

# RECLAMATION

*Managing Water in the West*

## Lower Colorado River Operations Overview

Lake Mead Water Quality Forum  
October 22, 2013



U.S. Department of the Interior  
Bureau of Reclamation

# The Colorado River: Operation and Current Conditions

- Overview of Basin Hydrology
- Overview of the Interim Guidelines
- Projected and Current System Conditions

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# Overview of Basin Hydrology

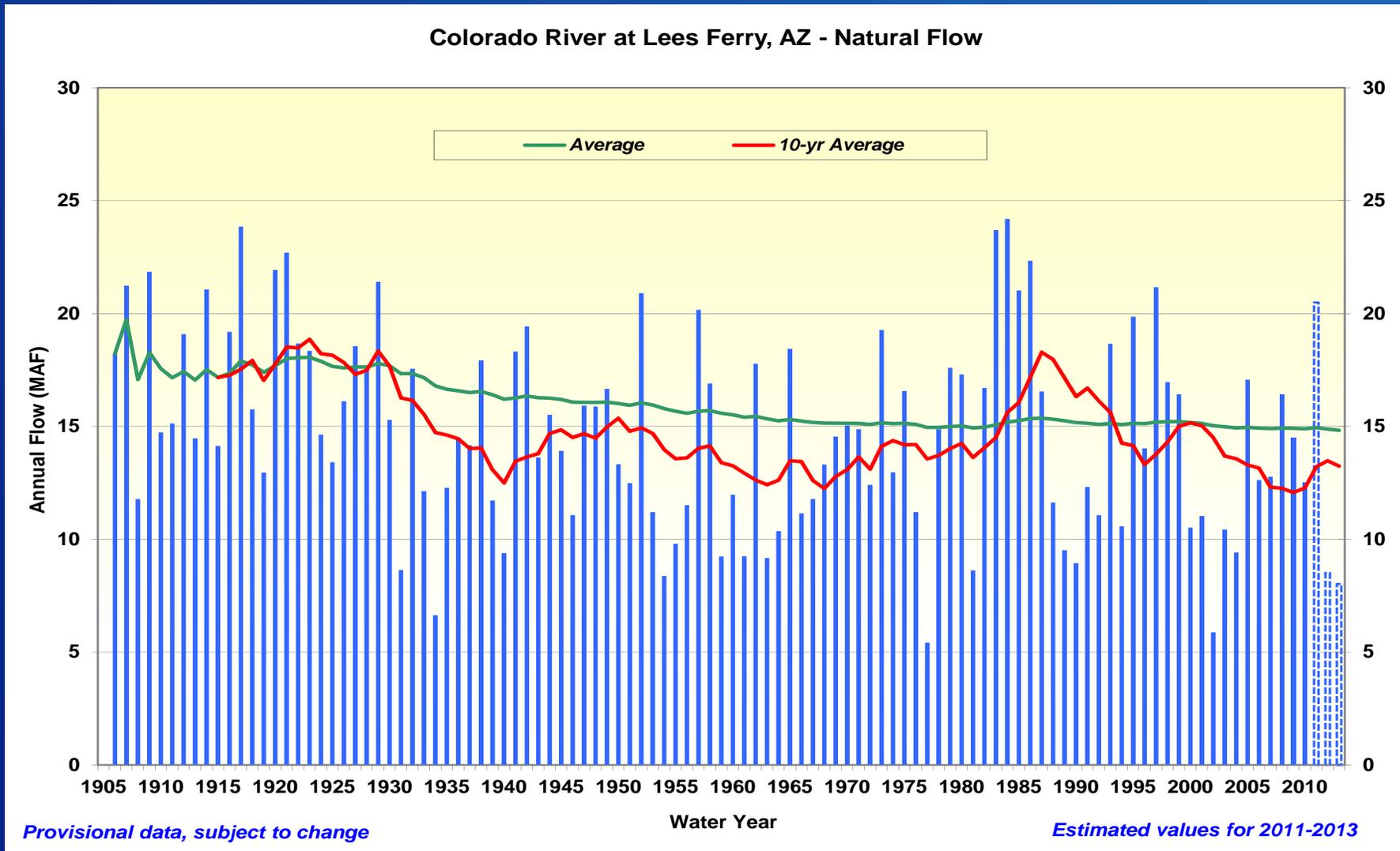
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# Natural Flow

