THE COLORADO RIVER
Collaboration or Conflict?

Northwest Colorado COG
Water Q/Q Committee
April 26, 2018

Anne J Castle
Getches-Wilkinson Center, University of Colorado

Colorado River Basin

Source: US Bureau of Reclamation

Areas Served Outside the Basin

Source: US Bureau of Reclamation

Sound Bites

- Serves 40 million people in US and MX
  - Including 4 of the fastest growing states
- Irrigates 5 million acres of farmland
- 23 Native American tribes rely on it
- 11 National Parks in the Basin
- Supports $1.4 trillion economy
  - $26 billion recreational industry

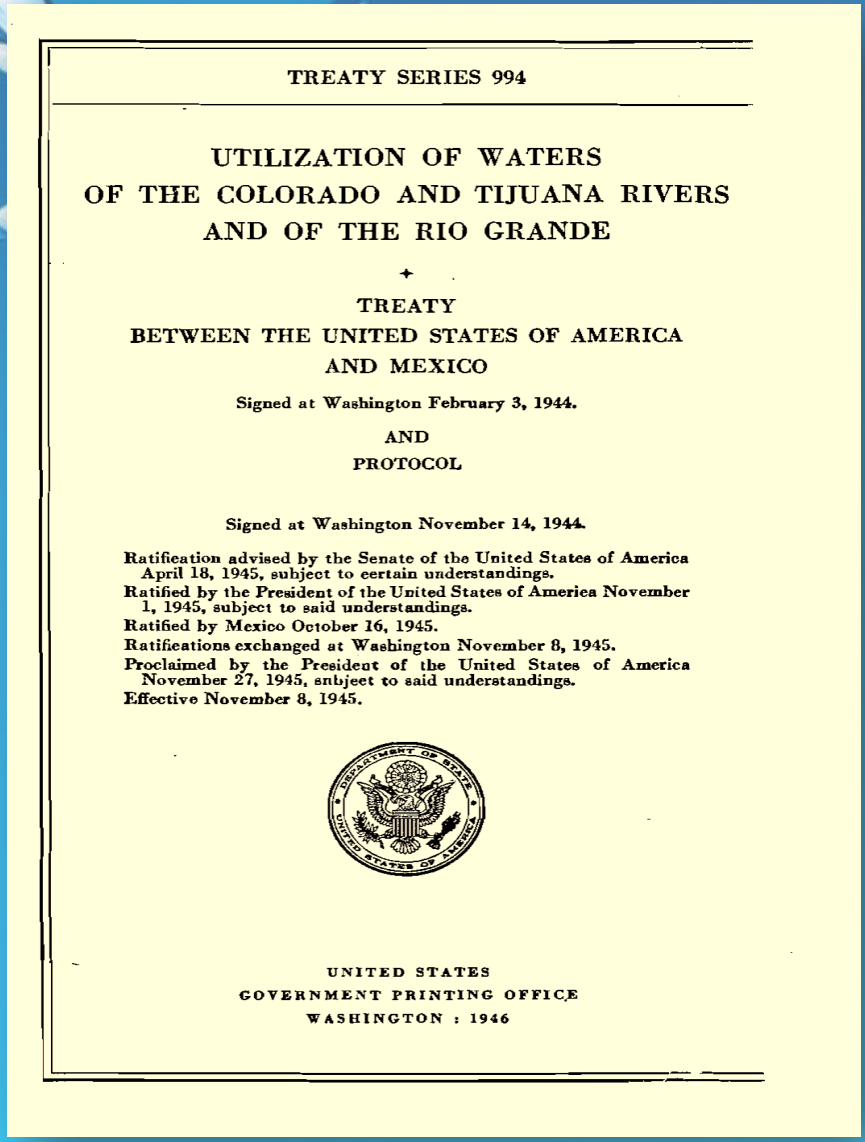
The Basic Math

Colorado River Compact - 1922

- Divided the river 50/50
  - Lower Basin gets 7.5 MAF
  - Upper Basin gets 7.5 MAF, but bears the risk of shortage
- If deliveries to Mexico in the future, split equally between Upper and Lower Basins

1944 Treaty - Mexico's Allocation

- 1.5 MAF/year
- Reductions in event of extraordinary drought



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.

