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Managing Water in the West

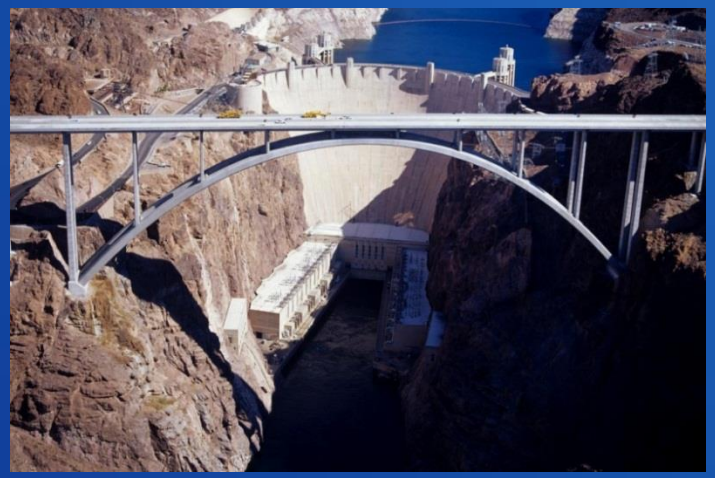
Colorado River Basin: System Status Update

Colorado River Citizens Forum
El Centro, CA
December 17, 2014

U.S. Department of the Interior
Bureau of Reclamation

Colorado River Basin: System Status Update

- Overview of the Colorado River Basin
- State of the System
- Projected System Conditions
- New Era of Limits
- Questions



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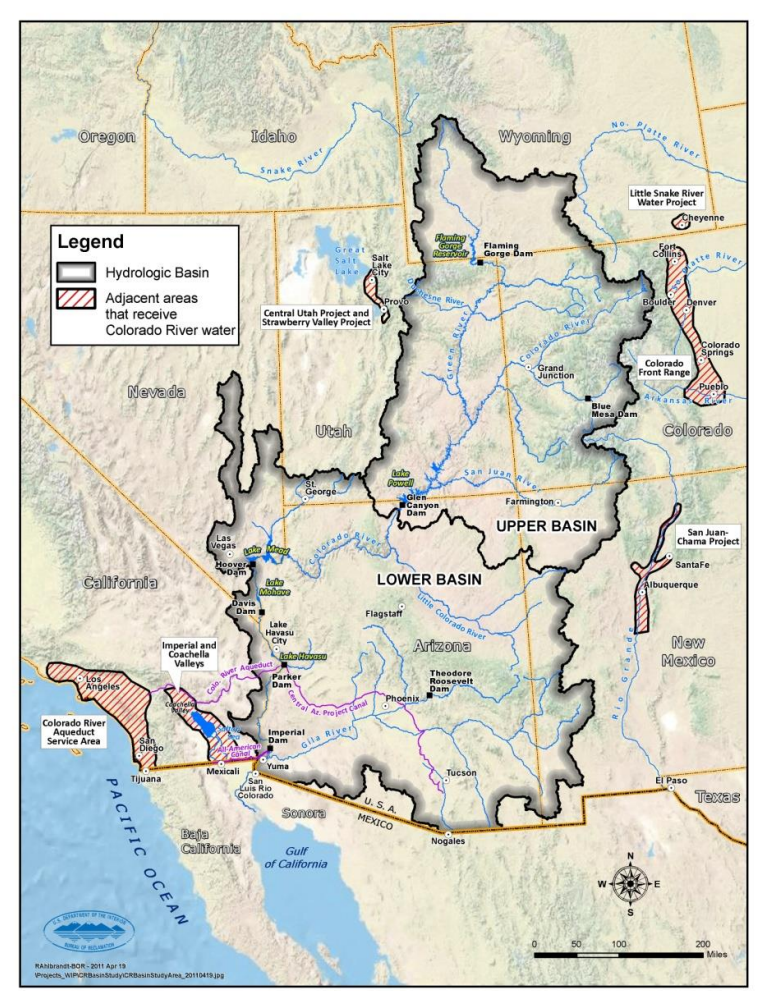
Overview of the Colorado River Basin

- 16.5 million acre-feet (maf) allocated annually
  - 7.5 maf each to Upper and Lower Basins
  - 1.5 maf to Republic of Mexico
- 13 to 14.5 maf of consumptive use on average annually
- Operations and water deliveries governed by the “Law of the River”
- 60 maf of storage
- 14.9 maf average annual inflow in Upper Basin over the past 100 years
- 1.3 maf average annual inflow in Lower Basin
- Inflows are highly variable year-to-year



Map of Colorado River Upper and Lower Basins

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State of the System

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Colorado River Basin Storage
(as of December 15, 2014)

Current Storage	Percent Full	MAF	Elevation (Feet)
Lake Powell	48%	11.7	3,600
Lake Mead	40%	10.5	1,086
Total System Storage*	50%	29.7	NA

*Total system storage was 29.4 maf or 49% this time last year

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Current Colorado River Drought

- Inflow into Powell has been below average 12 of the past 15 years (2000-2014)
- The period from 2000-2014 was the driest 15-year period in over 100 years of historical record
- Not unusual to have a few years of above average inflow during longer-term droughts
- Although tree-ring reconstructions show more severe droughts have occurred over the past 1200 years (e.g., drought in the mid 1100s), this drought ranks in the driest 1 percent of 15-year periods

