RECLAMATION
Managing Water in the West

Modeling to Support Minute 323 and Transboundary Cooperative Measures for Management of the Colorado River

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2018 RiverWare User Group Meeting

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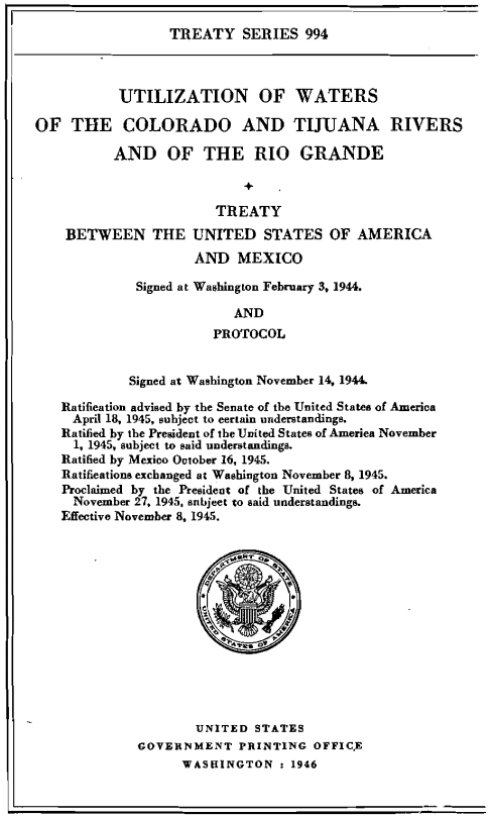
Outline

- Background
- Minute 323
- Modeling to support Minute 323 negotiations

1944 Water Treaty – Colorado River

- Apportions 1,500,000 acre-feet annually to Mexico
  - No express provision re: “carryover storage”
- Addresses surpluses & reductions
  - Surplus – in excess of amounts necessary to satisfy U.S. and Mexican uses
  - Shortage – reduction due to “extraordinary drought” – (Note: term is not defined)
- U.S. has never delivered less than the 1.5 MAF
- Administered by the International Boundary and Water Commission



TREATY SERIES 994

UTILIZATION OF WATERS
OF THE COLORADO AND TIJUANA RIVERS
AND OF THE RIO GRANDE

TREATY
BETWEEN THE UNITED STATES OF AMERICA
AND MEXICO

Signed at Washington February 3, 1944.

AND

PROTOCOL

Signed at Washington November 14, 1944.

Ratification advised by the Senate of the United States of America April 18, 1945, subject to certain understandings.
Ratified by the President of the United States of America November 1, 1945, subject to said understandings.
Ratified by Mexico October 16, 1945.
Ratifications exchanged at Washington November 8, 1945.
Proclaimed by the President of the United States of America November 27, 1945, subject to said understandings.
Effective November 8, 1945.

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1946

2007 Interim Guidelines

- In place for an interim period (2007 through 2026)
- Provide for coordinated operations of Lake Powell and Lake Mead to minimize Lower Basin shortages and Upper Basin curtailments
- Encourage efficient use and management of Colorado River water through the Intentionally Create Surplus (ICS) mechanism
- Establish guidelines for determining shortage conditions in the Lower Basin
- Does not include provisions for Mexico

Summary: U.S./Mexico – 1997-2012

- Litigation 1997, 2001, 2005
  - NGO focus on the Colorado River Delta
  - US/MX tension on All-American Canal
- Post 2007
  - Dialogue
  - Cooperative process (Minute 317)
  - Humanitarian response (Minute 318 in 2010)
- 2012 - Minute 319

