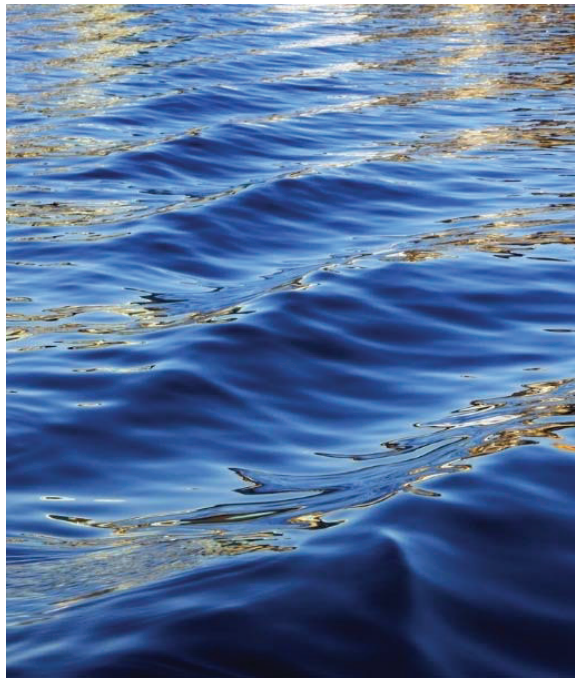
Drought Contingency Planning in the Colorado River Basin

Colorado Summary

October 9, 2018



Interstate Drought Contingency Planning Outline

* Drought Contingency Planning (General)

* Legal Context

* Current Conditions

* Drought Contingency Plans
  - ✓Upper Basin
  - ✓Lower Basin

* Current Tentative Timeline

Interstate Drought Contingency Planning (General)

What is it?

- ✓Interstate planning for drought response to reduce risks associated with reaching critical reservoir elevations at Lake Powell and Lake Mead.

Interstate Drought Contingency Planning (General)

*Why are we doing it?

- ✓If critical reservoir elevations are breached, the system faces threats to the ability to control our own destiny – drinking water supply, irrigation, natural resource preservation and hydropower production, economic stability, and overall system sustainability.

*Low probability but High Risk in Upper Basin.

- ✓Sensible to plan for the "worst case" scenarios to avoid potential controversy, conflict, and uncertainty.

- ✓Preparation for, but not predicting need for, implementation.

Context – Colorado River Basin

Lee Ferry

Upper Basin
7.5 MAF

Lower Basin
7.5 MAF
+ 1 MAF
8.5 MAF

Mexico
1.5 MAF

Context - Colorado River Compact, 1922

*Apportionment – Article III(a)

- ✓The exclusive beneficial use of *7.5 MAF per year of water from the Colorado River System is apportioned to the Upper and Lower Basin respectively* which includes all water needed for the supply of any future water rights. (Note: LB gets additional 1 MAF under Art. III (b)).

*Non-Depletion Clause - Art III(d)

- ✓Upper Basin states will not cause the flow at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years. (a/k/a *75 / 10 Rule*) *✳THIS IS NOT A DELIVERY OBLIGATION✳*

*Operational Provision - Art. III(e)

- ✓Upper Basin states *cannot keep water*, and the Lower Basin states *cannot call for delivery of water* that cannot be reasonably applied to domestic and agricultural use.

Treaty with Mexico, 1944

* Guarantees Mexico an annual quantity of 1.5 MAF.

* If a system surplus exists, amount can increase to 1.7 MAF.

* In "extraordinary drought," allotment can be reduced in proportion to reduction of uses within the U.S.
  - The Treaty does not define extraordinary drought.
  - Any definition would apply to Lower Rio Grande too. (Part of same treaty)

* Establishes the *International Boundary and Water Commission* to implement the Treaty.

* Minutes to the treaty further define but DO NOT alter terms.

Context - Upper Colorado River Compact 1948

- Article III(a) – apportions to individual states, "in perpetuity," the Upper Basin's share of consumptive use under the Colorado River Compact.
  1. Arizona gets 50,000 AF annually.
  2. The other states may use the following percentages:

State	Percentage of available supply	% of 7.5 MAF (full supply)
Colorado	51.75	3,855,375
New Mexico	11.25	838,125
Utah	23	1,713,500
Wyoming	14	1,043,000

Context - Upper Colorado River Compact cont'd

* Article IV – in the event curtailment of use shall become necessary to not deplete the flow at Lee Ferry below that required by Art. III of the Colorado River Compact, the extent of *curtailment by each state shall be determined in such amounts and at such times as determined by the UCRC*.

UCRC does NOT have authority to determine how to administer water within an individual state

❖We never have been in curtailment, and under historical hydrologic conditions, we will not face a curtailment in foreseeable future. Historical record, however, is not necessarily indicative of the future.

