

# Getting Water to the Crops

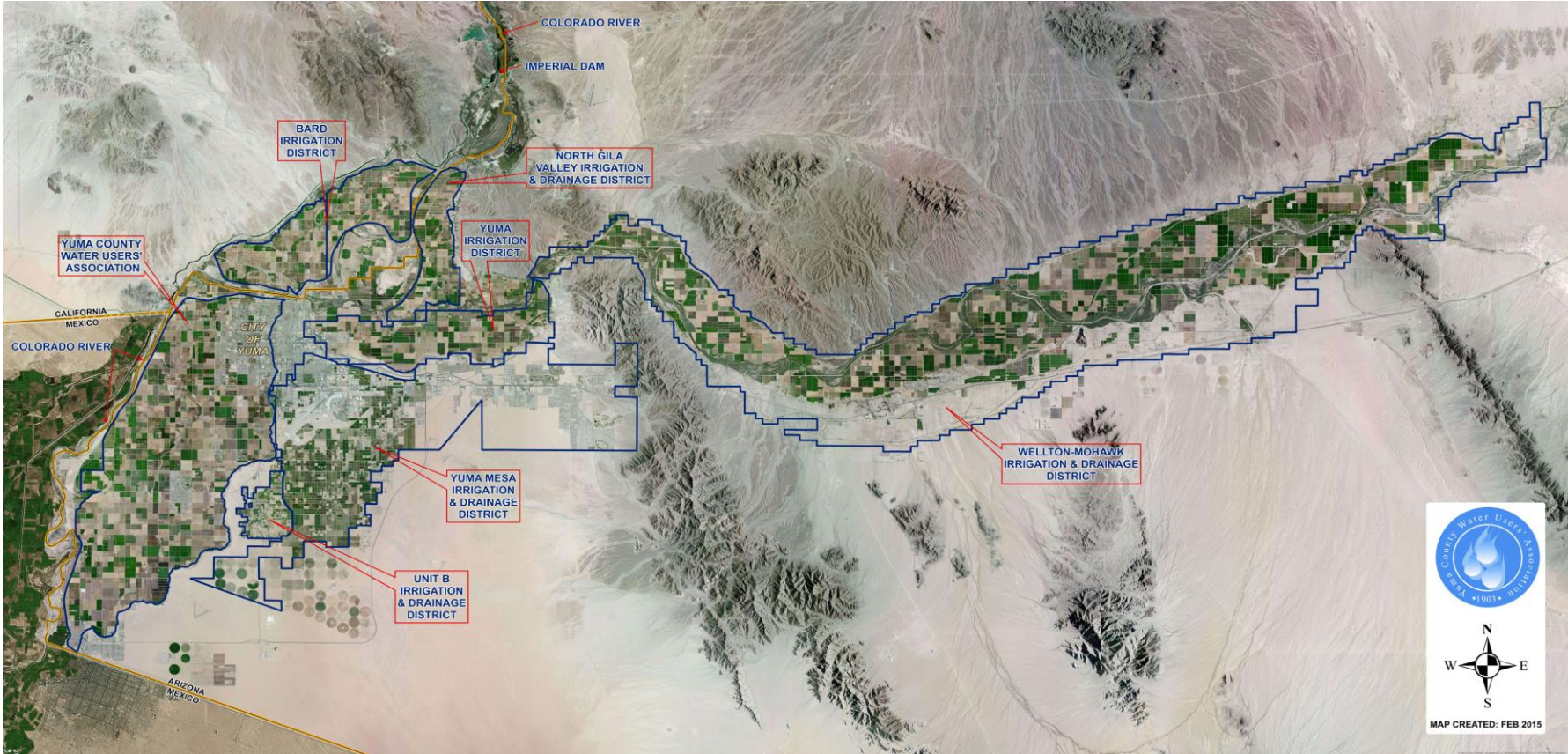
Little Drops of water

On little grains of sand

Sure do make a difference

In the price of land

# Yuma Area Colorado River Irrigation Districts

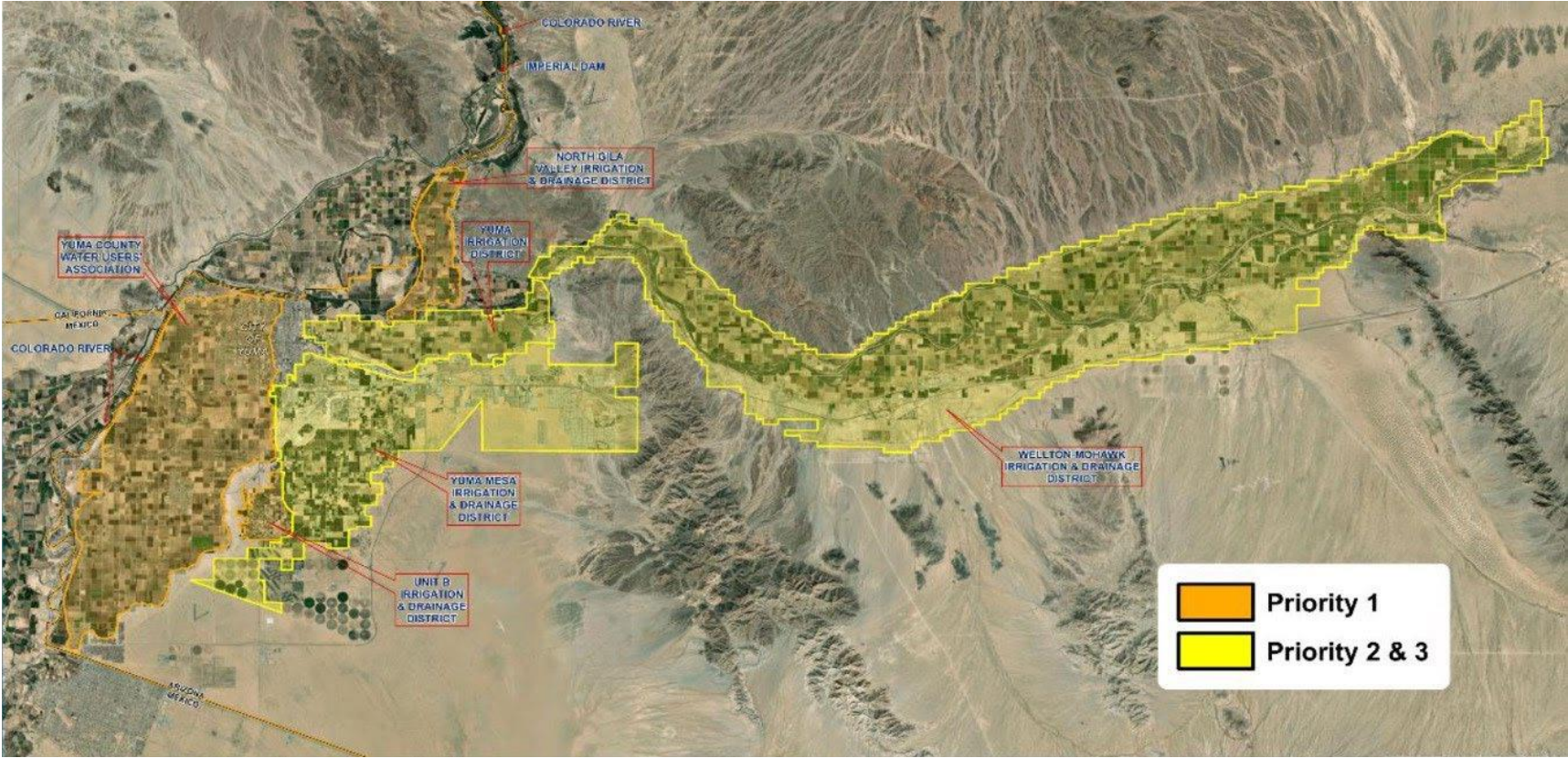


# A Few Basics About Wellton-Mohawk

- 62,744 contract acres, 55,971 currently farmed.
- 278,000 AF Consumptive Use Entitlement.
- Major Crops (2022):
  - Lettuce 24,000 acres
  - Alfalfa 13,000 acres
  - Wheat 12,000 acres
  - Summer Sudan 9,000 acres
  - Greens 8,000 acres
  - Other Vegetables 7,000 acres
  - Row Crops 6,000 acres
  - Grass 5,000 acres
  - Melons 4,000 acres
  - Seed Crops 1,200 Acres
  - 5 Rivers Cattle



