

# **Overview of Colorado River Reservoir Management**

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**WEF Lower Colorado River Tour**  
**February 27, 2019**

# U.S. Bureau of Reclamation

- U.S. Department of the Interior agency
- Established in 1902 in the 17 western United States
- Largest wholesaler of water in U.S., providing water to over 31 million people
- Provides water to irrigate 10 million acres of farmland, producing 60% of the nation's vegetables
- Second largest producer of hydroelectric power, with 58 powerplants producing 40 billion KWH
- Over 600 dams and reservoirs
- Includes Hoover, Parker, and Davis dams and infrastructure for water delivery on the lower Colorado River





# Colorado River – Operational Setting

- 16.5 million acre-feet (maf) allocated annually
  - 7.5 maf each to Upper and Lower Basins
  - 1.5 maf to Mexico
- 16 maf average annual “natural flow” (from historical record)
  - 14.8 maf in the Upper Basin and 1.3 maf in the Lower Basin
- Inflows are highly variable year to year
- 60 maf of storage (about 4 times the annual average inflow)
- Operations and water deliveries governed by the “Law of the River”





# Lower Colorado River Water Master Role

- The Boulder Canyon Project Act (BCPA) of 1928 established the Secretary of the Interior as Water Master of the Lower Colorado River
  - Develop Annual Operating Plan for Colorado River Reservoirs
  - Administer water contracts
  - Approve U.S. water orders
  - Schedule water releases from Hoover, Davis, and Parker Dams
  - Account for all mainstem water use

Lake Mead



Hoover Dam

Lake Mohave



Davis Dam

Lake Havasu



Parker Dam

**RECLAMATION**  
*Managing Water in the West*

Calendar Year 2015

**Colorado River Accounting and  
Water Use Report: Arizona,  
California, and Nevada**



U.S. Department of the Interior  
Bureau of Reclamation  
Lower Colorado Region  
Boulder Canyon Operations Office