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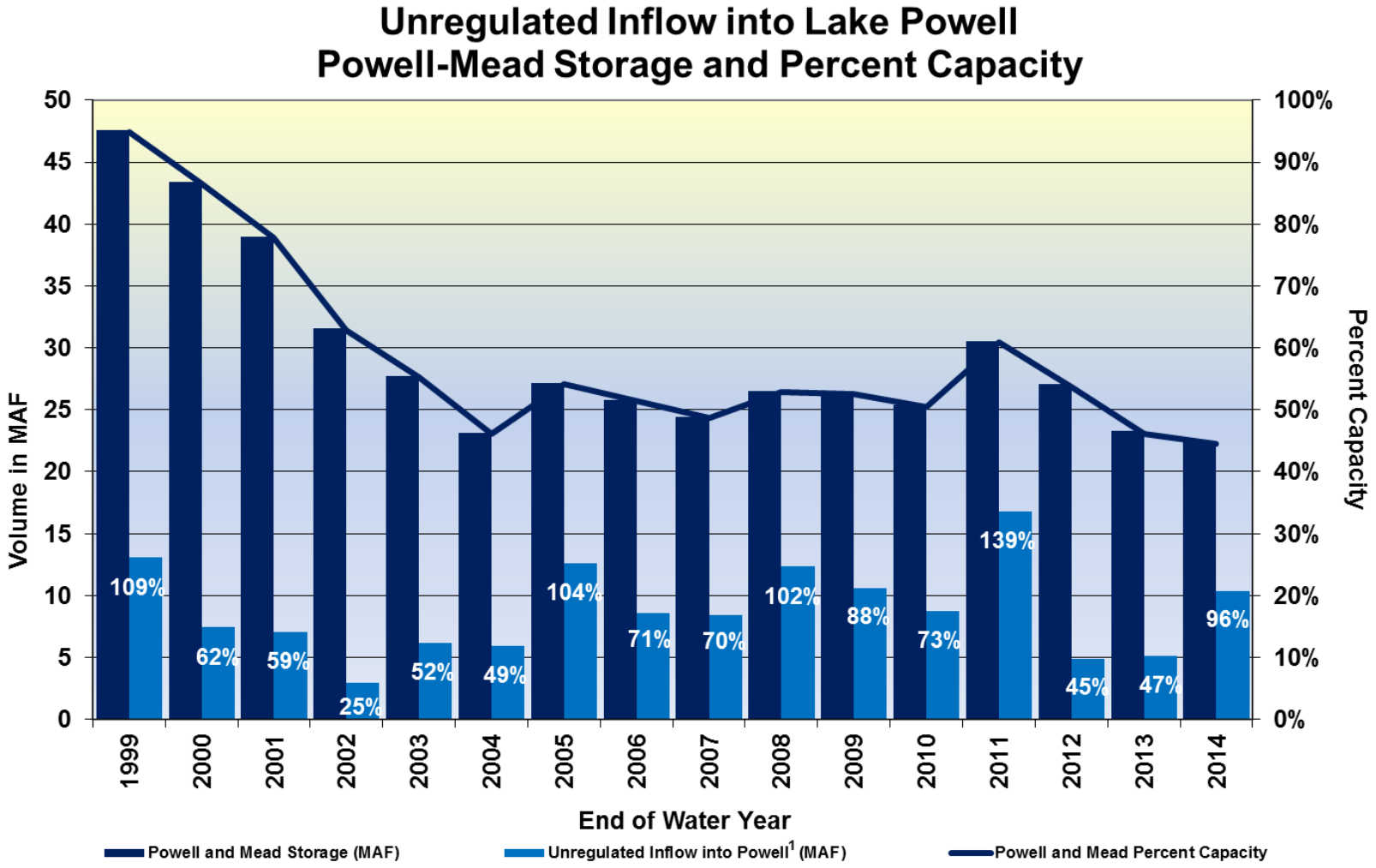
State of the System (Water Years 1999-2014)



[1]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 2012-2014 are based on the 30-year average from 1981-2010.

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Projected System Conditions 2015-2019

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Annual Operating Plan (AOP)

- A report on the current year's operations and the upcoming year's projected operations
  - published by about December of the current calendar year
- Three consultations held annually
  - May, July, and September
- 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 AOP currently available at:
  - http://www.usbr.gov/lc/region/g4000/AOP2015/AOP15_draft.pdf
- Current status and projected monthly operation available at:
  - http://www.usbr.gov/lc/region/g4000/24mo.pdf

Lake Powell & Lake Mead Operational Table

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

Lake Powell

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
3,700	**Equalization Tier** Equalize, avoid spills or release 8.23 maf	24.3
3,636 - 3,666 (2008-2026)	**Upper Elevation Balancing Tier**[3] 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)
3,596.62 ft Jan 1, 2015 projection		
3,575		9.5
	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	
3,525		5.9
	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf	
3,490		4.0
3,370		0

Lake Mead

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
1,220	**Flood Control Surplus or Quantified Surplus Condition** Deliver > 7.5 maf	25.9
1,200 (approx.)[2]	**Domestic Surplus or ICS Surplus Condition** Deliver > 7.5 maf	22.9 (approx.)[2]
1,145		15.9
1,105	**Normal or ICS Surplus Condition** Deliver ≥ 7.5 maf	11.9
1,083.37 ft Jan 1, 2015 projection		
1,075		9.4
	Shortage Condition Deliver 7.167[4] maf	
1,050		7.5
	Shortage Condition Deliver 7.083[5] maf	
1,025		5.8
	Shortage Condition Deliver 7.0[6] maf Further measures may be undertaken[7]	
1,000		4.3
895		0

Diagram not to scale

[1] Acronym for million acre-feet

[2] 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.