Minute 319 Overview

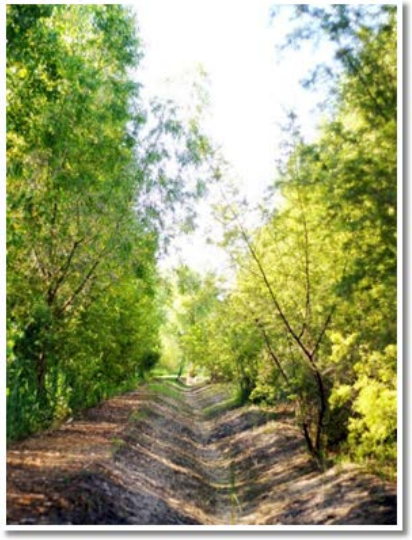
- Signed on November 20, 2012
- Cooperative 5-year agreement
- In place for an interim period from 2013 through 2017
- Provides for storage of Mexican conserved water in Lake Mead
- Shortage and surplus sharing with U.S. water users at high and low reservoir conditions
- Improved infrastructure for conservation
- Environmental projects including riparian restoration sites in the Colorado River Delta

One mile north of SIB before pulse flow

One mile north of SIB during pulse flow

Minute 323 Overview

- Entered into force on September 27, 2017; remains in effect through 2026
- Provides certainty for water operations in both countries by extending proactive, cooperative reservoir management strategies (e.g., surplus and shortage sharing, water storage in Lake Mead)