## Colorado River at Lees Ferry Gaging Station, Arizona

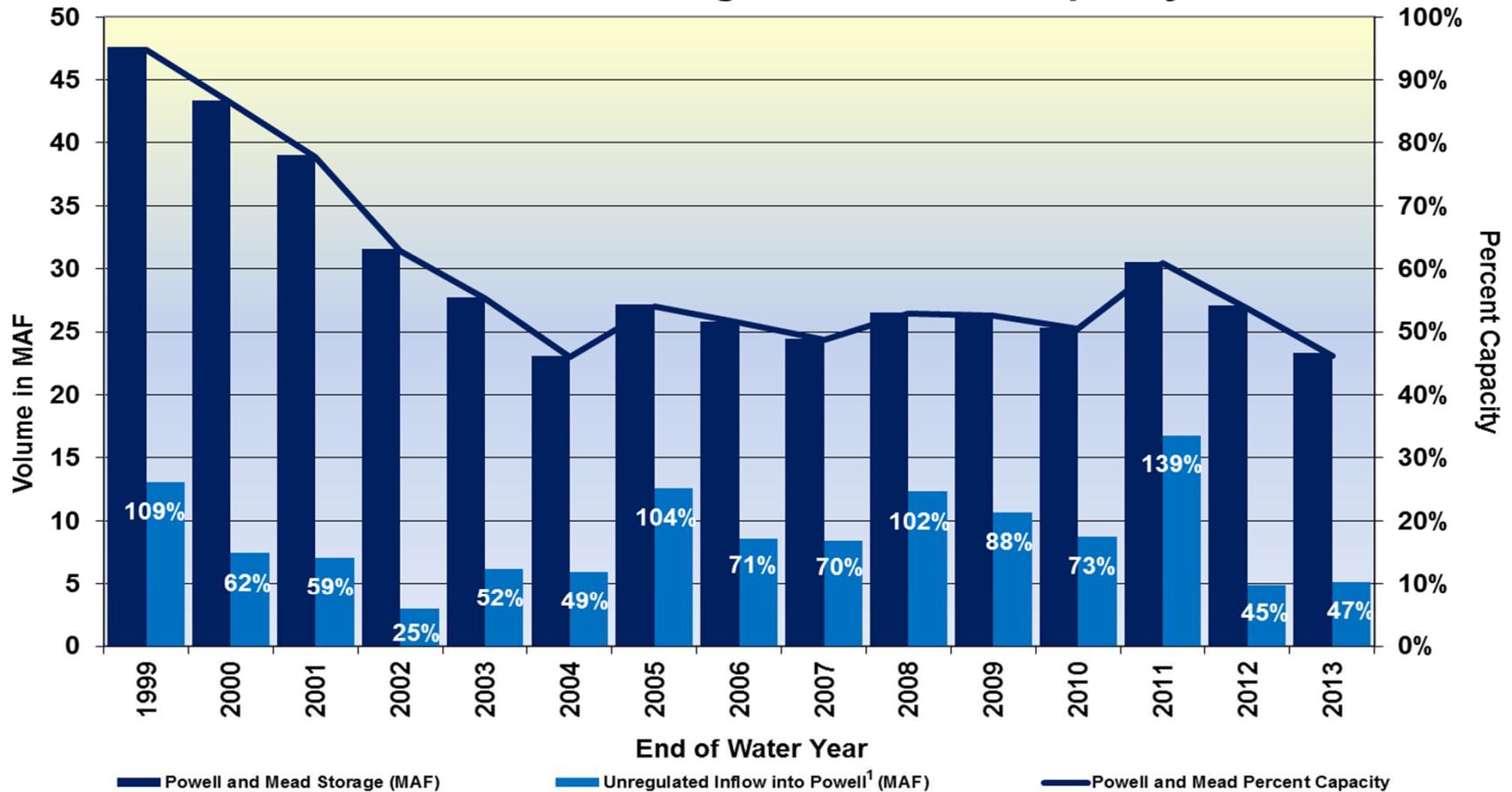
### Water Year 1906 to 2013



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# State of the System (Water Years 1999-2013)<sup>1</sup>

## Unregulated Inflow into Lake Powell Powell-Mead Storage and Percent Capacity



<sup>1</sup> Percentages at the top of the light blue bars represent percent of average unregulated inflow into Lake Powell for a given water year. Water years 1999-2011 are based on the 30-year average from 1971 to 2000. Water years 2012-2013 are based on the 30-year average from 1981-2010.

# Overview of the Interim Guidelines

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# Impetus for the Interim Guidelines



- Seven years of unprecedented drought
- Increased water use
- To date, there has never been a shortage in the Lower Basin and there were no shortage guidelines
- Operations between Lake Powell and Lake Mead were coordinated only at the higher reservoir levels “equalization”

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# Interim Guidelines<sup>1</sup> - A Robust Solution

- Operations specified through the full range of operation for Lake Powell and Lake Mead
- Encourage efficient and flexible use and management of Colorado River water through the ICS mechanism
- Strategy for shortages in the Lower Basin, including a provision for additional shortages if warranted<sup>2</sup>
- In place for an interim period (through 2026) to gain valuable operational experience
- Basin States agree to consult before resorting to litigation

1. Issued in Record of Decision, dated December 13, 2007; available at <http://www.usbr.gov/lc/region/programs/strategies.html>