[3] Subject to April adjustments which may result in a release according to the Equalization Tier

[4] Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

[5] Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

[6] Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

[7] 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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Water Year	Powell Elevation (feet)
2008	3,636
2009	3,639
2010	3,642
2011	3,643
2012	3,645
2013	3,646
2014	3,648
2015	3,649
2016	3,651
2017	3,652
2018	3,654
2019	3,655
2020	3,657
2021	3,659
2022	3,660
2023	3,662
2024	3,663
2025	3,664
2026	3,666

Lake Powell Equalization Elevation Table

2015 Level – 3,649 feet

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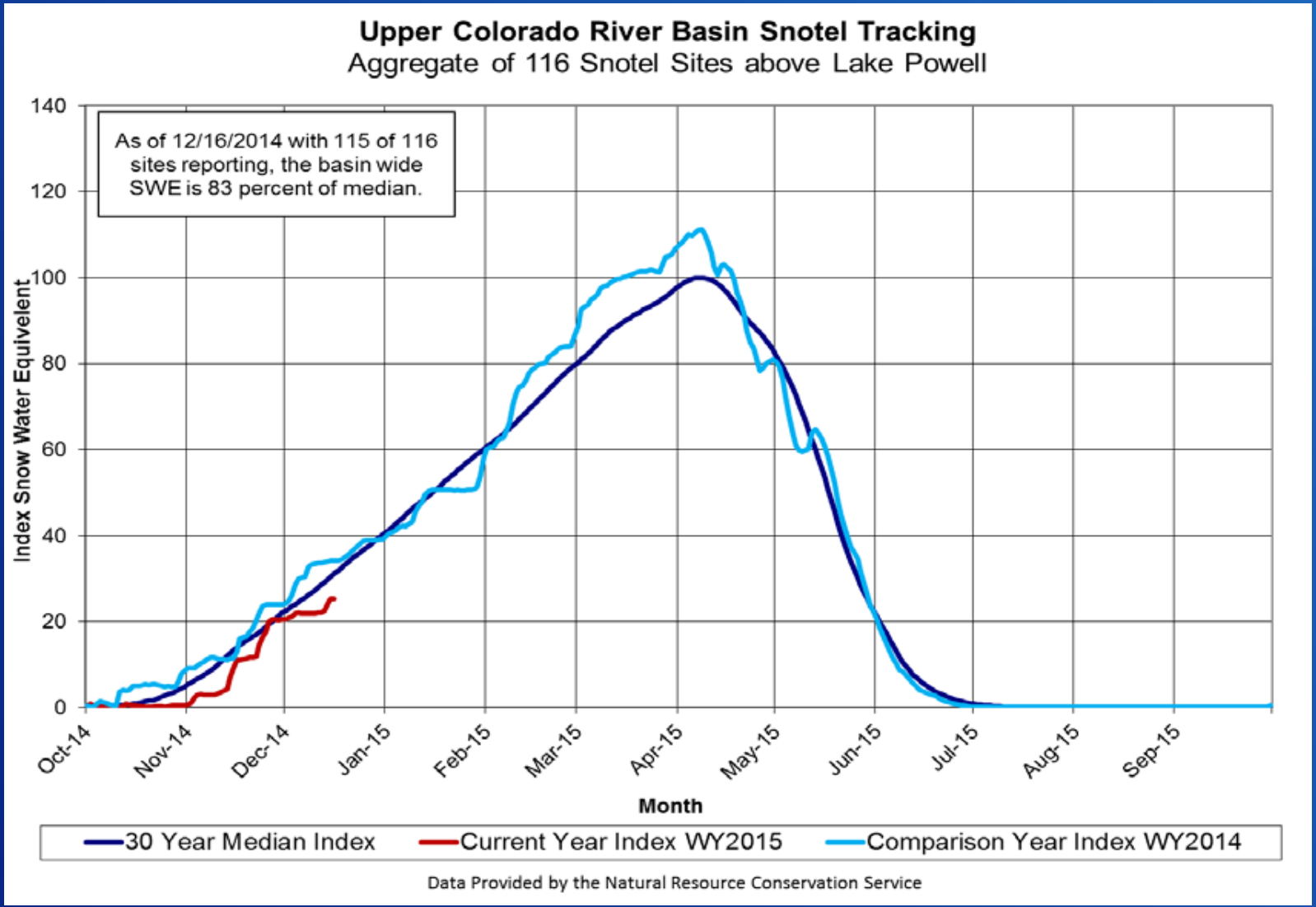
2015 Upper Basin Snowpack



http://www.usbr.gov/uc/water/notice/Graphs/Upper_Colorado.PNG

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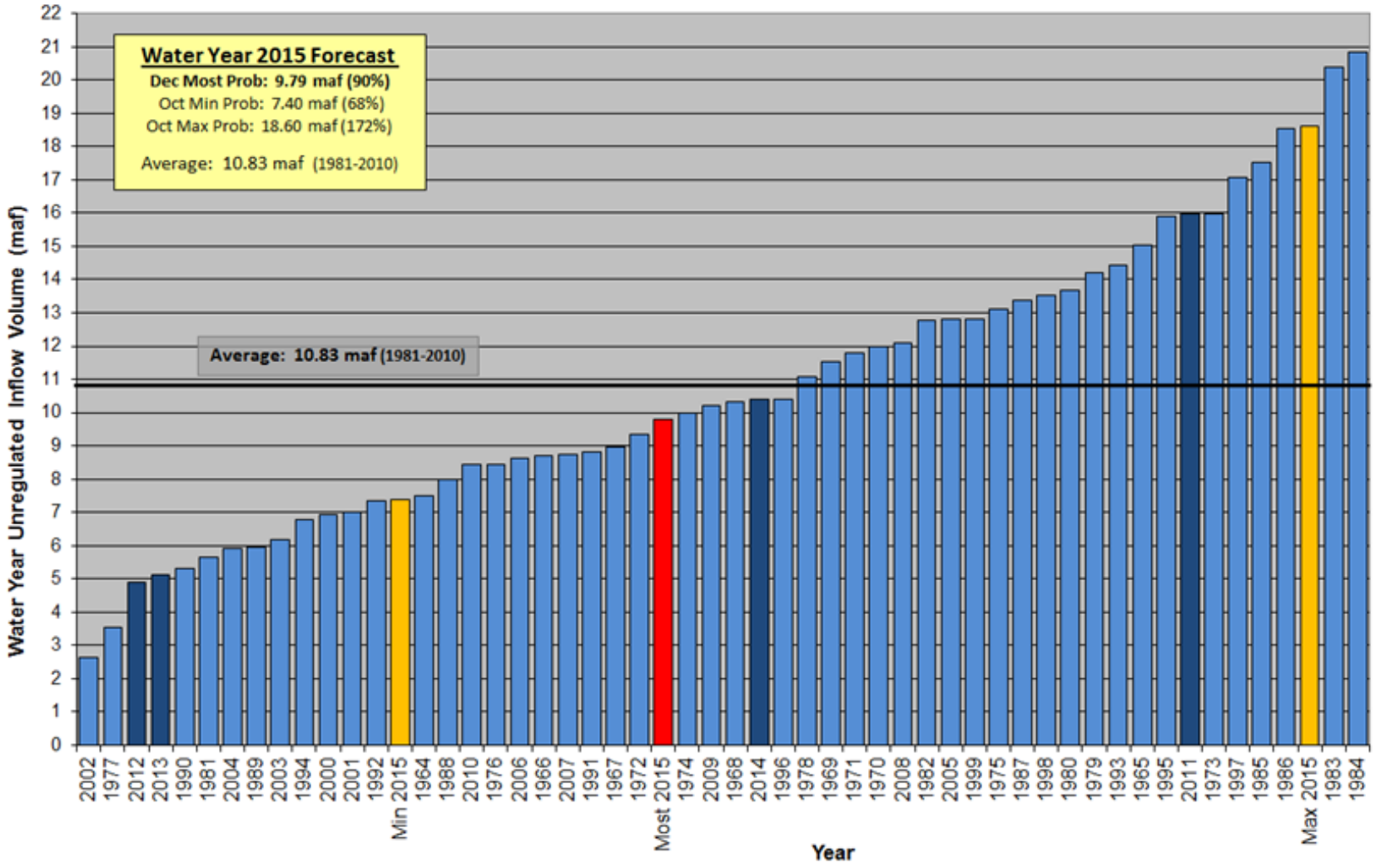
Powell Unregulated Inflow