# Yuma Area Colorado River Irrigation Districts



# **A Case Study in Efficiency – Agriculture and Water Use in the Yuma, Arizona Area**

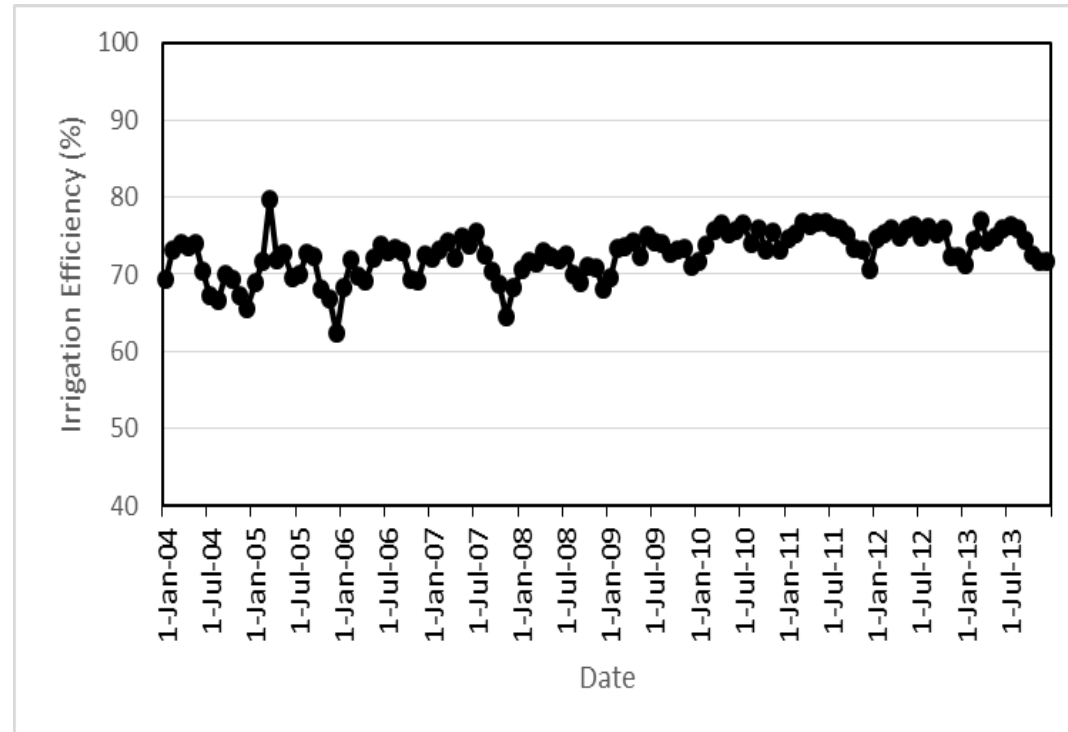
May 15, 2015

This case study is available online at  
[www.agwateryuma.com](http://www.agwateryuma.com)

## Case Study in Efficiency – Agriculture and Water Use in the Yuma, Arizona Area

An analysis performed for the Wellton-Mohawk Irrigation and Drainage District (WMIDD) indicates district-wide irrigation efficiencies have increased in recent years and approach 75 percent.

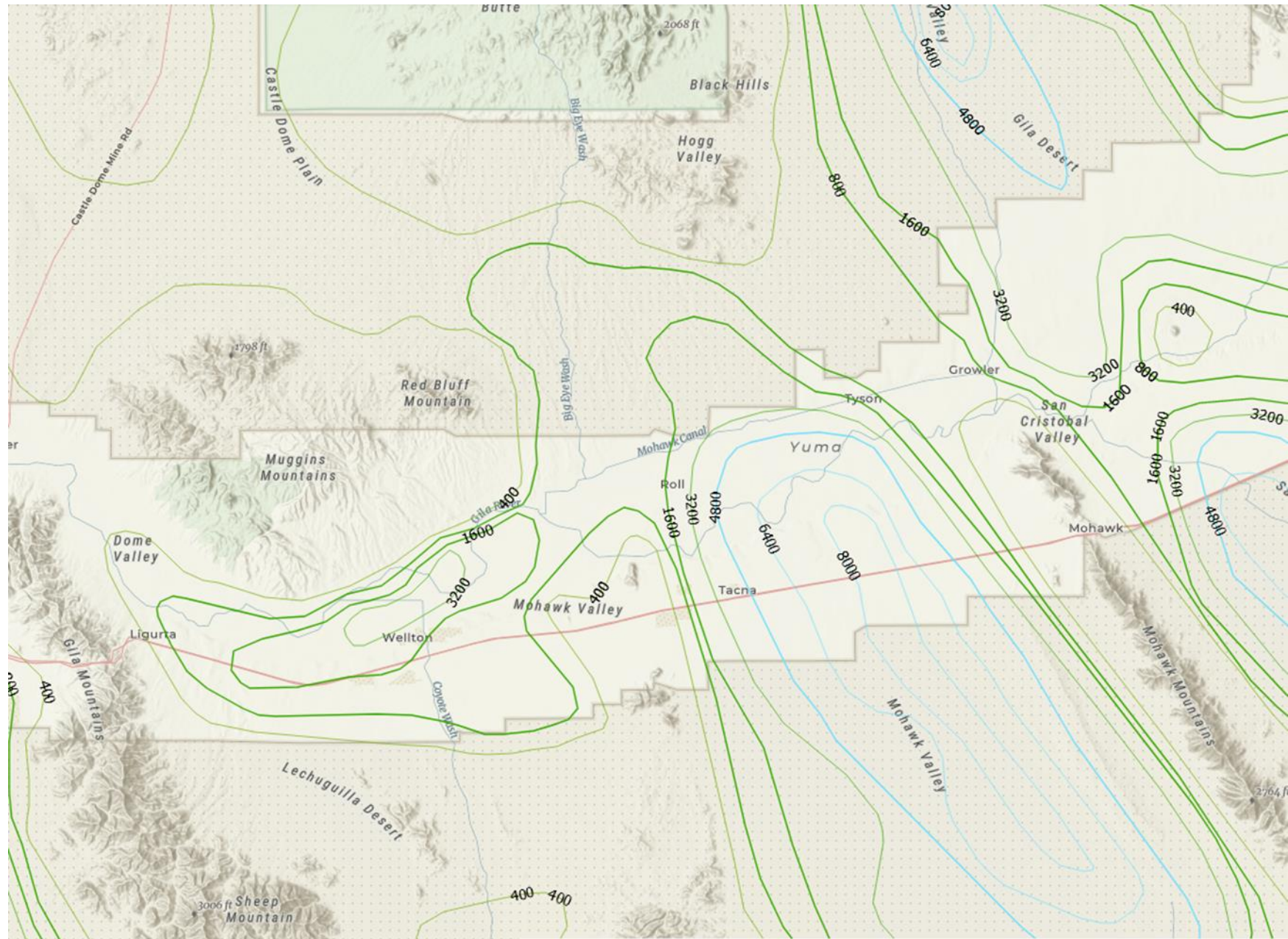
Such efficiency levels are quite high, given that leaching fractions approaching 15 percent are required to maintain soil salinity at optimal levels for vegetable production.



# Wellton-Mohawk Drought Management

- Continue efficient irrigation and water use practices.
- 2022 – implemented irrigation water use restrictions.
- 1.b. proposal in response to USBR 10/13/2022 RFP
- Continue to engage with other Arizona parties regarding Arizona's position in Basin States discussions.
- Groundwater investigations.