May 2015

**RECLAMATION**  
*Managing Water in the West*

# Colorado River Drought



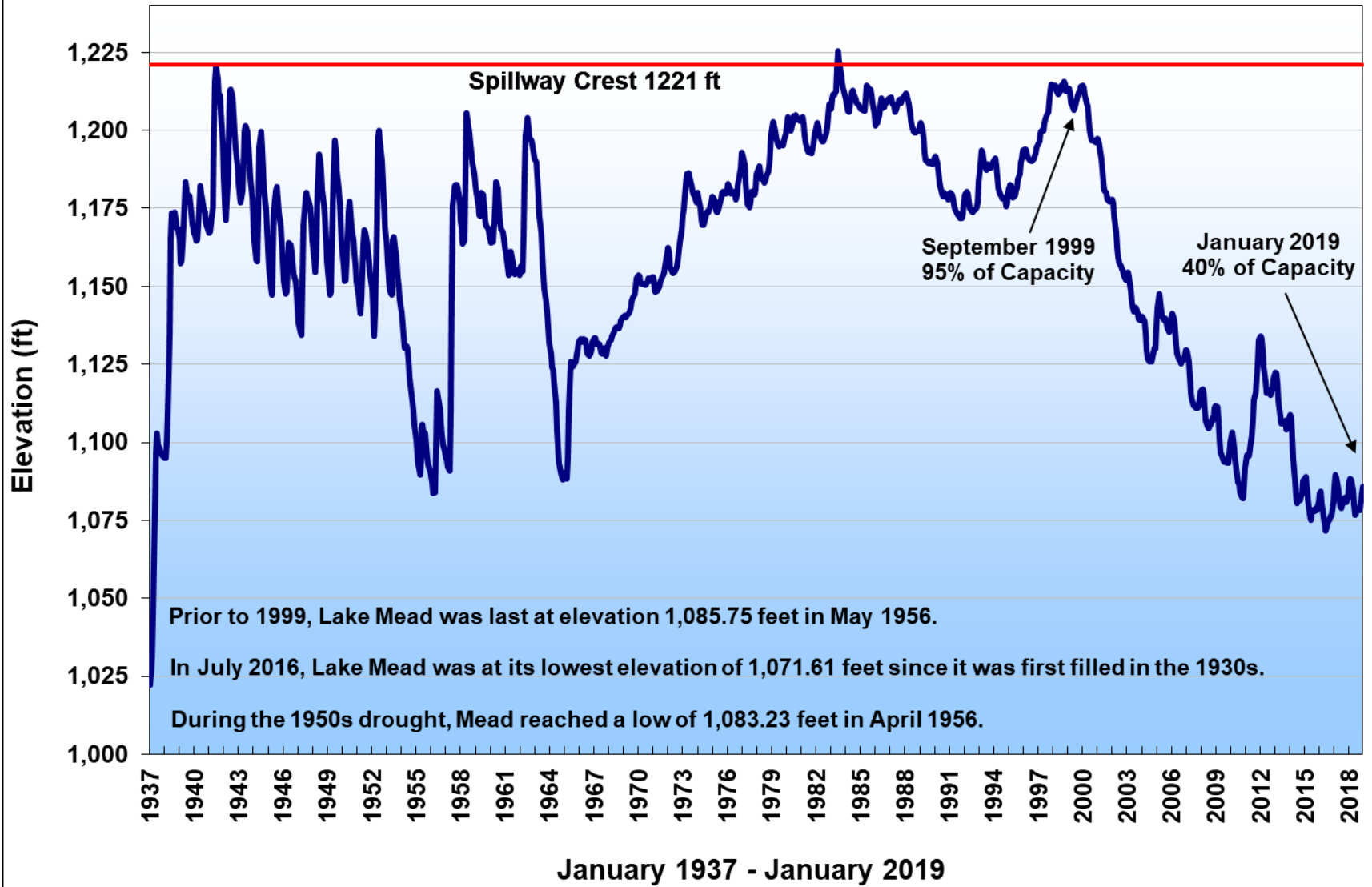
Lake Mead near Hoover Dam in 2000



Lake Mead near Hoover Dam in 2016



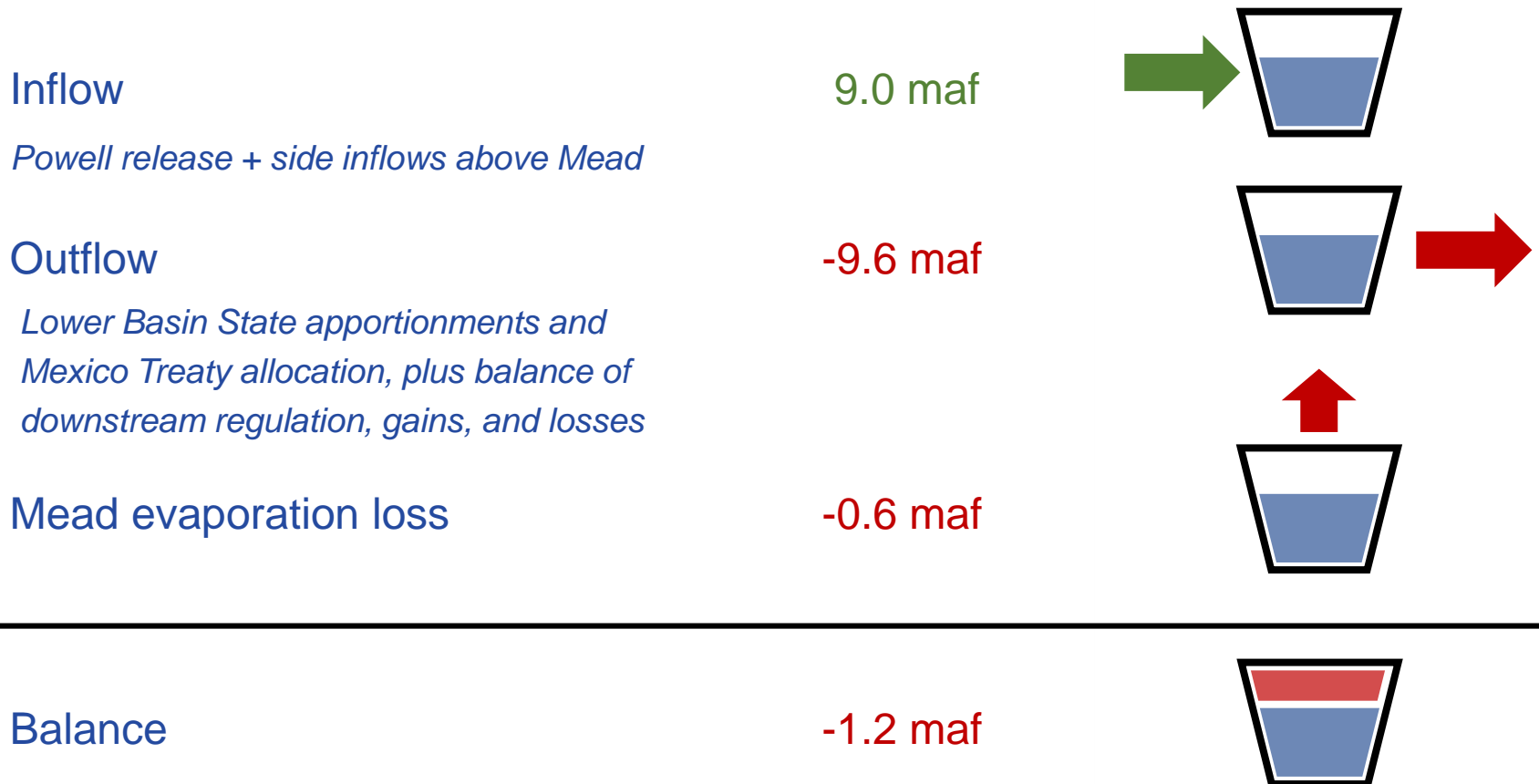
# Lake Mead End of Month Elevation



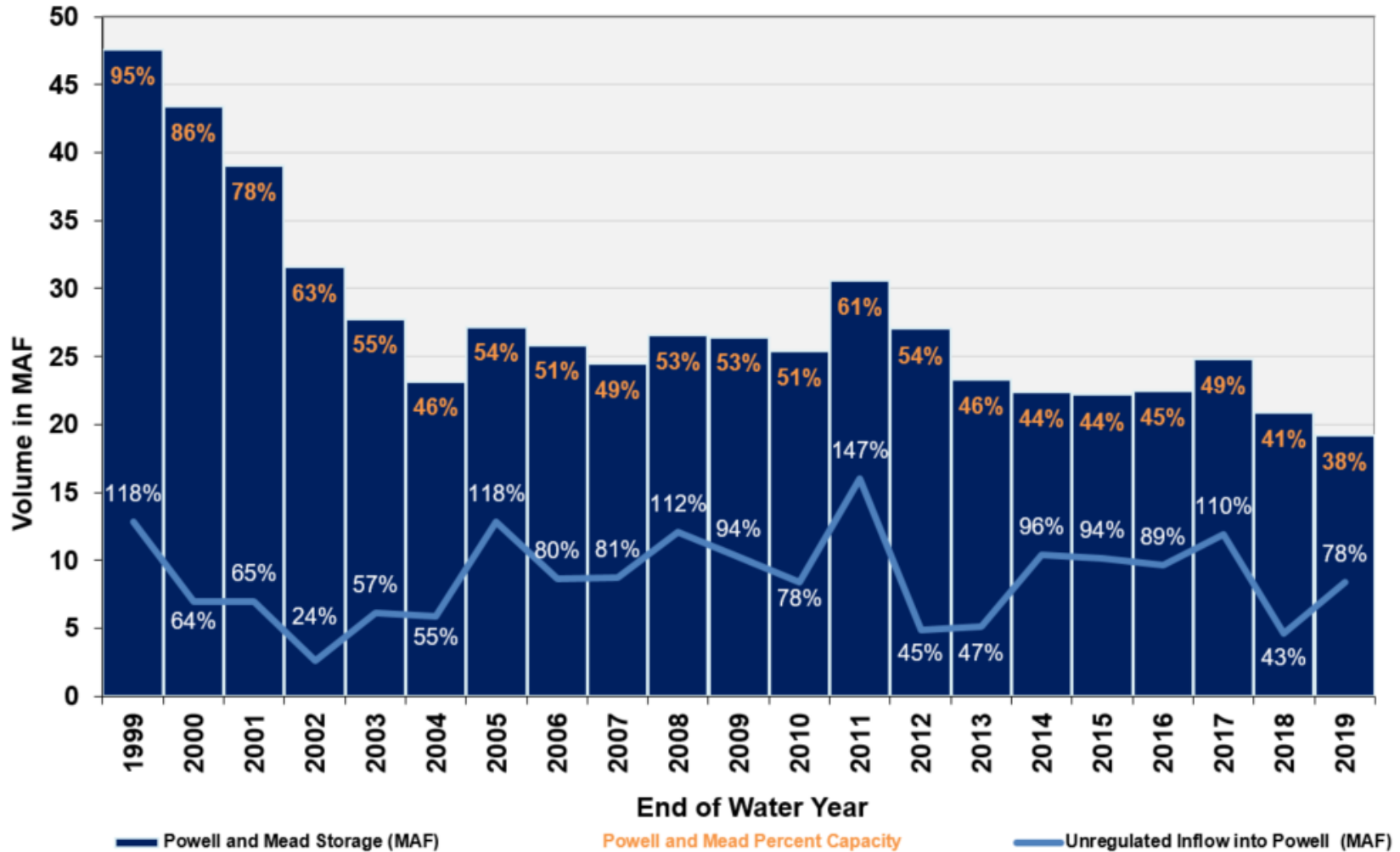


# Water Budget at Lake Mead

Given current water demands in the Lower Basin and Mexico, and a minimum objective release from Lake Powell (8.23 maf), Lake Mead storage declines by about 1.2 maf annually (equivalent to about 12 feet in elevation).



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



<sup>1</sup>Values for Water Year 2019 are projected. Unregulated inflow is based on the latest CBRFC forecast dated February 15, 2019. Storage and percent capacity are based on the February 2019 24-Month Study.

<sup>2</sup>Percentages on the light blue line represent percent of average unregulated inflow into Lake Powell for a given water year. The percent of average is based on the period of record from 1981-2010.

