Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
February 24-25, 2016

Agenda Item

Stakeholders' Perspective: The Upper Basin States (Colorado, New Mexico, Wyoming, and Utah)

Action Requested

Information item only; we will answer questions but no action is requested.

Presenter

Don Ostler, Executive Director and Secretary, Upper Colorado River Commission (AMWG and TWG alternate for Wyoming and New Mexico)

Previous Action Taken

N/A

Relevant Science

N/A

Summary of Presentation and Background Information

The States are the primary water right holders for waters of the Upper Colorado River Basin, and as such are the primary beneficiaries of the Colorado River Storage Project (CRSP) reservoirs including Lake Powell.

This presentation will include the upper basin states':

- interest in managing water and power generation within the upper basin, and specifically their interest in the operations of Glen Canyon Dam,
- perspective on the Glen Canyon Dam Adaptive Manager Program,
- role as water rights holders,
- interest in hydropower,
- compact obligations and tensions, and
- interests and activities in addressing environmental and other resource issues associated with the operation of this system.

AN UPPER BASIN STATE PERSPECTIVE

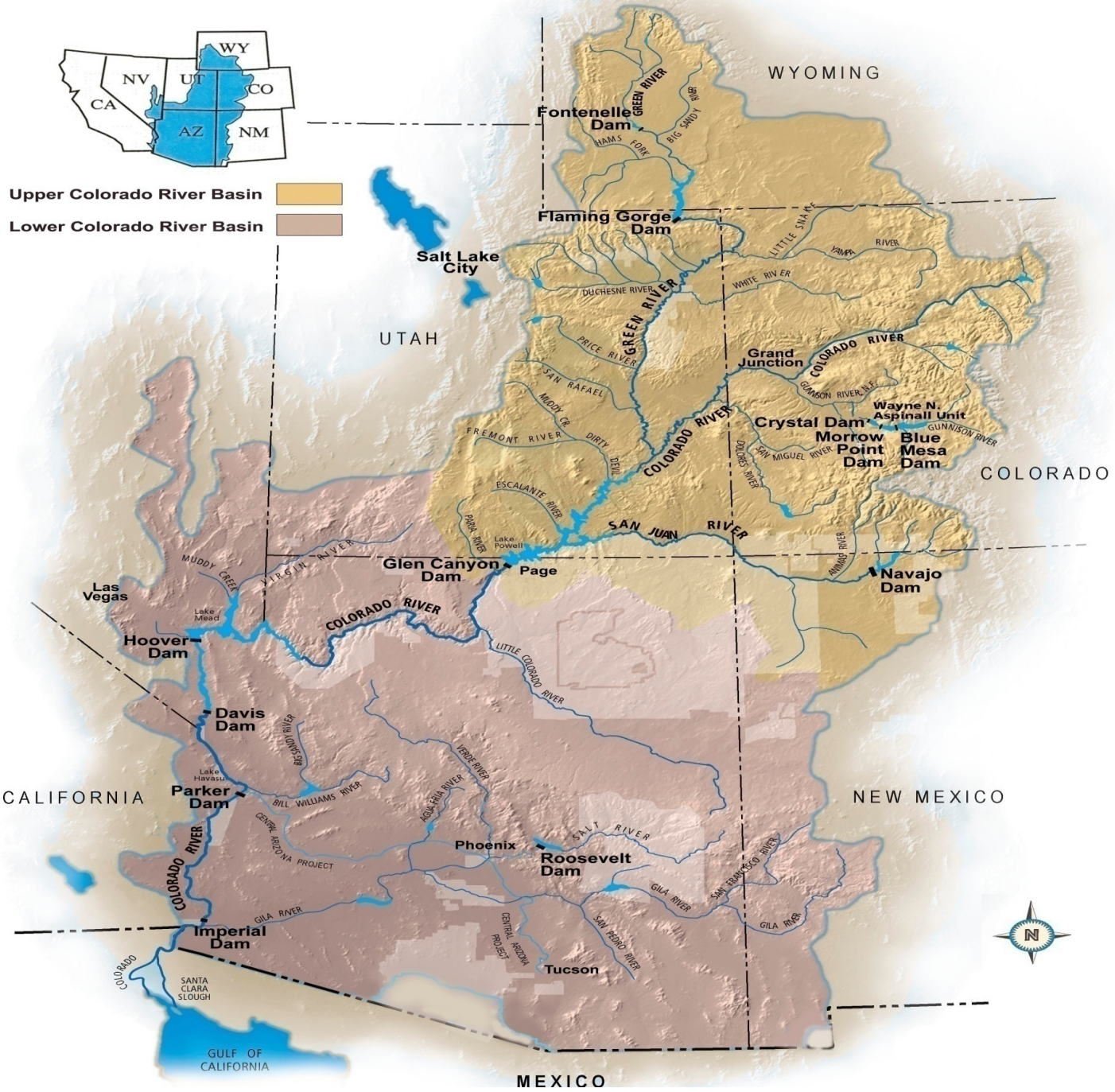
- Don Ostler
- Upper Colorado River Commission

- Adaptive Management Workgroup Stakeholder Presentation February 25, 2016

The Upper Colorado River Commission

- Interstate water administrative agency created in the 1948 Upper Basin Compact
- States of CO, UT, NM, WY & Federal Chair
- Responsibilities include
  - Studies, findings of water deliveries to LB, determine uses in UB, findings of extraordinary drought, determinations of shortage in UB etc

Colorado River Basin



States Are Unique Stakeholders

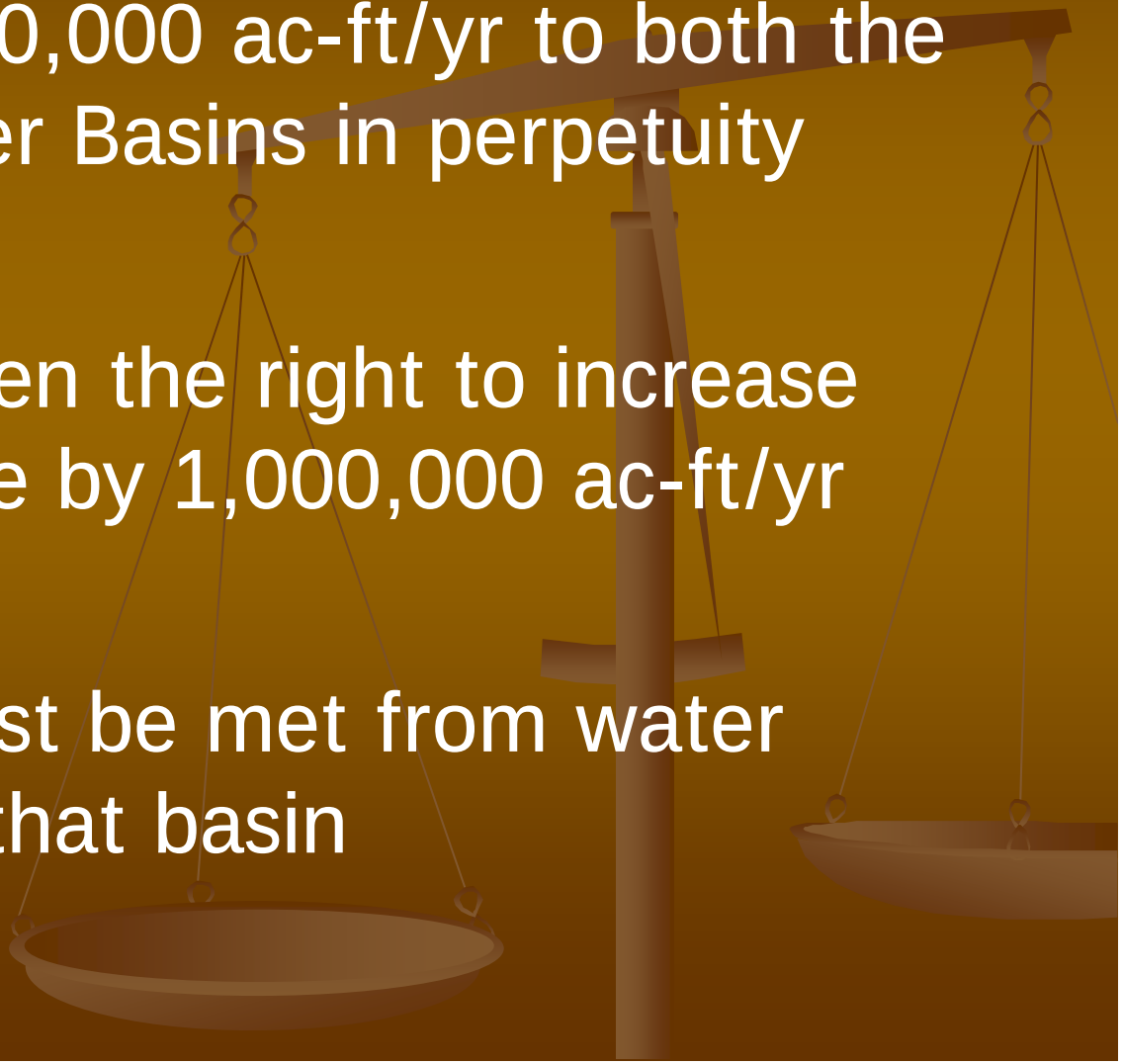
- Colorado River Water is apportioned to states to manage
- Represent many different stakeholders as a representative government – not a single issue group
- Regularly must balance competing stakeholder needs
- providing water to meet needs