- Provides for investment by U.S. entities (Federal and non-Federal) in water infrastructure and environmental projects in Mexico
- Implements a “water scarcity contingency plan” (in effect when U.S. implements Lower Basin Drought Contingency Plan) for additional actions to reduce the risk of reaching critical reservoir elevations at Lake Mead



Environmental Enhancement – Laguna Grande Site 2017

Conservation Projects

Modeling to Support Minute 323

- Focus on shortage/surplus sharing and Binational Water Scarcity Contingency Plan
- Key metrics were performance, i.e., protects Lake Mead, parity, and alignment

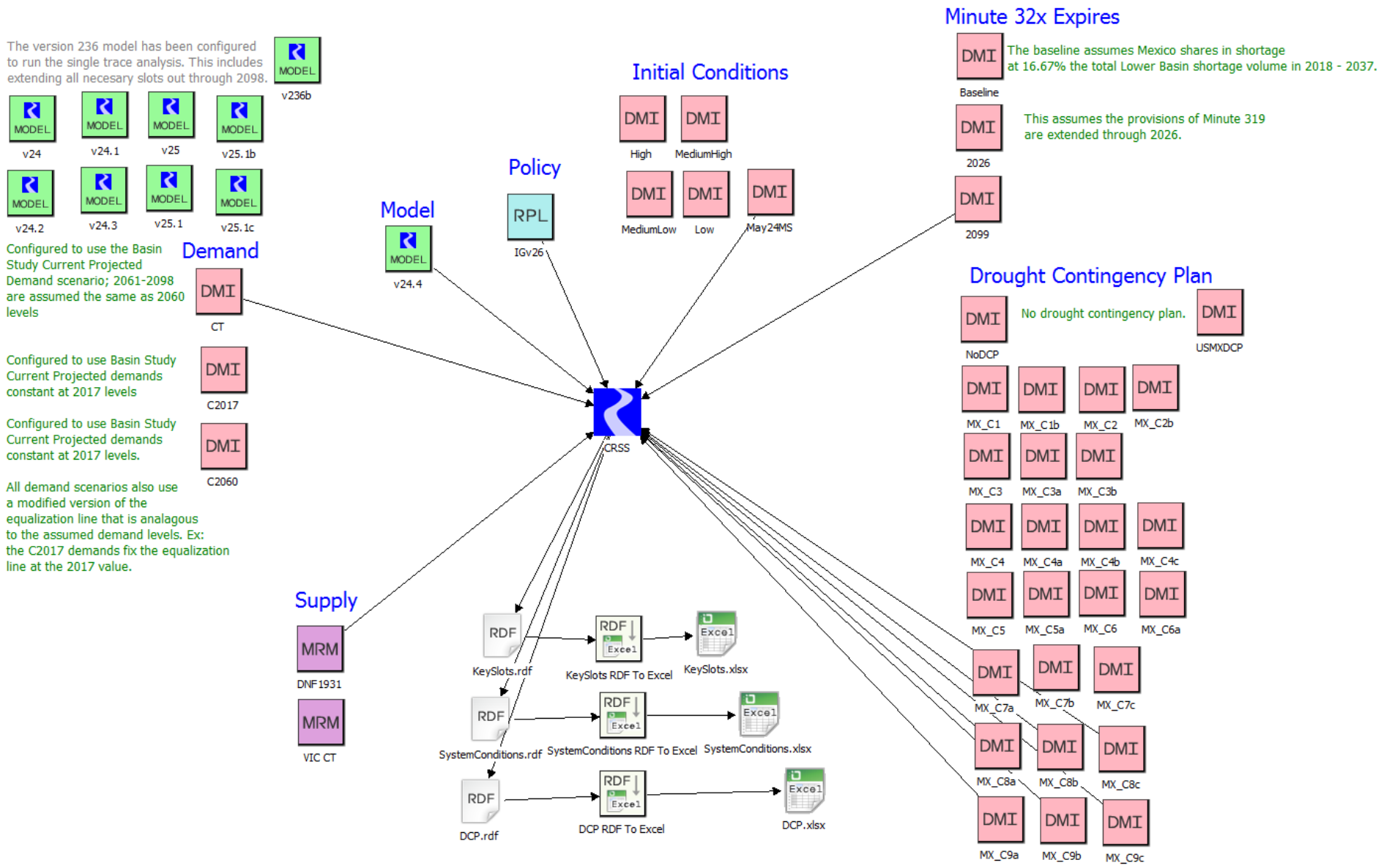
Lake Mead Elevation (feet)	U.S. Shortage (kaf)	U.S. Shortage (percent of apportionment)	MX Reductions (kaf)	MX Reductions (percent of apportionment)
<= 1,075 and >=1,050	313	4.44%	50	3.33%
< 1,050 and >= 1,025	417	5.56%	70	4.67%
<= 1,025	500	6.67%	125	8.33%