# Overview of the 2007 Interim Guidelines

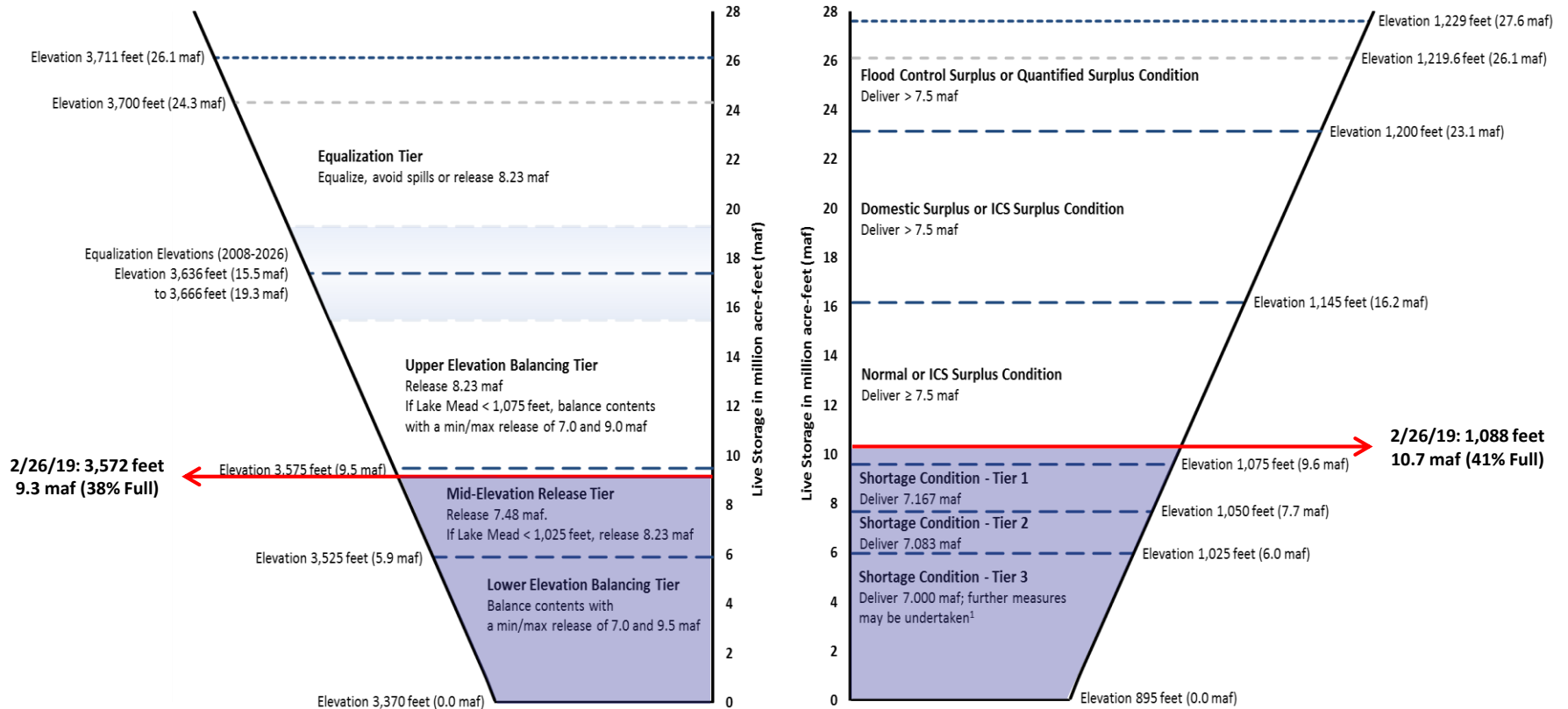


- In place for an interim period from 2007 through 2026
- Provide for coordinated operations of Lake Powell and Lake Mead at the full range of reservoir conditions
- Establish the Intentionally Created Surplus (ICS) mechanism
- Establish guidelines for determining a shortage condition in the Lower Basin
- Does not include provisions for Mexico – *Operational agreements with Mexico are established through “Minutes” by the International Boundary and Water Commission (IBWC)*

# Lake Powell and Lake Mead Operational Diagrams (According to the 2007 Interim Guidelines)

## Lake Powell

## Lake Mead



<sup>1</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.



# Current and Projected Conditions

# Colorado River Basin Storage (as of February 26, 2019)

| Reservoir             | Percent Full | Storage (MAF) | Elevation (Feet) |
|-----------------------|--------------|---------------|------------------|
| Lake Powell           | 38%          | 9.3           | 3,572            |
| Lake Mead             | 41%          | 10.7          | 1,088            |
| Total System Storage* | 45%          | 26.7          | NA               |

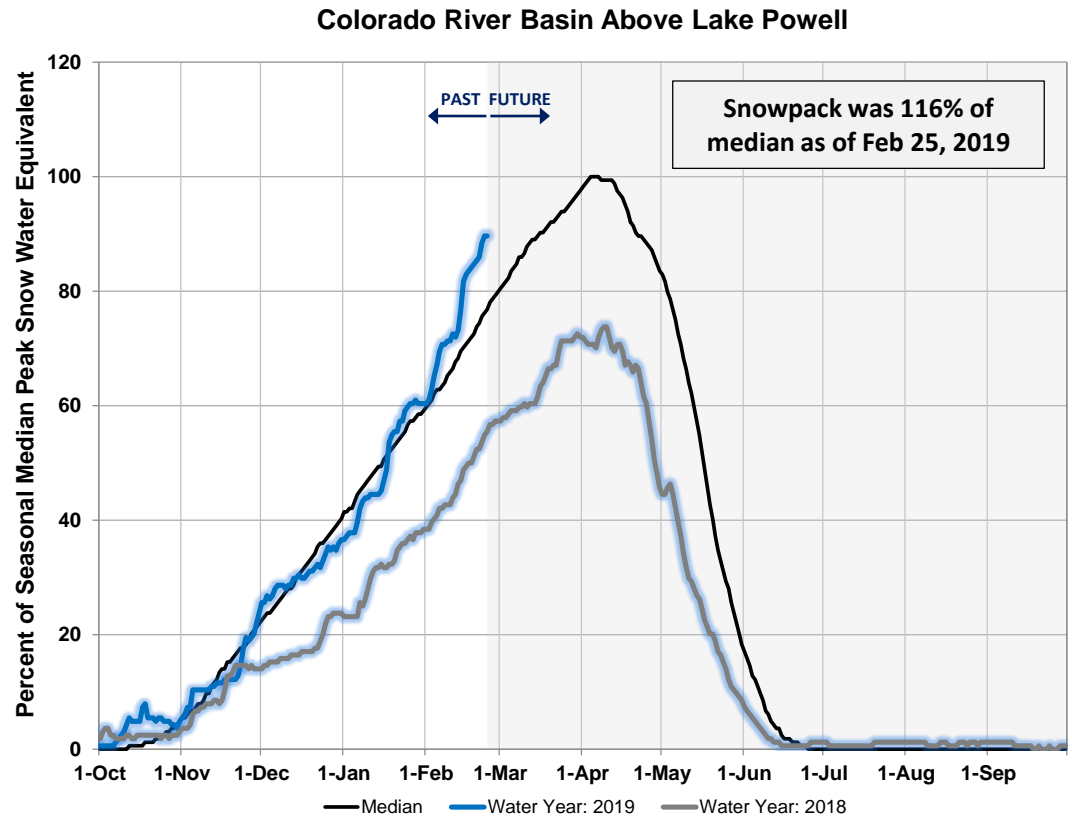
**\*Total system storage was 53% or 31.6 maf this time last year**