2. Mexico water deliveries are not directly affected by these guidelines

# Lake Powell & Lake Mead Operational Diagrams

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>
3,575	<b>Mid-Elevation Release Tier</b> Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5	1,145	<b>Normal or ICS Surplus Condition</b> Deliver ≥ 7.5 maf	15.9
3,525	<b>Lower Elevation Balancing Tier</b> Balance contents with a min/max release of 7.0 and 9.5 maf	5.9	1,105	<b>Shortage Condition</b> Deliver 7.167 <sup>4</sup> maf	11.9
3,490		4.0	1,075	<b>Shortage Condition</b> Deliver 7.083 <sup>5</sup> maf	9.4
3,370		0	1,050	<b>Shortage Condition</b> Deliver 7.0 <sup>6</sup> maf Further measures may be undertaken <sup>7</sup>	7.5
			1,025		5.8
			1,000		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

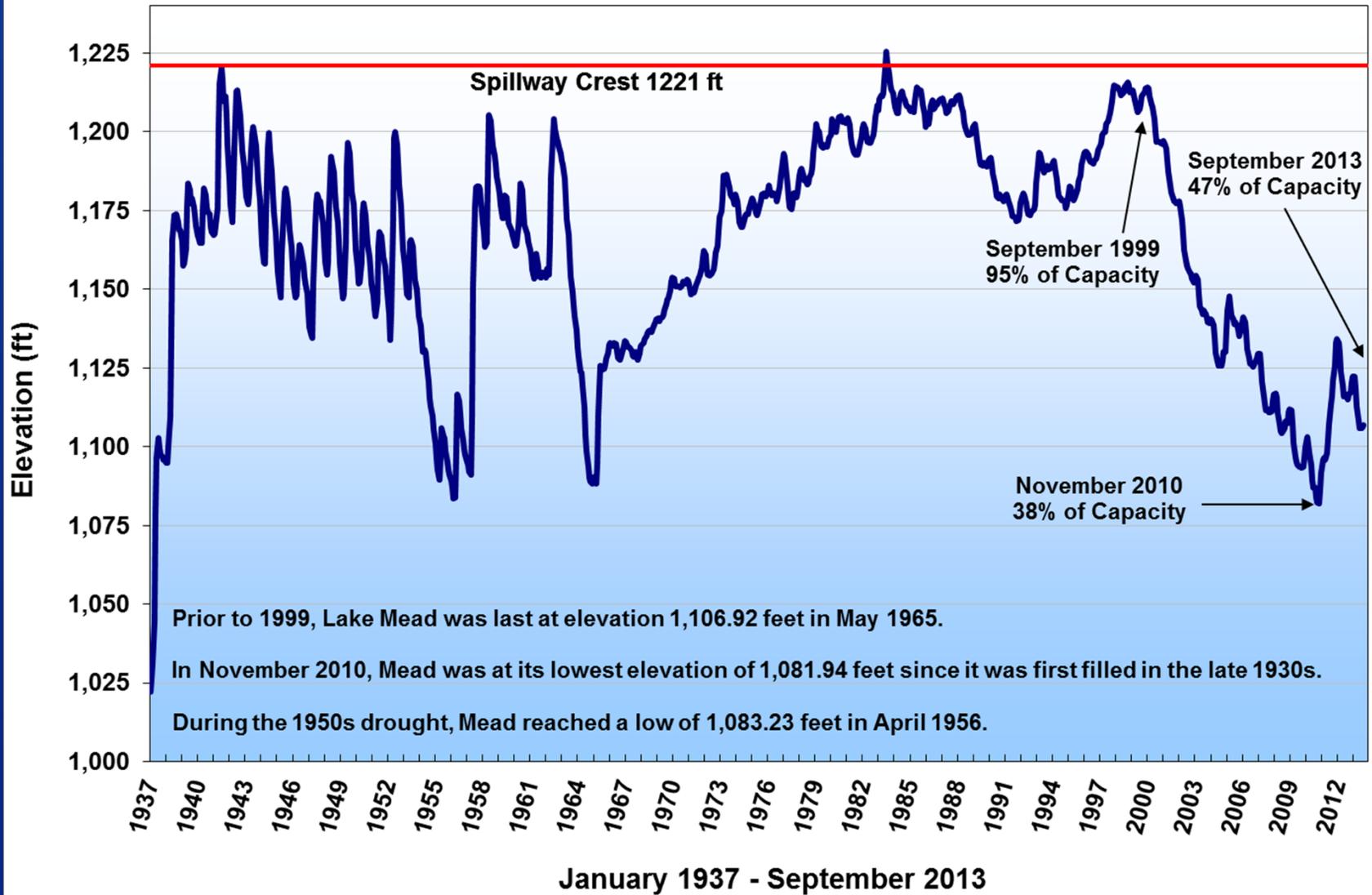
<sup>5</sup> Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

<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.

