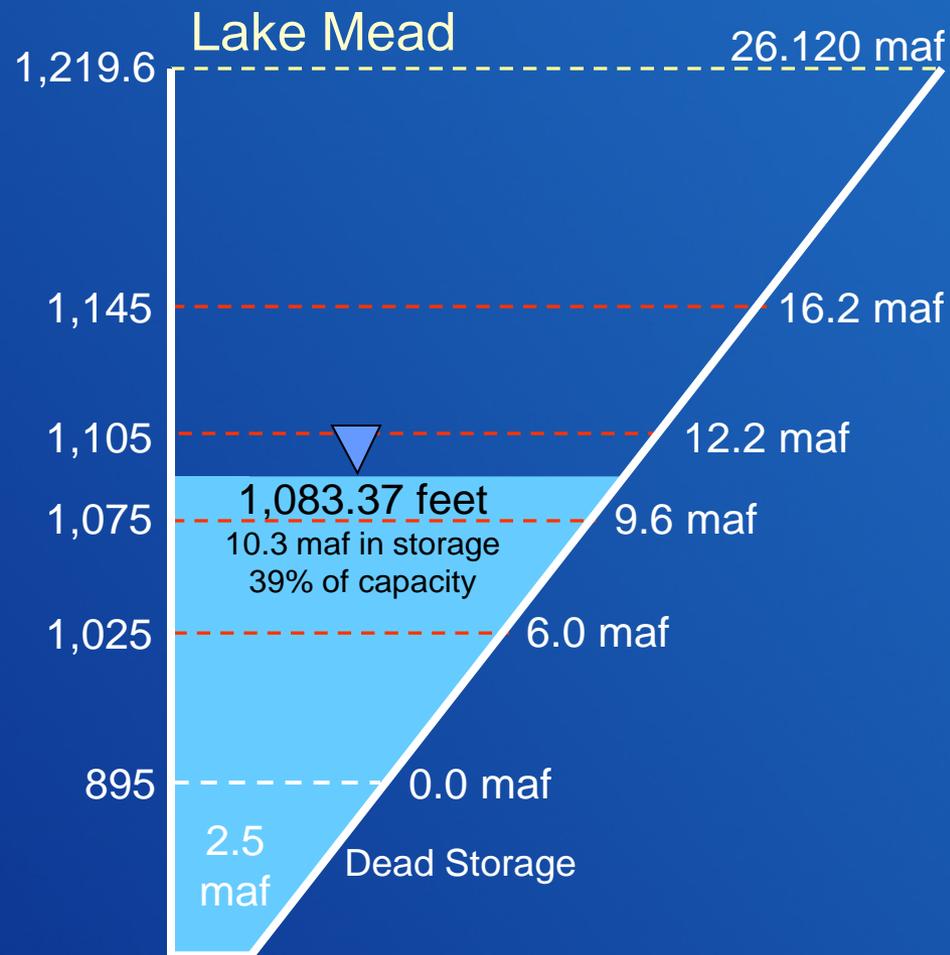
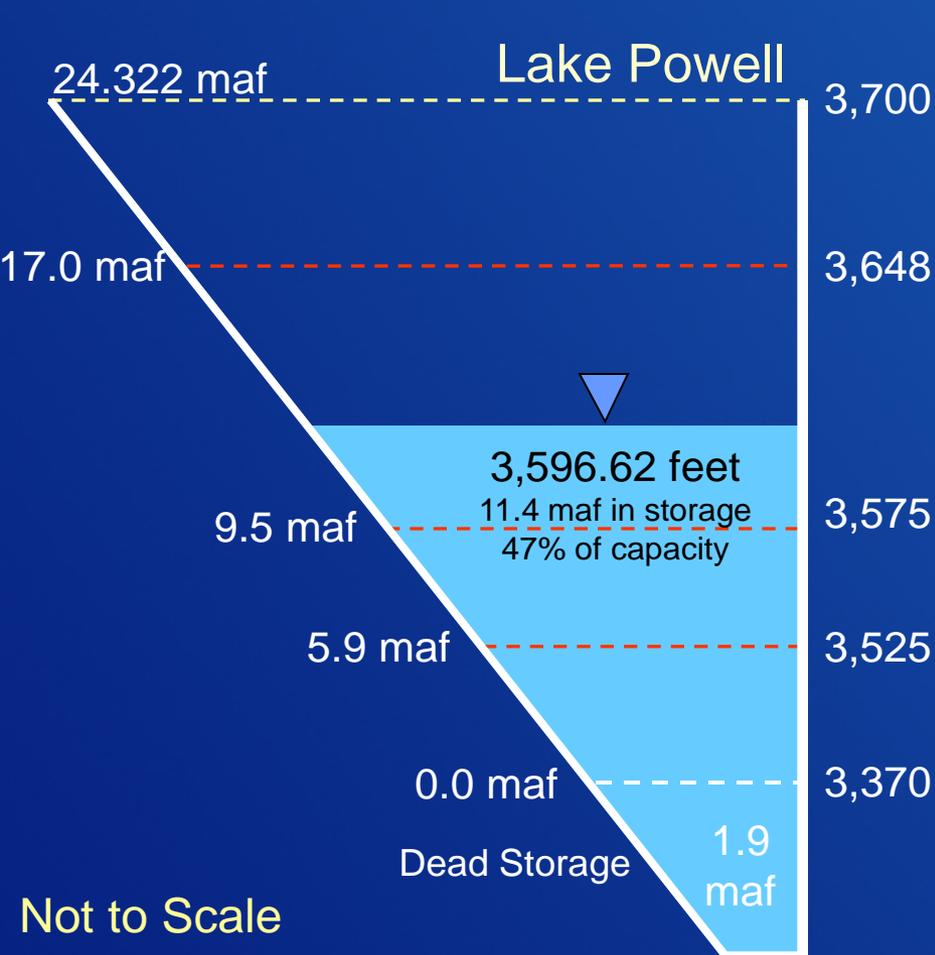