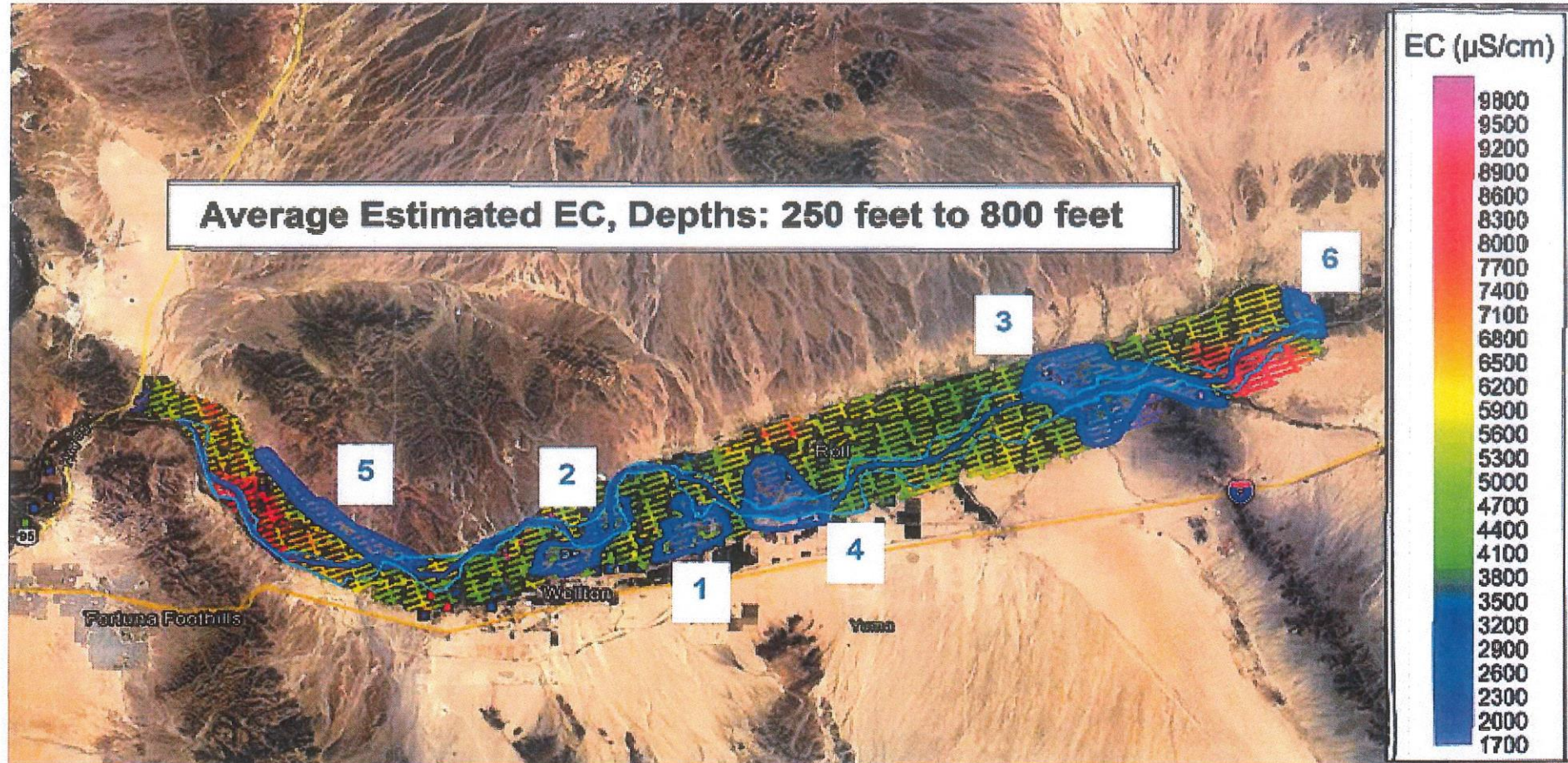


Figure 75. Wellton-Mohawk Valley: deep depth-averaged estimated EC (all values) with six polygons defining main areas of low EC estimates. Polygons 1 through 6 have areas of 2,200; 2,700; 7,300; 3,400; 2,800; and 900 acres, respectively.



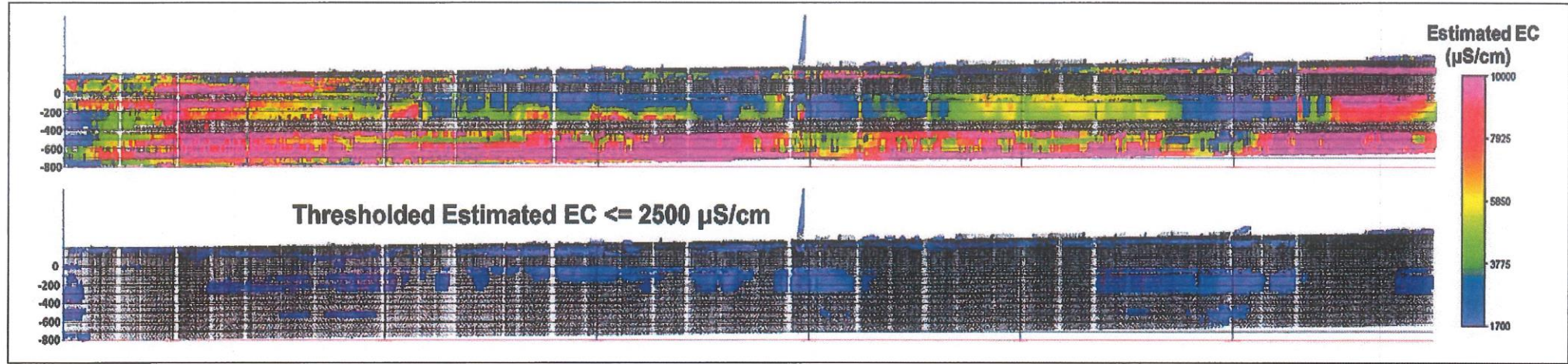


Figure 73. Wellton-Mohawk Valley: plot of all estimated EC values (top plot) and with threshold applied to only show subsurface volumes of estimated EC  $\leq 2,500$   $\mu\text{S}/\text{cm}$  (bottom plot). Distances are in meters (UTM, NAD83, Z11) and the vertical axis is in feet above MSL.

# *Colorado River Water Conservation Efforts in Arizona*

## *(Part 2) The Colorado River: A Statewide Perspective*



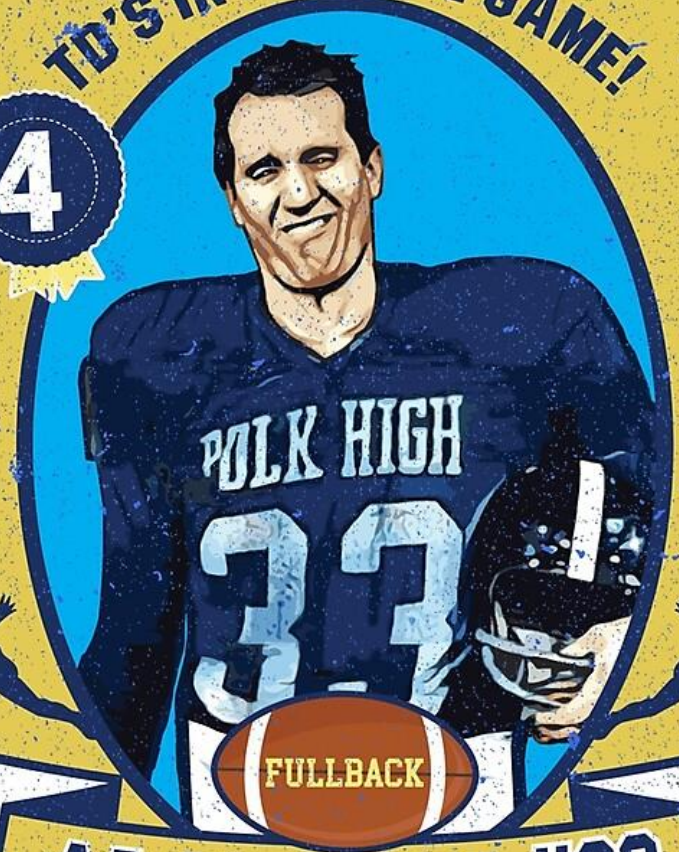
*Thomas Buschatzke, Director  
Arizona Department of Water Resources*