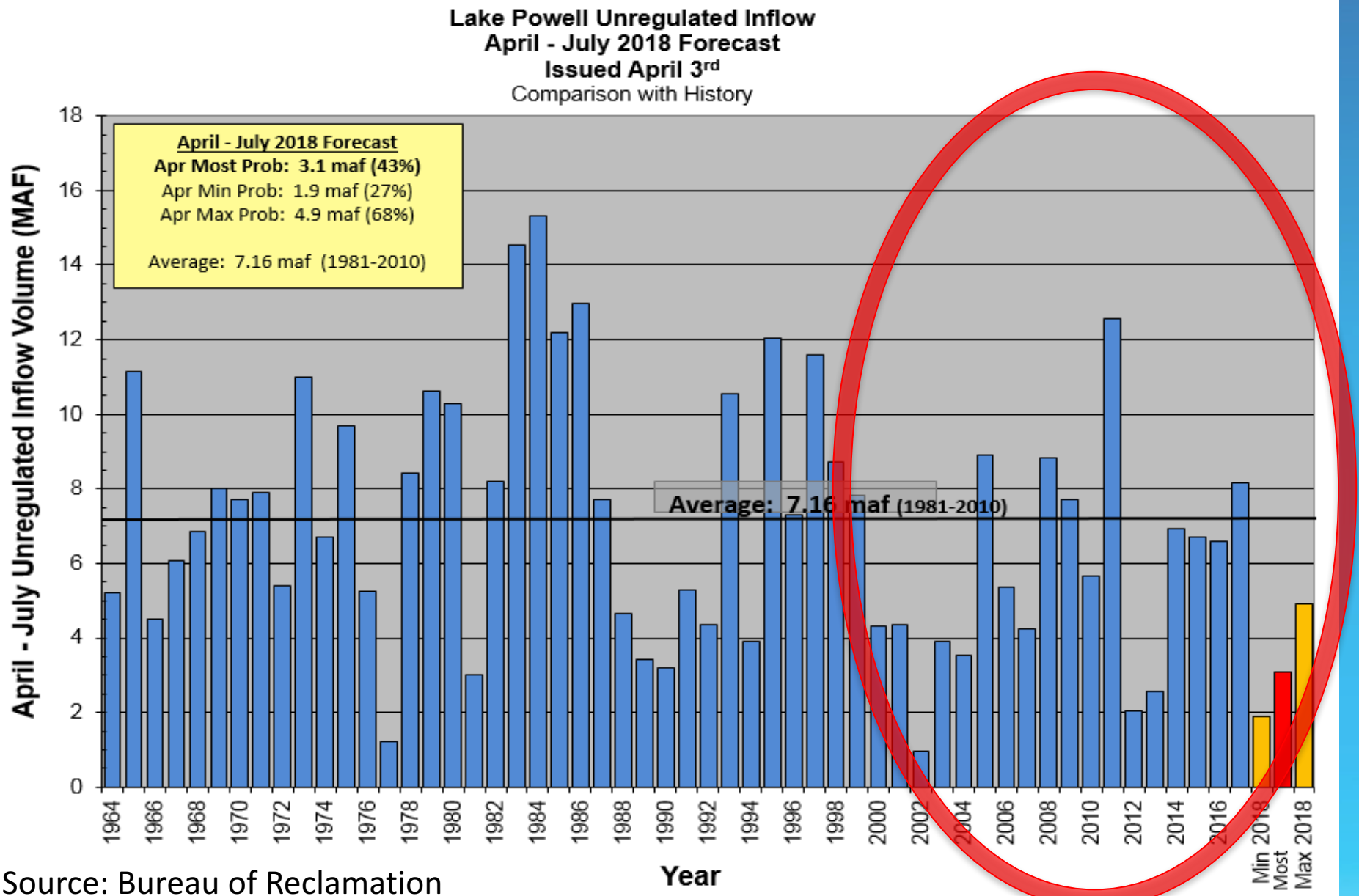
Ratification advised by the Senate of the United States of America April 18, 1945, subject to certain understandings.
Ratified by the President of the United States of America November 1, 1945, subject to said understandings.
Ratified by Mexico October 16, 1945.
Ratifications exchanged at Washington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