# Upper Colorado River Basin Water Year 2019 Snowpack and Observed Inflow

**Lake Powell  
Unregulated Inflow  
Forecast**  
*(dated 02/15/19)*

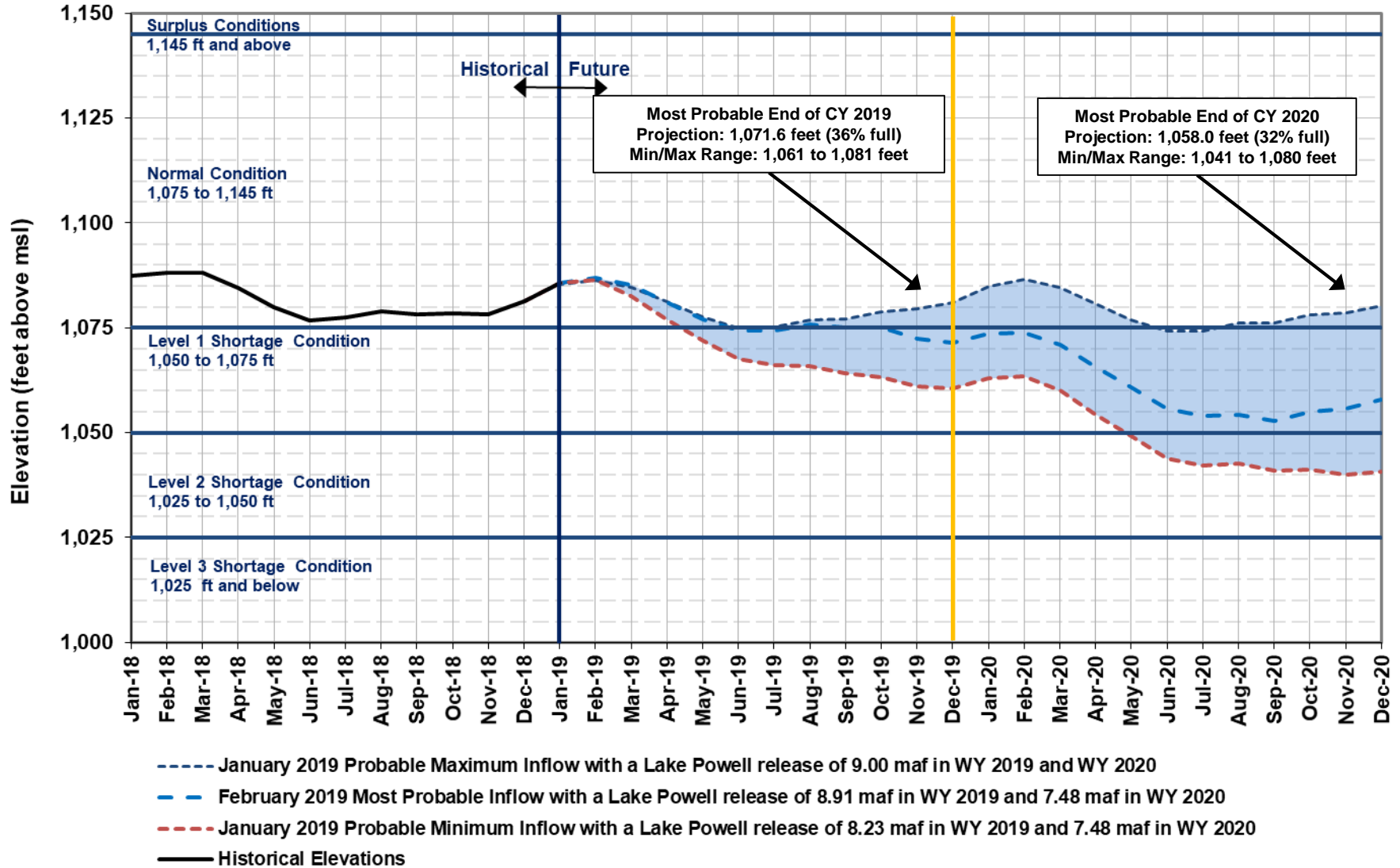
**April-July 2019  
84% of average**

**Water Year 2019  
78% of average**