*January 18, 2023*



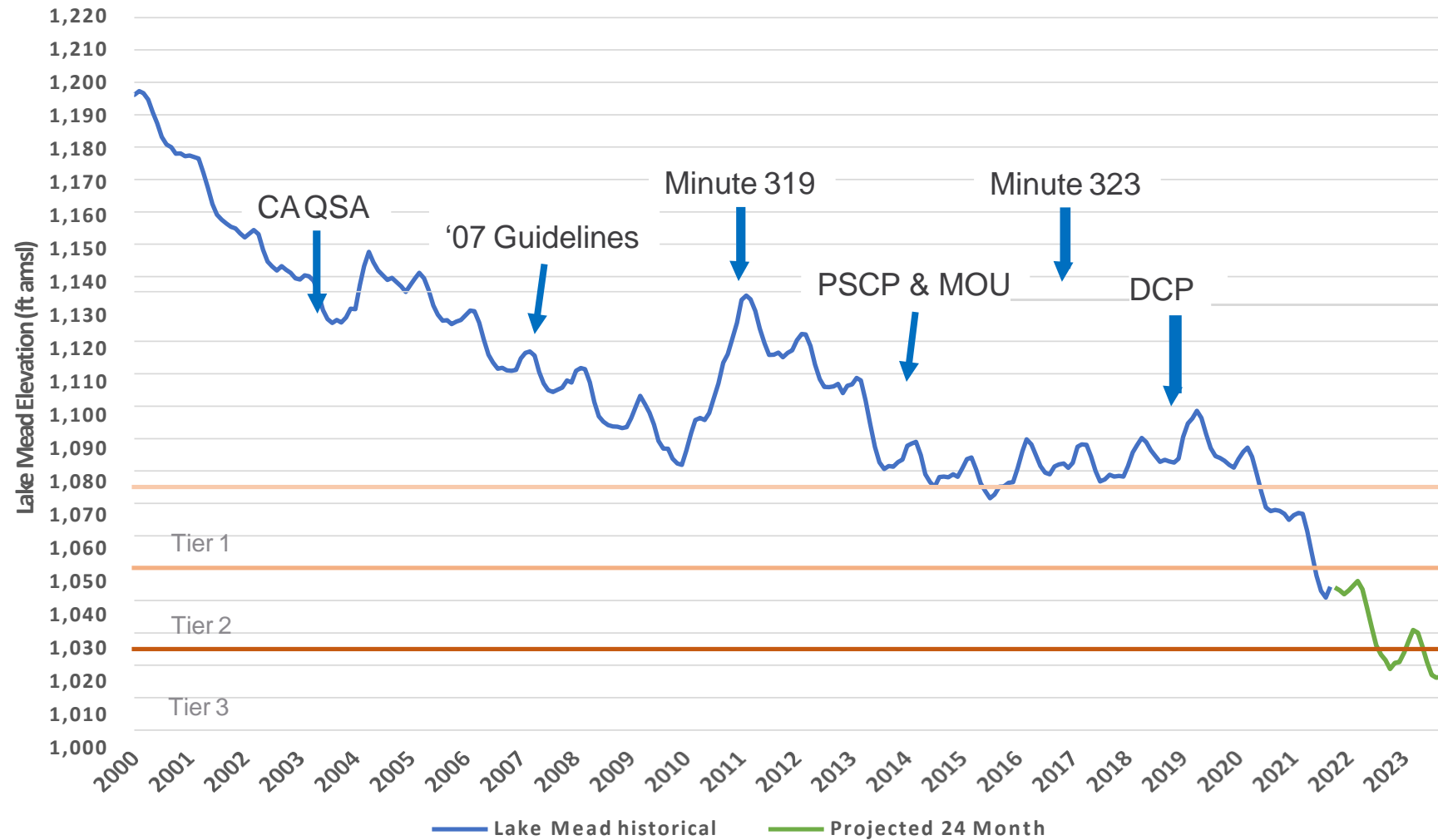
TD'S IN A SINGLE GAME!

4



**AL BUNDY #33**  
**POLK HIGH**

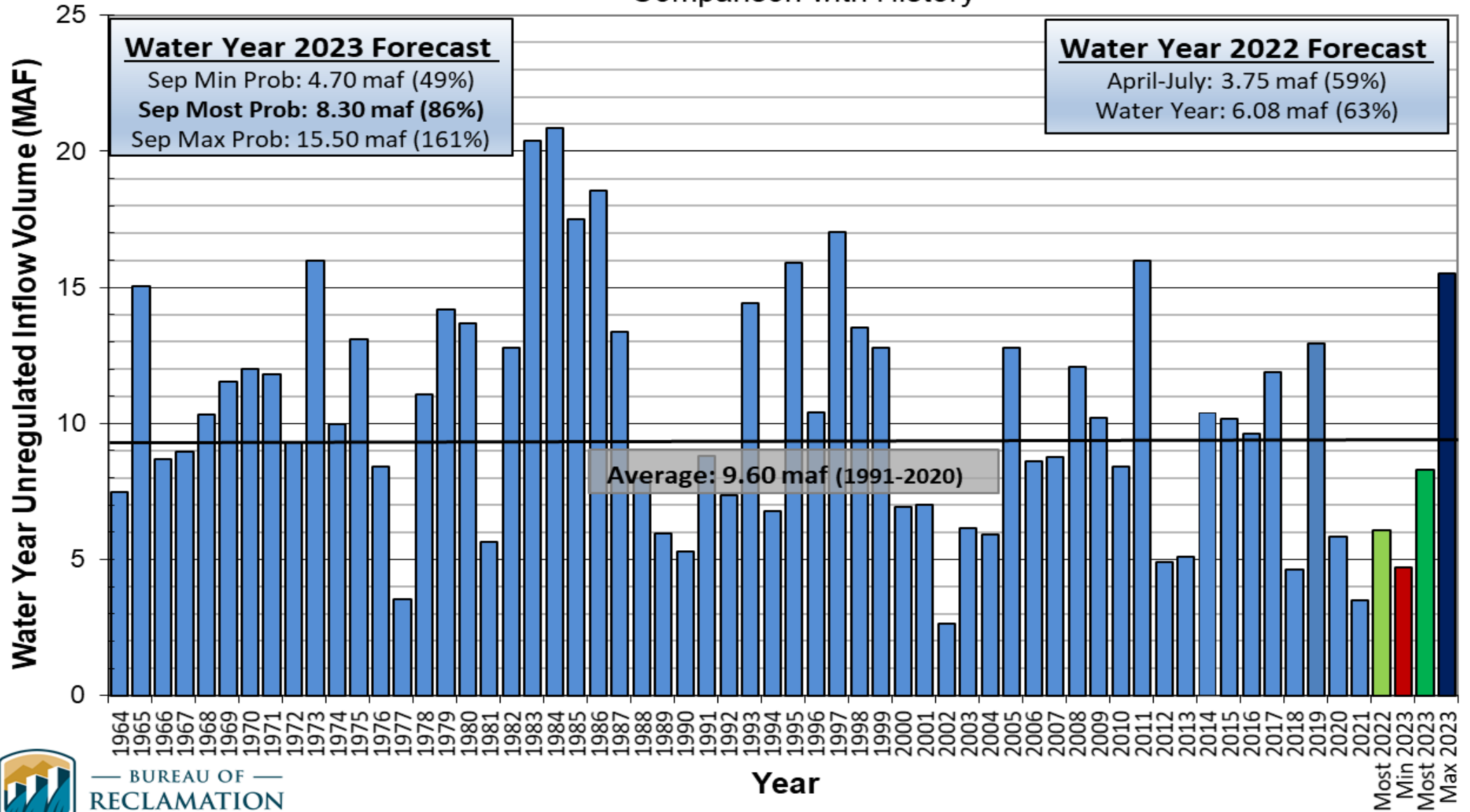
**Lake Mead Elevation**  
 (EOM Jan 2000 - Aug 2022 and Projected 24 Months)



# Lake Powell Unregulated Inflow

## Water Year 2022 and 2023 Forecast *(issued September 1)*

### Comparison with History



BUREAU OF  
RECLAMATION





# Supplemental Environmental Impact Statement (SEIS)

On November 17<sup>th</sup>, 2022 Reclamation published a Federal Register Notice (FRN) proposing to prepare a Supplemental Environmental Impact Statement (SEIS). The Supplement is to the December 2007 Record of Decision entitled “Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead” (2007 Interim Guidelines). Specifically, Section 2 (Lake Mead Operations) and Section 6 (Coordinated Operation of Lake Powell and Lake Mead) may be revised.