THE LAW OF THE RIVER

- Colorado River Compact – Foundation
- 15 other major laws, compacts, treaties and court decrees
- Governs all aspects of administering the River
- International relations
- Quality issues
- Environmental issues

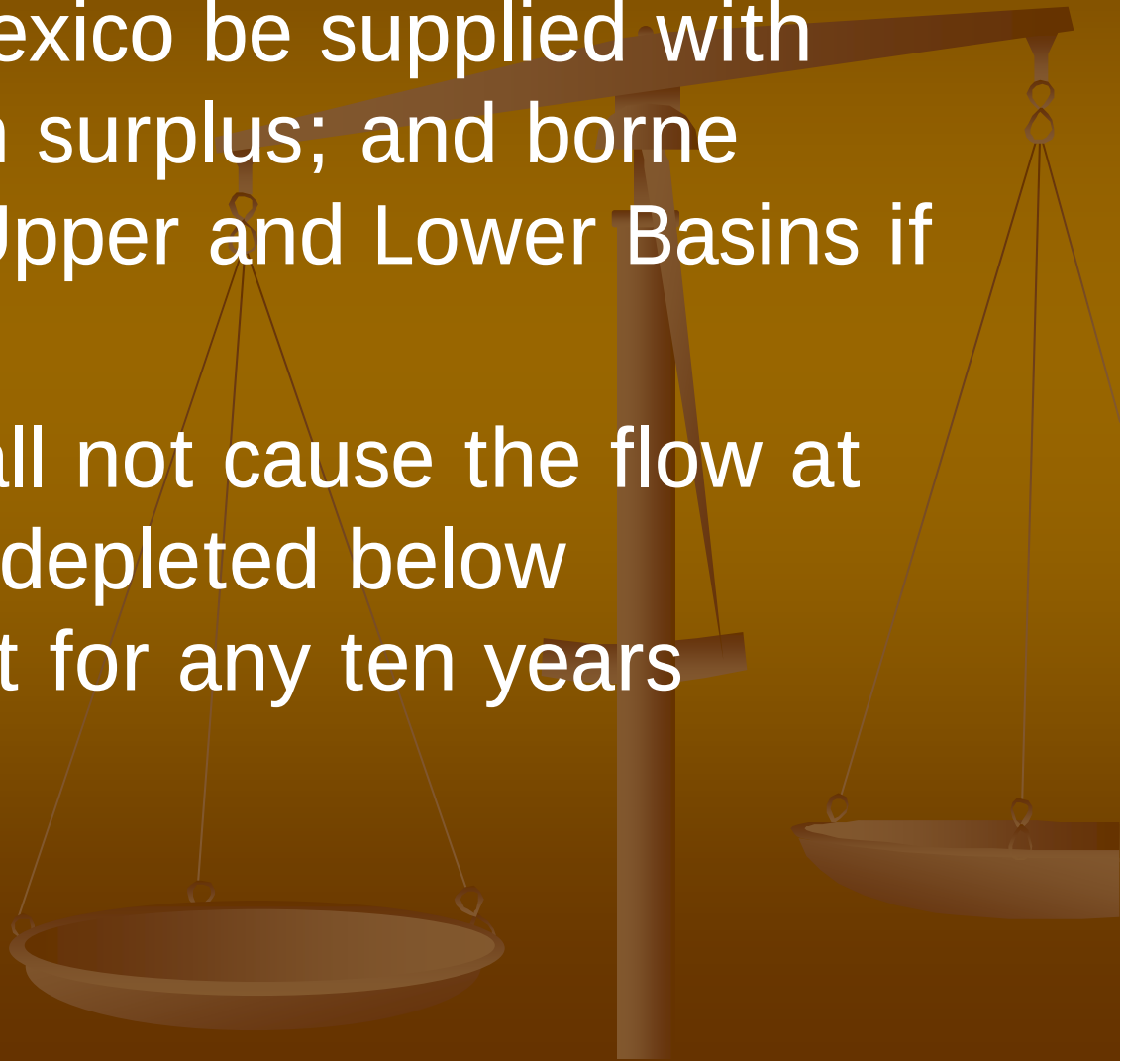
1922 Colorado River Compact

- Apportions 7,500,000 ac-ft/yr to both the Upper and Lower Basins in perpetuity
- Lower Basin given the right to increase consumptive use by 1,000,000 ac-ft/yr
- Basin needs must be met from water apportioned to that basin