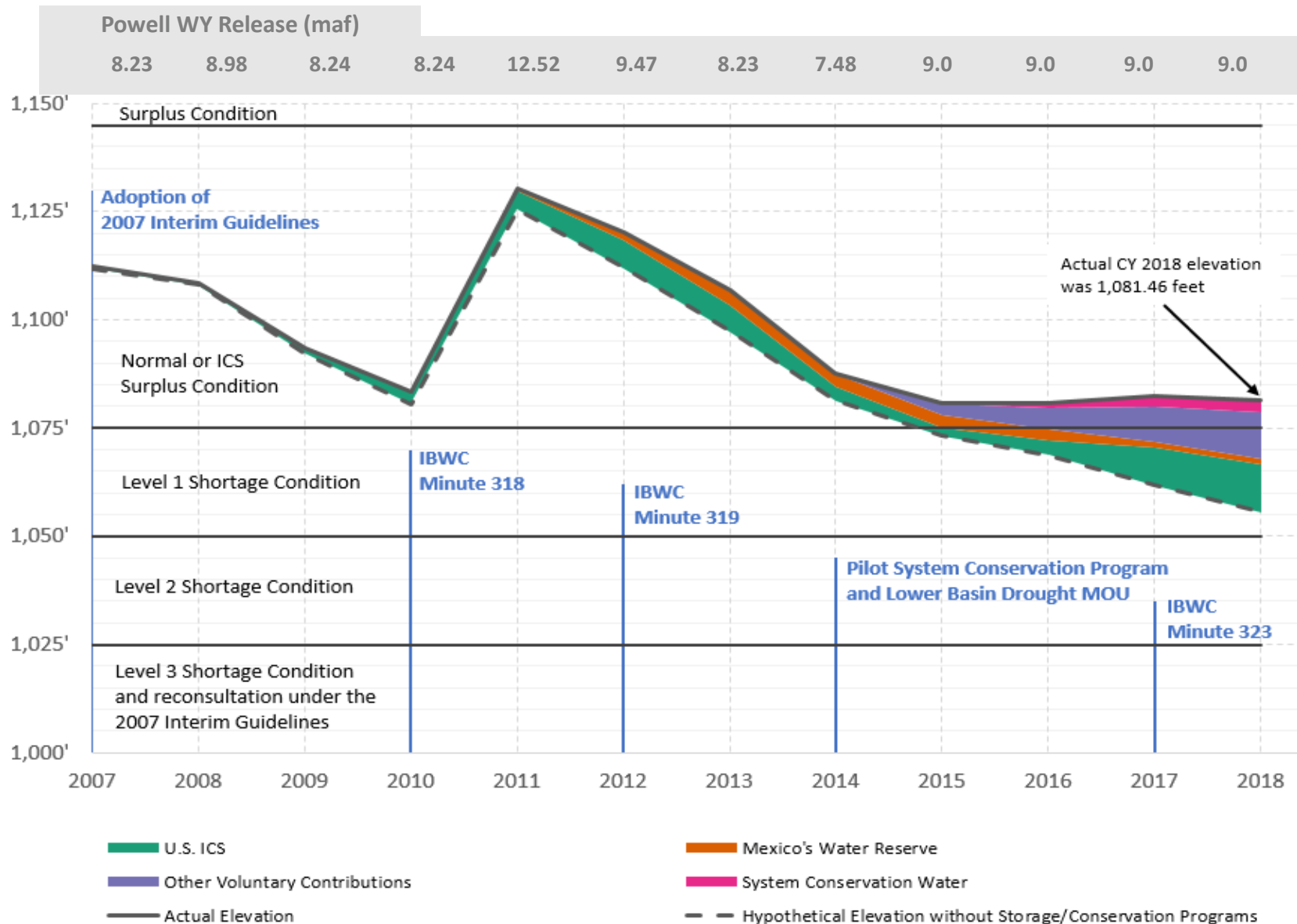
# Lake Mead End of Month Elevations

Projections from the January and February 2019 24-Month Study Inflow Scenarios



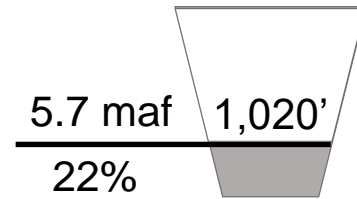


# Lake Mead End-of-Calendar Year Elevation



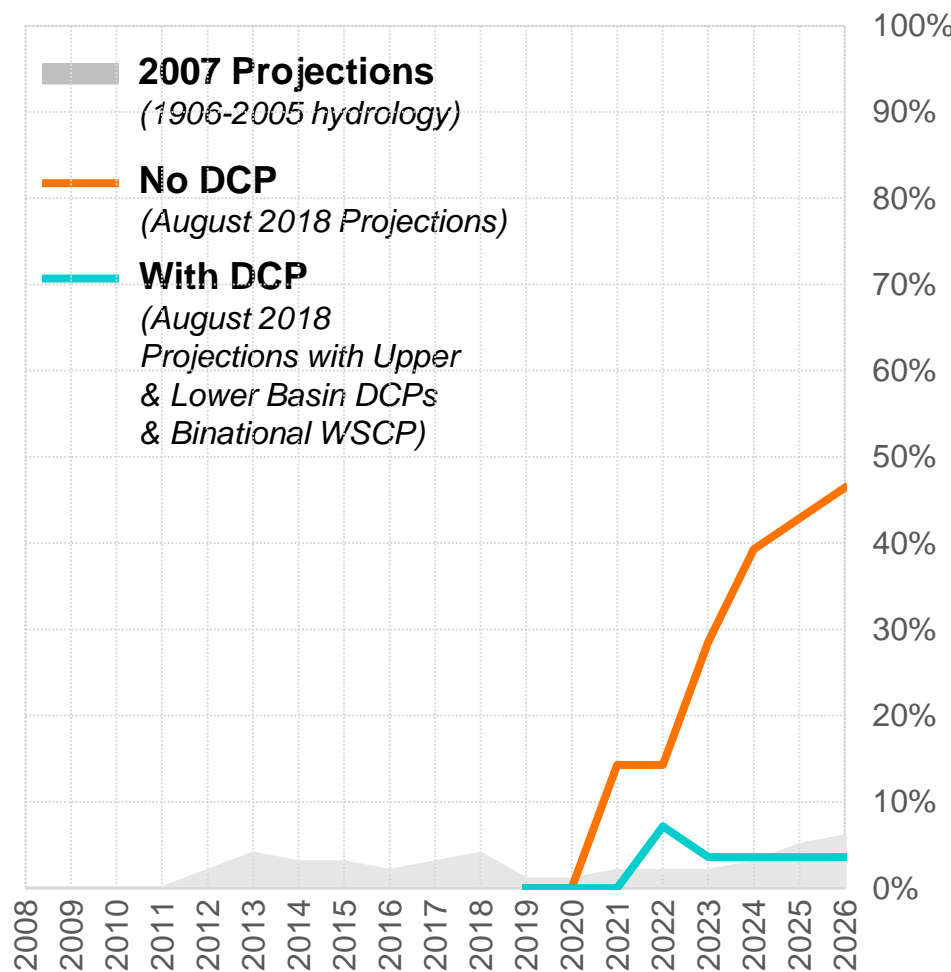