Context - 2007 Interim Guidelines

* Sets *criteria for shortages* in the Lower Basin
  - ✓Below elevation 1075 feet – 333,000 AF
  - ✓Below elevation 1050 feet – 417,000 AF
  - ✓Below elevation 1025 – 500,000 AF
  - ** Assumes Mexico will provide additional shortage savings*
* Creates option to bank water in LB = *Intentionally Created Surplus (ICS).*
  - ✓Extraordinary conservation
  - ✓System efficiency improvements
  - ✓Tributary conservation
  - ✓Importation of non-System water
* Specifies *coordinated operating criteria* for Lake Powell and Lake Mead
  - ✓To avoid UB curtailment and reduce impact of LB shortages under low water supplies.

Context – Coordinated Reservoir Operations

Lake Powell Operational Tiers
(subject to April adjustments or mid-year review mo

Lake Powell Elevation (feet)	Lake Powell Operational Tier
3,700	**Equalization Tier** — equalize, avoid spills or release 8.23 maf — **Equalize**
3,636 – 3,666 (see table below)	**Upper Elevation Balancing Tier** — release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf — **8.23 or balance if Mead low**
3,575	**Mid-Elevation Release Tier** — release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf — **7.48 or 8.23 if Mead low**
3,525	**Lower Elevation Balancing Tier** — balance contents with a min/max release of 7.0 and 9.5 maf — **Balance**
3,370	

Lake Powell current elevation 3,593 ft.