Not to Scale

<sup>1</sup> WY 2014 unregulated inflow into Lake Powell is based on the CBRFC outlook dated 8/1/14.

# End of Calendar Year 2014 Projections

## August 2014 24-Month Study Most Probable Inflow Scenario<sup>1</sup>



<sup>1</sup> WY 2014 unregulated inflow into Lake Powell is based on the CBRFC outlook dated 8/1/14.

# Lake Powell & Lake Mead Operational Table

Operational Tiers for Water/Calendar Year 2015 determined with the August 2014 24-Month Study

Lake Powell			Lake Mead		
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3,636 - 3,666 (2008-2026)	<b>Upper Elevation Balancing Tier<sup>3</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	15.5 - 19.3 (2008-2026)	1,200 (approx.) <sup>2</sup>	<b>Domestic Surplus or ICS Surplus Condition</b> Deliver > 7.5 maf	22.9 (approx.) <sup>2</sup>
			1,145		
3,575	<b>Mid-Elevation Release Tier</b> Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5	1,105	<b>Normal or ICS Surplus Condition</b> Deliver ≥ 7.5 maf	11.9
3,525	<b>Lower Elevation Balancing Tier</b> Balance contents with a min/max release of 7.0 and 9.5 maf	5.9	1,075	<b>Shortage Condition</b> Deliver 7.167 <sup>4</sup> maf	9.4
3,490			1,050		
3,370	0	1,025	<b>Shortage Condition</b> Deliver 7.0 <sup>6</sup> maf Further measures may be undertaken <sup>7</sup>	5.8	
		1,000			4.3
			895		0

3,596.62 ft  
Jan 1, 2015 projection

1,083.37 ft  
Jan 1, 2015 projection

**Diagram not to scale**  
<sup>1</sup> Acronym for million acre-feet  
<sup>2</sup> This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.  
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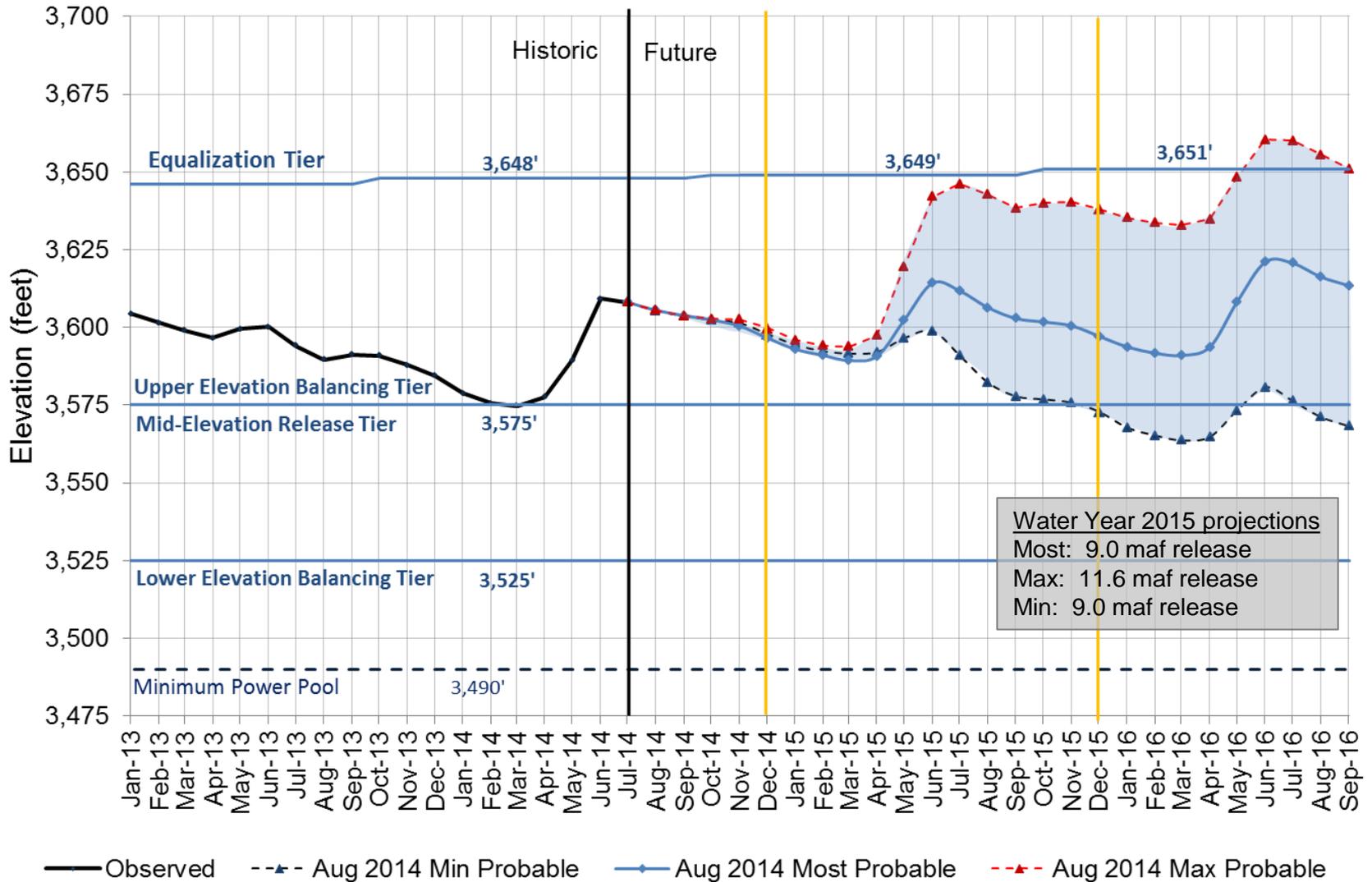
# Projected Lake Powell Operational Tiers