Reclamation anticipates revising Section 2.D (“Shortage Conditions”), including potential modifications to Sections 2.D.1.b and 2.D.1.c to decrease the quantity of water apportioned for consumptive use in the Lower Division States (Arizona, California, and Nevada). Reclamation anticipates revising Sections 6.C (“Mid-Elevation Release Tier”) and 6.D (“Lower Elevation Balancing Tier”) to modify and/or reduce the quantity of water released from Glen Canyon Dam (below 7.0 MAF annually). Any revisions would be effective for the 2024 water year.

# Lake Powell & Lake Mead Operational Table

## Lake Mead Operating Condition Determination for CY2023<sup>1,2</sup>

Lake Powell			Lake Mead		
Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) <sup>1</sup>	Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) <sup>1</sup>
3,700	<b>Equalization Tier</b> Equalize, avoid spills or release 8.23 maf	24.3	1,220	<b>Flood Control Surplus or Quantified Surplus Condition</b> Deliver > 7.5 maf	25.9
3,636 - 3,666 (2008-2026)	<b>Upper Elevation Balancing Tier<sup>3</sup></b> Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	15.5 - 19.3 (2008-2026)	1,200 (approx.) <sup>2</sup>	<b>Domestic Surplus or ICS Surplus Condition</b> Deliver > 7.5 maf	22.9 (approx.) <sup>2</sup>
			1,145	<b>Normal or ICS Surplus Condition</b> Deliver ≥ 7.5 maf	15.9
3,575	<b>Mid-Elevation Release Tier</b> Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5	1,105		11.9
3,525			1,075	9.4	
3,490	<b>Lower Elevation Balancing Tier</b> Balance contents with a min/max release of 7.0 and 9.5 maf	5.9	1,050	<b>Shortage Condition</b> Deliver 7.167 <sup>4</sup> maf	7.5
			1,025	<b>Shortage Condition</b> Deliver 7.083 <sup>5</sup> maf	5.8
3,490		4.0	1,000	<b>Shortage Condition</b> Deliver 7.0 <sup>6</sup> maf Further measures may be undertaken <sup>7</sup>	4.3
3,370		0	895		0

**1,047.61 ft  
Jan 1, 2023  
Projection**

Diagram not to scale

<sup>1</sup> Acronym for million acre-feet

<sup>2</sup> This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.

<sup>3</sup> Subject to April adjustments which may result in a release according to the Equalization Tier

<sup>4</sup> Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

<sup>5</sup> Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

<sup>6</sup> Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

<sup>7</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.



<sup>1</sup> Lake Powell and Lake Mead operational tier determinations are based on August 2022 24-Month Study projections and will be documented in the draft 2023 AOP.

<sup>2</sup> The operating determination for CY 2023 is based on a projected elevation "as if" the 0.48 maf were delivered to Lake Mead with a Glen Canyon Dam release pattern of 7.00 maf in WY 2023.

# 2007 Interim Guidelines, Minute 323, Lower Basin Drought Contingency Plan, and Binational Water Scarcity Contingency Plan

## Total Volumes (kaf)

Lake Mead Elevation (feet msl)	2007 Interim Guidelines Shortages		Minute 323 Delivery Reductions	Total Combined Reductions	DCP Water Savings Contributions			Binational Water Scarcity Contingency Plan Savings	Combined Volumes by Country <i>US: (2007 Interim Guidelines Shortages + DCP Contributions)</i> <i>Mexico: (Minute 323 Delivery Reductions + Binational Water Scarcity Contingency Plan Savings)</i>					Total Combined Volumes
	AZ	NV	Mexico	<b>Lower Basin States + Mexico</b>	AZ	NV	CA	Mexico	AZ Total	NV Total	CA Total	Lower Basin States Total	Mexico Total	<b>Lower Basin States + Mexico</b>
1,090 - 1,075	0	0	0	<b>0</b>	192	8	0	41	192	8	0	200	41	<b>241</b>
1,075 - 1050	320	13	50	<b>383</b>	192	8	0	30	512	21	0	533	80	<b>613</b>
1,050 - 1,045	400	17	70	<b>487</b>	192	8	0	34	592	25	0	617	104	<b>721</b>
1,045 - 1,040	400	17	70	<b>487</b>	240	10	200	76	640	27	200	867	146	<b>1,013</b>
1,040 - 1,035	400	17	70	<b>487</b>	240	10	250	84	640	27	250	917	154	<b>1,071</b>
1,035 - 1,030	400	17	70	<b>487</b>	240	10	300	92	640	27	300	967	162	<b>1,129</b>
1,030 - 1,025	400	17	70	<b>487</b>	240	10	350	101	640	27	350	1,017	171	<b>1,188</b>
<1,025	480	20	125	<b>625</b>	240	10	350	150	720	30	350	1,100	275	<b>1,375</b>

**2022 Operations**



**2023 Operations**

**2022 Operations**



**2023 Operations**

The Secretary of the Interior will take affirmative actions to implement programs designed to create or conserve 100,000 acre-ft per annum or more of Colorado River System water to contribute to conservation of water supplies in Lake Mead and other Colorado River reservoirs in the lower basin. All actions taken by the United States shall be subject to applicable law, including availability of appropriations.