Lake Powell Equalization Elevation Table

Water Year	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

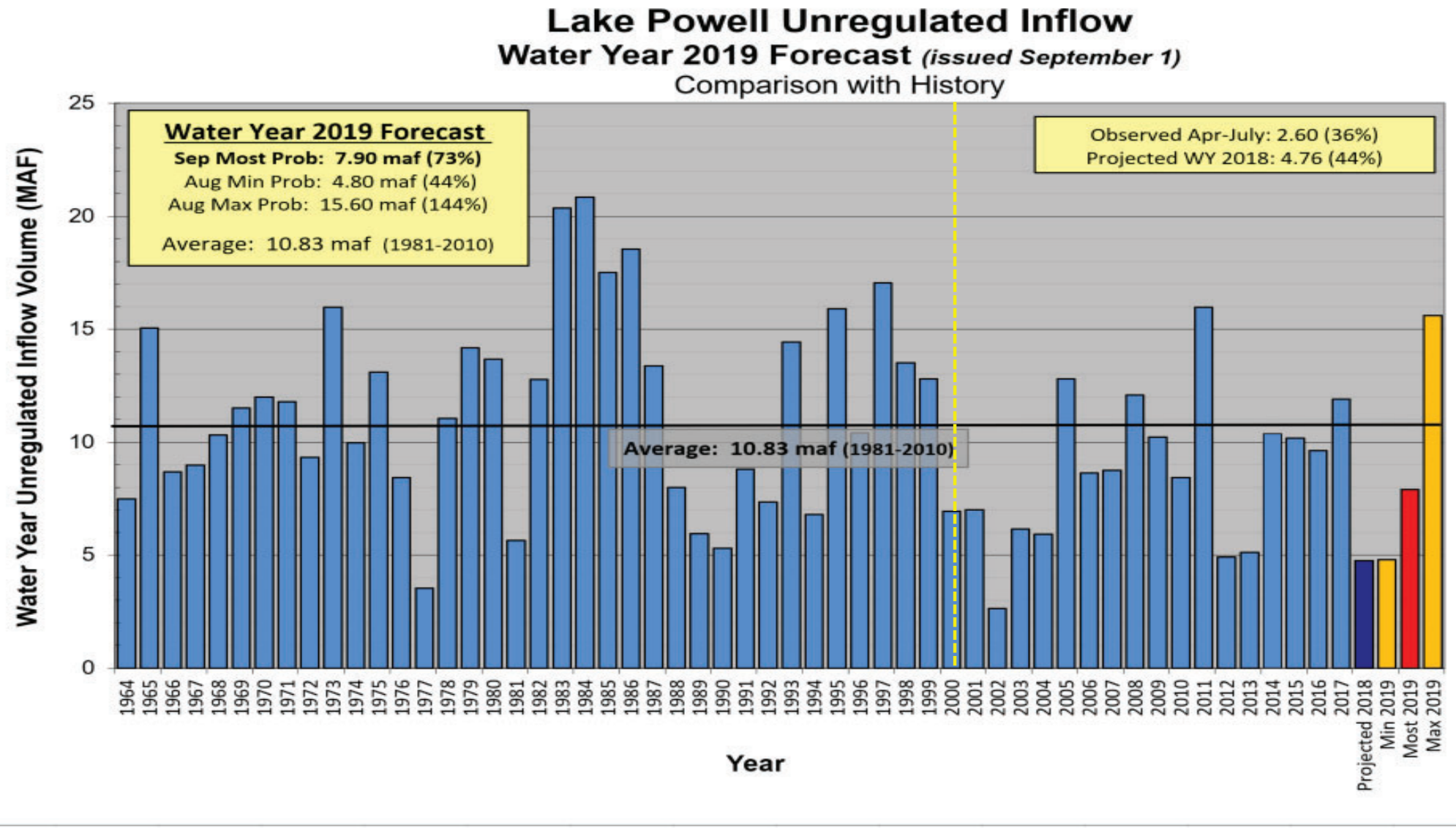
Current Issue: DROUGHT