Water Year 2015 Forecast *(Issued December 1)*

Comparison with History



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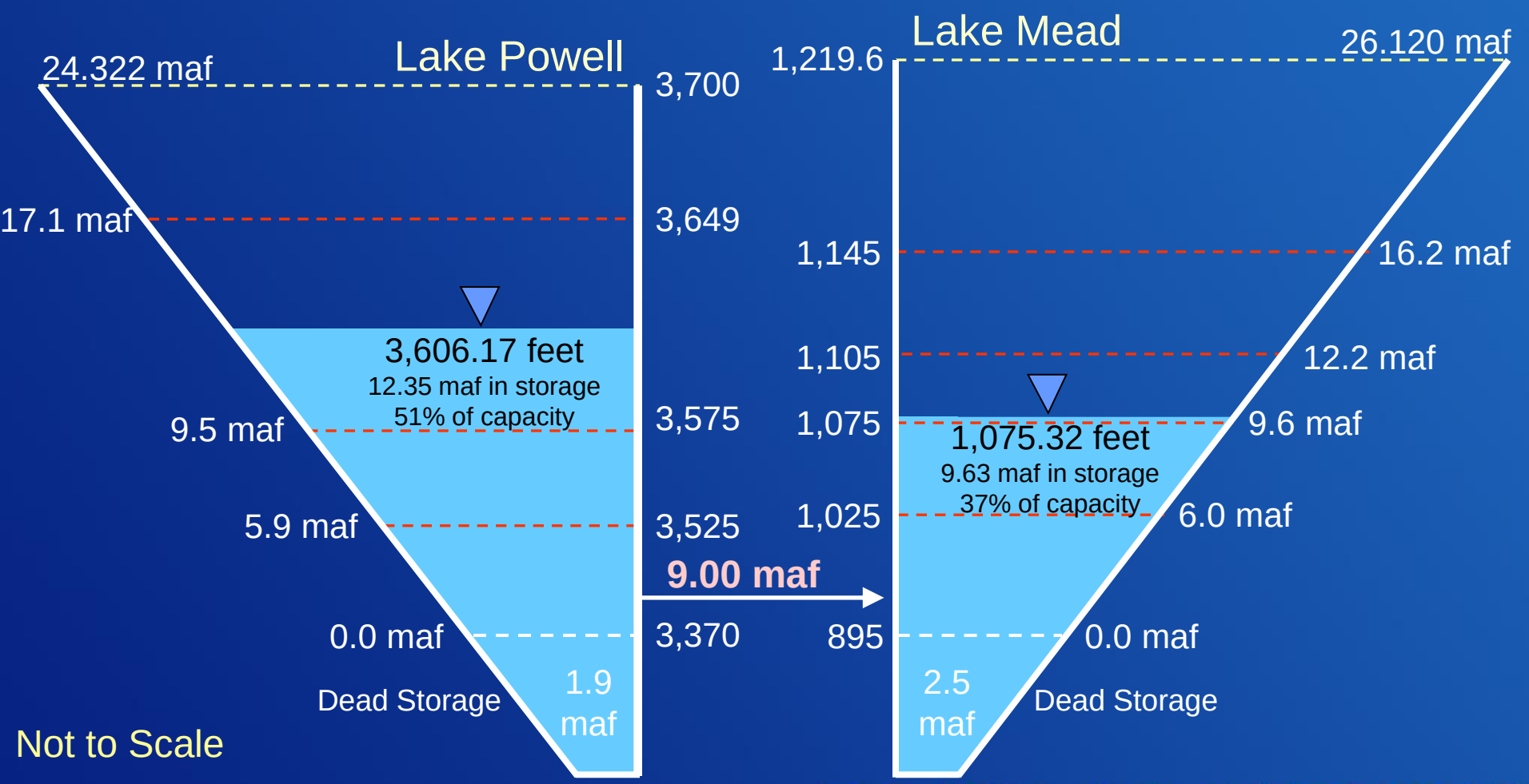
End of Water Year 2015 Projections

December 2014 24-Month Study Most Probable Inflow Scenario[1]

Projected Unregulated Inflow into Powell[1] = 9.79 maf (90% of average)



[1] WY 2015 unregulated inflow into Lake Powell is based on the CBRFC outlook dated 12/1/14.