Based on August 2014 24-Month Study Inflow Scenarios

Powell Inflow Scenario	WY 2015 Release Projection
Probable Minimum	Upper Elevation Balancing Tier w/ Projected April shift to Balancing  9.0 maf release
Most Probable	Upper Elevation Balancing Tier w/ Projected April shift to Balancing  9.0 maf release
Probable Maximum	Upper Elevation Balancing Tier w/ Projected April shift to Equalization  11.63 maf release

# Lake Powell End of Month Elevations

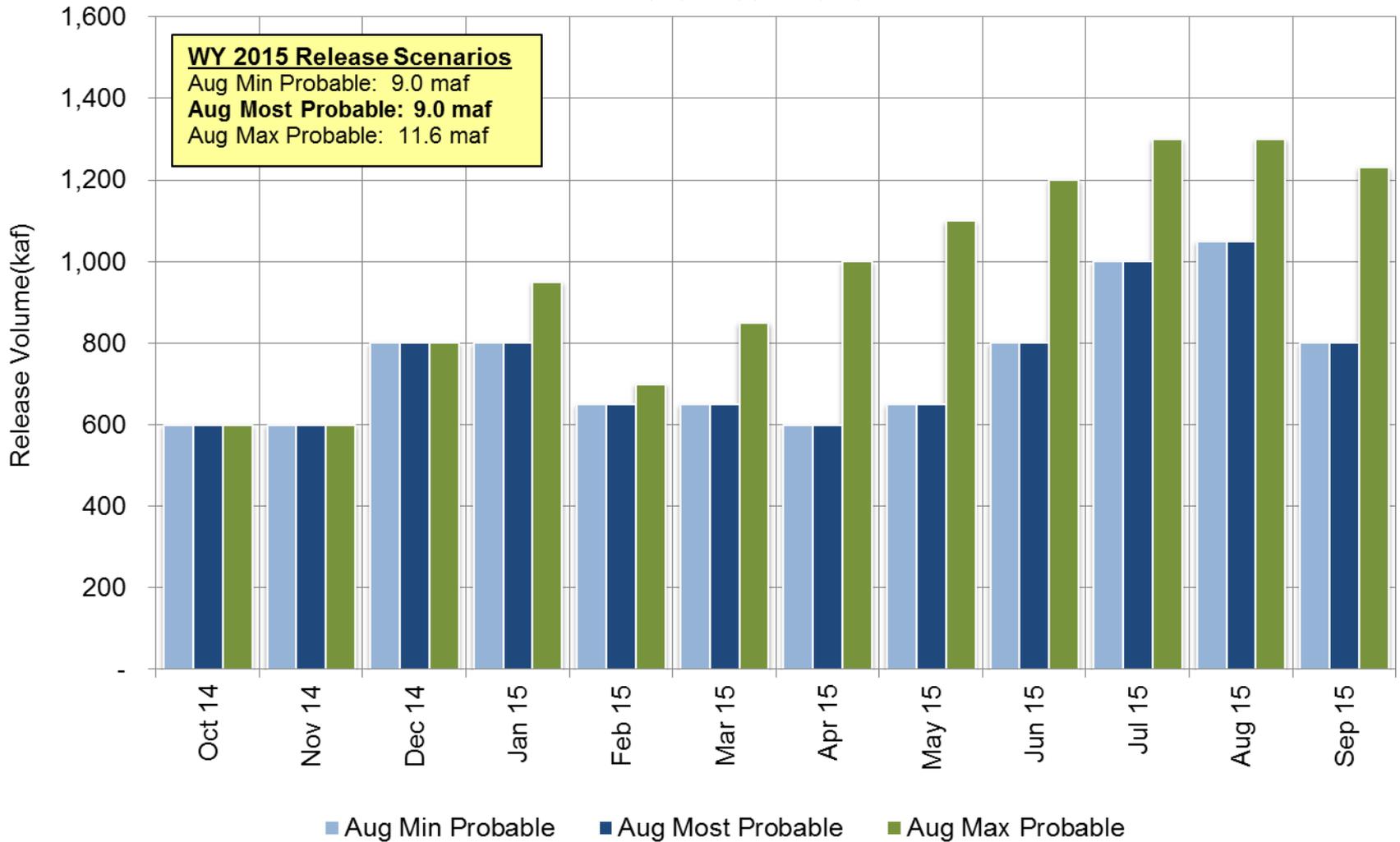
## Historic and projected based on August 2014 modeling