❖ Basin Hydrology--How Bad Is It?

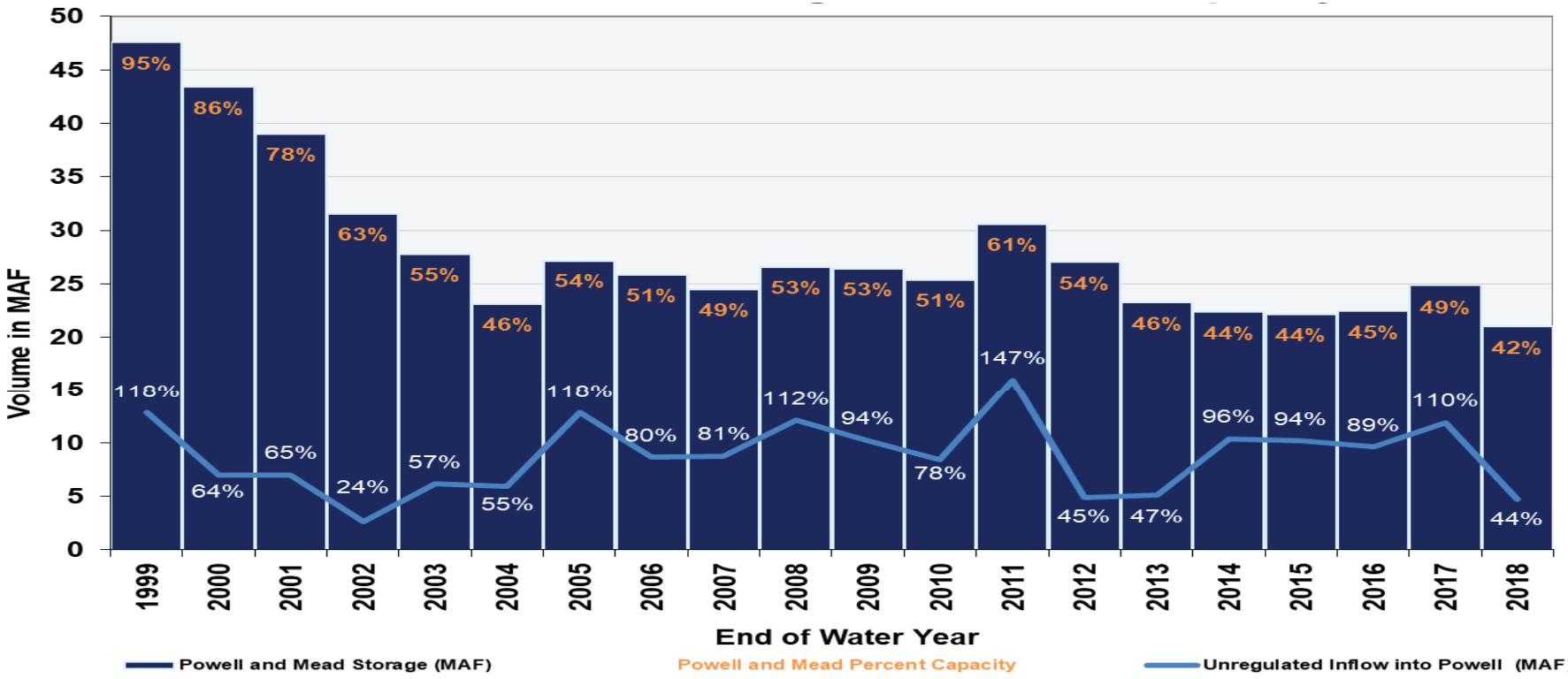
- ✓ Water Year 2017— good hydrology.
- ✓ Water Year 2018 – On track to be third driest year on record.