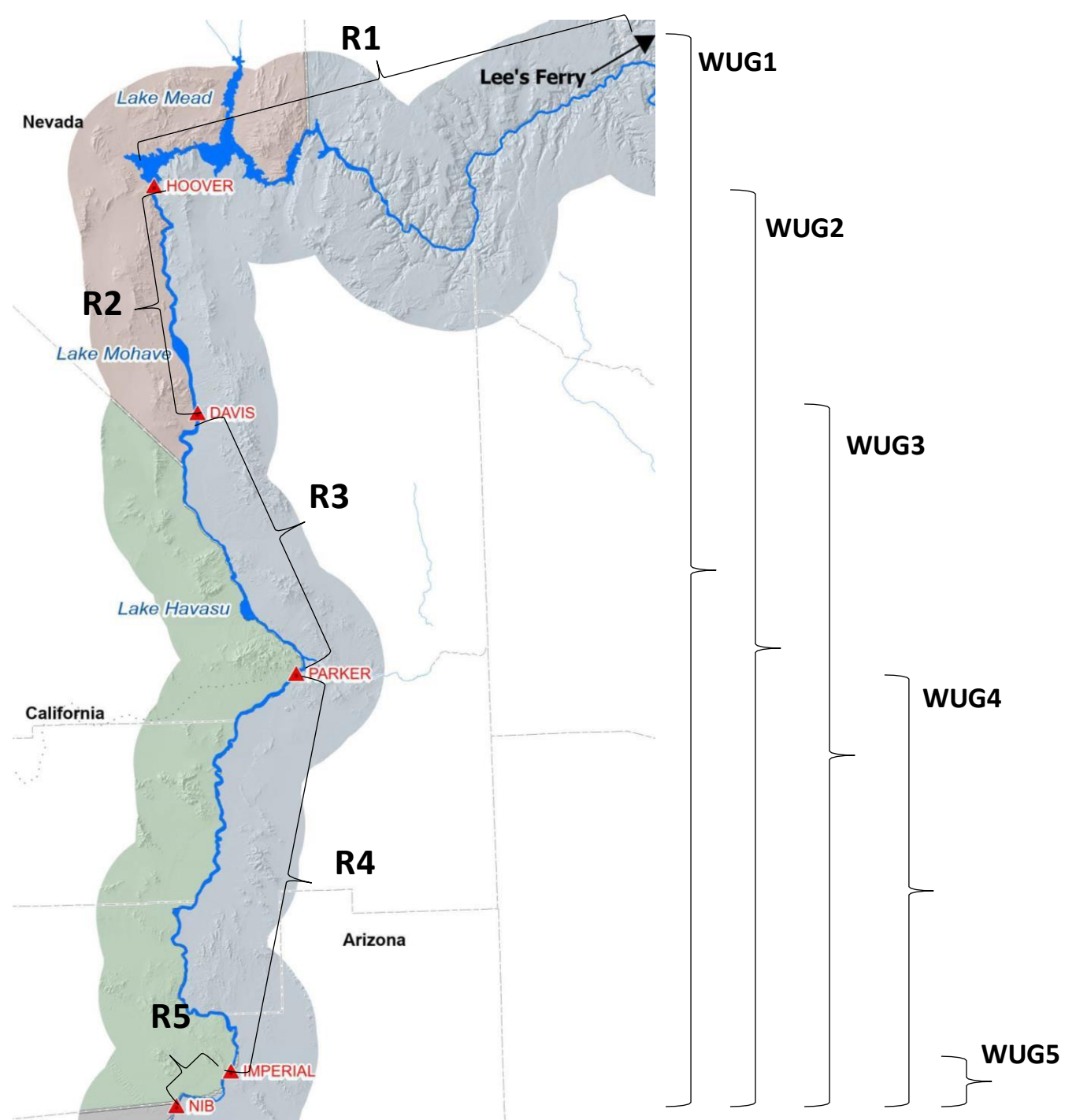


# S.E.I.S.

- Models a range of actions to assess a range of environmental impacts that may require additional mitigation (LCRMSCP enhancements).
- The Secretary asked the 7 Basin States to develop a consensus proposal for the coordinated operations of Lake Powell and Lake Mead for inclusion in the modeling, with a January 21, 2023 deadline.
- Failing to reach consensus on a single proposal, 6 of the Basin States (Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming) submitted their proposal.
- California submitted a separate proposal.

# Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming (6 States) SEIS Proposal 1/31/2023

Lower Basin Totals (all reductions in 1000 acre-feet)						
Tier	Elevation	IG	DCP	IPV	Add'l Reductions	Total
Tier 0	1090-1075	0	241	1,543	0	1,784
Tier 1	1075-1050	383	230	1,543	0	2,156
Tier 2a	1050-1045	625	750	1,543	0	2,918
Tier 2b	1045-1040	625	750	1,543	0	2,918
Tier 2c	1040-1035	625	750	1,543	0	2,918
Tier 2d	1035-1030	625	750	1,543	0	2,918
Tier 2e	1030-1025	625	750	1,543	250	3,168
Tier 3a	1025-1020	625	750	1,543	250	3,168
Tier 3b	1020-1015	625	750	1,543	450	3,368
Tier 3c	1015-1000	625	750	1,543	450	3,368



**ASSESSMENT REACHES (from CRSS)**

Reach	Start	End	System Loss (AFY)
R1 <sup>\1</sup>	Lee's Ferry	Hoover Dam	580,000
R2	Hoover Dam	Davis Dam	193,000
R3 <sup>\2</sup>	Davis Dam	Parker Dam	329,000
R4	Parker Dam	Imperial Dam	365,000
R5	Imperial Dam	NIB	76,000
<b>TOTAL</b>			<b>1,543,000</b>

<sup>\1</sup> System Loss is estimated evaporation at elevation 1,100 ft-amsl

<sup>\2</sup> Includes ET losses of 191,000 afy along riparian corridor from Davis Dam to Parker Dam



# Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming (6 States) SEIS Proposal 1/31/2023

Tier	Elevation	Arizona					Nevada					California					Mexico				
		IG	DCP	IPV	Add'l Reductions	Total	IG	DCP	IPV	Add'l Reductions	Total	IG	DCP	IPV	Add'l Reductions	Total	IG	DCP	IPV	Add'l Reductions	Total
Tier 0	1090-1075	0	192	408	0	600	0	8	17	0	25	0	0	766	0	766	0	41	351	0	392
Tier 1	1075-1050	320	192	387	0	899	13	8	18	0	39	0	0	782	0	782	50	30	356	0	436
Tier 2a	1050-1045	480	240	374	0	1,094	20	10	19	0	49	0	350	816	0	1,166	125	150	335	0	610
Tier 2b	1045-1040	480	240	374	0	1,094	20	10	19	0	49	0	350	816	0	1,166	125	150	335	0	610
Tier 2c	1040-1035	480	240	374	0	1,094	20	10	19	0	49	0	350	816	0	1,166	125	150	335	0	610
Tier 2d	1035-1030	480	240	374	0	1,094	20	10	19	0	49	0	350	816	0	1,166	125	150	335	0	610
Tier 2e	1030-1025	480	240	369	93	1,182	20	10	19	10	59	0	350	813	147	1,309	125	150	343	0	618
Tier 3a	1025-1020	480	240	369	93	1,182	20	10	19	10	59	0	350	813	147	1,309	125	150	343	0	618
Tier 3b	1020-1015	480	240	364	168	1,252	20	10	19	18	67	0	350	810	264	1,424	125	150	350	0	625
Tier 3c	1015-1000	480	240	364	168	1,252	20	10	19	18	67	0	350	810	264	1,424	125	150	350	0	625

\* All values are in 1000 acre-ft

# California SEIS Proposal 1/31/2023

Lake Mead Elevation	Baseline Reductions (ISG, DCP, Minute 323) (KAF)	Additional 1.0 MAF below 1,145' (KAF)	Additional Protection Volumes (KAF)	Cumulative Protection Volumes (KAF)
1,145	-	1,000	-	1,000
1,090	241	1,000	-	1,241
1,075	613	1,000	-	1,613
1,050	721	1,000	-	1,721
1,045	1,013	1,000	-	2,013
1,040	1,071	1,000	-	2,071
1,035	1,129	1,000	-	2,129
1,030	1,188	1,000	-	2,188
1,025	1,375	1,000	150	2,525
1,020	1,375	1,000	300	2,675
1,015	1,375	1,000	500	2,875
1,010	1,375	1,000	750	3,125
1,005	1,375	1,000	950	3,325
1,000*	1,375	1,000	950	3,325

# California SEIS Proposal 1/31/2023

At all elevations below 1,145', provide 1.0 MAFY of additional interim period protection volumes. These volumes could be achieved through voluntary or mandatory means. California has proposed to conserve 400 KAFY of this volume through voluntary actions and its water districts are developing programs to initiate this plan in 2023. Proposed allocation of the remaining volume is based on previous negotiations among the states: 560 KAFY to Arizona and 40 KAFY to Nevada.

# California SEIS Proposal 1/31/2023

If Lake Mead elevations decline further, Reclamation should reduce releases from Lake Mead in addition to the above volumes as follows:

- a.  $\leq 1,025'$ : 150 KAFY
- b.  $\leq 1,020'$ : 300 KAFY
- c.  $\leq 1,015'$ : 500 KAFY
- d.  $\leq 1,010'$ : 750 KAFY
- e.  $\leq 1,005'$ : 950 KAFY

These reductions should be applied using existing authorities or implemented through additional voluntary compensated conservation agreements.