# Projected Lake Powell Monthly Release Volume Distribution

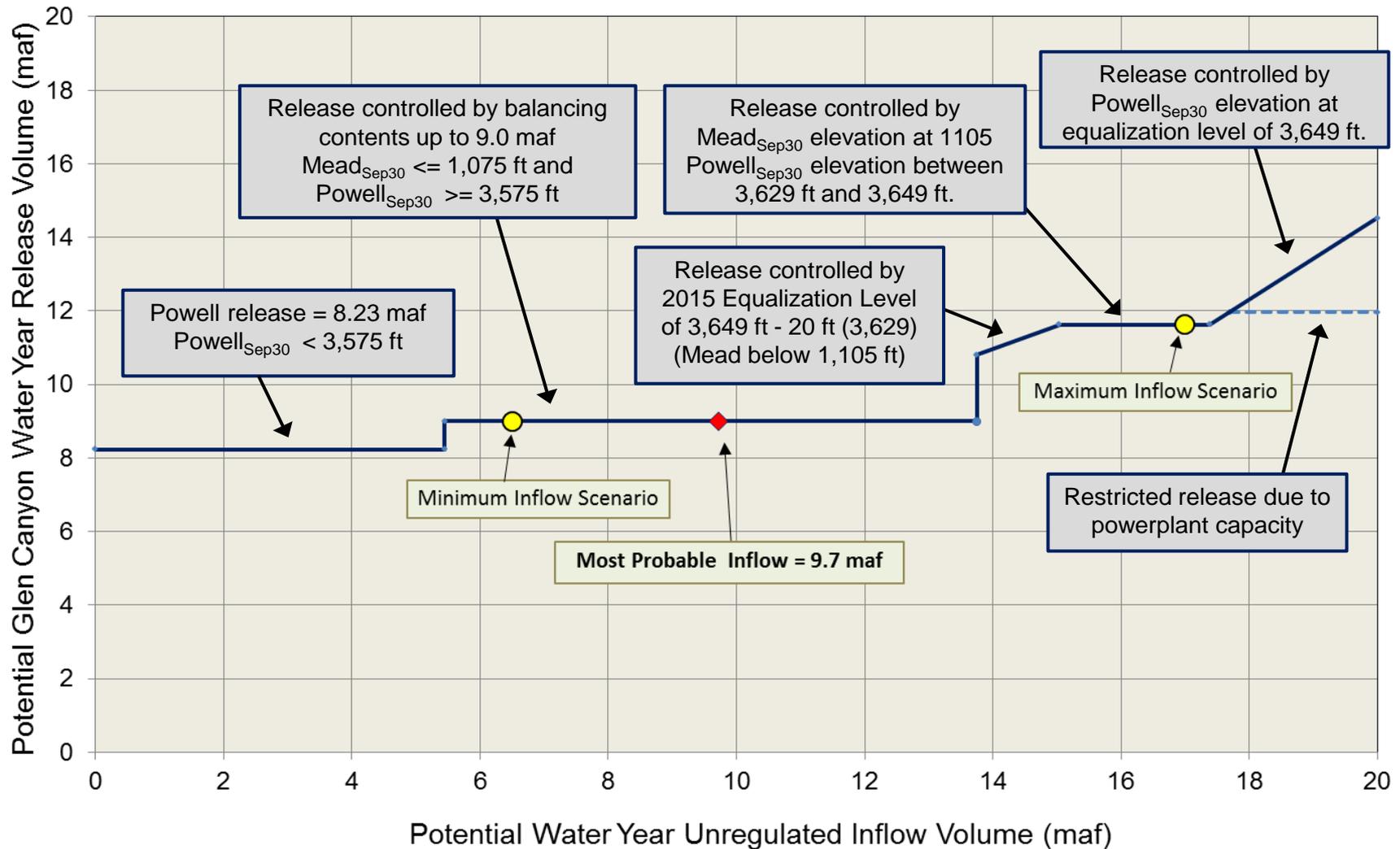
Release Scenarios from August 2014 24-Month Study