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# Lake Mead End of Month Elevation



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# Projected and Current Conditions

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# Projected Conditions

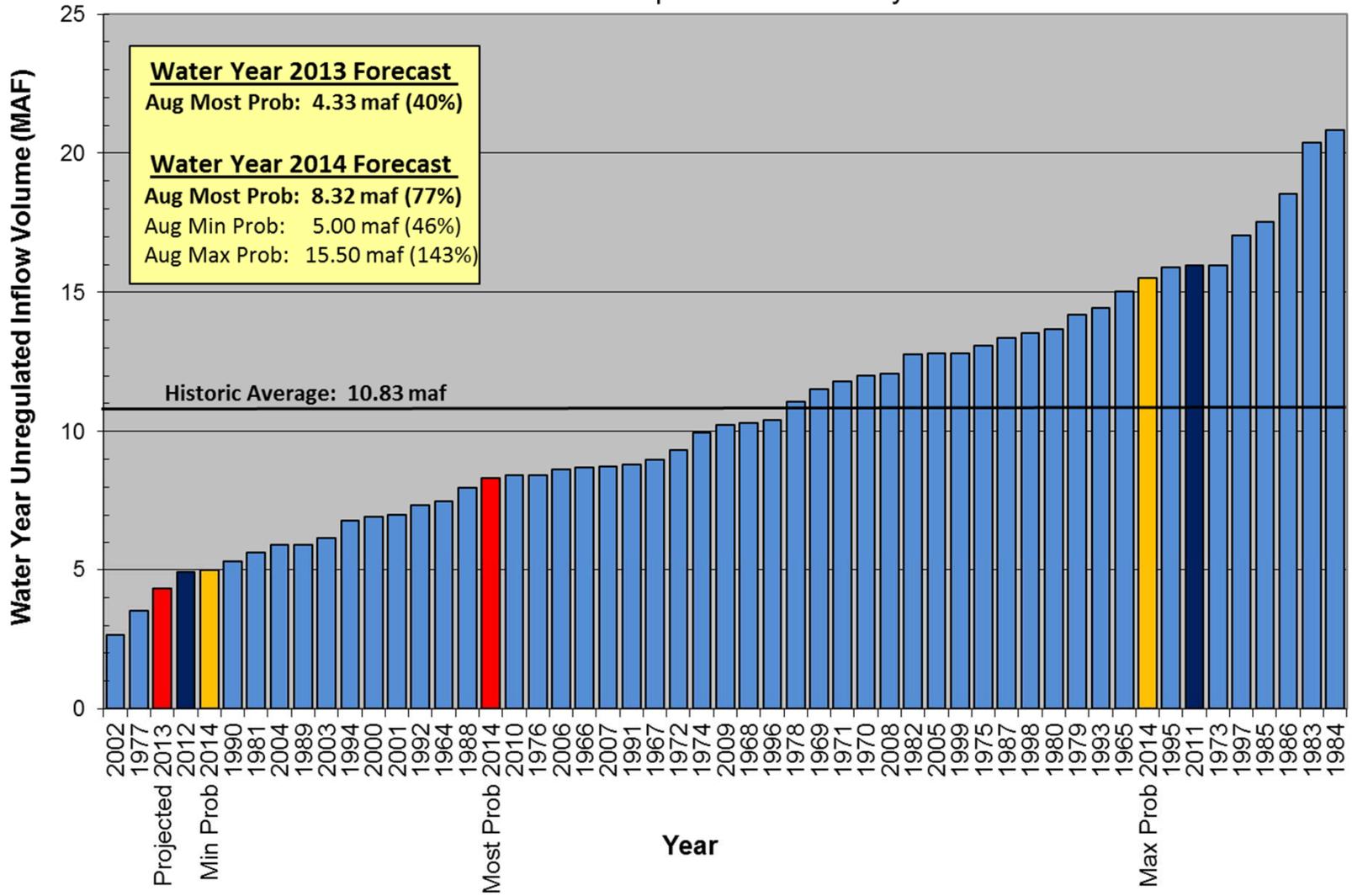
- Under the 2007 Interim Guidelines:
  - August projections are used as the basis for decision for Lake Powell and Lake Mead *annual* operations for the coming year
  - April projections are also important due to potential adjustments to Lake Powell's annual operation at the higher reservoir levels
- Draft 2014 Annual Operating Plan (AOP) currently available at:
  - [http://www.usbr.gov/lc/region/g4000/AOP2014/AOP14\\_draft.pdf](http://www.usbr.gov/lc/region/g4000/AOP2014/AOP14_draft.pdf)
- Current status and projected monthly operation available at:
  - <http://www.usbr.gov/lc/region/g4000/24mo.pdf>

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## Lake Powell Unregulated Inflow