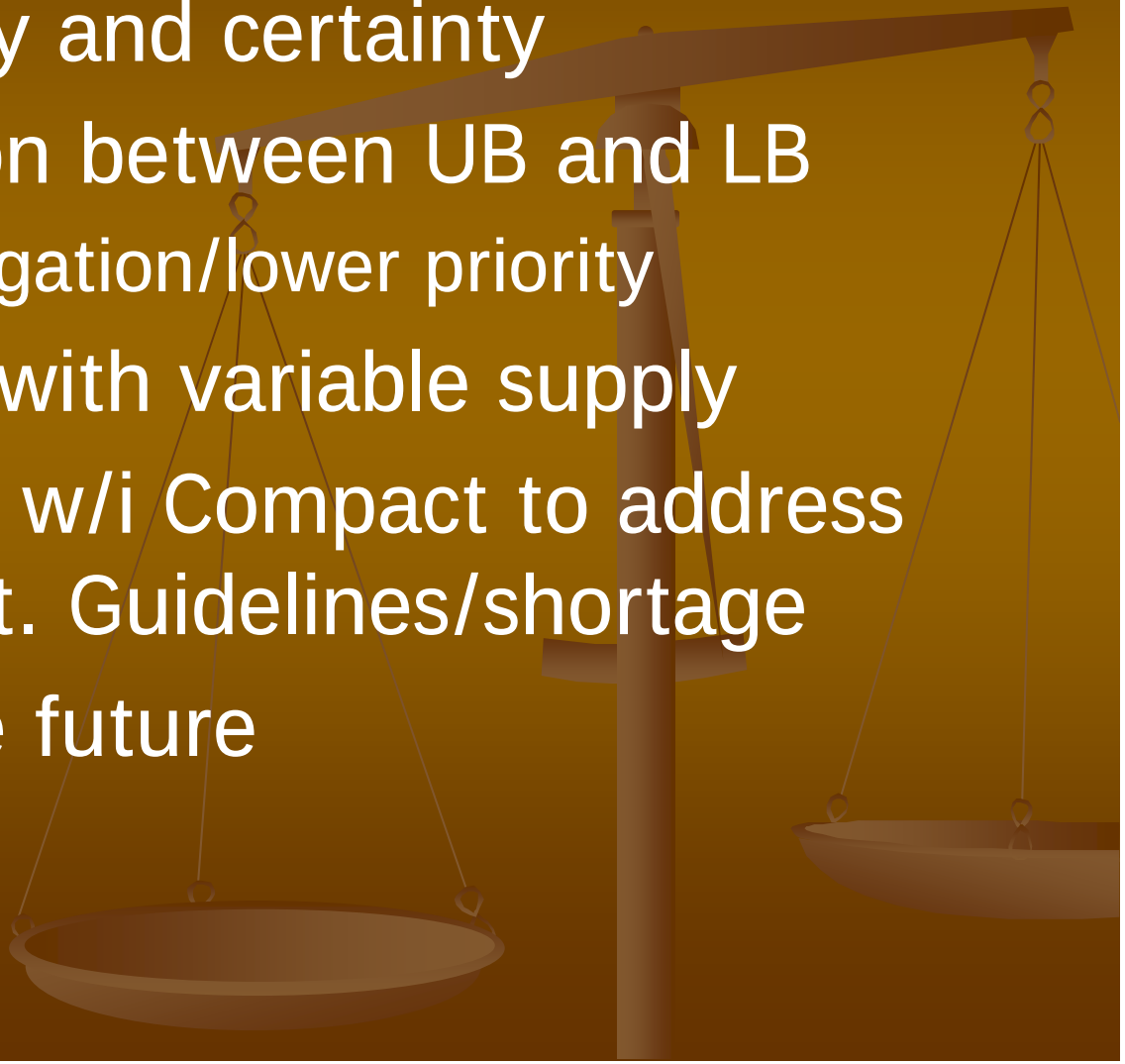
1922 Colorado River Compact

- Provides that Mexico be supplied with water, first from surplus; and borne equally by the Upper and Lower Basins if no surplus
- Upper Basin shall not cause the flow at Lee Ferry to be depleted below 75,000,000 ac-ft for any ten years



Colorado River Compact

- Provides stability and certainty
- Creates a tension between UB and LB
  - curtailment obligation/lower priority
- Process to deal with variable supply
- Allows flexibility w/i Compact to address new issues – Int. Guidelines/shortage
- Essential for the future



Law of the River Allocations

- **7.5 MAF to Upper Basin (%'s CO 51.75, UT 23, NM 11.25, WY 14)**[1]
- 7.5 MAF to Lower Basin (4.4 CA; 2.8 AZ; 0.3 NV)[2]
- **1.0 MAF additional to Lower Basin**[3]
  (*i.e.,* tributary development)
- **1.5 MAF to Mexico**[4]

17.5 MAF Total Allocated **'on paper'**

[1] 1922 Colorado River Compact, 1948 Upper Colorado River Compact
[2] Colorado River Compact, 1929 Black Canyon Project Act, 1964 AZ v. CA
[3] 1922 Colorado River Compact
[4] Treaty of 1944

Colorado River Manager

Working on the Colorado River

NOT SO FAST

- The River is over allocated
- Demand now equals or exceeds supply in some areas
- Balance UB new development with risk of shortage
- What might be the impacts of Climate change?
- How will shortages be shared with Mexico for the first time?
- How to insure compact compliance?

Colorado River Issues Cont.

- Concern about sustaining uses at Lake Mead
- How will future growth be accommodated
- What role will agriculture play as the supply imbalance persists
- Endangered species and environmental concerns
- How to preserve long term compact legal positions?

The real Colorado River Manager

Hydrology comparison

- 2000-2014 12.3 MAF @ LF
- 1988-2014 13.2 MAF @ LF
- Basin Study CC 13.7 MAF @ LF
- 1906-2014 GR 14.8 MAF @ LF
- 1120-1172 PH 12.7 MAF @ LF
- 1896-1921 16.8 maf @ LF

CC –climate change GR – gage period NF PH – paleo-hydrology

Data from Reclamation's Naturalized Flows database

Current Uses

- Upper Basin Uses 4 to 4.5 maf/yr
- Lower Basin Uses full compact amount

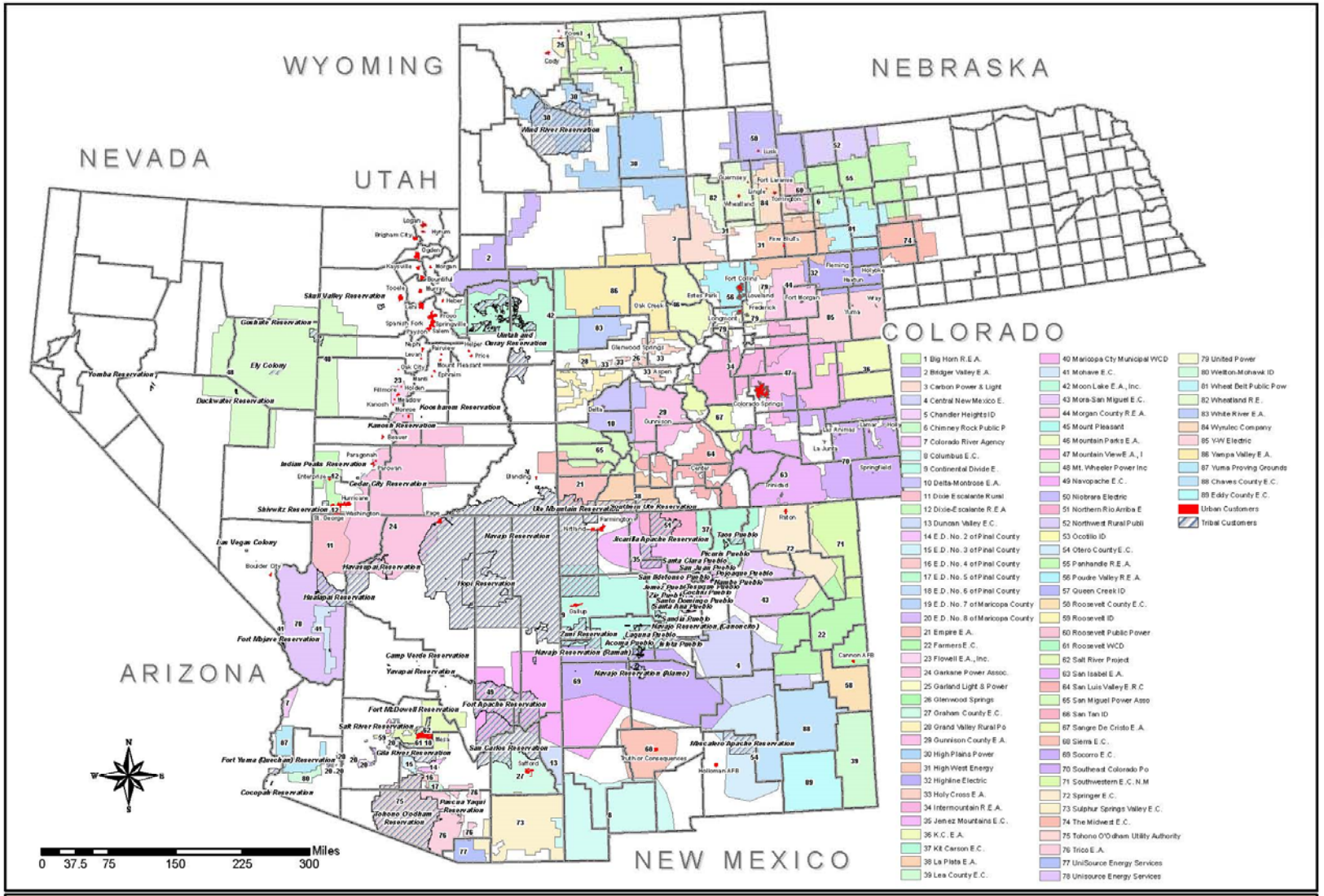
The Basin Fund is Important

Hydropower is an Authorized Purpose

- Operation, maintenance/replacement of CRSP Units
- Repay construction costs with interest to Congress
- Salinity investment and operations
- Cost share of salinity control - $2M/yr