CRSS Configuration

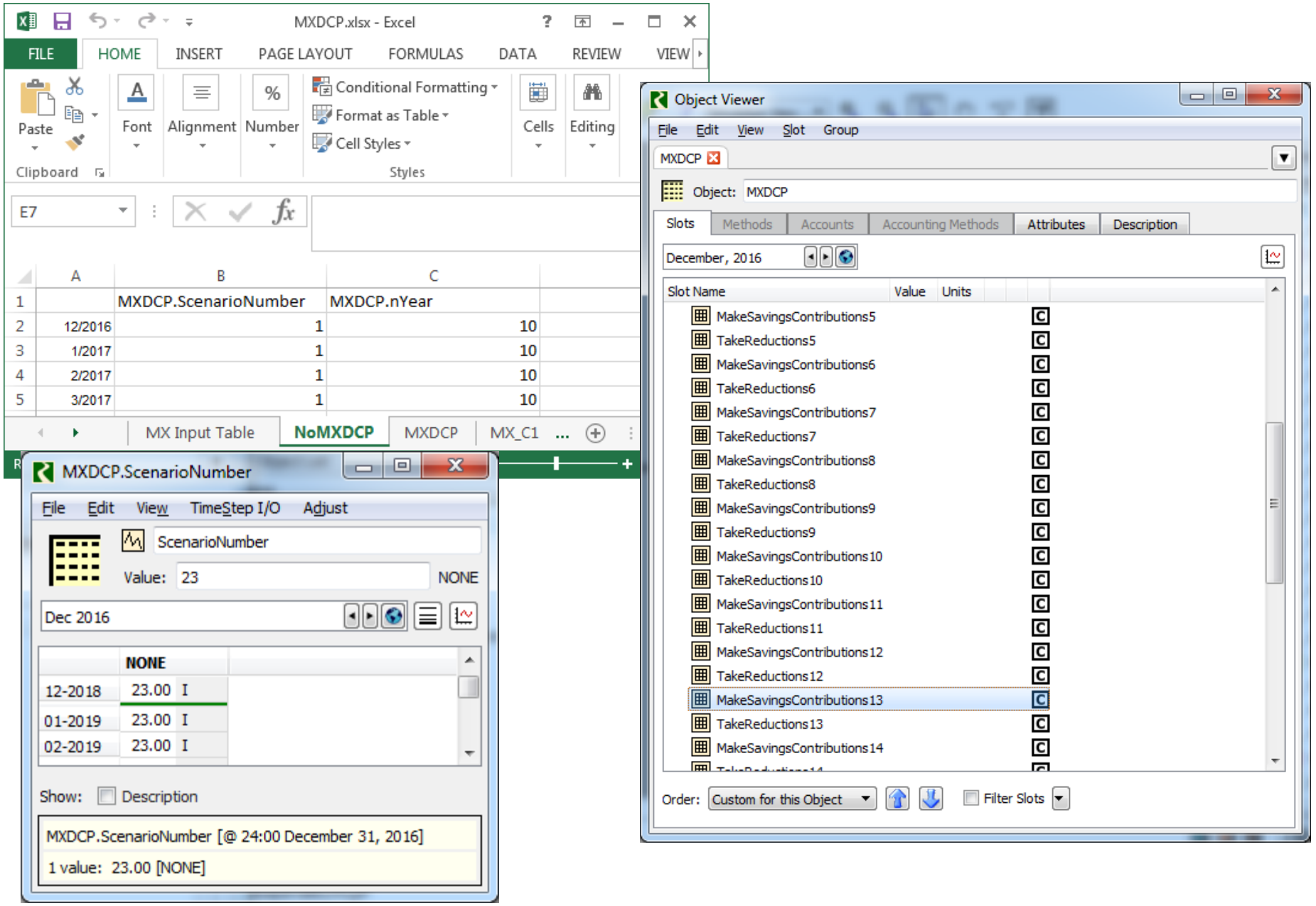
- Colorado River Simulation System (CRSS)
  - Implemented in RiverWare
  - Comprehensive, basin-scale planning model for the Colorado River Basin
  - Monthly timestep
  - Excels at comparative analyses

- Configuration for Minute 323 modeling
  - Used 82 hydrologic inflow traces
    - Resampled 1931-2012
  - December 31, 2016 reservoir levels as initial conditions (projected by May 2016 24-month study)
  - RiverSMART
    - Analyzed 25+ different scenarios