# Lake Powell Unregulated Inflow Forecast

## **Water Year 2023 Forecast**

Sep Min Prob: 4.70 maf (49%)

**Sep Most Prob: 8.30 maf (86%)**

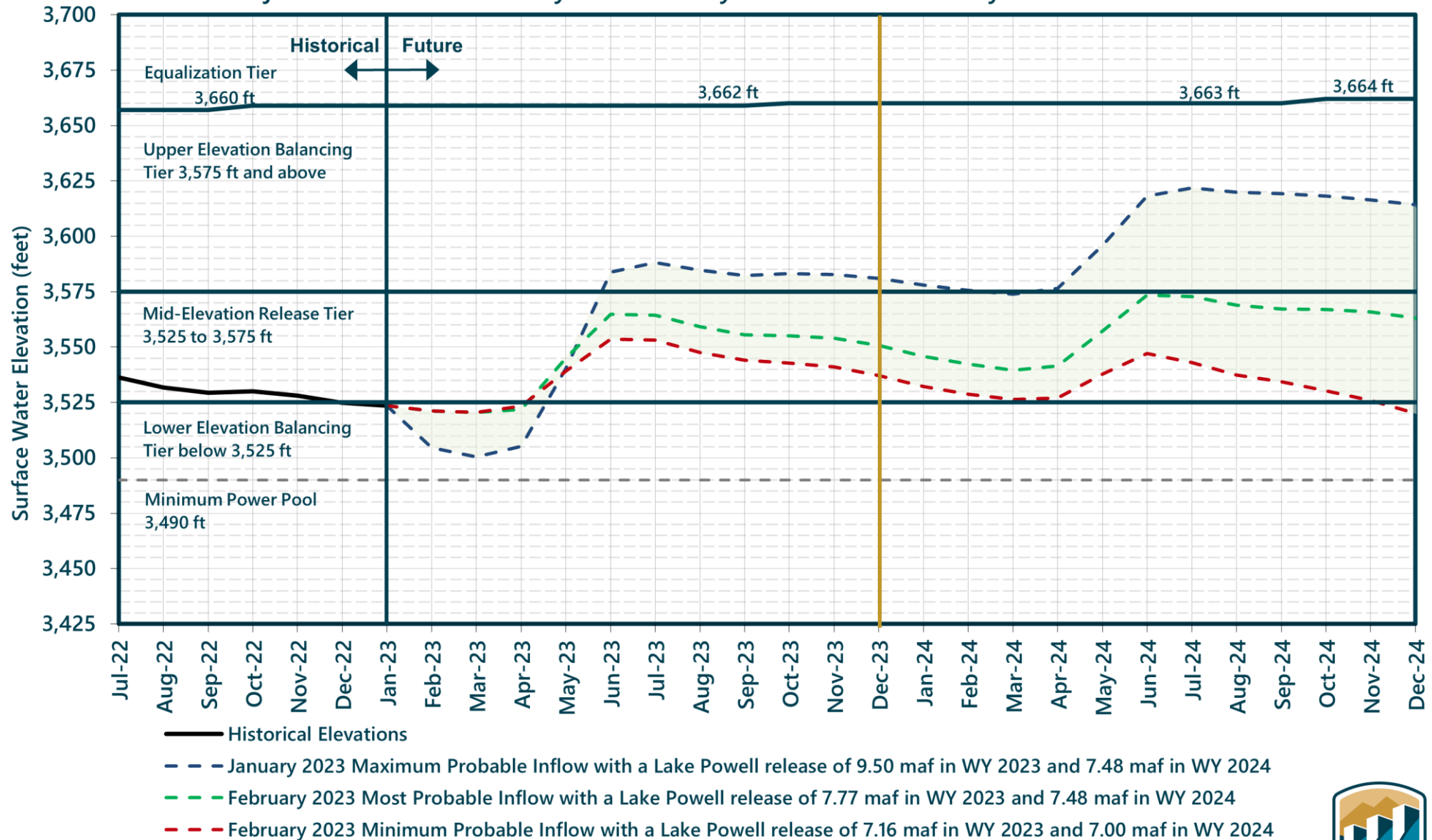
Sep Max Prob: 15.50 maf (161%)

# SIMPLE MODEL

- $\text{Inflow} - \text{Outflow} = \text{Change in Storage}$
- Change in Storage equates to a change in Elevation
- Are proposed 2024 LB reductions sufficient to protect Lake Mead at elevation 1,000?

# Lake Powell End of Month Elevations<sup>1</sup>

Projections from the January and February 2023 24-Month Study Inflow Scenarios

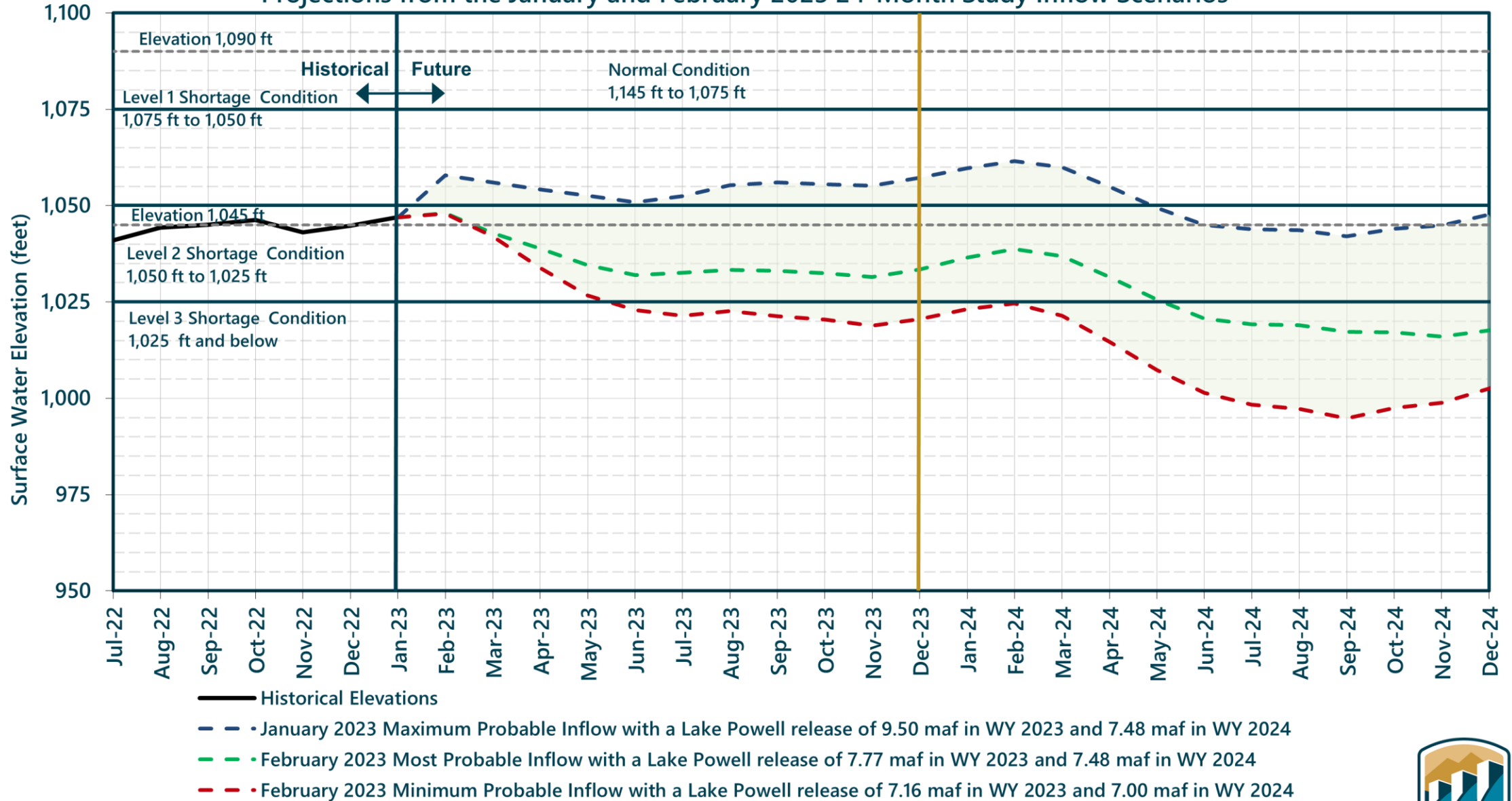


<sup>1</sup> Projected Lake Powell end of month physical elevations from the latest 24-Month Study inflow scenarios. The Drought Response Operations Agreement (DROA) is available online at: <https://www.usbr.gov/dcp/finaldocs.html>.