Next Developments

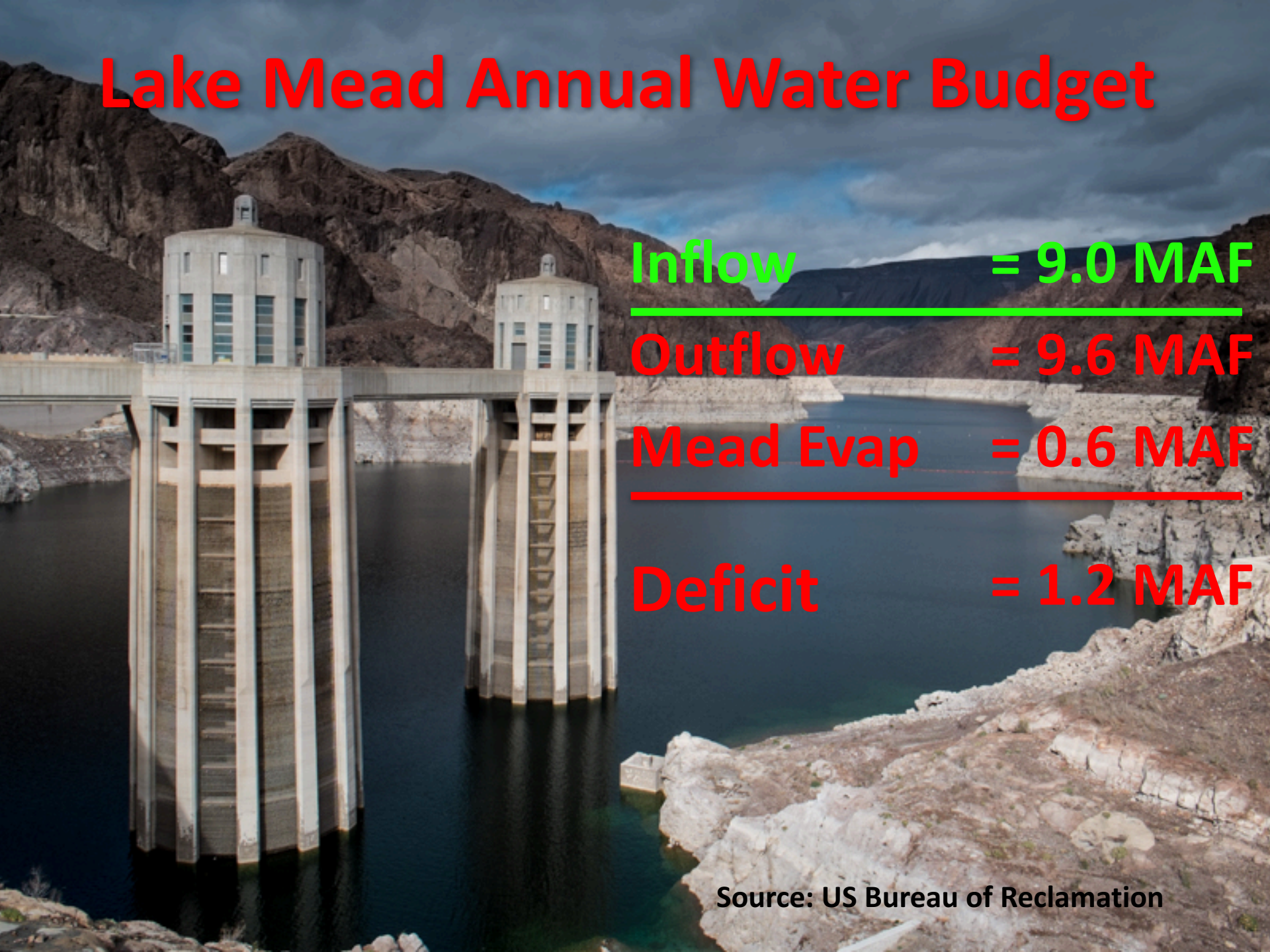
- 1948 – Upper Basin Compact
  - CO: 51.75%
  - NM: 11.25%
  - UT: 23%
  - WY: 14%
- 1956 – Colorado River Storage Project Act
- 1964 – Arizona v. California, US Supreme Court decree