❖ Context in Basin

- ✓ Powell inflows were less than 5 million acre-feet 7 out of last 18 yrs.
- ✓ Above-average Powell inflows have occurred only 5 years since 2000.
- ✓ 4 of the 5 lowest years on record have occurred during the 19-year drought, with 2012 and 2013 being the driest consecutive two-year period in recorded history.
- ✓ Current predictions are for increasing demand and decreasing supply.


Lake Powell Unregulated Inflow
Water Year 2019 Forecast (issued September 1)
Comparison with History
Water Year 2019 Forecast
Sep Most Prob: 7.90 maf (73%)
Aug Min Prob: 4.80 maf (44%)
Aug Max Prob: 15.60 maf (144%)
Average: 10.83 maf (1981-2010)
Observed Apr-July: 2.60 (36%)
Projected WY 2018: 4.76 (44%)
Average: 10.83 maf (1981-2010)
Water Year Unregulated Inflow Volume (MAF)
0
5
10
15
20
25
1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 Projected 2018 Min 2019 Most 2019 Max 2019
Year

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



[1]Values for Water Year 2018 are projected. Unregulated inflow is based on the latest CBRFC forecast dated September 17, 2018. Storage and percent capacity are based on the September 2018 24-Month Study.

[2]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.

Drought Contingency Planning – Rationale/Process

* The 2007 Interim Guidelines are insufficient to protect against reservoirs declining to critically low elevations if dry conditions persist or worsen.

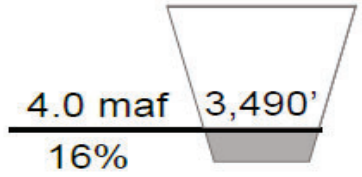
* Over the past decade, drought has increased the risk of declining to critical reservoir elevations nearly four-fold since implementation of the 2007 Interim Guidelines.

* Beginning in 2013, in response to these historic drought conditions, the seven Colorado River Basin States, the Department of Interior and the Republic of Mexico have been working on Drought Contingency Plans.

* Urgency increased due to this year's very poor hydrology.

* Modeling studies of the DCPs indicate that, when implemented, the risk of reaching critical elevations in Lakes Powell and Mead through 2026 is significantly reduced.

Risk of Lake Powell < 3,490’



Full Hydrology (1906-2015)

Stress Test Hydrology (1988-2015)

2007 Projections
(1906-2005 hydrology)

No DCP
(August 2018 Projections)

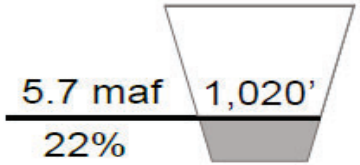
With DCP
(August 2018 Projections with Upper & Lower Basin DCPs & Binational WSCP)

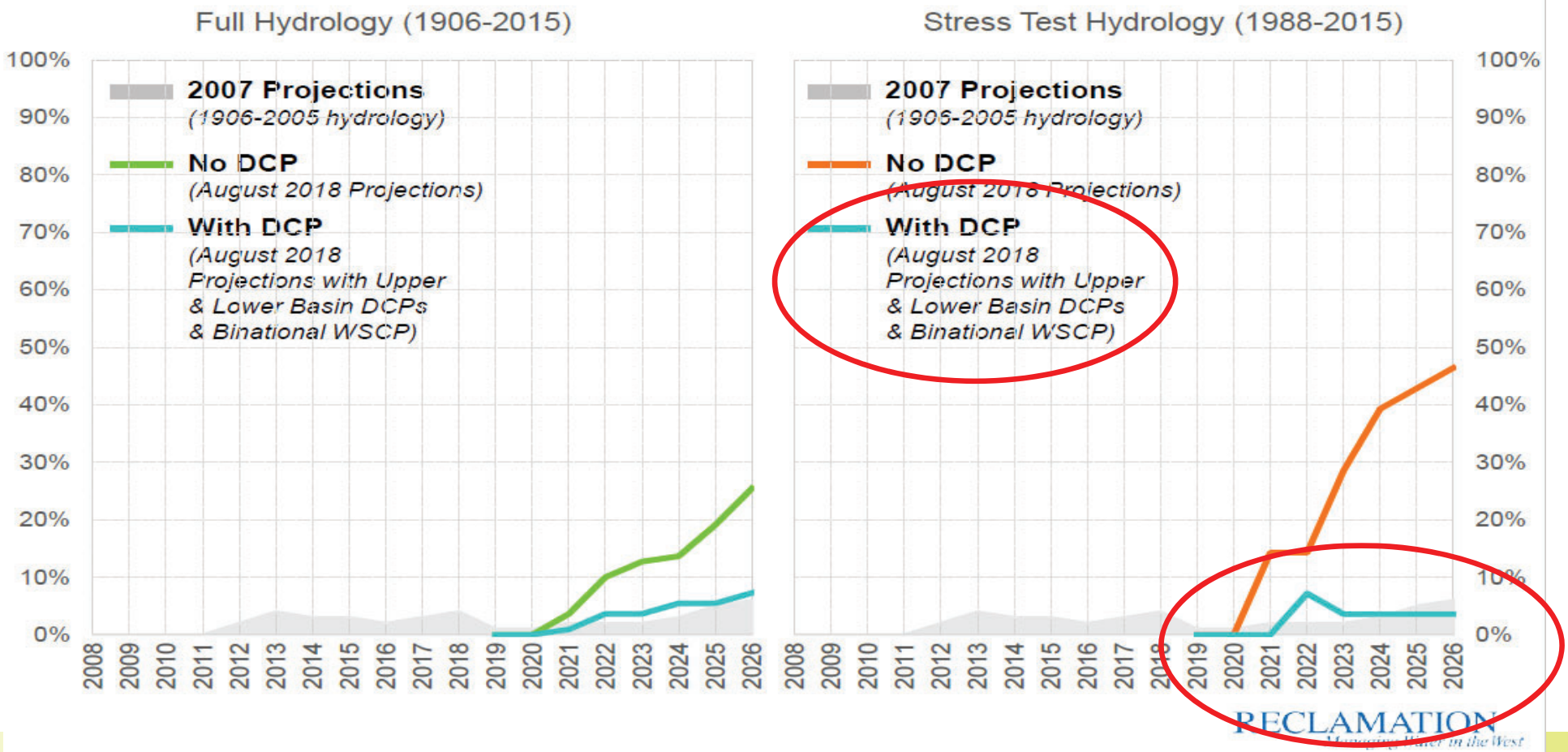
100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%