# Lake Mead End of Month Elevations<sup>1</sup>

Projections from the January and February 2023 24-Month Study Inflow Scenarios



<sup>1</sup> Projected Lake Mead end of month physical elevations from the latest 24-Month Study inflow scenarios.  
 The Drought Response Operations Agreement (DROA) is available online at: <https://www.usbr.gov/dcp/finaldocs.html>.





# 2023 Year End Conditions

## February 24-Month Study

- Minimum Probable:
  - Lake Powell: Elevation: 3524.74      Contents: 5.53 MAF
  - Lake Mead: Elevation: 1017.45      Contents: 5.50 MAF
- Most Probable:
  - Lake Powell: Elevation: 3550.81      Contents: 7.15 MAF
  - Lake Mead: Elevation: 1033.42      Contents: 6.53 MAF

# 2024 Proposed Lower Basin Reductions

- Minimum Probable Inflow (Mead at 1017.45):
  - California Proposal: 2.675 MAF
  - 6-States Proposal: 3.368 MAF
- Most Probable Inflow (Mead at 1033.42):
  - California Proposal: 2.129 MAF
  - 6-States Proposal: 2.918 MAF

# Lake Mead 5.5 MAF Total Release in 2024

- Losses: Hoover to NIB – 960,000 AF
- Mexico: 1.225 MAF
- Deliverable: 3,315,000 AF
- Total PPRs: 4,108,000 AF

# Colorado River Compact of November 24, 1922

- Article III(a): There is hereby apportioned from the Colorado River System in perpetuity to the Upper Basin and the Lower Basin respectively the exclusive beneficial consumptive use of 7,500,000 acre-feet per annum, which shall include all water necessary for the supply of any rights which may now exist (Present Perfected Rights).



Decree  
ARIZONA v. CALIFORNIA et al.

Decided June 3, 1963—Decree entered March 9, 1964—  
Amended decree entered February 28, 1966—Decided and supplemental  
decree entered January 9, 1979—Decided March  
30, 1983—Second supplemental decree entered April  
16, 1984—Decided June 19, 2000—Supplemental  
decree entered October 10, 2000—Consolidated  
decree entered March 27, 2006

II (B)(3): If insufficient mainstream water is available for release, as determined by the Secretary of the Interior, to satisfy annual consumptive use of 7,500,000 acre-feet in the aforesaid three States, then the Secretary of the Interior, after providing for satisfaction of present perfected rights in the order of their priority dates without regard to state lines and after consultation with the parties to major delivery contracts and such representatives as the respective States may designate, may apportion the amount remaining available for consumptive use in such manner as is consistent with the Boulder Canyon Project Act as interpreted by the opinion of this Court herein.

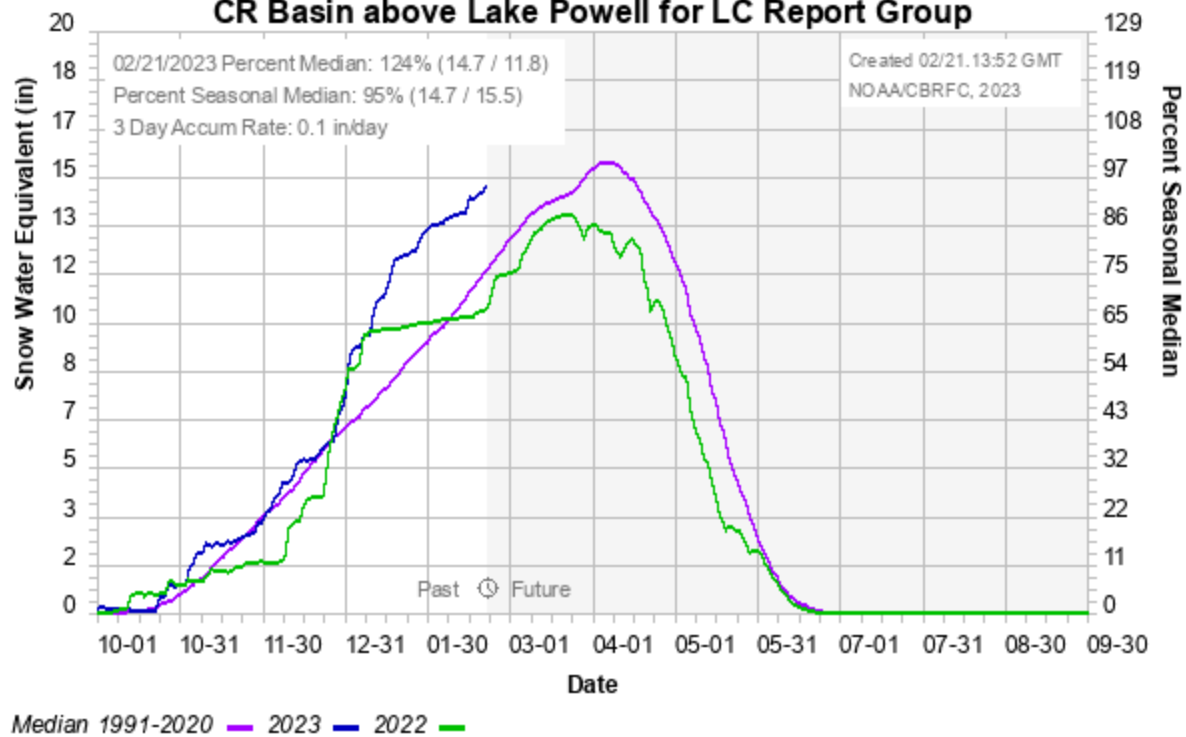
Entity	Diversion AF/Year	PPR Number (Per Decree entered March 9, 1964)
Cocopah Indian Reservation	7,681	PPR No. 1
Colorado River Indian Reservation	662,402	PPR No. 2
Fort Mojave Indian Reservation	103,535	PPR No. 3
Fort Yuma Indian Reservation	6,350	PPR No. 3A
Yuma County Water Users' Association	254,200	PPR No. 4
Unit B	6,800	PPR No. 5
North Gila Valley Unit	24,500	PPR No. 6
PPR's 7 - 21	11,423	PPR 7 - 21
Total Arizona PPR's	1,076,891	

Entity	Diversion AF/Year	PPR Number
Chemehuevi Indian Reservation	11,340	PPR No. 22
Fort Yuma Indian Reservation	71,616	PPR No. 23
Colorado River Indian Reservation	56,846	PPR No. 24
Fort Mojave Indian Reservation	16,720	PPR No. 25
Palo Verde Irrigation District	219,780	PPR No. 26
Imperial Irrigation District	2,600,000	PPR No. 27
Yuma Project (Reservation Division)	50,000	PPR No. 28
All Other California PPR's	4,990	PPR Nos. 29 - 80
Total California PPR's	3,031,292	

United States Supreme Court  
ARIZONA v. CALIFORNIA(1963)  
No. 592  
Argued: Decided: June 3, 1963

- None of this is to say that in case of shortage, the Secretary cannot adopt a method of proration or that he may not lay stress upon priority of use, local laws and customs, or any other factors that might be helpful in reaching an informed judgment in harmony with the Act, the best interests of the Basin States, and the welfare of the Nation. It will be time enough for the courts to intervene when and if the Secretary deviates from the standards Congress has set for him to follow, including his obligation to respect "present perfected rights" as of the date the Act was passed. At this time the Secretary has made no decision at all based on an actual or anticipated shortage of water, and so there is no action of his in this respect for us to review. Finally, as the Master pointed out, Congress still has broad powers over this navigable international stream. Congress can undoubtedly reduce or enlarge the Secretary's power if it wishes. Unless and until it does, we leave in the hands of the Secretary, where Congress placed it, full power to control, manage, and operate the Government's Colorado River works ...

### Colorado Basin River Forecast Center CR Basin above Lake Powell for LC Report Group





Questions?

Comments?

Discussion?