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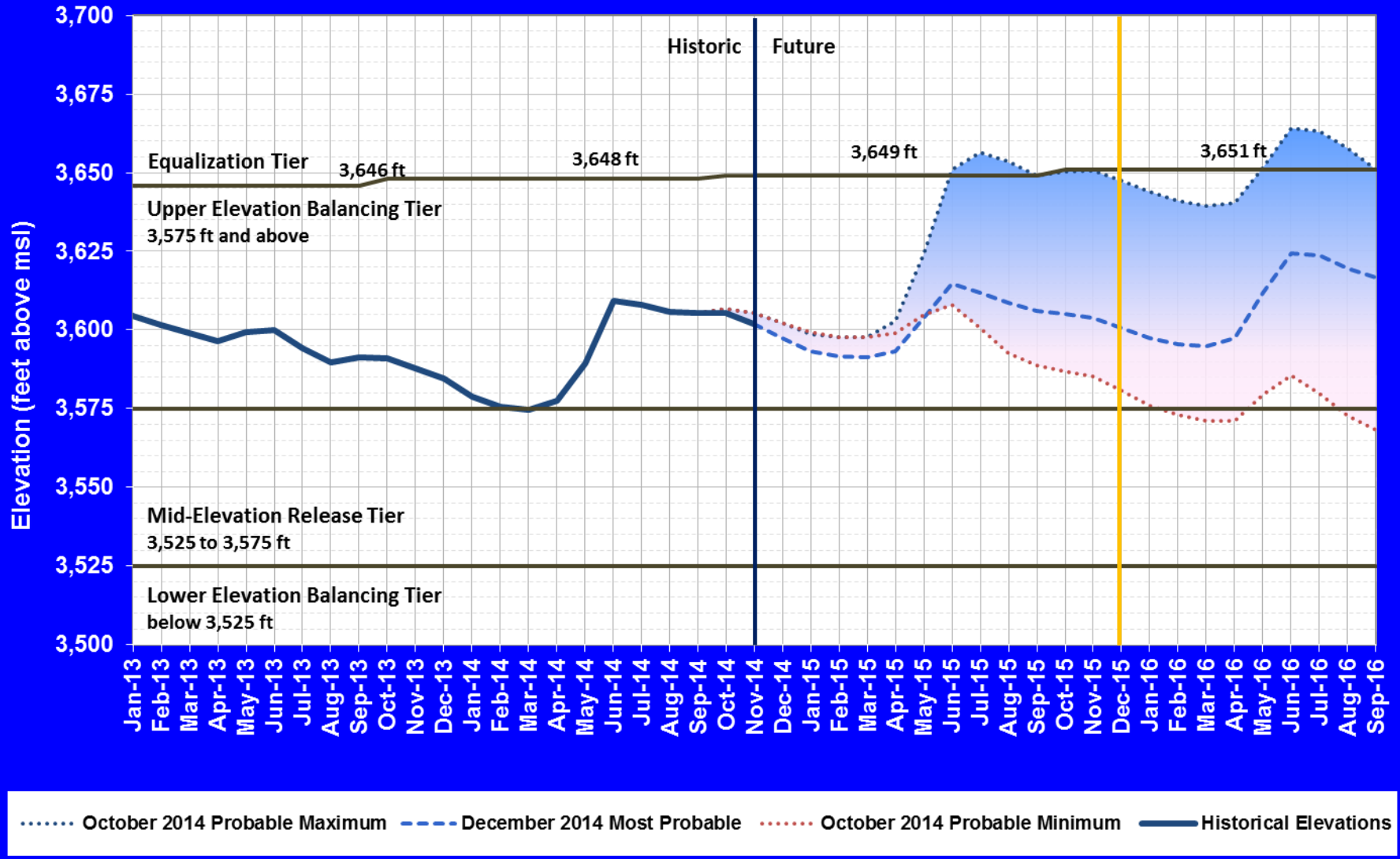
Lake Powell End of Month Elevations