2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026

RECLAMATION
Managing Water in the West

Risk of Lake Mead < 1,020’



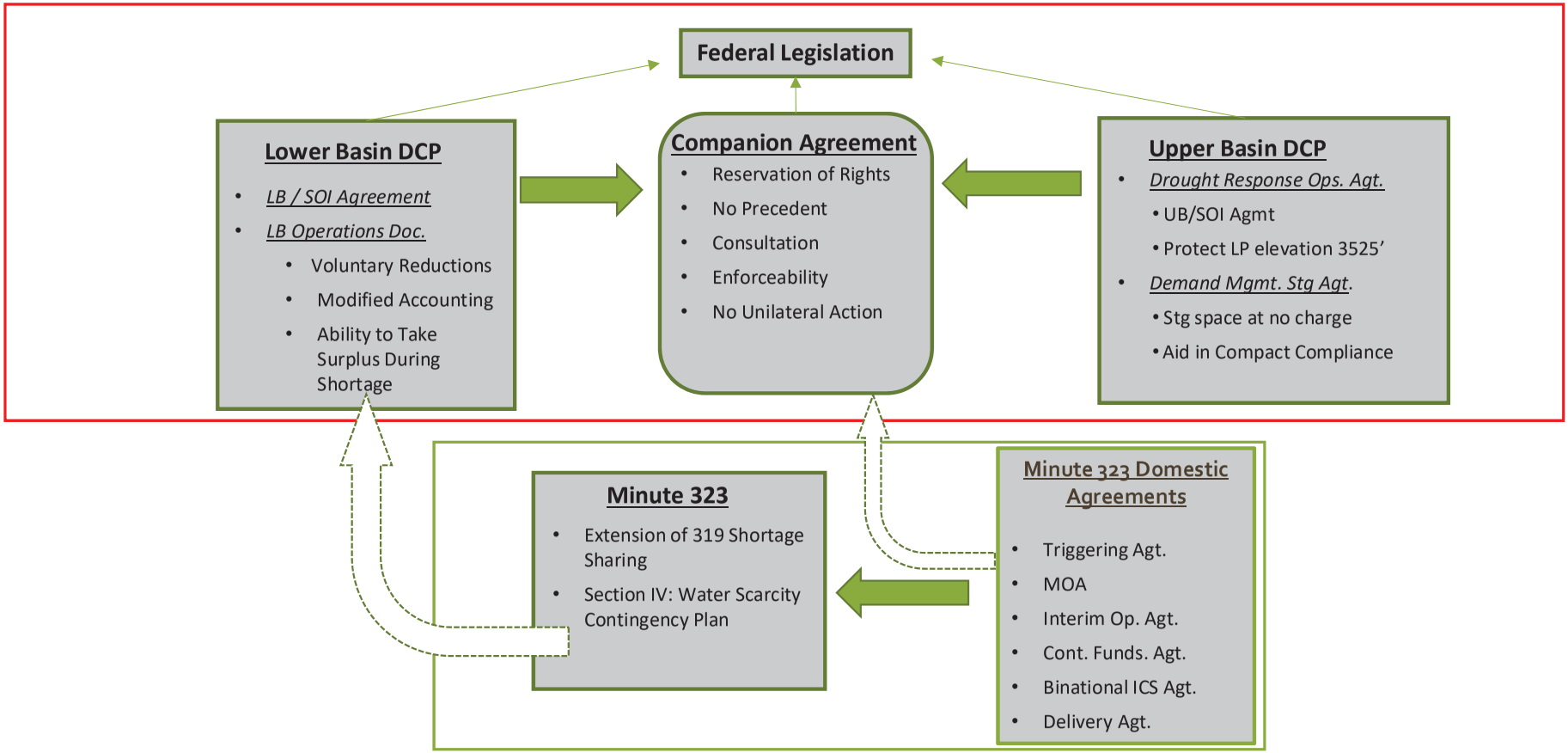


Interstate Drought Contingency Planning

Goals:

- ✓Identify methods for providing *additional flexibility and security* in the Colorado River System in times of ongoing or extended drought
- ✓*Avoid unilateral* and *uncoordinated* efforts that could provoke or lead to litigation or conflict.

Drought Contingency Documents/Relationships



UB DCP
Drought Response Operations Agreement

Navajo Reservoir

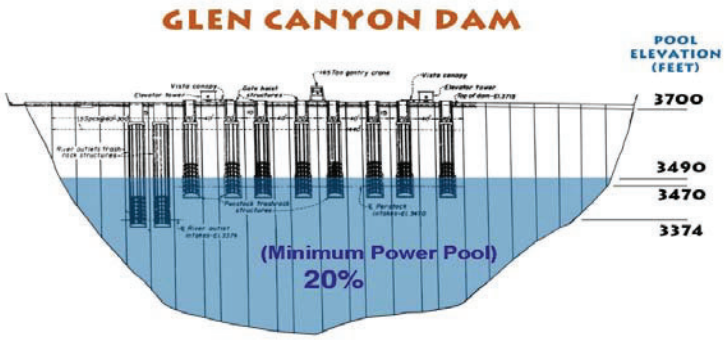
Flaming Gorge Reservoir

Blue Mesa Reservoir

Lake Powell

- Agree on process for developing operational plans to implement based on specific triggers to help maintain minimum power pool elevation at Lake Powell
- By conserving water (temporarily) in Lake Powell or moving water available (and subsequently recovering the storage) from upper CRSP facilities

UB DCP - DROA
Why Minimum Power Pool?



Loss of power generation impacts:

✓Clean power supply

✓Funding for:

- Repayment for construction of CRSPA projects.
- Operating and maintaining Glen Canyon, Aspinall, Flaming Gorge, Navajo, etc. reservoirs.
- Complying with Endangered Species Act, NEPA, and Grand Canyon protection obligations.
- Salinity mitigation.
- Upper Basin projects funded by current Basin Fund MOA.

✓Threat to maintaining compact compliance

❖Directly implicates ability to utilize existing water supplies.

UB DCP – DROA cont'd.

*Signatories: Secretary of the Interior and Upper Division States through the Upper Colorado River Commission.

* Target Elevation: 3525' to help assure enough water can remain in Lake Powell to protect minimum power pool and infrastructure (somewhere between 3490' and 3525')

* Principles and Process Document:

- ✓Sets forth minimum principles to guide any plan development process.
- ✓Establishes process for developing a plan to move water (and subsequently recover storage) from CRSPA Initial Units to protect elevation 3525' at LP based on real time conditions.

UB DCP – DROA cont'd.

* Principles to be considered during plan development include:

- ✓ Operate Units with maximum flexibility practicable to accomplish drought response releases and subsequent recovery of storage operations.
- ✓ Ensure all CRSPA Initial Units are considered.
- ✓ Remain consistent with existing permitting, and honor water and hydropower contracts.
- ✓ Recognize that recovery of storage part of drought response operations.
- ✓ Consider natural resource conditions and impacts to Basin Fund and Bulk Electric System.
- ✓ Provide for emergency actions to occur if need to protect target elevation is imminent.
- ✓ Others – not an exhaustive list.

UB DCP – DROA con'td.