Historic Drought in the Colorado River



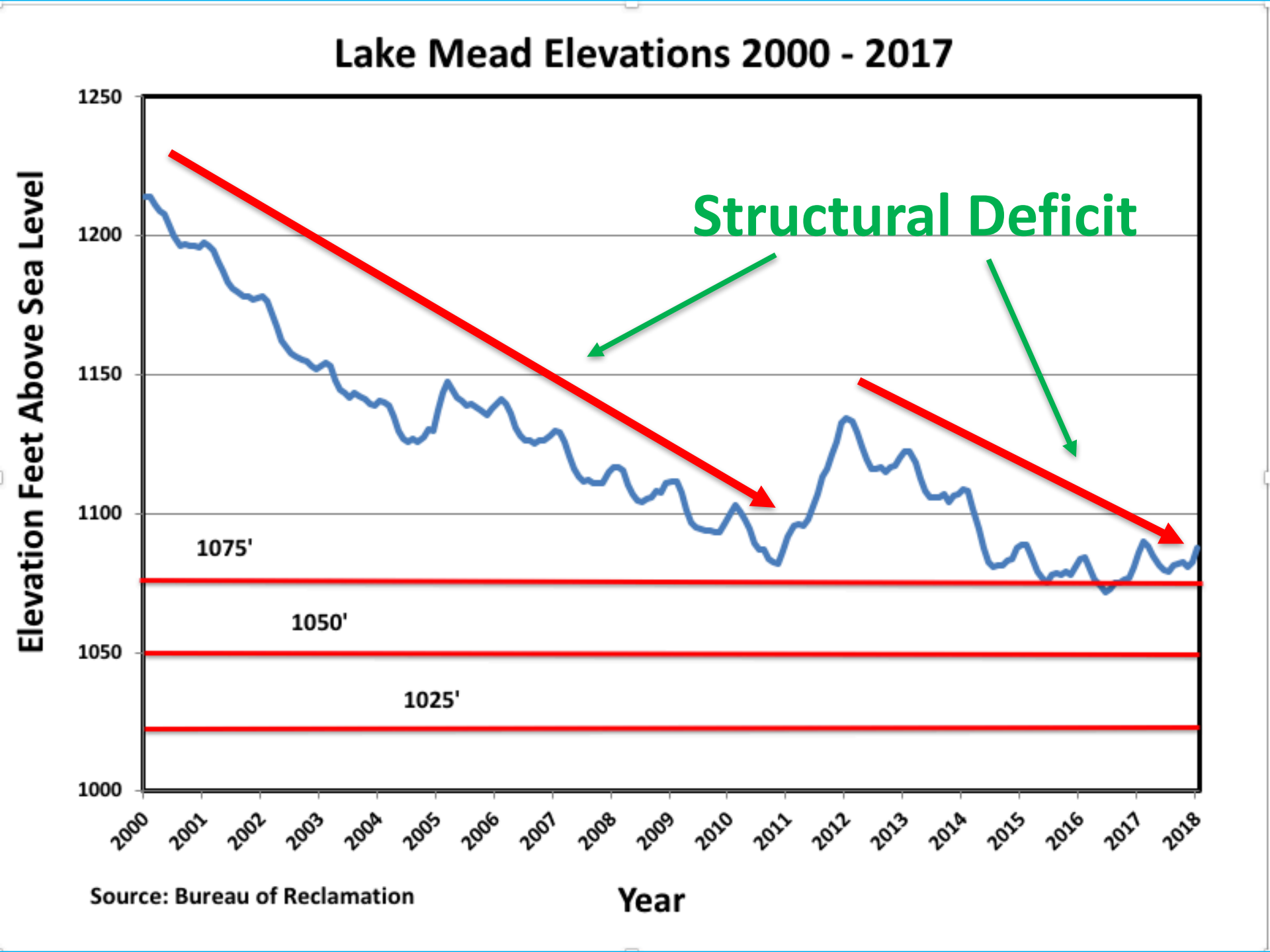
Source: Bureau of Reclamation

Lake Mead Annual Water Budget



Inflow	= 9.0 MAF
Outflow	= 9.6 MAF
Mead Evap	= 0.6 MAF
Deficit	= 1.2 MAF

Source: US Bureau of Reclamation


Lake Mead Elevations 2000 - 2017
Structural Deficit
1075'
1050'
1025'
Elevation Feet Above Sea Level
1250
1200
1150
1100
1050
1000
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Year
Source: Bureau of Reclamation

Predictions for the Future

- Udall/Overpeck paper 2017
- Rising temperatures decrease runoff
- Conservative estimates:
  - 20% decrease in runoff by 2050
  - 35% by 2100
- Support for decreases of:
  - 30% by 2050
  - 55% by 2100

Initial Responses

- 2007 Interim Guidelines
- Minute 319 with Mexico

2007 Interim Guidelines

- Sharing of shortage and surplus
- Balancing and equalization of lake levels
- Banking of water - Intentionally Created Surplus

Lake Powell

Lake Mead

2007 Interim Guidelines
Lower Basin Shortage Sharing
(in acre feet)

Lake Mead Elevation	California (4.4 MAF)	Arizona (2.8 MAF)	Nevada (0.3 MAF)
1075' – 1050'	0	320,000	13,000
1050' – 1025'	0	400,000	17,000
Below 1025'	0	480,000	20,000

Minute 319

- Effective 2013 - 2017
- Addresses shortage sharing, and much more

Participants in Min. 319

- US Federal Government
  - Dept. of State and IBWC
  - Dept. of the Interior (Reclamation and FWS)
- Mexican Federal Government
- 7 Colorado River Basin States
- Key US water districts/funders
- Multiple environmental NGOs/funders
  - US and Mexican

Minute 319 Components

- Operational
  - Sharing of shortage and surplus
  - Gives Mexico the ability to defer deliveries and store in US reservoirs
- Infrastructure
  - $21M in US investment in Mexico
- Environmental
  - Pulse and base flows