Water Year 2015



# Lake Powell Release under Coordinated Operations

Water Year 2015 Release Volume as a Function of Unregulated Inflow Volume  
based on August 2014 24-Month Study Conditions



An aerial photograph of the Hoover Dam and Hoover Dam Bypass Bridge. The dam is a large concrete structure with a curved face, situated in a deep canyon. The bridge is a long, multi-arched concrete structure that spans the canyon, bypassing the dam. The Colorado River flows through the canyon below. The surrounding landscape is rugged and rocky, with some winding roads and power lines visible. The sky is clear and blue.

# Lower Colorado River Basin Hydrology and Operations

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# Colorado River Basin Storage (as of September 2, 2014)

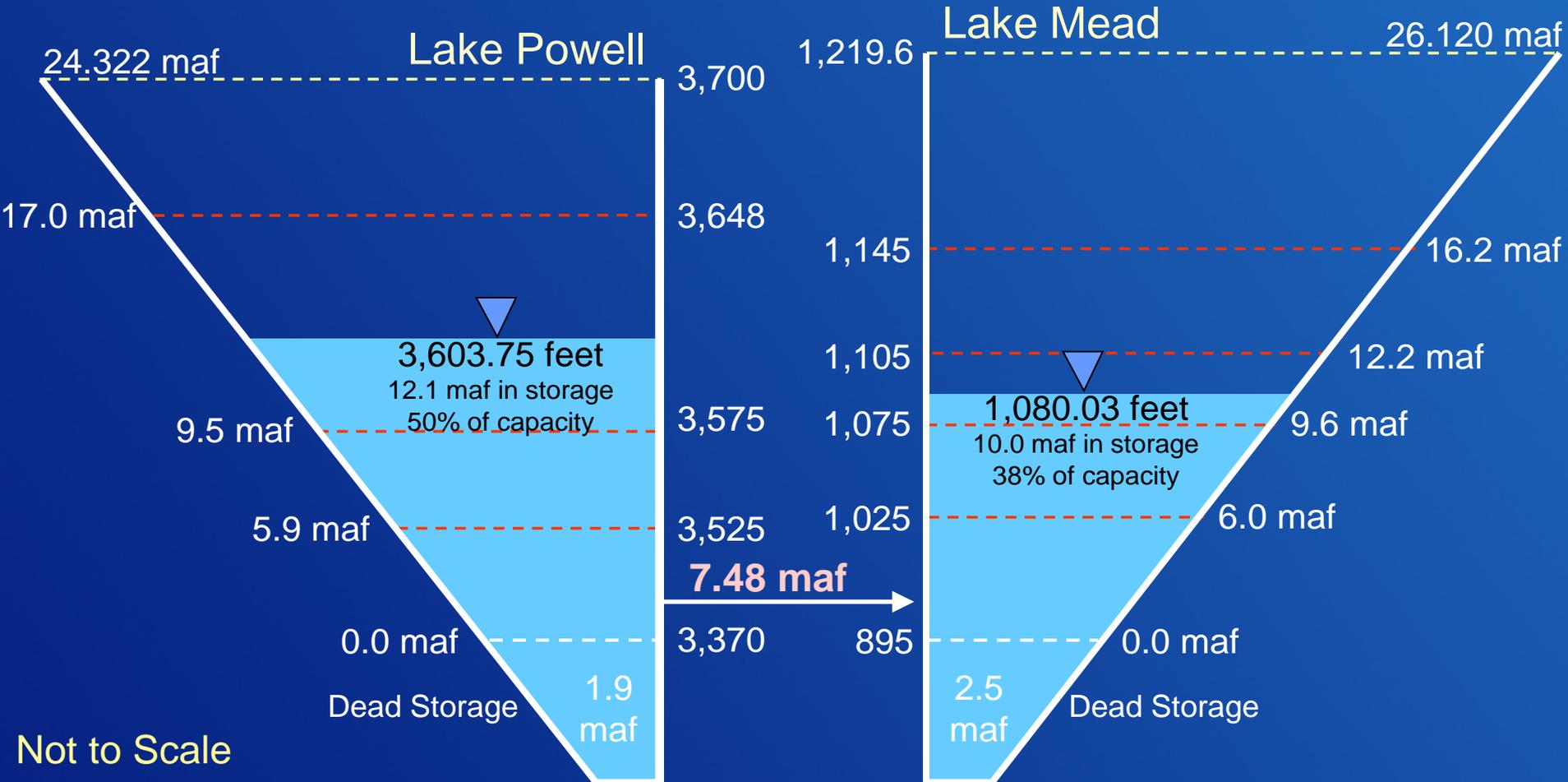
Current Storage	Percent Full	MAF	Elevation (Feet)
Lake Powell	51%	12.3	3,605.8
Lake Mead	39%	10.2	1,081.7
Total System Storage*	51%	30.2	NA