* Process summary for developing Plan

- ✓ Trigger planning process when MINIMUM probable hydrology projects LP elevations may reach elevation 3525' or below.
  - Monthly calls/meetings initiated to track conditions and status at Units.
- ✓ Develop draft operations plan considering principles in Agreement when MOST probable hydrology projects LP elevations will reach elevation 3525' or below.
  - Provide for timely adjustments based on actual monthly hydrology
  - Allow for subsequent recovery of storage
- ✓ Conduct Outreach on terms of draft operations plan
  - Coordinate and conduct outreach to Tribes, local governments, interested stakeholders, technical workgroups, etc.
  - Provide terms to Lower Division States for review.
- ✓ Finalize Drought Operations Plan
  - Obtain Commission approval
  - Submit to Secretary for approval
- ✓ Implement Drought Operations Plan

UB DCP
Demand Management Storage Agreement

*Purpose

- ✓Secure ability to use unfilled storage space in CRSPA Initial Units to promote continued compliance with compact obligations in times of extended drought.
- ✓Provide foundation on which the Upper Basin may explore and potentially develop a demand management program in the future.

* Need

- ✓For any demand management to be effective, multi-year storage is required. Water must be conserved and stored over several years to provide a meaningful benefit.
- ✓There is little incentive to investigate the many outstanding issues related to demand management without securing some assurances to mitigate risks and justify expending time and resources.

UB DCP
DM Storage Agmt. Elements

*Authorization (federal approval)

- ✓Secures Secretary's authority to allow, over the long-term, storage at CRSPA Initial Units of water conserved as part of an Upper Basin Demand Management Program.
- ✓Ensures such storage will be at no charge.
- ✓Authorization does not sunset.

*Agreement (interstate agreement)

- ✓Sets forth minimum parameters under which the Upper Division States could access the authorized storage space between now and 2026.

❖Neither element authorizes, mandates or guarantees that an Upper Basin Demand Management Program will be instituted.

❖Rather sets requirement that there be an Upper Basin Demand Management Program before the Upper Division States can access storage authorized under the agreement.

UB DCP -DM Storage Agmt. Summary of Agreement Framework

* To access the authorized storage, the UCRC must develop and approve an UB Demand Management Program.

* To approve a program:
  - ✓ The Upper Division States, through the UCRC, must determine demand management is feasible;
  - ✓ The UCRC must make findings that demand management activities are necessary to help assure compact compliance;
  - ✓ The UCRC must to consult with the Lower Basin States on terms of Upper Basin Program;
  - ✓ The UCRC must enter into an agreement with Secretary on verification and accounting of water conserved, conveyed, and stored as part of a program.
  - ✓ The UCRC must formally approve the program; and
  - ✓ Each Upper Division State must approve the program through its respective Commissioner.

UB DCP -DM Storage Agmt
Summary of Agreement Framework - cont'd.

* Water conserved under an UB Demand Management Program must:

- ✓ Be conserved, stored and released for the sole purpose of compact compliance.
- ✓ Involve water that has been imported into the Upper Colorado River Basin, or has been consumptively used within the Basin under existing rights prior to being conserved in any program.
- ✓ Be physically available for diversion and be beneficially and consumptively used within the Upper Basin except for participation in and UB Demand Management Program.
- ✓ Be accounted for and verified as conserved, conveyed and stored for demand management purposes.

UB DCP - DM Storage Agmt
Summary of Agreement Framework – cont'd.

*Any water stored under a UB Demand Management Program is subject to:

- ✓ Evaporation charges.
- ✓ Annual creation limits and an overall maximum volume limitation of 500,000 acre feet.
- ✓ Reductions during a "spill" at Glen Canyon Dam.
- ✓ Annual verification of volume conserved, conveyed and stored.

* Water stored and released under a UB Demand Management Program shall:

- ✓ Be released only at the request of the UCRC to help assure compact compliance.
- ✓ Not be subject to "coordinated operations" of the Colorado River System Reservoirs.
- ✓ Be available for release under the above parameters through 2057.

UB DCP - DM Storage Agmt
Summary of Agreement Framework – cont'd.

* Post -2026

- ✓ Access to demand management storage for any program after 2026 will be informed by and considered as part of the renegotiation of the 2007 Interim Guidelines (which expire in 2026).
- ✓ Program conditions post-2026 are expected to include specific elements outlined in the Agreement.

Lower Basin DCP Elements

* Lower Basin DCP Agreement

- ✓Sets terms for Secretary and Lower Basin agreement on LB DCP Operations.
- ✓Includes Secretary commitment to work to create 100,000 acre feet of water per year.
- ✓Term is until the end of 2026.

* Lower Basin DCP Operations

- ✓Serves as guidance, in combination with the 2007 Interim Guidelines, to control LB operations thru 2026.
- ✓Requires each Lower Division State to contribute specific volumes of DCP water at certain Lake Mead elevations.
- ✓Recognizes that the DCP contributions may be created by converting banked storage (ICS) to DCP ICS, but restricts when DCP ICS can be delivered in the future (above elevation 1090, except for temp. borrowing).
- ✓Provides greater flexibilities to incentivize creation of additional banked storage (ICS). Some flexibilities require federal approval.