### Water Years 2013 and 2014 Forecast (issued August 1)

Comparison with History



# Lake Powell & Lake Mead Operational Table

## Operational Tier Determinations for Water Year/Calendar Year 2014

Lake Powell			Lake Mead		
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3,575			1,145		
	<b>3,573.69</b>		1,105	<b>1,103.08</b> <b>Normal or ICS Surplus Condition</b> Deliver ≥ 7.5 maf	11.9
	<b>1/1/14 Projection<sup>1</sup></b>		1,075	<b>1/1/14 Projection</b> <b>Shortage Condition</b> Deliver 7.167 <sup>4</sup> maf	9.4
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 Condition</b> Deliver 7.083 <sup>5</sup> maf	7.5
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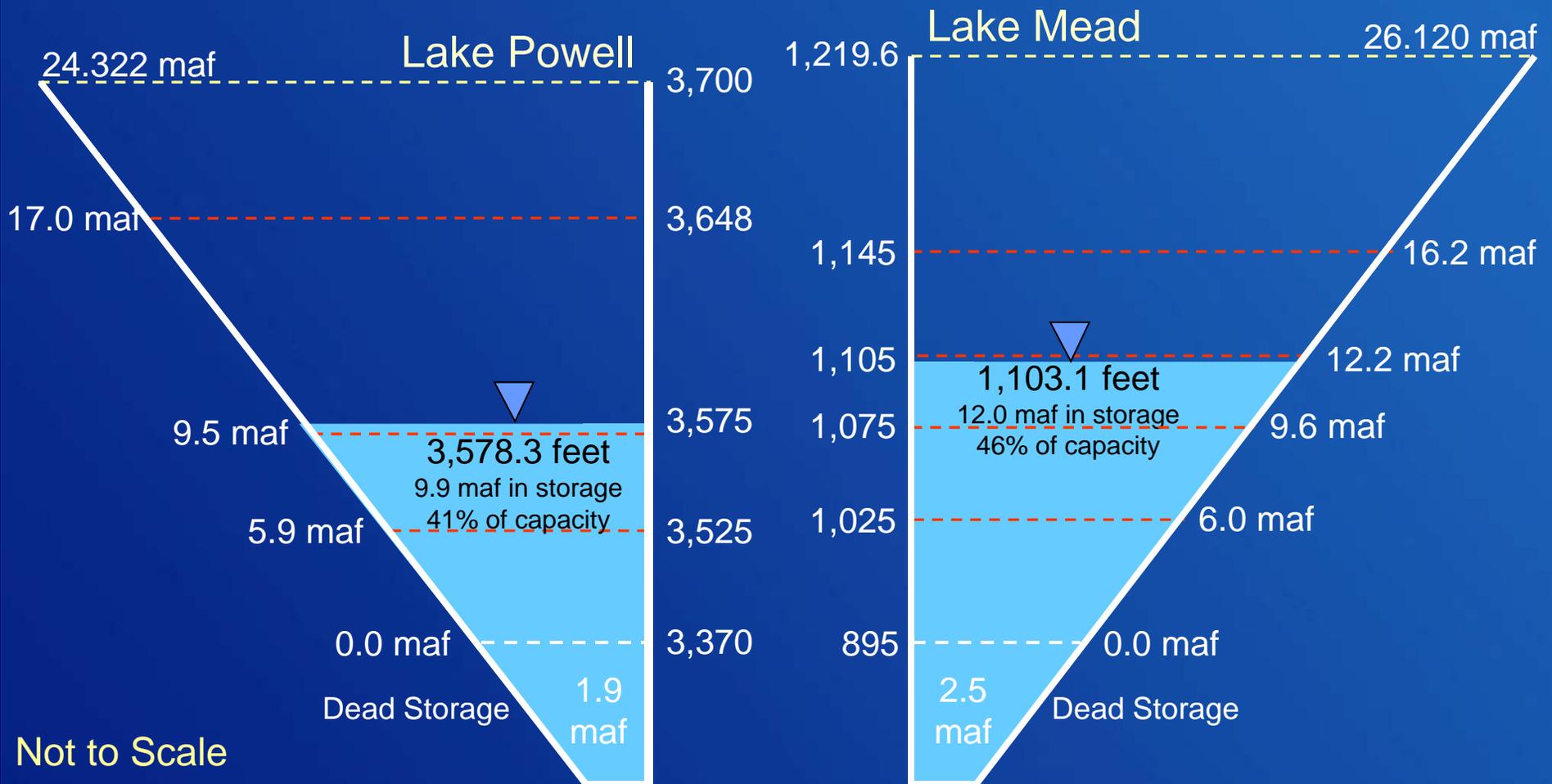
<sup>1</sup> Lake Powell's projected elevation is based on an 8.23 maf annual release pattern from in water year 2014.

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# End of Calendar Year 2013 Projections

August 2013 24-Month Study Most Probable Inflow Scenario<sup>1</sup>

Based on a 7.48 maf release pattern from Lake Powell in Water Year 2014



<sup>1</sup> WY 2014 unregulated inflow into Lake Powell is based on the CBRFC outlook dated 8/1/13.