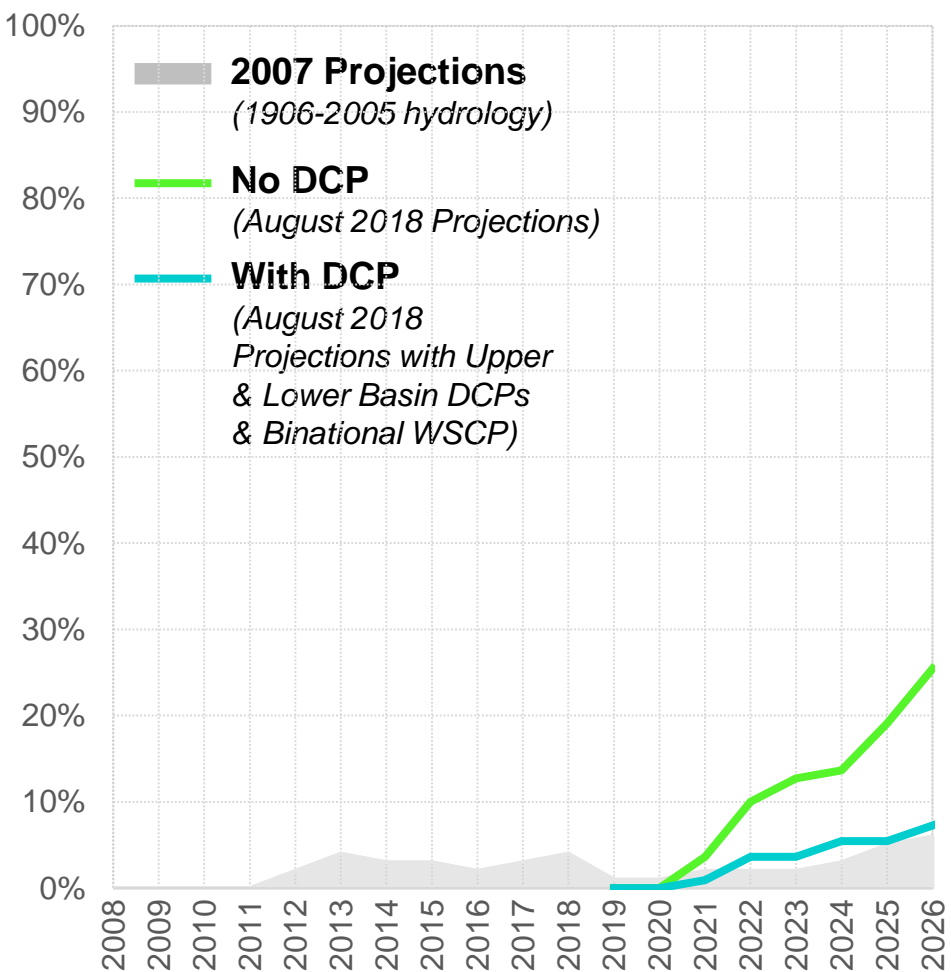
End of calendar year 2018 balances of U.S. ICS and Mexico's Water Reserve, system conservation water, and other voluntary contributions to Lake Mead are provisional and subject to change.