Shortage Sharing Schedule from Minute 319

Lake Mead Elevation	California (4.4 MAF)	Arizona (2.8 MAF)	Nevada (0.3 MAF)	Mexico (1.5 MAF)
1075’ – 1050’	0	320,000	13,000	50,000
1050’ – 1025’	0	400,000	17,000	70,000
Below 1025’	0	480,000	20,000	125,000

Environmental

- Base flow – 52,696 af
  - Water to be developed by env NGOs
  - Raised $10 million to purchase rights
- Pulse flow – 105,392 af
  - Just once during 5-year term

Colorado River in Mexico

Colorado River Delta in 1948

Aldo Leopold, Sand County Almanac, The Green Lagoons:
“the river was nowhere and everywhere, for he could not decide which of a hundred green lagoons offered the most pleasant and least speedy path to the Gulf.”

The Delta Today

Morelos Dam – the River disappears

Opening the Gates – March 2014

The Leading Edge

Source: National Geographic

Source:
Dale Turner, TNC
Used with permission

May 12, 2014

Almost there

May 15, 2014

The river and the sea meet once again

Lessons Learned

- Water did the most good in the active restoration areas
- Base flows may be more important for the environment
- The human element – reconnection of the communities to the River

SAN LUIS RIO COLORADO

Source: Raise the River

SAN LUIS RIO COLORADO

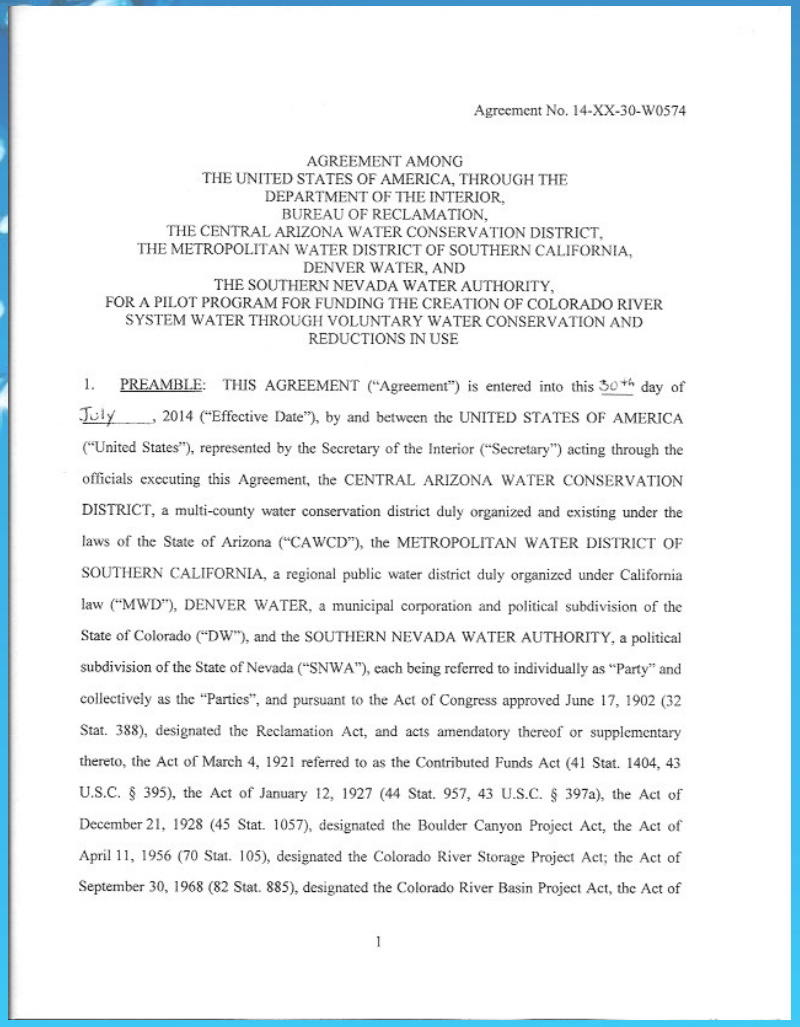
SAN LUIS RIO COLORADO

New and Ongoing Efforts

- System Conservation Pilot Program
- 7-State Drought Contingency Planning (DCP)
- Minute 323

System Conservation Agreement

- Leadership by major municipalities in drought contingency actions
- Demonstrate capabilities of voluntary water conservation measures
- $11 million initially
  - Additional $5M in 2016
  - **$16M+ for 2018**



Agreement No. 14-XX-30-W0574

AGREEMENT AMONG
THE UNITED STATES OF AMERICA, THROUGH THE
DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
THE CENTRAL ARIZONA WATER CONSERVATION DISTRICT,
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA,
DENVER WATER, AND
THE SOUTHERN NEVADA WATER AUTHORITY,
FOR A PILOT PROGRAM FOR FUNDING THE CREATION OF COLORADO RIVER
SYSTEM WATER THROUGH VOLUNTARY WATER CONSERVATION AND
REDUCTIONS IN USE