The Basin Fund is Important

- Provides a major portion of GCDAMP $9.5 M/yr
- Cost Share of Upper Colorado and San Juan Recovery Implementation $7M/yr
- Portion of UB State Development Costs
- Lower Cost to Power Customers



Western Area Power Administration GIS

WAPA Service Territory

DISCLAIMER:
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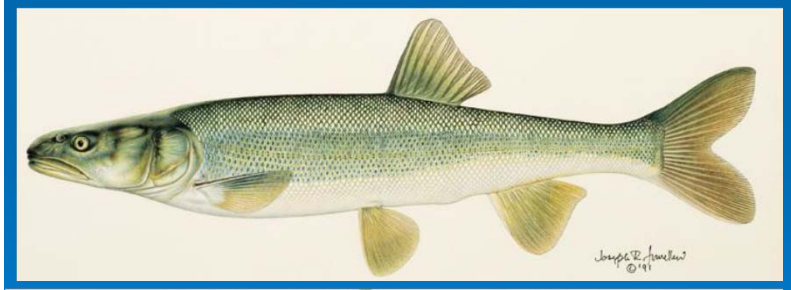
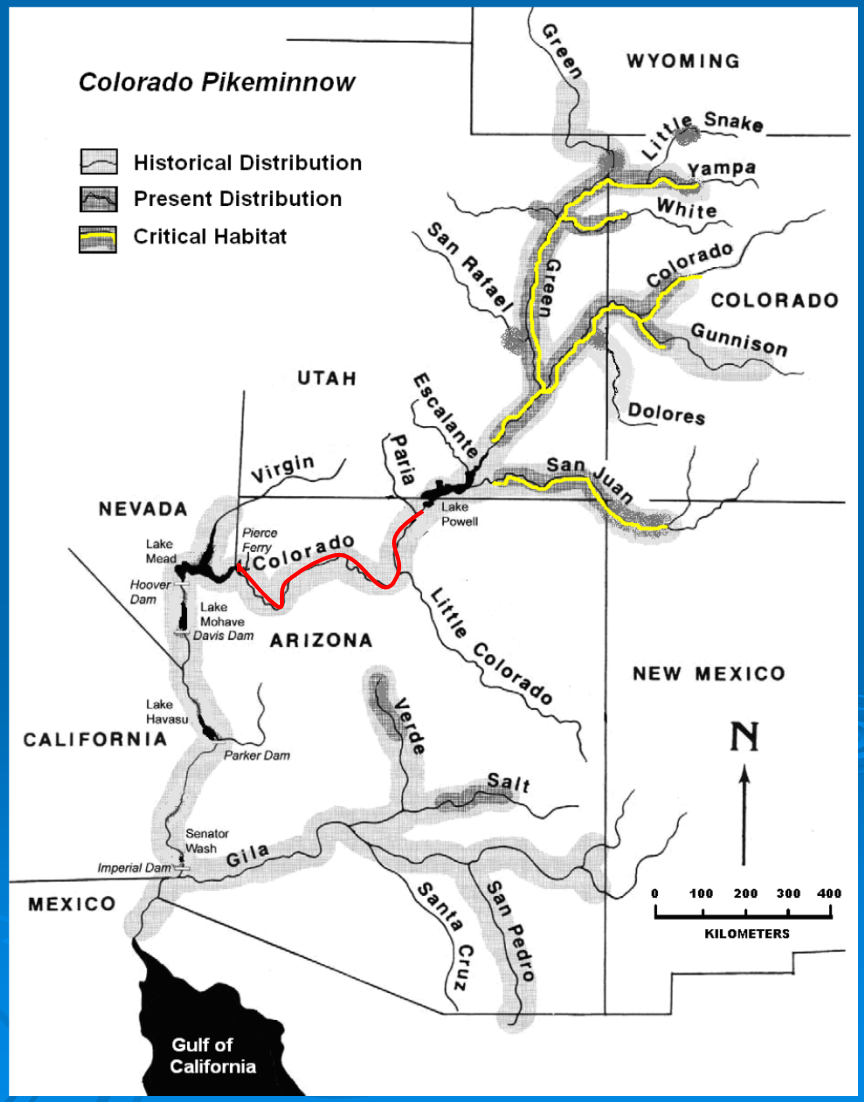
Unites States Deparment of Energy
Western Area Power Administration
Colorado River Storage Project

Environmental Issues Important to the Upper Basin States

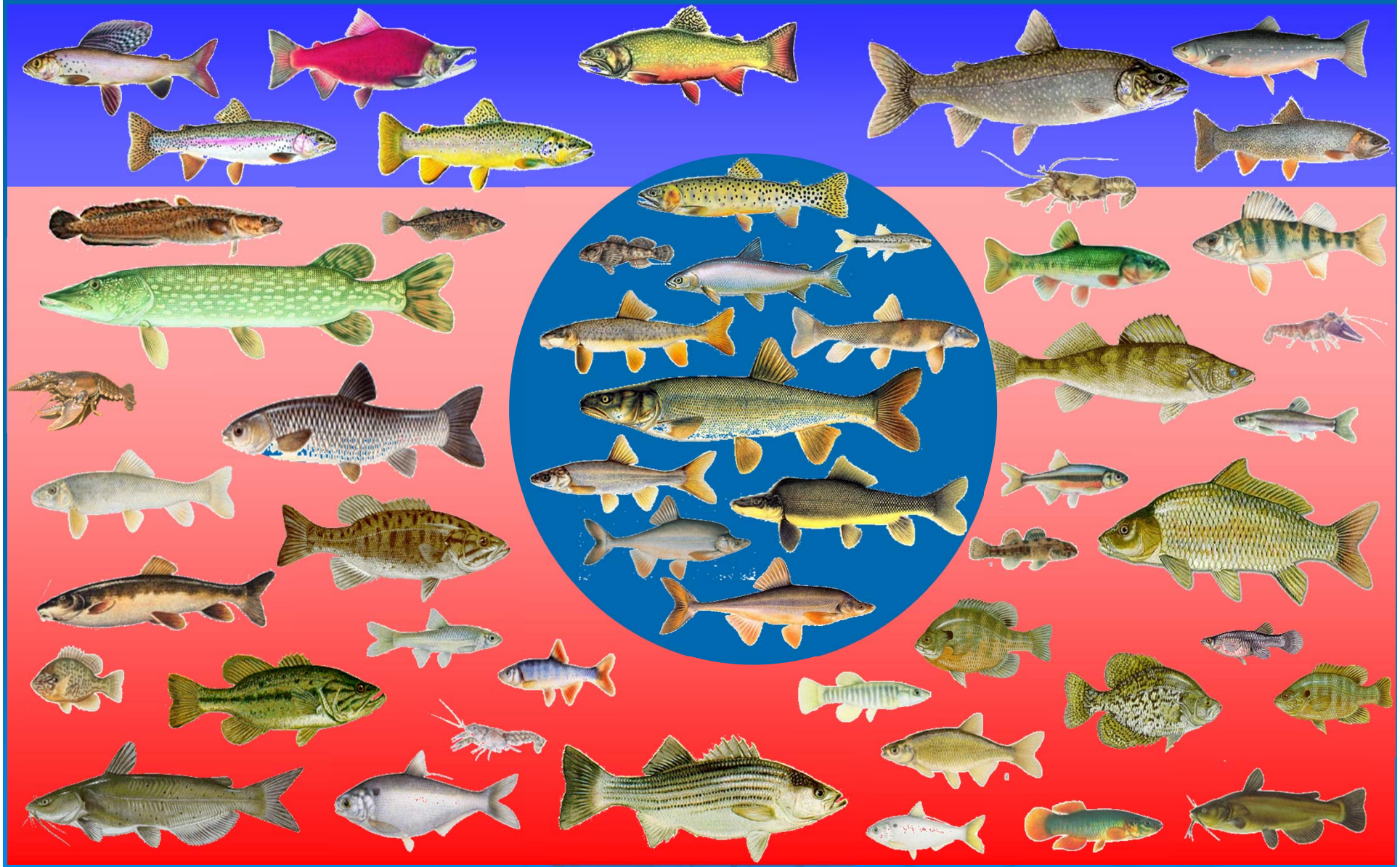
- Colorado River Recovery Implementation Program
- San Juan River Recovery Implementation Program
- Colorado River Salinity Control Program
- Glen Canyon Dam Adaptive Management Program
- Many Others