\*Total system storage was 29.8 maf or 50% this time last year

# End of Water Year 2014 Projections

## August 2014 24-Month Study Most Probable Inflow Scenario<sup>1</sup>

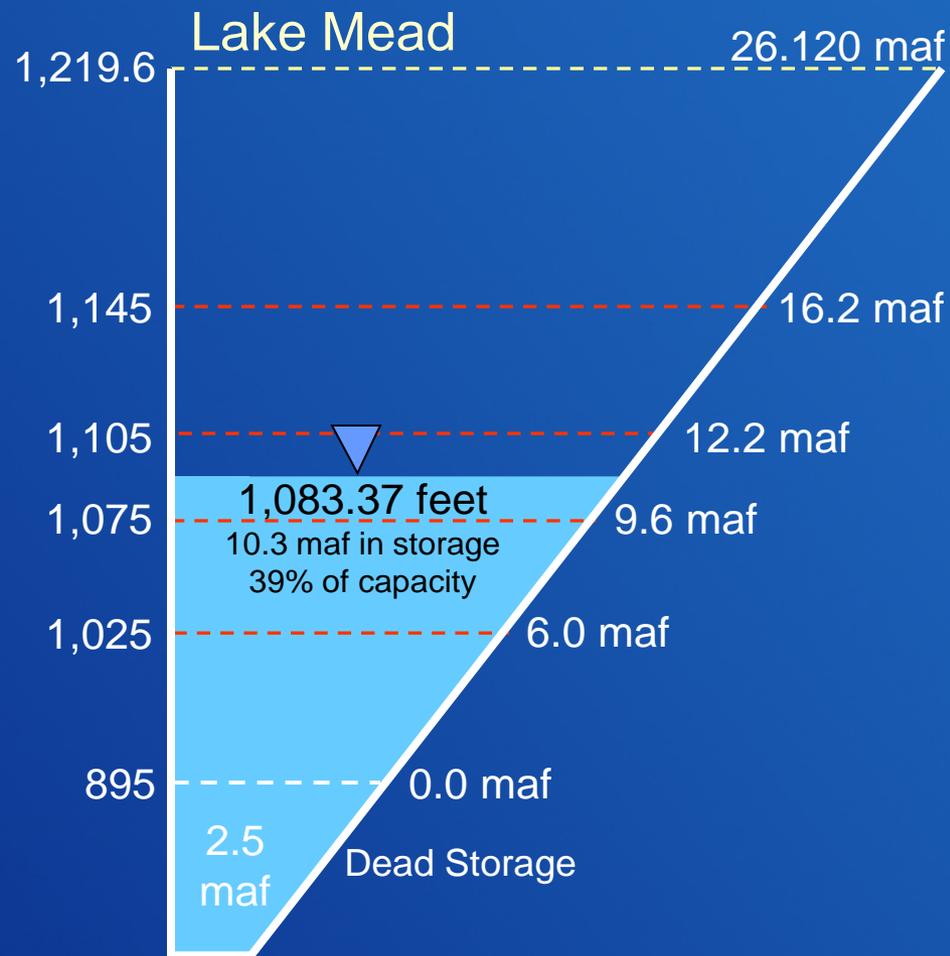
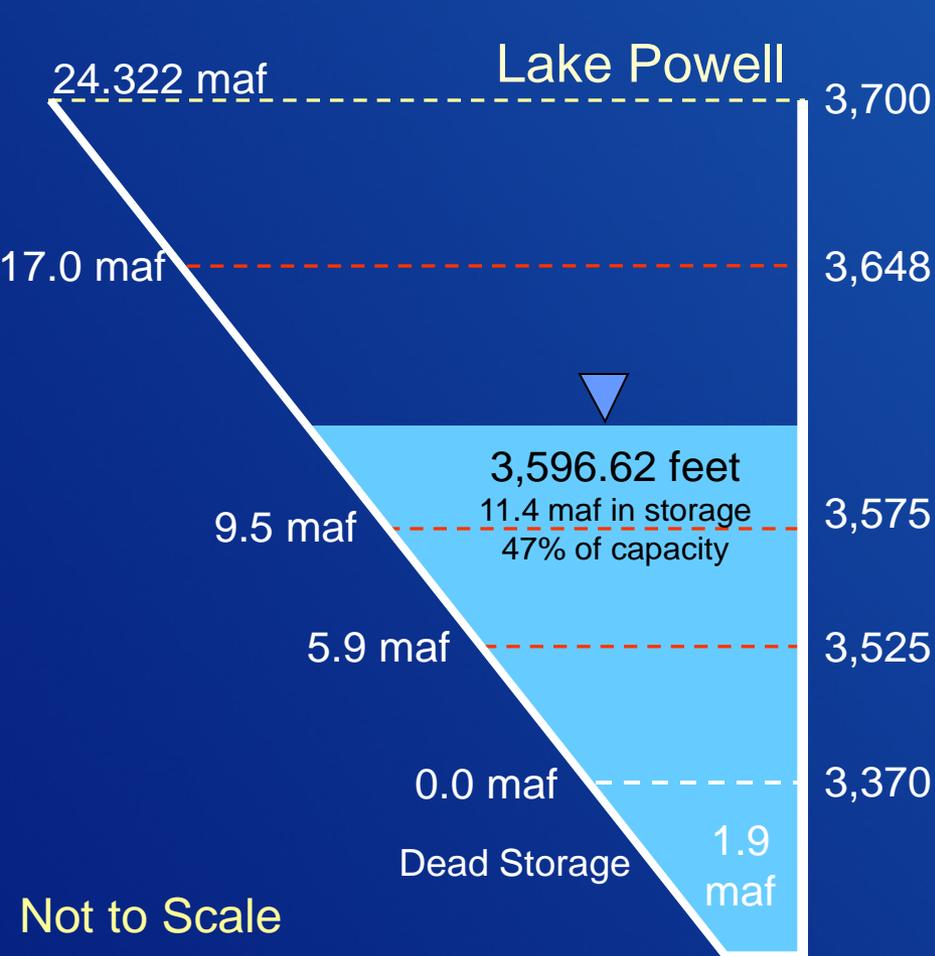
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# End of Calendar Year 2014 Projections