# Risk of Lake Mead < 1,020'



Full Hydrology (1906-2015)

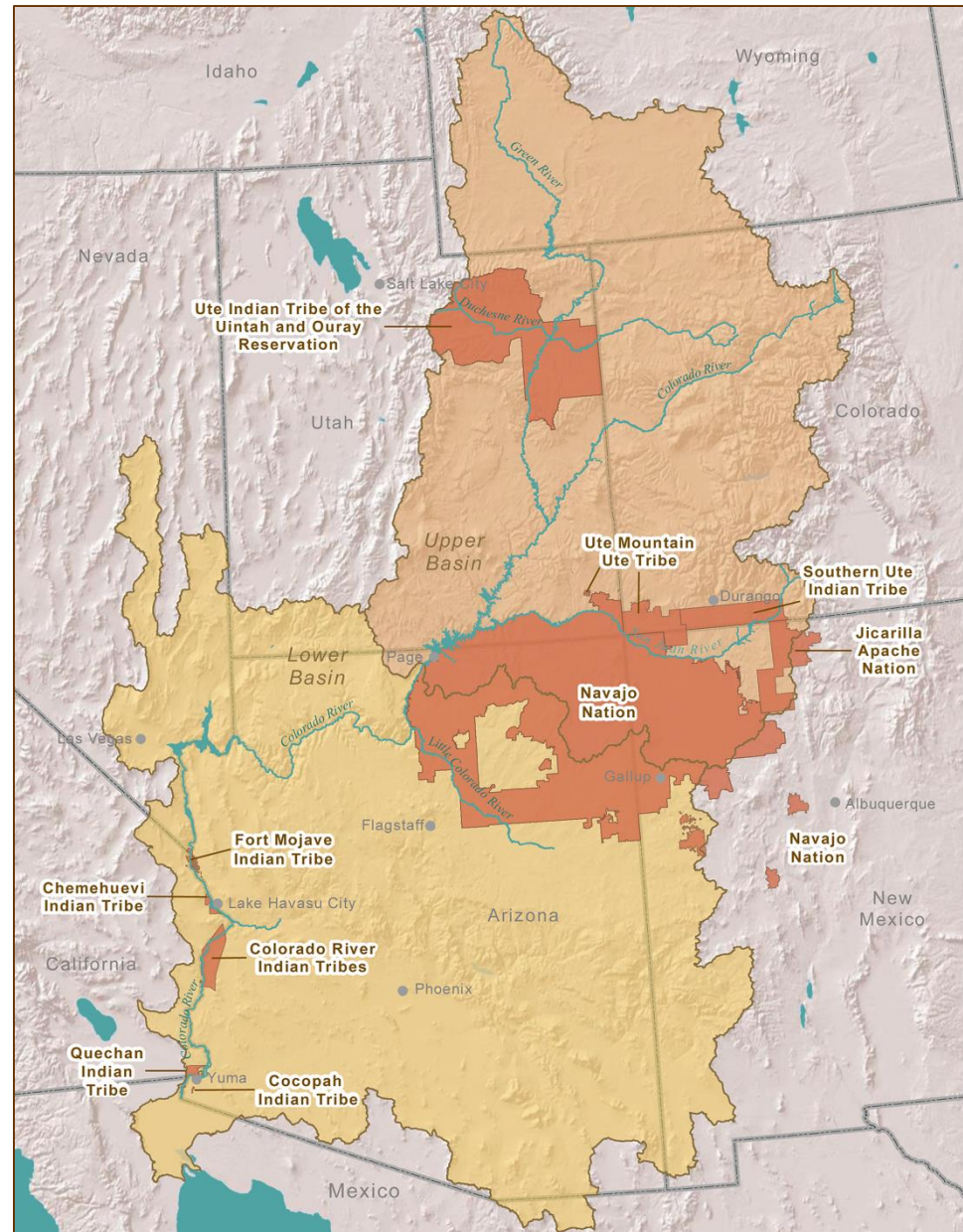
Stress Test Hydrology (1988-2015)



# Tribal Water Study

# Tribal Water Study

- Builds on limited assessment of tribal water issues in Colorado River Basin Study
- Conducted jointly by Reclamation and Ten Tribes Partnership
- Final Report Published in 2018
- Objectives
  - Assess current and future water development for TTP Tribes
  - Assess system impacts resulting from development of tribal water
  - Identify tribal water development challenges and opportunities





# Tribal Water Study

## Water Use and Development Findings

- Total Partnership tribes' water rights, including unsettled diversion claims, nearly 2.8 MAFY
- Partnership tribes currently divert approximately 1.4 MAFY, mostly for agricultural purposes
- Under rapid development scenarios, most tribes anticipate diverting full rights by 2040
- Modeling metrics indicates that Colorado River System more impacted by future hydrology than tribal development
- Modeling indicates a slight decrease in Lake Powell elevations and increase in Lower Basin shortage due to higher rates of tribal water development