Environmental Resources – UCRIP/SJRIP/GCAMP





Major Threats: Invasive species



Expanding Nonnative Fish Populations

River	Presence of Invasive Species	
	1988	Today
Colorado		
Gunnison		
Green		
White		
Yampa		


www.gcmrc.gov
USGS

Colorado River Salinity Control Program

- Cooperative effort and funding of the federal government and the seven Colorado River Basin States.
- Controls salinity through irrigation improvements, vegetation management, and point source control.
- Combined efforts of the Program have resulted in the control of an estimated 1.3 million tons of salt per year.
- Funded with power revenues from the Colorado River Basin Fund.

Lake Mead in 2000

Lake Mead in Feb, 2011

119 foot bathtub ring

Drought Contingency Planning

The Basin States and the Bureau of Reclamation are planning for drought response to reduce risks associated with reaching critical reservoir elevations at Lake Powell and Lake Mead. These are low probability events, but with high consequences.

Drought Contingency Planning

- Colorado River Basin States
  - Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming
- Upper Colorado River Commission
- Department of the Interior
  - Bureau of Reclamation, National Park Service, Fish and Wildlife Service, Western Area Power Administration (WAPA)
- Major Water Providers
  - MWD, CAWCD, SNWA, DW (FRWC),CRCD, SWCD
- Others – water rights holders, NGOs, etc.