# Lower Basin Side Inflows – WY/CY 2013<sup>1,2</sup>

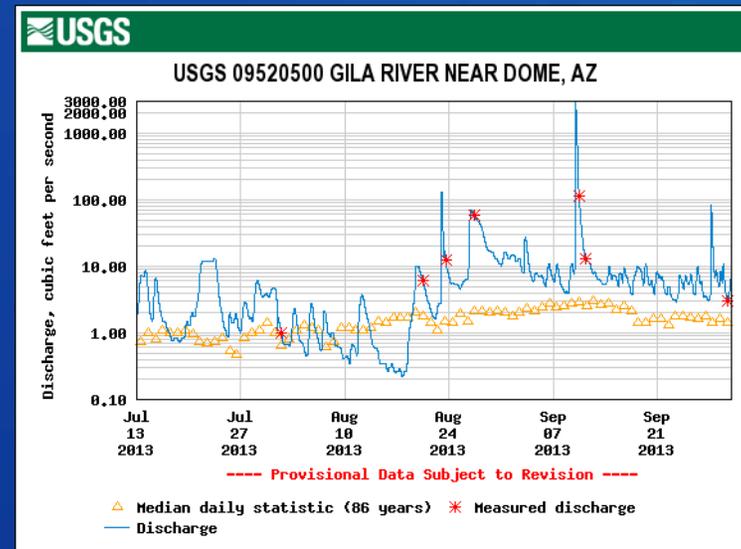
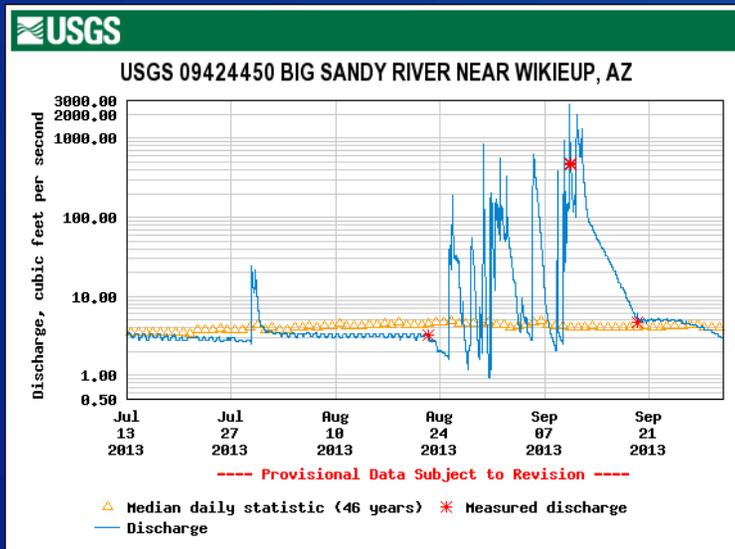
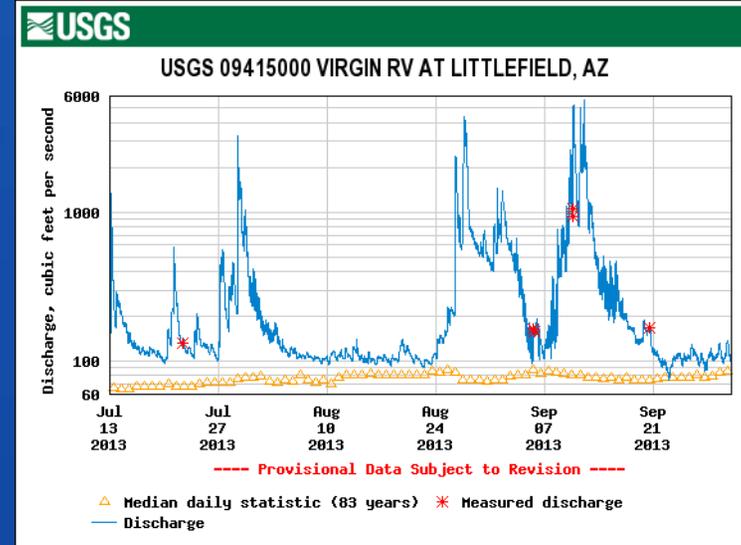
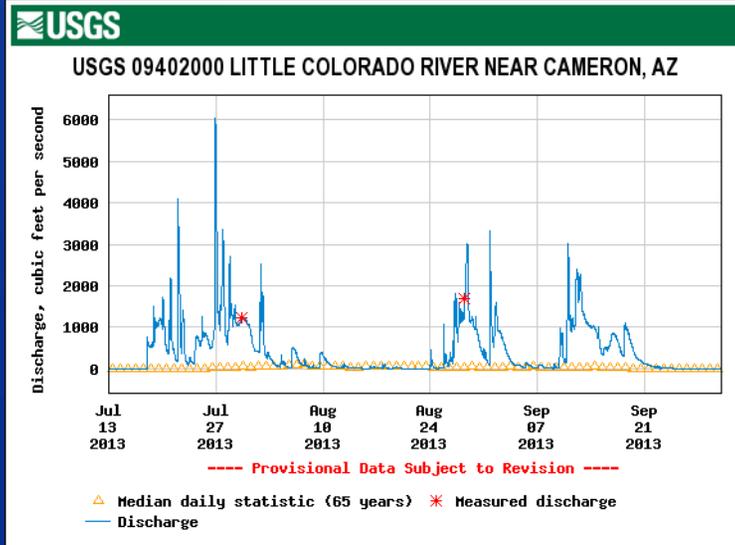
## Intervening Flow from Glen Canyon to Hoover Dam