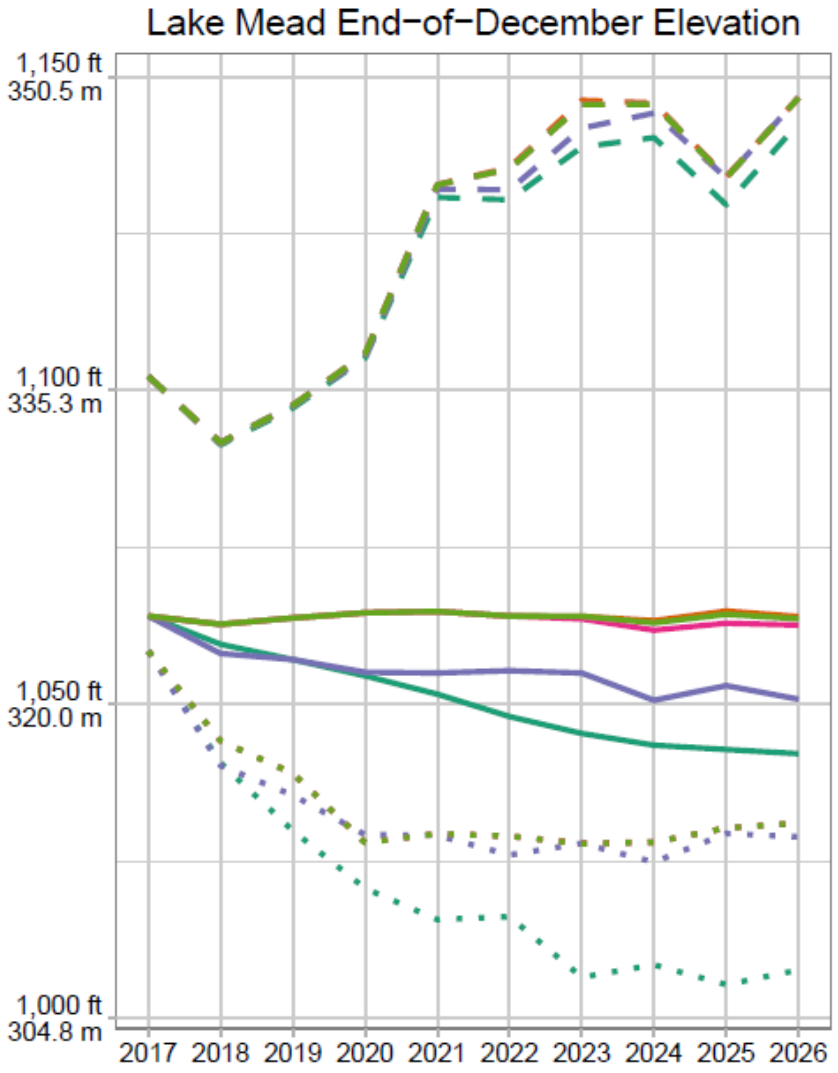
RiverSMART Setup

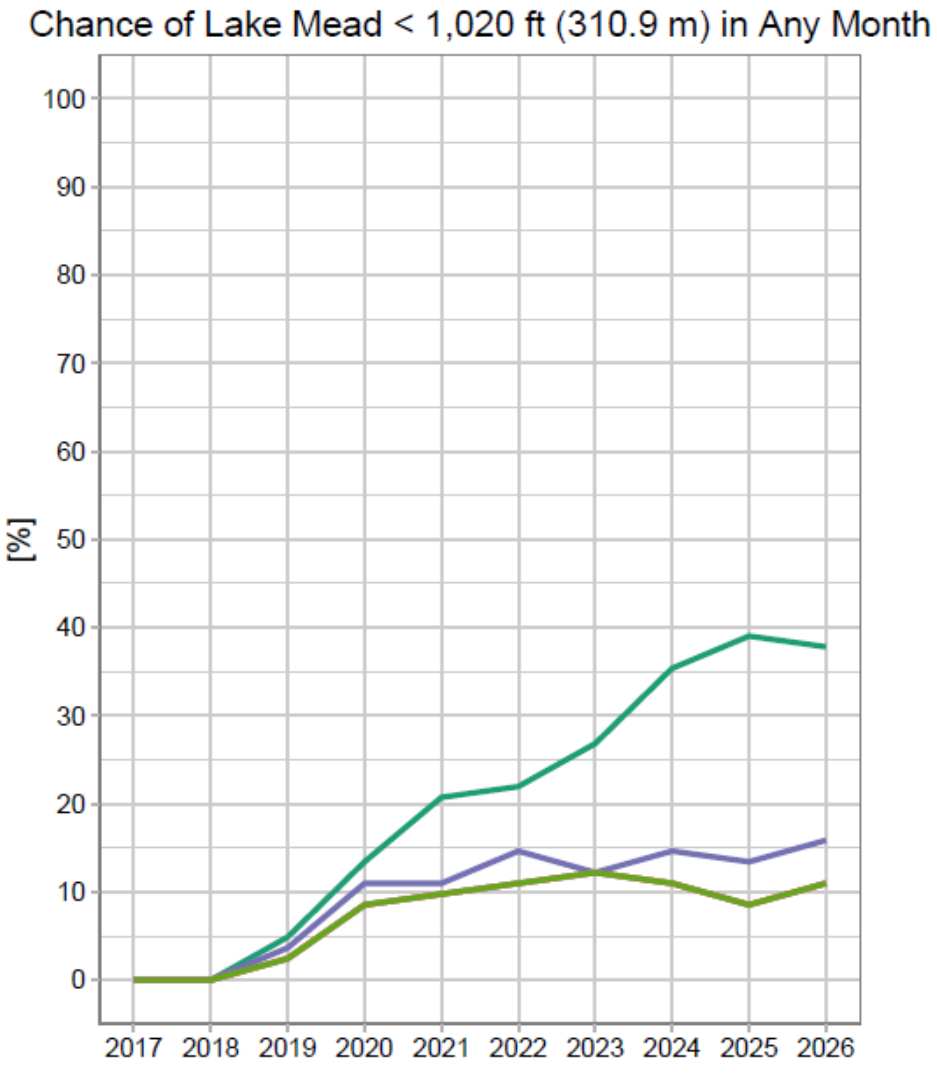


Scenario Configuration

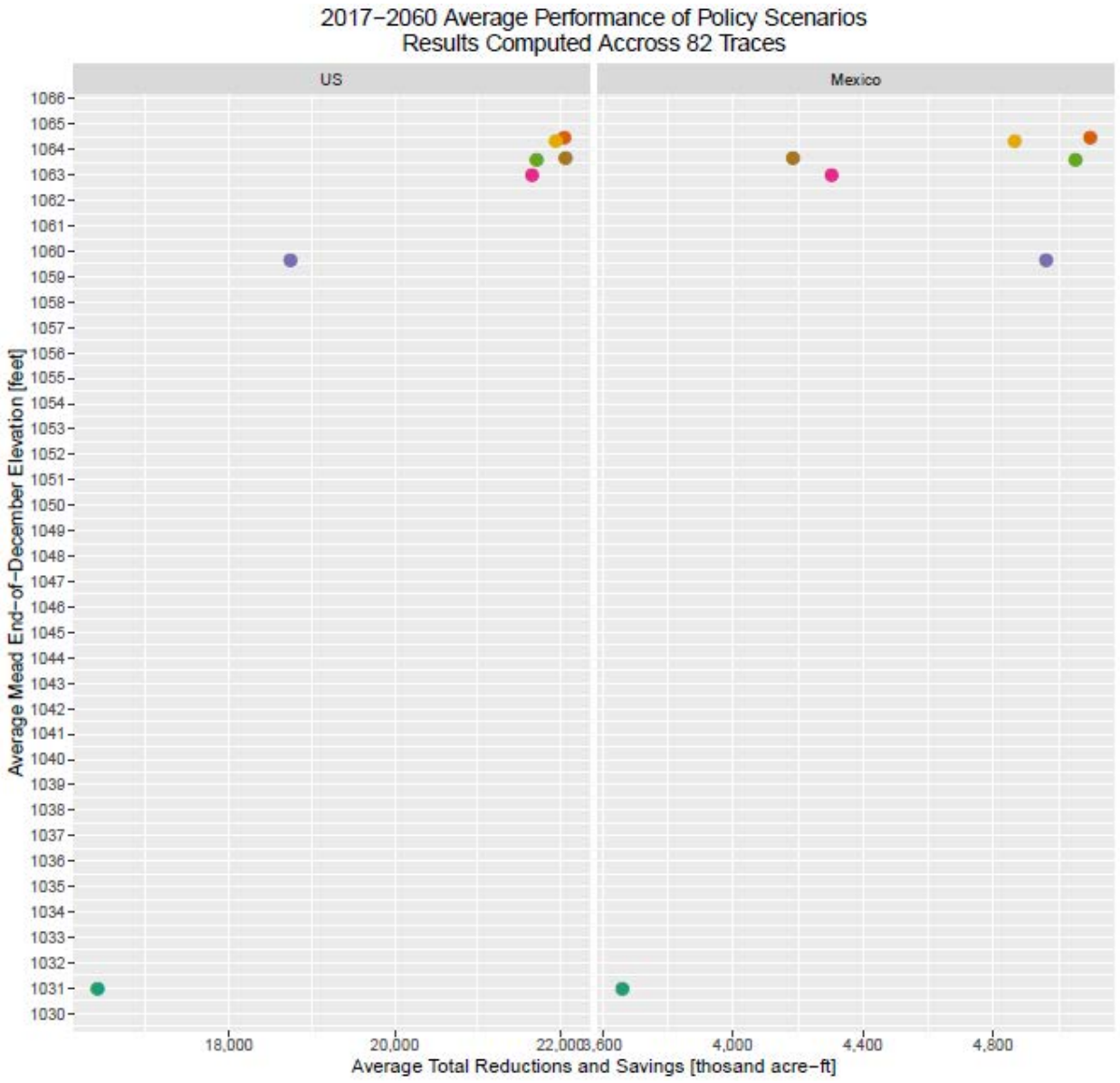


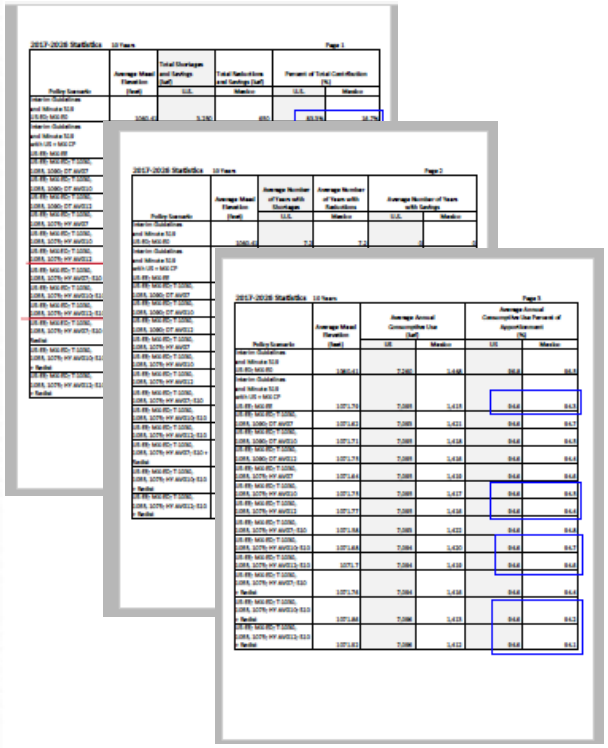
Output and Analysis - Performance





Output and Analysis – Parity and Alignment





Summary and Conclusion

- Entered into force on September 27, 2017; remains in effect through 2026
- Binational water scarcity contingency plan will be in alignment with LB DCP (if implemented)

Projected January 1 Lake Mead Elevation (ft msl)	Mexico's Savings that Contribute to the Binational Water Scarcity Contingency Plan
At or below 1,090 and above 1,075	41,000 acre-feet (51 mcm)
At or below 1,075 and above 1,050	30,000 acre-feet (37 mcm)
At or below 1,050 and above 1,045	34,000 acre-feet (42 mcm)
At or below 1,045 and above 1,040	76,000 acre-feet (94 mcm)
At or below 1,040 and above 1,035	84,000 acre-feet (104 mcm)
At or below 1,035 and above 1,030	92,000 acre-feet (113 mcm)
At or below 1,030 and above 1,025	101,000 acre-feet (125 mcm)
At or below 1,025	150,000 acre-feet (185 mcm)

Mexico's water scarcity contingency plan savings volumes from Minute 323