## August 2014 24-Month Study Most Probable Inflow Scenario<sup>1</sup>



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			1,145		
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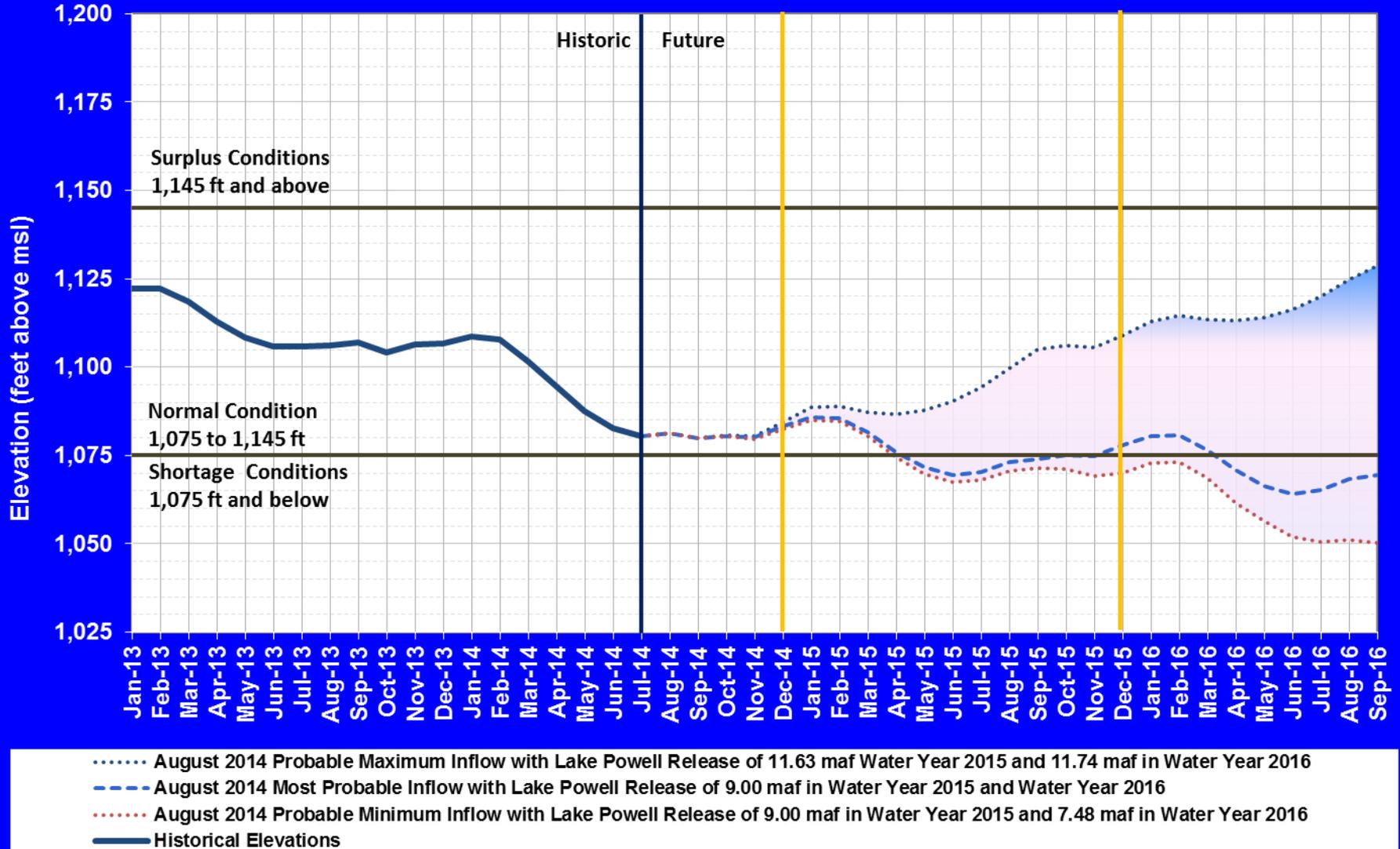
# Projected Lake Mead Operational Tiers