1. PREAMBLE: THIS AGREEMENT ("Agreement") is entered into this 30th day of July, 2014 ("Effective Date"), by and between the UNITED STATES OF AMERICA ("United States"), represented by the Secretary of the Interior ("Secretary") acting through the officials executing this Agreement, the CENTRAL ARIZONA WATER CONSERVATION DISTRICT, a multi-county water conservation district duly organized and existing under the laws of the State of Arizona ("CAWCD"), the METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, a regional public water district duly organized under California law ("MWD"), DENVER WATER, a municipal corporation and political subdivision of the State of Colorado ("DW"), and the SOUTHERN NEVADA WATER AUTHORITY, a political subdivision of the State of Nevada ("SNWA"), each being referred to individually as "Party" and collectively as the "Parties", and pursuant to the Act of Congress approved June 17, 1902 (32 Stat. 388), designated the Reclamation Act, and acts amendatory thereof or supplementary thereto, the Act of March 4, 1921 referred to as the Contributed Funds Act (41 Stat. 1404, 43 U.S.C. § 395), the Act of January 12, 1927 (44 Stat. 957, 43 U.S.C. § 397a), the Act of December 21, 1928 (45 Stat. 1057), designated the Boulder Canyon Project Act, the Act of April 11, 1956 (70 Stat. 105), designated the Colorado River Storage Project Act; the Act of September 30, 1968 (82 Stat. 885), designated the Colorado River Basin Project Act, the Act of

1

Upper Basin DCP

- Weather modification
- Drought operations – use other upstream reservoirs to maintain critical levels in Lake Powell
- Demand management investigation

Lower Basin DCP

- Proposed new shortage sharing schedule
- DCP+ in Arizona

Proposed New Lower Basin Shortage Sharing Schedule

Lake Mead Elevation	California (4.4 MAF)	Arizona (2.8 MAF)	Nevada (0.3 MAF)	USBR
1090’ – 1075’	0	192,000	8,000	100,000
1075’ – 1050’	0	512,000	21,000	100,000
1050’ – 1045’	0	592,000	25,000	100,000
1045’ – 1040’	200,000	640,000	27,000	100,000
1040’ – 1035’	250,000	640,000	27,000	100,000
1035’ – 1030’	300,000	640,000	27,000	100,000
1030’ – 1025’	350,000	640,000	27,000	100,000
Below 1025’	350,000	720,000	30,000	100,000

But . . . .


An Elusive Colorado River Drought Plan Fails To Materialize — For Now
91.5 KRCC
The Takeaway
By LUKE RUNYON • JAN 10, 2018


Arizona water managers disagree on how to prevent a shortage on the Colorado River
Brandon Loomis, The Republic | azcentral.com
Published 6:00 a.m. MT March 2, 2018
azcentral.
PART OF THE USA TODAY NETWORK


Arizona Debates Conservation as Colorado River Shortage Looms
Bloomberg Environment
Posted March 13, 2018, 5:29 AM

Minute 323

- Signed last September
- Extends Minute 319 provisions
- New and deeper shortage sharing contingent on agreements and approvals among US entities

Binational Water Scarcity Contingency Plan

Lake Mead Elevation	California (4.4 MAF)	Arizona (2.8 MAF)	Nevada (0.3 MAF)	USBR	Mexico (1.5 MAF)	Total
1090' – 1075'	0	192,000	8,000	100,000	41,000	341,000
1075' – 1050'	0	512,000	21,000	100,000	80,000	713,000
1050' – 1045'	0	592,000	25,000	100,000	104,000	821,000
1045' – 1040'	200,000	640,000	27,000	100,000	146,000	1,113,000
1040' – 1035'	250,000	640,000	27,000	100,000	154,000	1,171,000
1035' – 1030'	300,000	640,000	27,000	100,000	162,000	1,229,000
1030' – 1025'	350,000	640,000	27,000	100,000	171,000	1,288,000
Below 1025'	350,000	720,000	30,000	100,000	275,000	1,475,000

Interstate Troubles

Colorado and three states accuse Arizona of manipulating Colorado River supply and demand