Projections from October and December 2014 24-Month Study Inflow Scenarios



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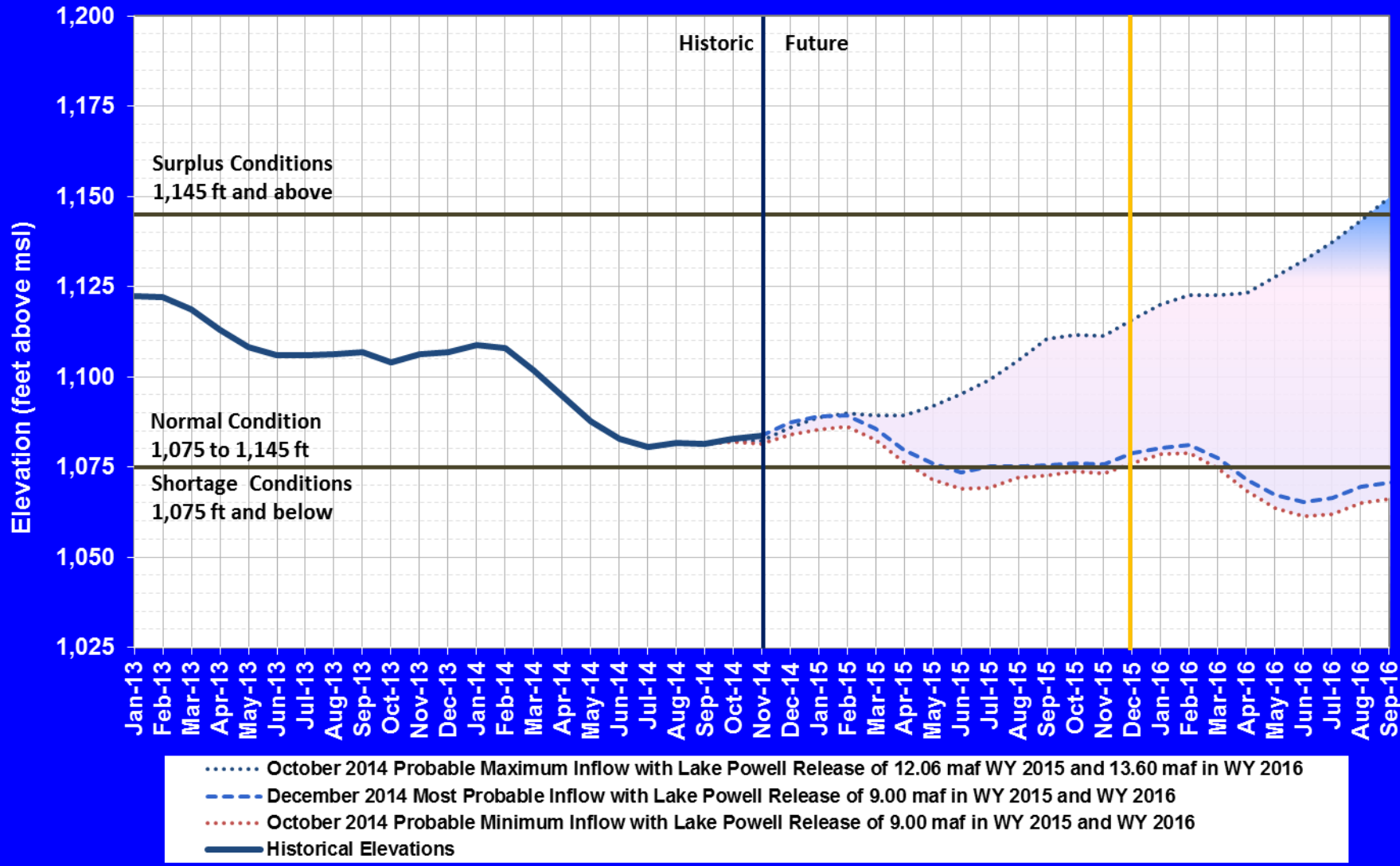
Lake Mead End of Month Elevations

Projections from October and December 2014 24-Month Study Inflow Scenarios



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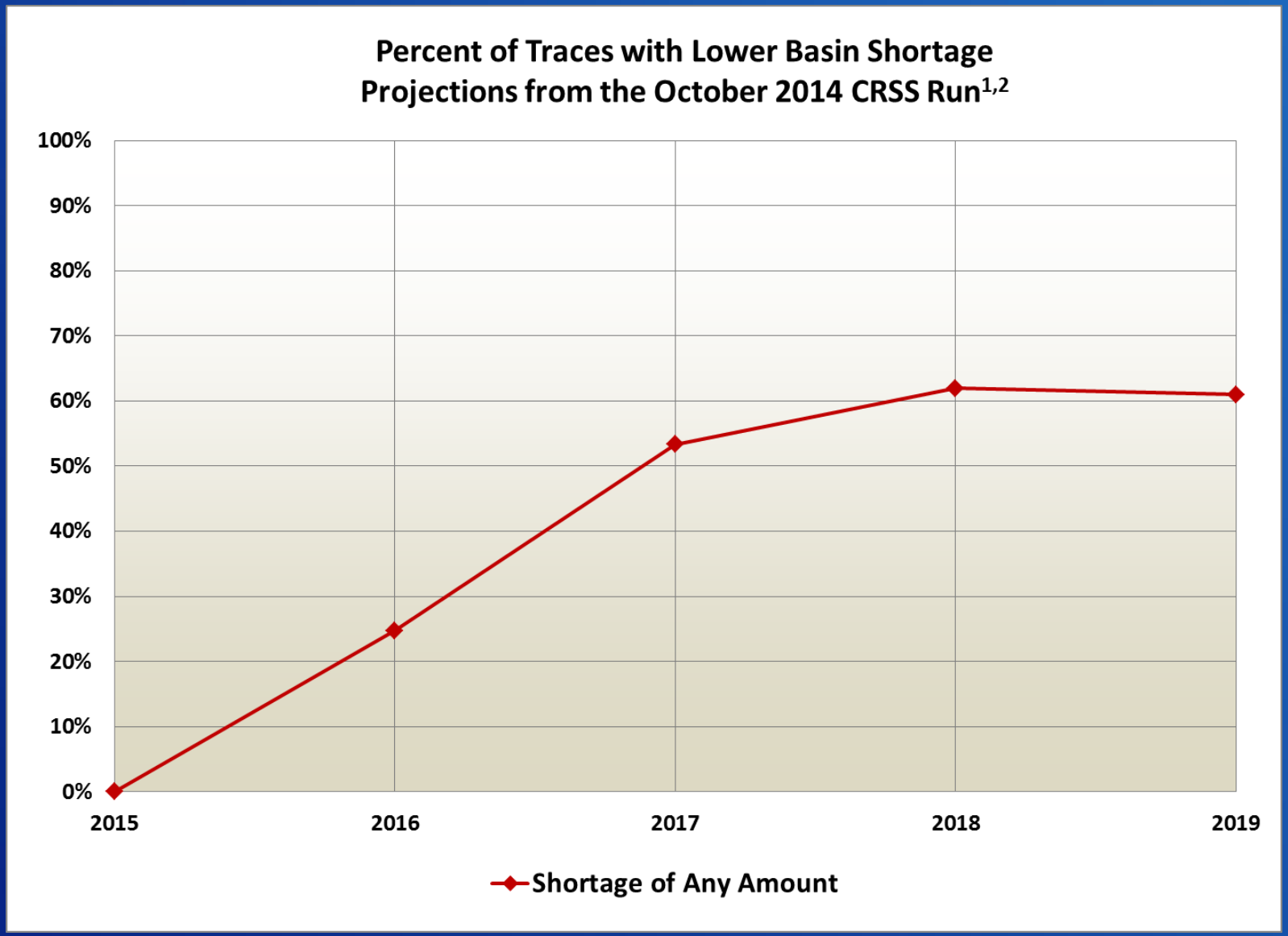
Lower Basin Shortage through 2019



[1] Reservoir initial conditions based on the most probable October 24-month Study projected levels for December 31, 2014.
[2] Hydrologic inflow traces based on resampling of the observed natural flow record from 1906-2010.