Lake Powell Storage

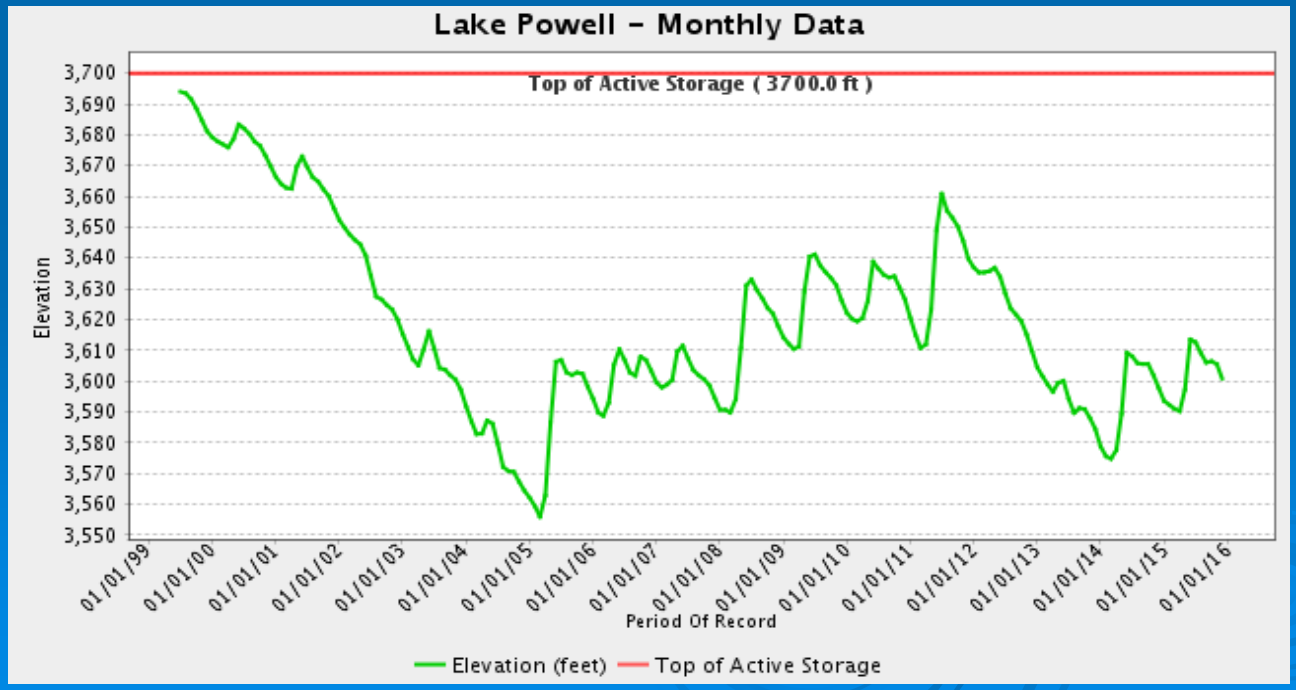
Inflows to Lake Powell

Percentage of 30-year average (1971-2000): 12.04 maf

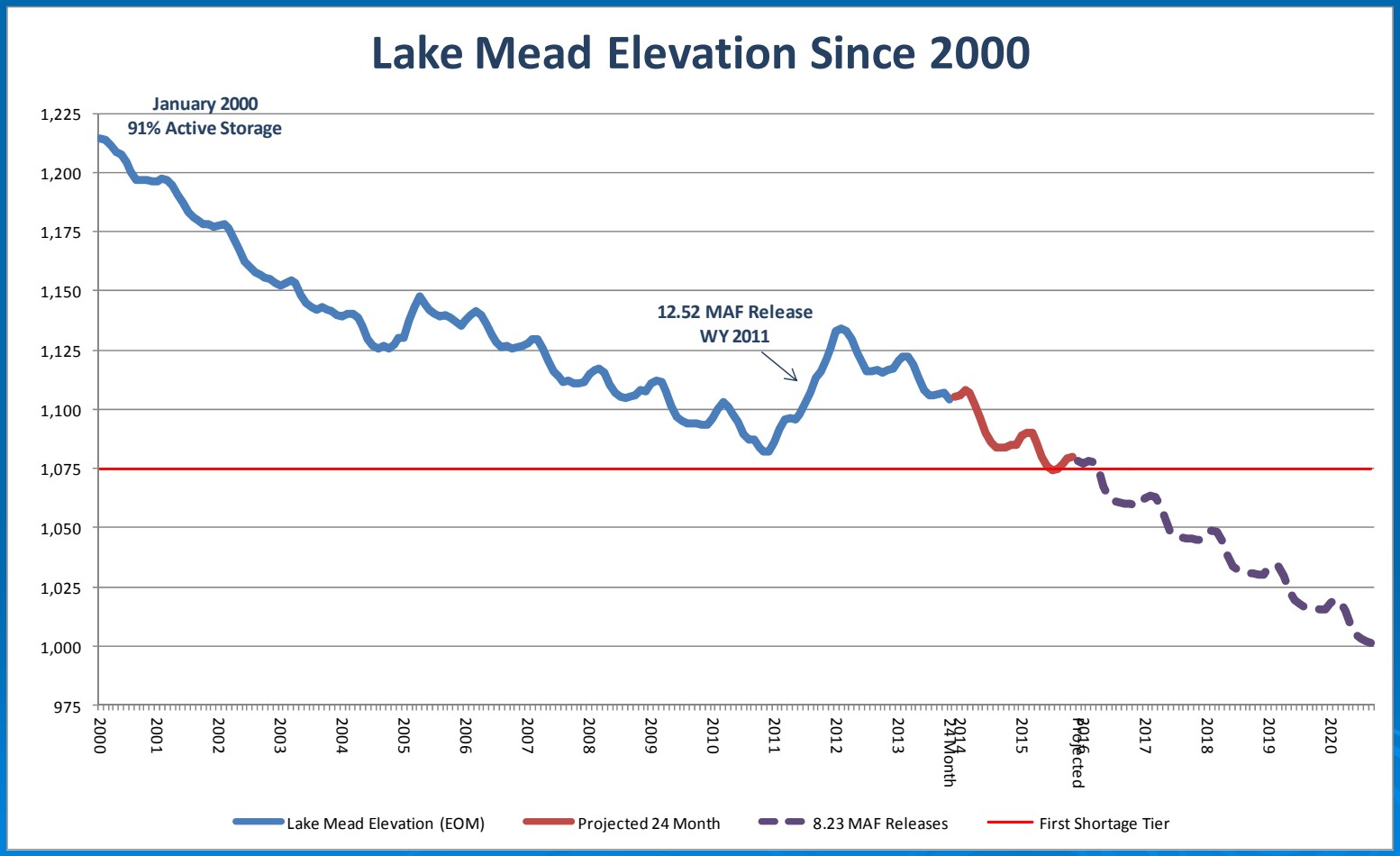
- 2000 – 7.32 maf (62%)
- 2001 – 6.96 maf (59%)
- 2002 – 3.06 maf (25%)
- 2003 – 6.36 maf (51%)
- 2004 – 6.13maf (49%)
- 2005 – 12.62 maf (105%)
- 2006 – 8.77 maf (71%)
- 2007 – 8.23 maf (68%)
- 2008 – 12.36 maf (102%)
- 2009 – 10.36 maf (92%)
- 2010 – 8.74 maf (73%)
- 2011 – 16.79 maf (142%)

(1981-2010: 10.83 maf)

- 2012 – 4.91 maf (45%)
- 2013 – 5.12 maf (47%)
- 2014 – 10.38 maf (96%)
- 2015 – 10.18 maf (94%)



Lake Mead Storage – Assuming Normal Releases



2007 Interim Guidelines

Lake Powell Operational Tiers (subject to April adjustments or mid-year review modifications)		
Lake Powell Elevation (feet)	**Lake Powell Operational Tier**	**Lake Powell Active Storage** (maf)
3,700		**24.32**
	Equalization Tier equalize, avoid spills or release 8.23 maf	
3,636 – 3,666		**15.54 – 19.29**
(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	(2008 – 2026)
3,575		**9.52**
	Mid-Elevation Release Tier release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	
3,525		**5.93**
	Lower Elevation Balancing Tier balance contents with a min/max release of 7.0 and 9.5 maf	
3,370		**0**

Upper Basin Drought Contingency Planning

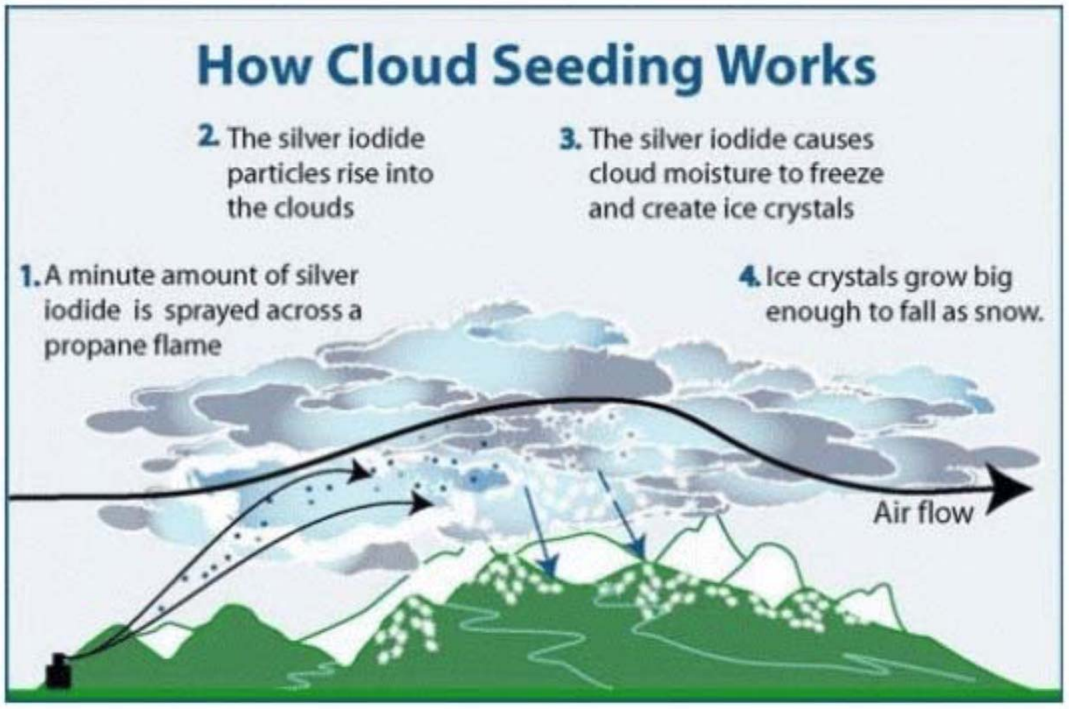
Goals

- Reduce or eliminate probability of Lake Powell reaching minimum power pool elevation (est. 3490 ft.) through 2026.
- Ensure the continued operation of the 2007 Interim Guidelines through 2026.
- Respect existing framework for administering use of Colorado River water in both the Upper Colorado River Basin and each Upper Division State.
- Combined with expected actions in Lower Basin, increase the synergistic benefits for Basin as a whole.