Month in WY/CY 2013	5-Year Average Intervening Flow (KAF)	Observed Intervening Flow (KAF)	Observed Intervening Flow (% of Average)	Difference From 5-Year Average (KAF)	
H I S T O R Y	October 2012	54	53	98%	-1
	November 2012	44	60	136%	+16
	December 2012	99	50	50%	-49
	January 2013	81	56	69%	-25
	February 2013	94	68	73%	-26
	March 2013	77	69	89%	-8
	April 2013	80	37	46%	-43
	May 2013	64	28	44%	-36
	June 2013	33	1	3%	-32
	July 2013	55	113	207%	+58
	August 2013	109	133	122%	+24
	September 2013	81	155	191%	+74
F U T U R E	October 2013	54			
	November 2013	44			
	December 2013	99			
<b>WY 2013 Totals</b>	<b>870</b>	<b>823</b>	<b>95%</b>	<b>-47</b>	
<b>CY 2013 Totals</b>	<b>870</b>	<b>857</b>	<b>98%</b>	<b>-13</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 2008-2012.

# Lower Basin Inflows July-September 2013



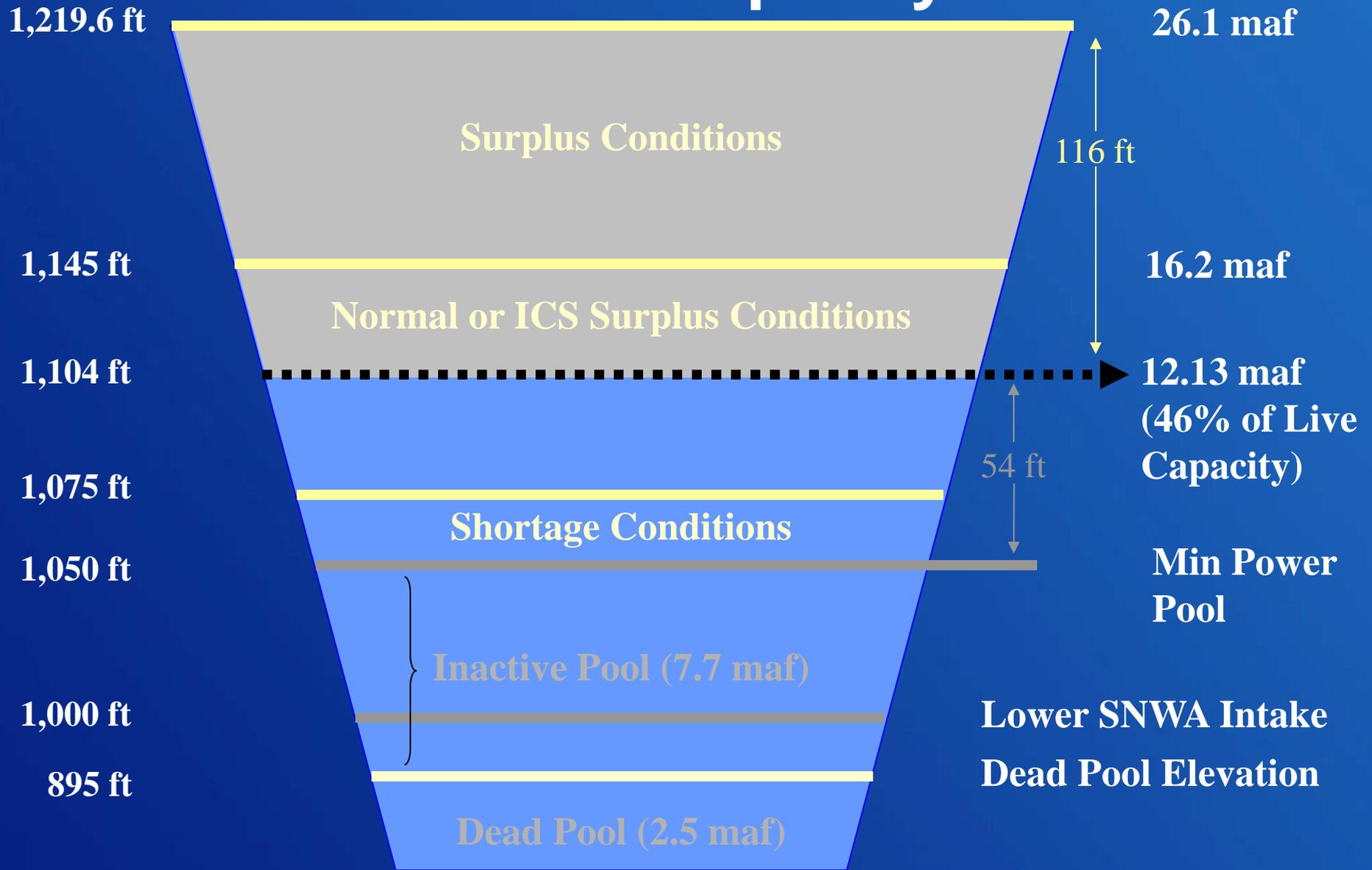
# Colorado River Basin Storage (as of October 21, 2013)