THE DENVER POST

Feud erupts between utility, US states over Colorado River

The Washington Post
Democracy Dies in Darkness

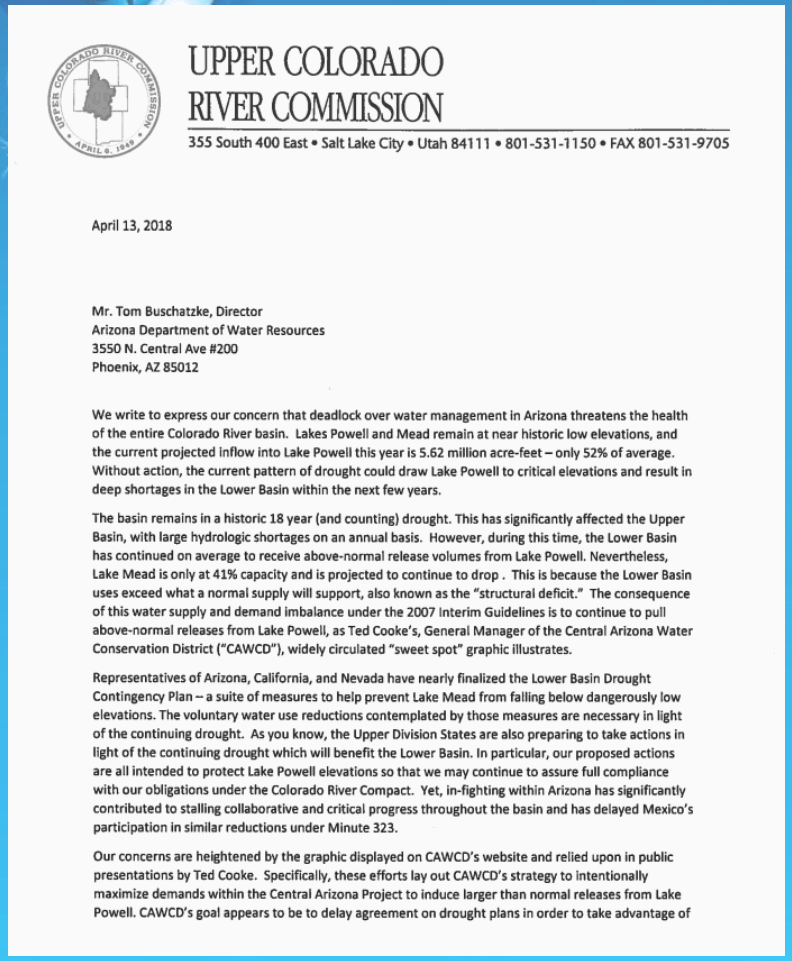
Four states that also get Colorado River water say CAP keeps too much for Arizona

By Tony Davis Arizona Daily Star Apr 16, 2018 Updated Apr 17, 2018

tucson.com

Upper Basin and Denver Water Objections

"CAP's goal appears to be to delay agreement on drought plans in order to take advantage of what it terms the "sweet spot" by drawing "bonus water" from Lake Powell."



UPPER COLORADO RIVER COMMISSION

355 South 400 East • Salt Lake City • Utah 84111 • 801-531-1150 • FAX 801-531-9705

April 13, 2018

Mr. Tom Buschatzke, Director
Arizona Department of Water Resources
3550 N. Central Ave #200
Phoenix, AZ 85012

We write to express our concern that deadlock over water management in Arizona threatens the health of the entire Colorado River basin. Lakes Powell and Mead remain at near historic low elevations, and the current projected inflow into Lake Powell this year is 5.62 million acre-feet – only 52% of average. Without action, the current pattern of drought could draw Lake Powell to critical elevations and result in deep shortages in the Lower Basin within the next few years.