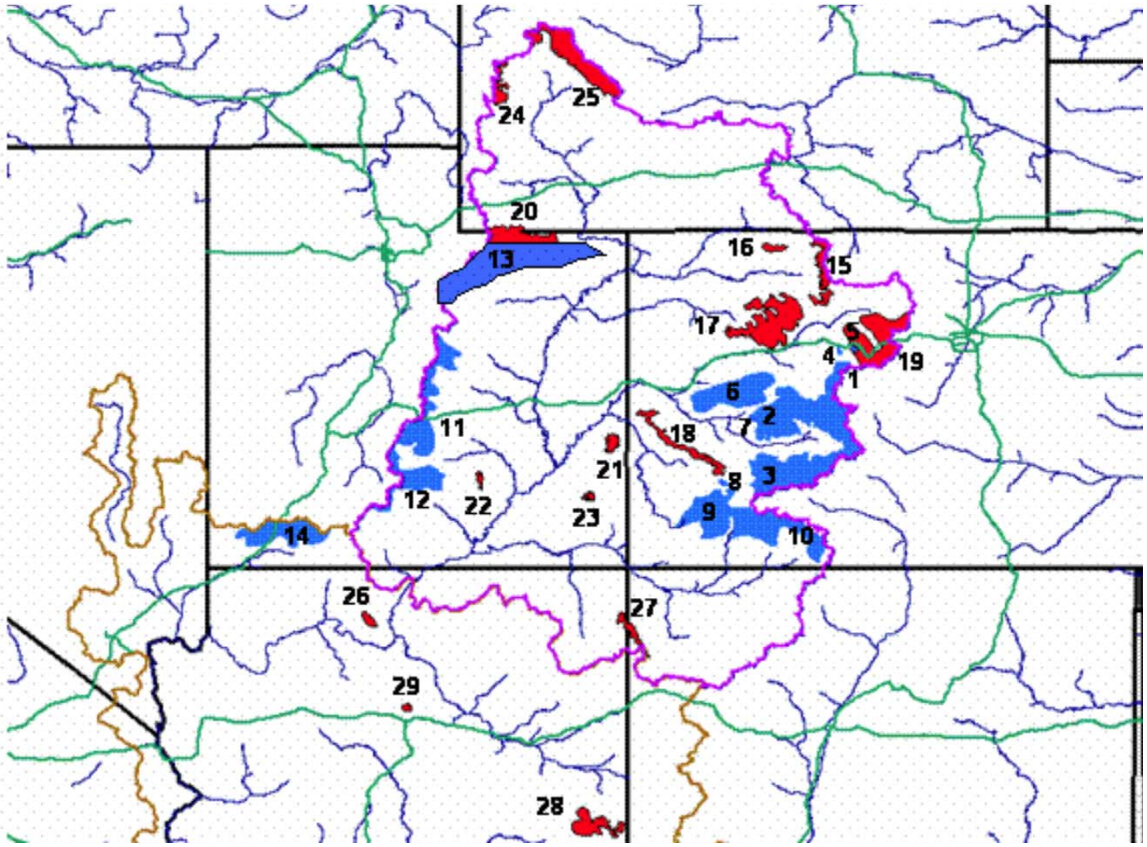
Upper Basin Plan - Elements

- Expand existing *weather modification programs*.
- *CRSP drought operations* (Aspinall, Flaming Gorge, Navajo and Glen Canyon Dam).
- Develop opportunities for *Upper Basin demand management*.
- Term – Consistent with *term for 2007 Interim Shortage Guidelines*.

WEATHER MODIFICATION



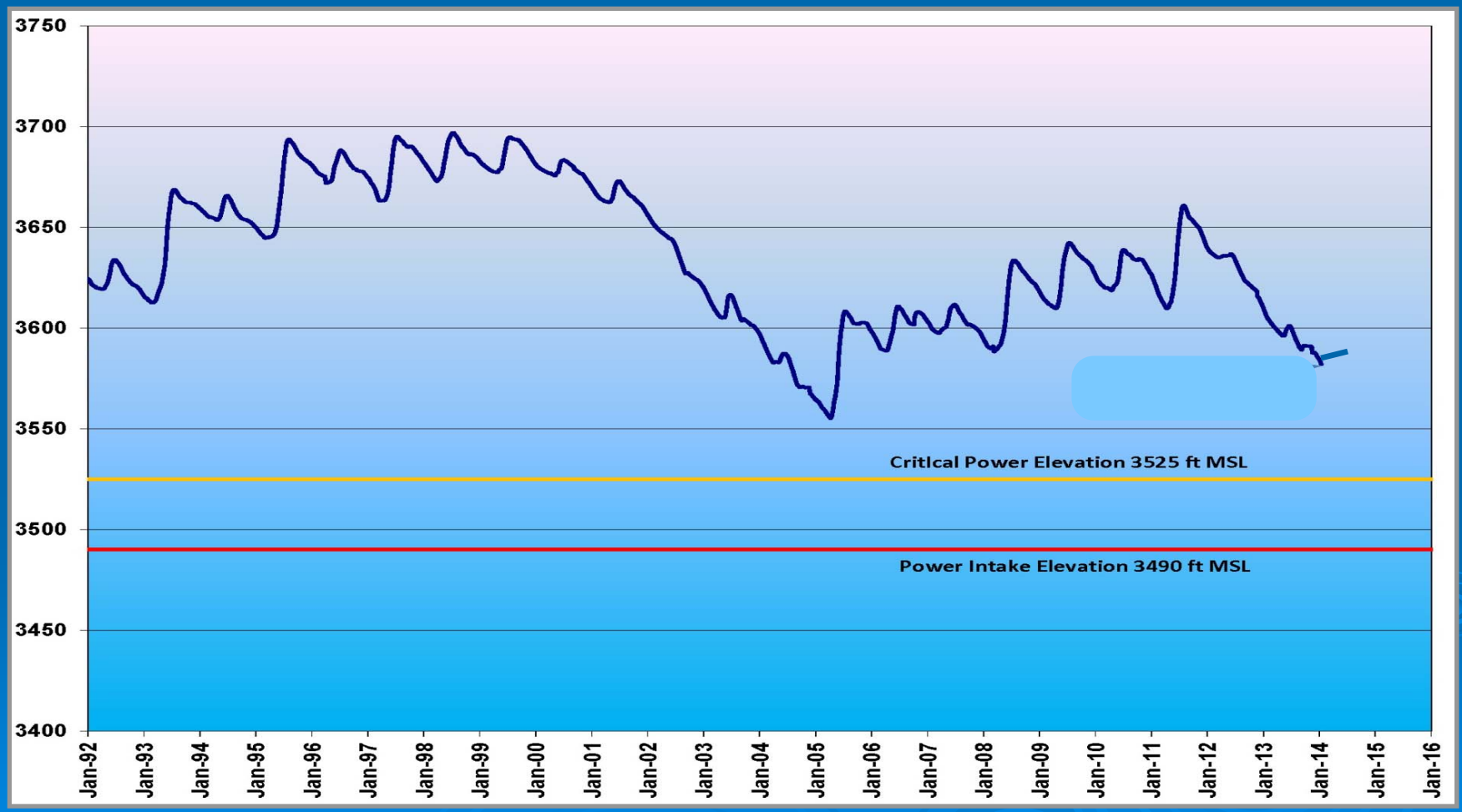
EXISTING AND POTENTIAL CLOUD SEEDING LOCATIONS



2006 UCRC Weather Mod Study

- Potential gain from optimized existing seeding operations – 550kaf
- Potential gain from new operations – 650kaf
- Very low cost – $10-$15/ac-ft