Current Storage	Percent Full	MAF	Elevation (Feet)
Lake Powell	45%	10.92	3,591.1
Lake Mead	46%	12.13	1,104.3
Total System Storage*	50%	29.71	NA

\*Total system storage was 33.8 maf or 57% this time last year

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# Lake Mead Capacity

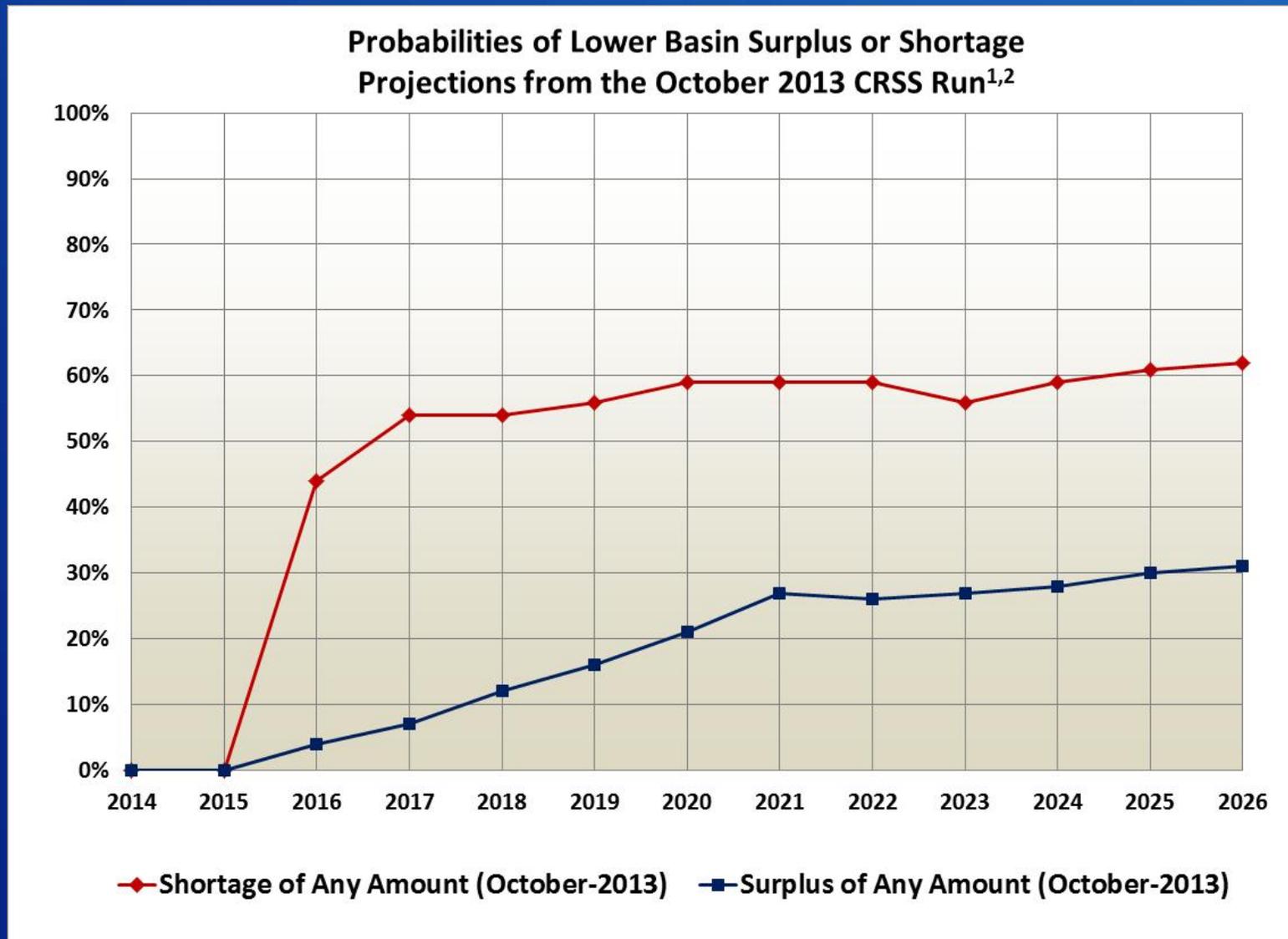


Not to scale

As of Oct 21, 2013

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# Lower Basin Surplus & Shortage through 2026



<sup>1</sup> Reservoir initial conditions based on projected levels on December 31, 2013, from the October 2013 24-Month Study  
<sup>2</sup> Hydrologic inflow traces based on resampling of the observed natural flow record from 1906-2010

An aerial photograph of a large concrete dam and its reservoir. The reservoir is a deep blue-green color, contrasting with the brown, rocky terrain of the surrounding mountains. The dam is a curved structure with several spillways. A road with a few cars is visible on the dam's crest. The sky is clear and blue.

# The Colorado River: Operations and Current Conditions

For further information:  
<http://www.usbr.gov/lc/region>

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