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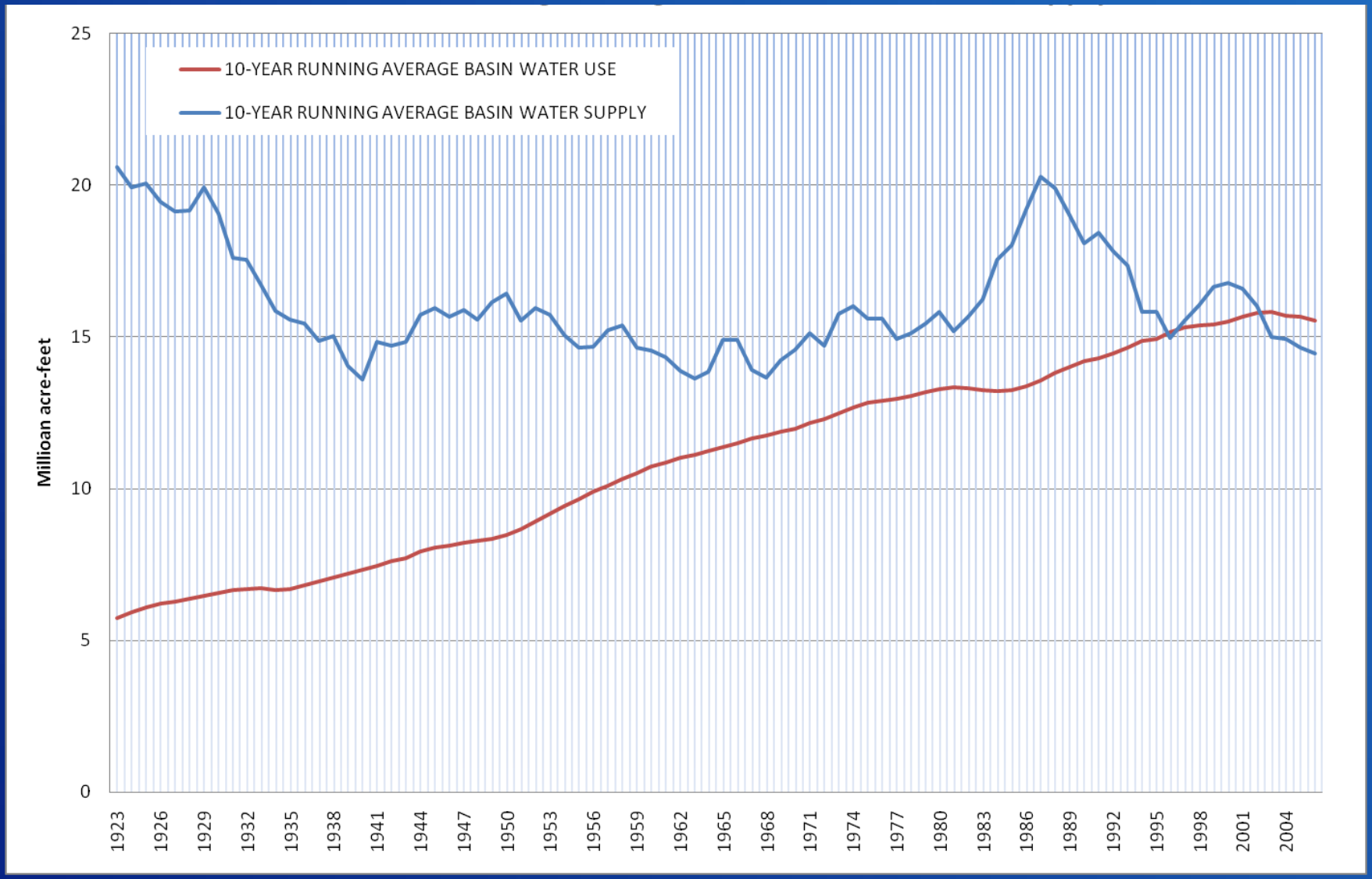
New Era of Limits



Historic Colorado River Water Supply & Use (10-year running average)