Based on August 2014 24-Month Study Inflow Scenarios

Powell Inflow Scenario	CY 2015 Jan 1, 2015 Projection	CY 2016 Jan 1, 2016 Projections
Probable Minimum	Normal - ICS Surplus Condition Elevation 1,083.37 ft	Shortage Condition – Level 1 Elevation 1,069.96 ft
Most Probable		Normal - ICS Surplus Condition Elevation 1,078.01 ft
Probable Maximum		Normal - ICS Surplus Condition Elevation 1,108.96 ft

# Lake Mead End of Month Elevations

## Projections from August 2014 24-Month Study Inflow Scenarios



# Lower Basin Side Inflows – WY/CY 2014<sup>1,2</sup>

## Intervening Flow from Glen Canyon to Hoover Dam

Month in WY/CY 2014		5-Year Average Intervening Flow (KAF)	Observed Intervening Flow (KAF)	Observed Intervening Flow (% of Average)	Difference From 5-Year Average (KAF)
HISTORICAL	October 2013	52	38	73%	-14
	November 2013	52	101	194%	49
	December 2013	95	43	45%	-52
	January 2014	75	45	60%	-30
	February 2014	78	76	97%	-2
	March 2014	68	29	43%	-39
	April 2014	80	17	21%	-63
	May 2014	60	13	22%	-47
	June 2014	23	12	52%	-11
July 2014	64	55	86%	-9	
FUTURE	August 2014	116			
	September 2014	97			
	October 2014	52			
	November 2014	52			
	December 2014	95			
<b>WY 2014 Totals</b>		<b>860</b>	<b>642</b>	<b>75%</b>	<b>-218</b>
<b>CY 2014 Totals</b>		<b>860</b>	<b>660</b>	<b>77%</b>	<b>-200</b>

<sup>1</sup> Values were computed with the LC's gain-loss model for the most recent 24-month study.

<sup>2</sup> Percents of average are based on the 5-year mean from 2009-2013.

# YAO Operations Update

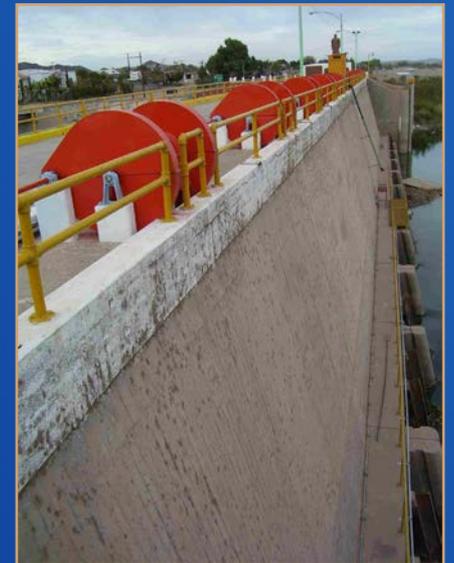
- Brock Reservoir and Senator Wash  
2014 YTD accumulated storage<sup>1</sup>

–Brock Reservoir	100,620 AF
–Senator Wash	68,980 AF



- Excess Flows to Mexico<sup>2</sup>

2014 YTD total                      18,530 AF

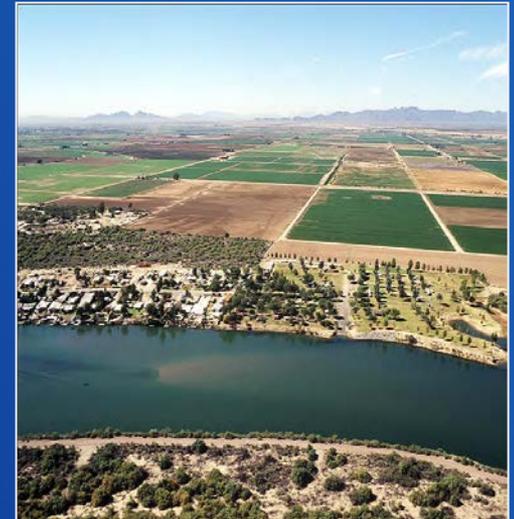


<sup>1</sup> Provisional year-to-date totals through August 28, 2014

<sup>2</sup> Provisional year-to-date total through September 2, 2014

# YAO Operations Update

- Pumped drainage return flows from the Wellton-Mohawk Irrigation and Drainage District
  - Flow at station 0+00 on the Main Outlet Drain from January through July 2014 was 63,000 AF at 2,740 ppm
- Provisional drainage flows to the Colorado River
  - From the South Gila Drainage Wells January through July 2014 was 9,000 AF at 1,690 ppm
  - From the Yuma Mesa Conduit January through July 2014 was 3,480 AF at 1,400 ppm



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