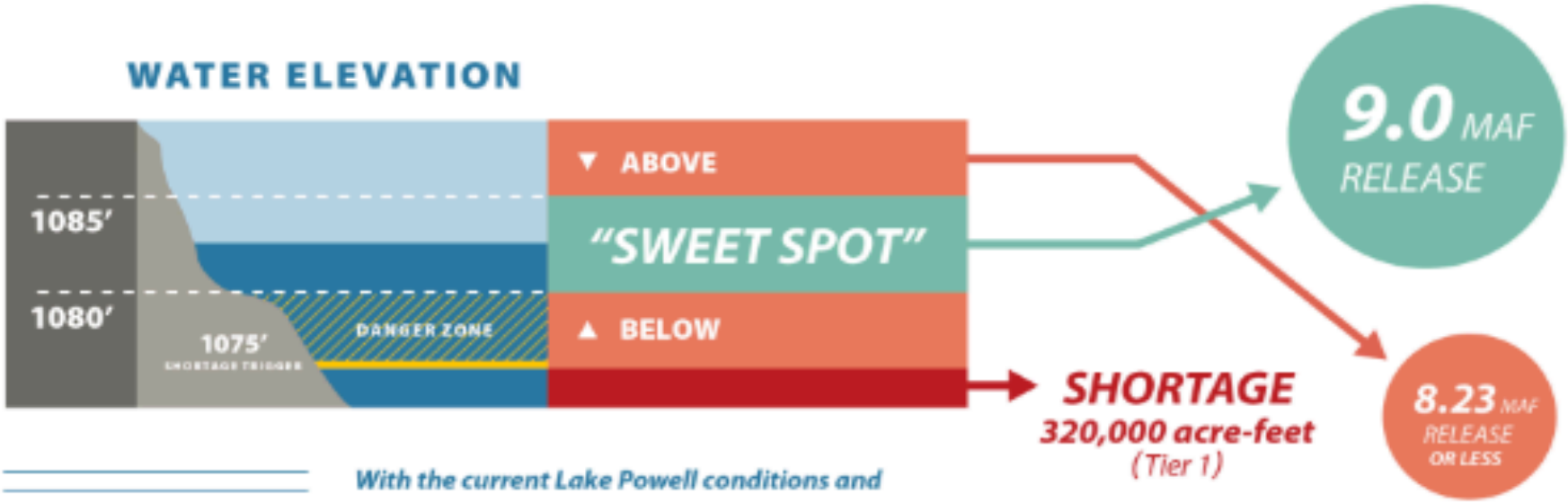
The basin remains in a historic 18 year (and counting) drought. This has significantly affected the Upper Basin, with large hydrologic shortages on an annual basis. However, during this time, the Lower Basin has continued on average to receive above-normal release volumes from Lake Powell. Nevertheless, Lake Mead is only at 41% capacity and is projected to continue to drop . This is because the Lower Basin uses exceed what a normal supply will support, also known as the "structural deficit." The consequence of this water supply and demand imbalance under the 2007 Interim Guidelines is to continue to pull above-normal releases from Lake Powell, as Ted Cooke's, General Manager of the Central Arizona Water Conservation District ("CAWCD"), widely circulated "sweet spot" graphic illustrates.

Representatives of Arizona, California, and Nevada have nearly finalized the Lower Basin Drought Contingency Plan -- a suite of measures to help prevent Lake Mead from falling below dangerously low elevations. The voluntary water use reductions contemplated by those measures are necessary in light of the continuing drought. As you know, the Upper Division States are also preparing to take actions in light of the continuing drought which will benefit the Lower Basin. In particular, our proposed actions are all intended to protect Lake Powell elevations so that we may continue to assure full compliance with our obligations under the Colorado River Compact. Yet, in-fighting within Arizona has significantly contributed to stalling collaborative and critical progress throughout the basin and has delayed Mexico's participation in similar reductions under Minute 323.

Our concerns are heightened by the graphic displayed on CAWCD's website and relied upon in public presentations by Ted Cooke. Specifically, these efforts lay out CAWCD's strategy to intentionally maximize demands within the Central Arizona Project to induce larger than normal releases from Lake Powell. CAWCD's goal appears to be to delay agreement on drought plans in order to take advantage of

Maintaining the "SWEET SPOT"

THE LEVEL OF **LAKE MEAD** IS ONE FACTOR THAT **DETERMINES** **AMOUNT OF WATER RELEASED FROM LAKE POWELL**



With the current Lake Powell conditions and a Lake Mead elevation between 1080' and 1085', 9 MAF of water is released.

HYDROLOGY

ANOTHER FACTOR THAT DETERMINES RELEASES FROM LAKE POWELL is the inflow to Lake Powell from snowpack and precipitation which generates river flows.

8.23 MAF RESULTS IN SHORTAGE

Releases of 8.23 MAF will drop the lake level 9' annually and drive the system into shortage more quickly.

Source: Central Arizona Project

What's Next?

- **Nail down the DCP in Lower Basin**
- Min. 323 – work group to determine how US and Mexico can jointly plan and operate the river after 2026
- Upper Basin water bank in Lake Powell?
- Address the overall structural deficit

Colorado Issues

- System conservation water bank – in Lake Powell or other UB reservoirs
- Shepherding conserved water to bank
- How to deal with new depletions - in Colorado and other UB states
- Quantifying and measuring conservation
- Tying development approvals more closely to water availability and conservation

Long Term Challenges

- Climate change – impact on runoff
- Salton Sea
- Unquantified tribal settlements and unused tribal water
- Not sacrificing the agricultural economy or the environment

Significant Achievements

- Voluntary reductions in demand, triggered by falling reservoir levels
- Participants – Feds, 7 states, water agencies, NGOs, tribes, philanthropy
- Little (not zero) major litigation over the last 15 years

Why Is This Basin Different?

- Federal role
- Constructive role of env NGOs and philanthropy
- Collaboration has become the expectation
- Litigation viewed as failure

QUESTIONS and DISCUSSION