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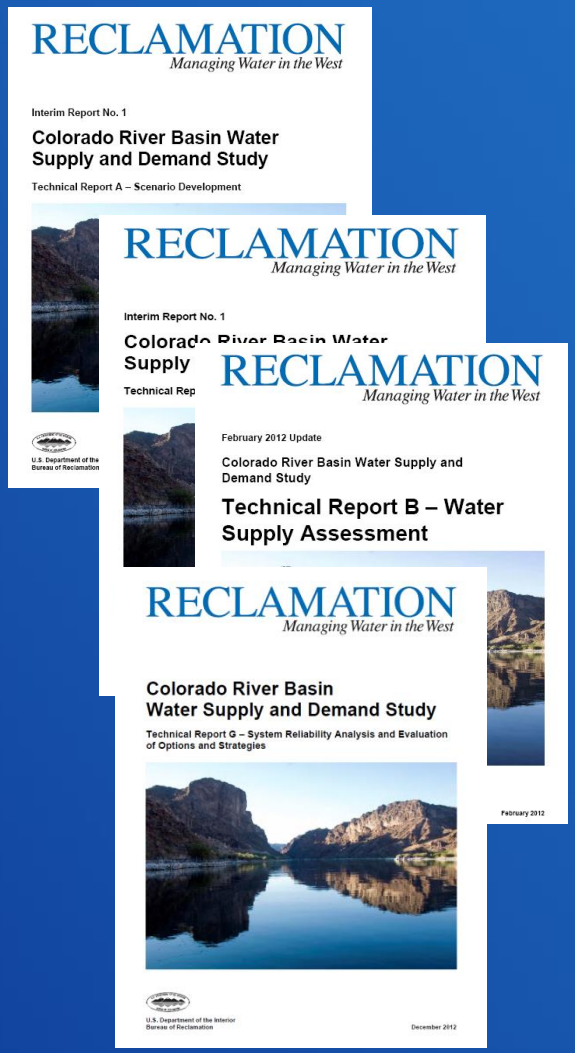
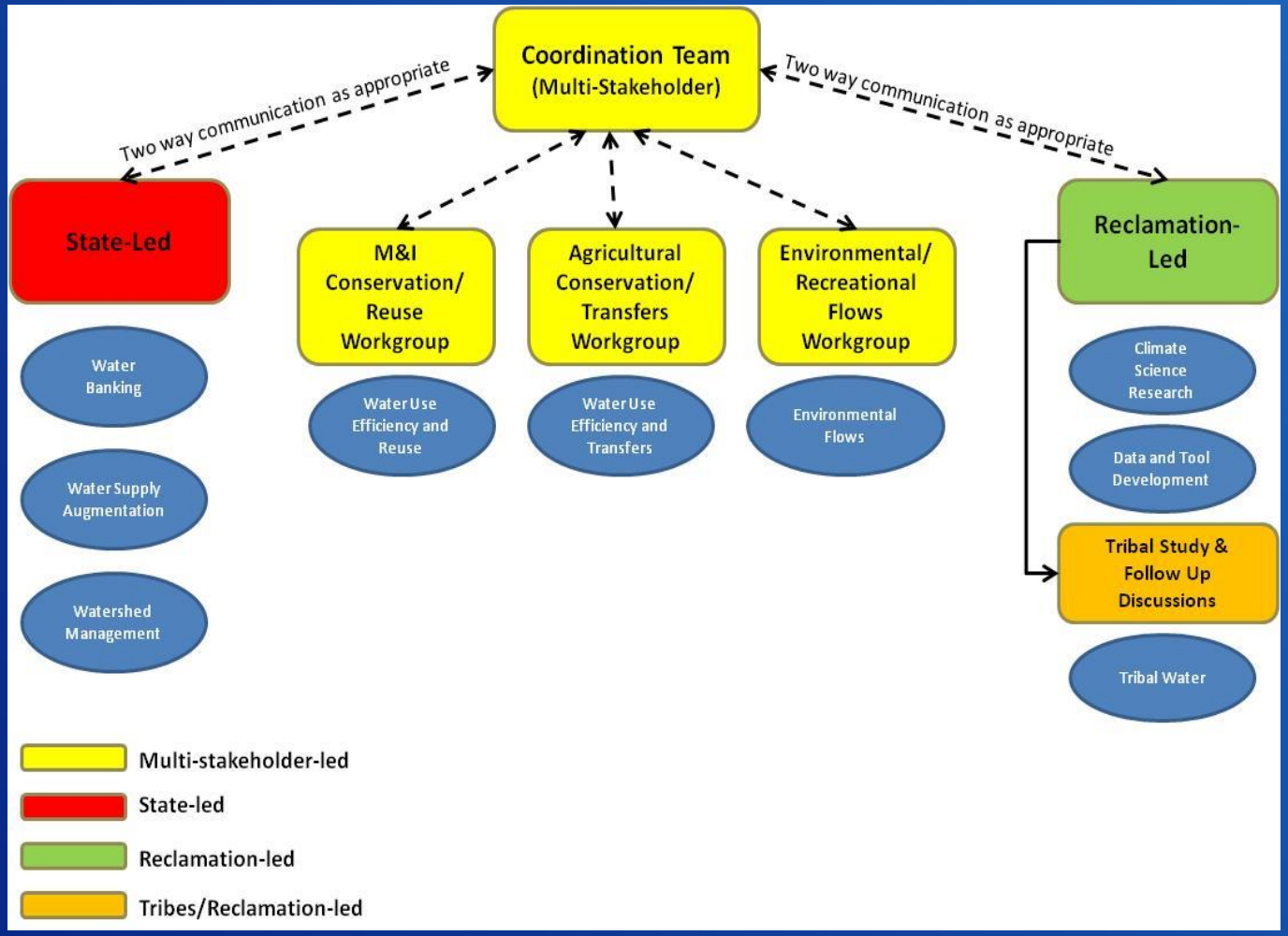
Colorado River Basin Water Supply and Demand Study

- Completed in 2012, the Study was conducted by Reclamation and the Basin States in collaboration with stakeholders throughout the Basin
- A planning study to assess potential future water supply and demand imbalances and to identify options to address those imbalances
- In May 2013, a *Moving Forward* process was initiated to build on technical foundation and partnerships established in the Study
- A *Moving Forward* Phase 1 Report is scheduled to be published soon
- For more information: http://www.usbr.gov/lc/region/programs/crbstudy.html



Basin Study Moving Forward Work Groups



http://www.usbr.gov/lc/region/programs/crbstudy/MovingForward/index.html

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Additional Drought Planning Activities

- The federal government is working with water agencies to develop a 5-year pilot program beginning in 2015 to help ease drought conditions
  - Memorandum of Understanding was signed last week
  - Strategies may include voluntary reductions in water use to help protect against declining Lake Mead elevations
- A component of the plan, the System Conservation Pilot Program, was entered into on July 30, 2014
  - Includes $11M to fund new efforts resulting in water savings in Lakes Powell and Mead that benefit all users of the Colorado River system during the on-going drought

Closing Thoughts…

- The period from 2000-2014 is the driest 15-year period in over 100 years of record keeping
- Fortunate to start the drought in 2000 with nearly full system conditions
- Climate models project increased variability in the future which may include longer, more extreme dry and wet periods than previously observed
- As such, a future hydrology that includes continued drought may lead us to new operational challenges, and the need for innovative, collaborative solutions

Colorado River Basin: System Status Update

For further information:

www.usbr.gov/lc/riverops.html
BCOOWaterOps@usbr.gov

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