Critical Powell Elevations

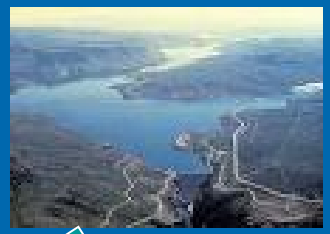


CRSP Drought Operations

Navajo Reservoir

Flaming Gorge Reservoir

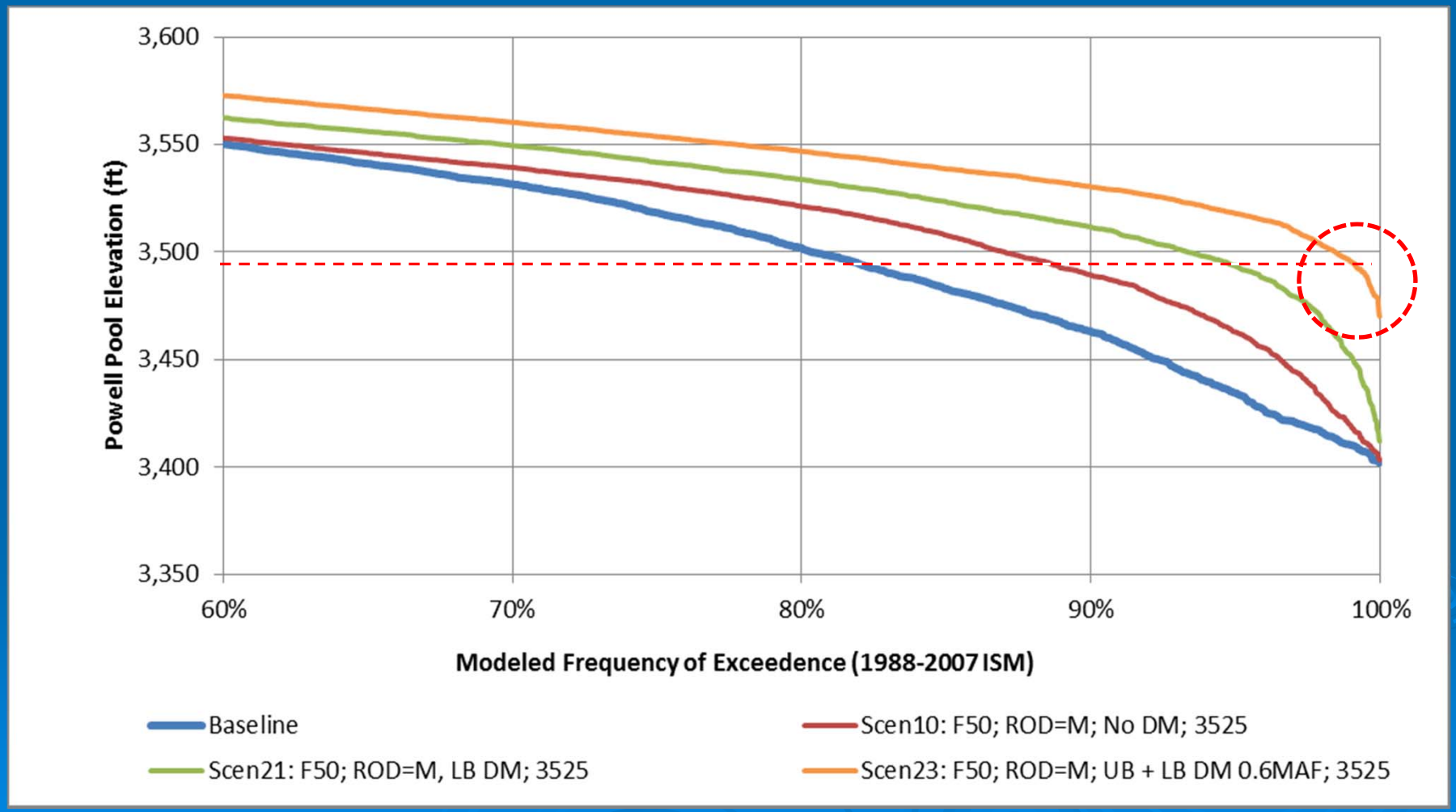
Blue Mesa Reservoir



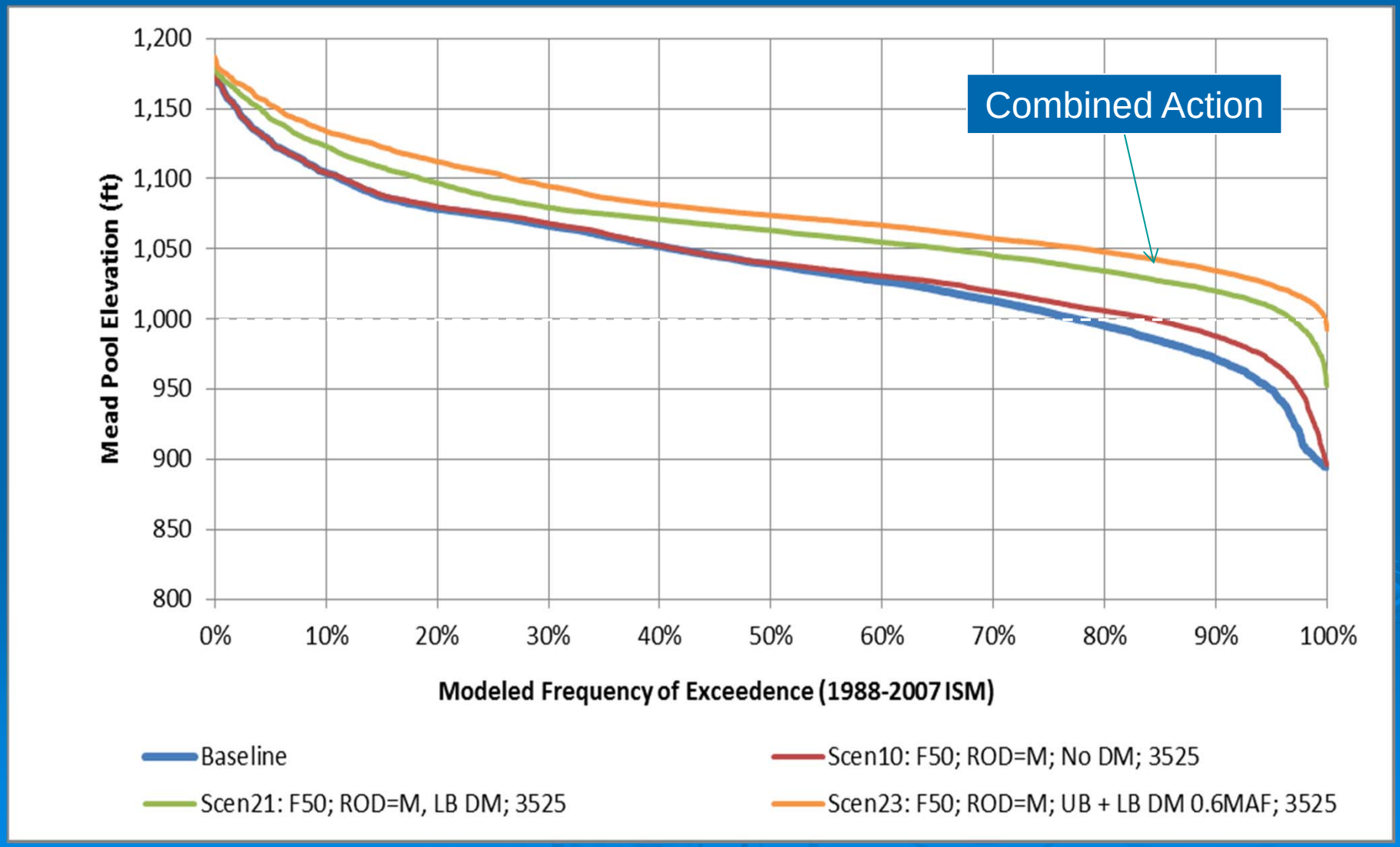
Lake Powell

- Agree on triggers and operations to implement under emergency conditions to maintain minimum power pool elevation at Lake Powell
- By conserving water (temporarily) in Lake Powell or moving water available from upper CRSP facilities.

Combined efforts bend the curve



Combinations of UB and LB DM, together with Extended Operations, gives the best results



CRSP Drought Operations Details

- Challenge
  - Identify flexibilities to release water and subsequently recover storage in a manner that:
    - Works within existing Records of Decisions and Biological Opinions for operating each CRSP reservoir.
    - Protects hydropower facilities.
    - Shares the benefits and burdens across the basin.
    - Helps attain contingency planning goals within appropriate timeframe.

Demand Management

- Evaluate alternatives to facilitate temporary, voluntary, and compensated reductions in consumptive use through willing seller/willing buyer arrangements

- Examples - temporary or rotational fallowing, municipal conservation, interruptible supply agreements, deficit irrigation of crop land, system efficiencies, conservation, etc.

Demand Management

- Challenge - Working within the prior appropriation system, and respecting way of life of water rights holders, to facilitate to voluntarily reductions in consumptive use on willing buyer/willing seller basis.

- Some of the questions - Feasibility, Accounting, Management and Administration, Interest, Shepherding.

- Evaluation Mechanisms - Currently include:
  - System Conservation Pilot Program
  - Water Bank Working Group

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