❖Overall, requires LB conservation and provides for additional flexibilities to accomplish.

Lower Basin DCP – cont'd.

Total Contemplated Lower Basin Volumes (in KAF)
2007 Interim Guidelines, Minute 323, Lower Basin Drought Co… Plan &
Binational Water Scarcity Contingency P…

Lake Mead Elevation (ft msl)	2007 Interim Guidelines Shortages		Minute 323 Delivery Reductions	Total Combined Reductions	DCP Contributions			Binational Water Sc… C…	…ountry …es Shortages + …ibutions) …3 Delivery Reductions + …er Scarcity Contingency Plan Savings)					Total Combined Volumes
	AZ	NV	Mexico	*Lower Basin States + Mexico*					*AZ Total*	*NV Total*	*CA Total*	*Lower Basin States Total*	*Mexico Total*	*Lower Basin States + Mexico*
1,090 - >1,075	0	0	0					41	192	8	0	*200*	*41*	***241***
1,075 - >1050	320	13				8	0	30	512	21	0	*533*	*80*	***613***
1,050 - >1,045	400	1…			192	8	0	34	592	25	0	*617*	*104*	***721***
1,045 - >1,040				***487***	240	10	200	76	640	27	200	*867*	*146*	***1,013***
1,040 - >1,03…			…	***487***	240	10	250	84	640	27	250	*917*	*154*	***1,071***
1,035 - >1,030			70	***487***	240	10	300	92	640	27	300	*967*	*162*	***1,129***
1,030 – 1,025	400	17	70	***487***	240	10	350	101	640	27	350	*1,017*	*171*	***1,188***
<1,025	480	20	125	***625***	240	10	350	150	720	30	350	*1,100*	*275*	***1,375***

DRAFT

The US will work to create or conserve 100,000 af or more of Colorado River system water on an annual basis to contribute to conservation of water supplies in Lake Mead and other Colorado River reservoirs. All actions taken by the United States shall be subject to applicable federal law, including availability of appropriations.

Lower Basin Drought Contingency Operations

- Provisions that incentivize creation and long-term storage of Extraordinary Conservation (EC) ICS in Lake Mead.

  - ✓EC ICS will be available for delivery when Lake Mead is above elevation 1,025' (Above 1,075' in the 07 Interim Guidelines);
  - ✓EC ICS will be subject to a one-time, 10% evaporation assessment rather than a 5% system assessment and annual 3% evaporation losses;
  - ✓Each State's maximum ICS accumulation limit will increase by 200kaf, and all ICS may be delivered through 2057;
  - ✓Upon agreement, a state may access another's ICS available capacity.

❖Each benefits from Federal Approval

Treaty Minute 323

* Signed - Santa Fe, October 2017, along with domestic agreements necessary to implement the Minute.

* Key Results
  - ✓Helps cement drought planning in the Lower Basin (Mexico participating).
  - ✓Continues problem solving consistent with Treaty.
  - ✓Does not compromise state authorities or rely on use of state water to accomplish.

❖ For Mexico's participation in drought contingency to be operational, Lower Basin must effectuate a Drought Contingency Plan.

Companion Agreement

* Signatories: Secretary of the Interior and Bureau of Reclamation Commissioner, Upper Basin and Lower Basin parties.

* Elements:

  - ✓Attaches and incorporates UB DCP and LB DCP documents.
  - ✓Provides mutual understanding of DCP documents as tools to be used in an effort to protect each Basin and benefit the system.
  - ✓Establishes mutual willingness to obtain federal legislation to implement the DCPs.
  - ✓Sets forth provisions to resolve claims and controversies, reserve rights and legal positions, and implement a consultation process.
  - ✓Serves as mechanism to enforce the terms of the DCPs.

❖The Bridge between the UB and LB DCPs

Federal Legislation

*Purpose

- ✓ To authorize and direct the Secretary to execute the UB and LB DCP agreements and implement the DCP operations.

* Need

- ✓ To avoid claims or controversies that any element of the DCPs conflicts with or is otherwise not authorized by existing law.

TENTATIVE TIMELINE

* Interstate DCP Agreements
  - ✓Outreach
    - October . . .
  - ✓UB, LB Approvals
    - October through December
  - ✓Federal Legislation
    - Start laying foundation for possible federal approval in October, and continue process as needed with hope for legislative vehicle in late 2018/early 2019.
  - ✓Arizona legislation
    - Earliest is likely January 2019
  - ✓ Execute documents
    - Estimated at early 2019

❖ *FLUID SCHEDULE*

* Intrastate Demand Management Discussion
  - ✓Outreach / Coordination
    January 2018 - . . . ONGOING Iterative Process

THANK YOU

Questions?

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