

# 26<sup>TH</sup> ANNUAL AG FORUM

FEBRUARY 25, 2022



## *STATUS OF ARIZONA WATER SUPPLIES AND IMPACT ON AGRICULTURAL AND URBAN GROWTH*

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Salmon, Lewis & Weldon, P.L.C.

**I. PAUL R. ORME, PAUL R. ORME, P.C. AND OF COUNSEL TO SALMON, LEWIS & WELDON P.L.C., Phoenix, Arizona**

A. Currently Counsel to 4 Special Districts in Various Capacities:

- (1) Central Arizona Irrigation and Drainage District (Eloy)
- (2) Maricopa-Stanfield Irrigation & Drainage District (Maricopa-Stanfield)
- (3) New Magma Irrigation & Drainage District (San Tan Valley/Queen Creek)
- (4) Electrical District No. 3 of Pinal county (Maricopa-Stanfield Area)

B. Drought Contingency Plan Committee (2018)

C. Arizona Reconsultation Committee (2021)

Both Representing Pinal County Agriculture

Two largest districts

MSIDD = Maricopa-Stanfield Irrigation & Drainage district is in yellow

CAIDD = Central Arizona Irrigation & Drainage district is in green

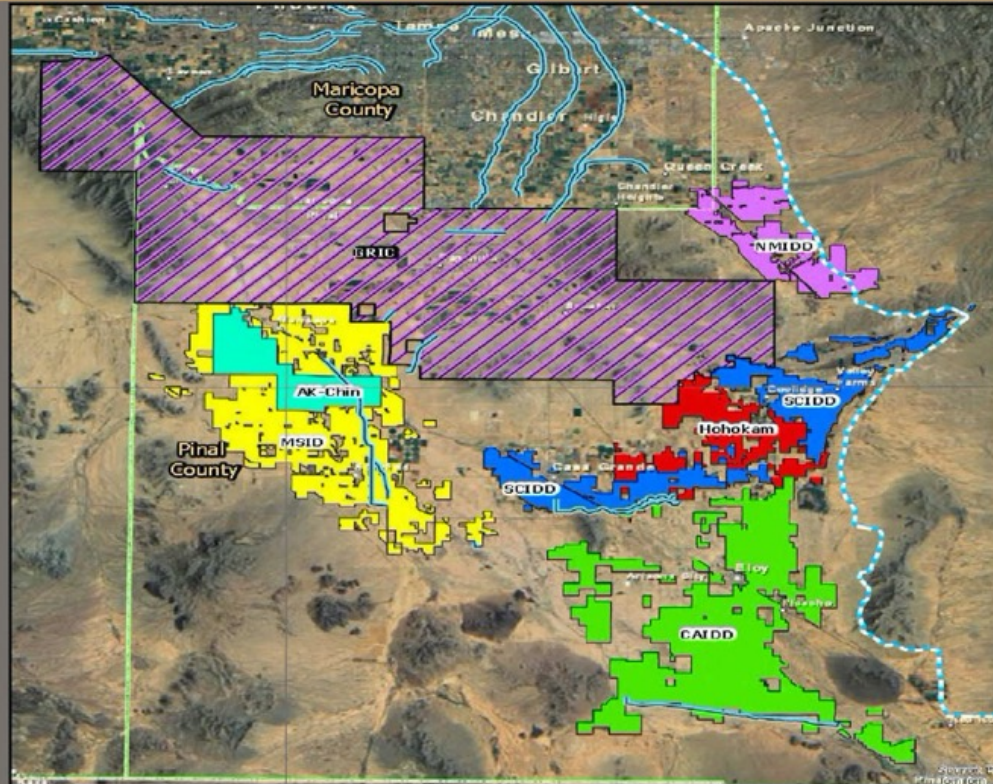
Tribal Nation Boundaries

Gila River Indian Community

Ak Chin Indian Community

Graphic source: Paul Orme/Sharon B. Megdal

# Pinal County Irrigation Districts



# Contribution of On-Farm Agriculture and Agribusiness To the Pinal County Economy

## An Economic Contribution Analysis for 2016

Ashley Kerna Bickel, Dari Duval, George Frisvold

Department of Agricultural & Resource Economics, University of Arizona Cooperative Extension

December 2018

### On-Farm Agriculture

*Crop, livestock, and agricultural support  
service industries*

Pinal County accounts for:

- 45%** ... of Arizona's cattle and calf sales
- 42%** ... of Arizona's cotton and cottonseed sales
- 39%** ... of Arizona's milk sales
- 22%** ... of Arizona's other crops and hay sales

Pinal County is an important supplier of milk and other dairy products to the Phoenix and Tucson metro areas

### Agribusiness

*Agricultural input manufacturing, and food & fiber pro-  
cessing industries*

Food manufacturing is the largest manufacturing sector in the county, providing more than...

- 25%** of manufacturing jobs, 18% from dairy products alone
- 33%** of manufacturing wages

Agriculture-related wholesale trade accounts for **23%** of county wholesale trade jobs and **19%** of wholesale wages

## Economic Contribution Analyses

### Economic Contribution of:

#### On-Farm Agriculture

The total contribution, including multiplier effects, of *on-farm agriculture* to the Pinal County economy in 2016 was approximately...

- \* **\$1.1 billion in sales** (\$908.1 million on-farm direct, of which \$875 million is crop, livestock, & other farm sales)
- \* **\$372.8 million in value added** (\$273 million on-farm direct)
- \* Nearly **5,200 full- and part-time jobs** (3,800 on-farm direct)

#### On-Farm Agriculture & Agribusiness

The total contribution of *agriculture and agribusiness combined* to the Pinal County economy in 2016, including multiplier effects, was...

- \* **Nearly \$2.3 billion in sales** (\$908.1 million on-farm direct, \$979 million agribusiness direct, and \$370 million in other sales)
- \* **\$611.1 million in value added** (\$273 million on-farm direct, \$160.4 million agribusiness direct)
- \* More than **7,500 jobs** (3,800 on-farm direct; 1,346 agribusiness direct)

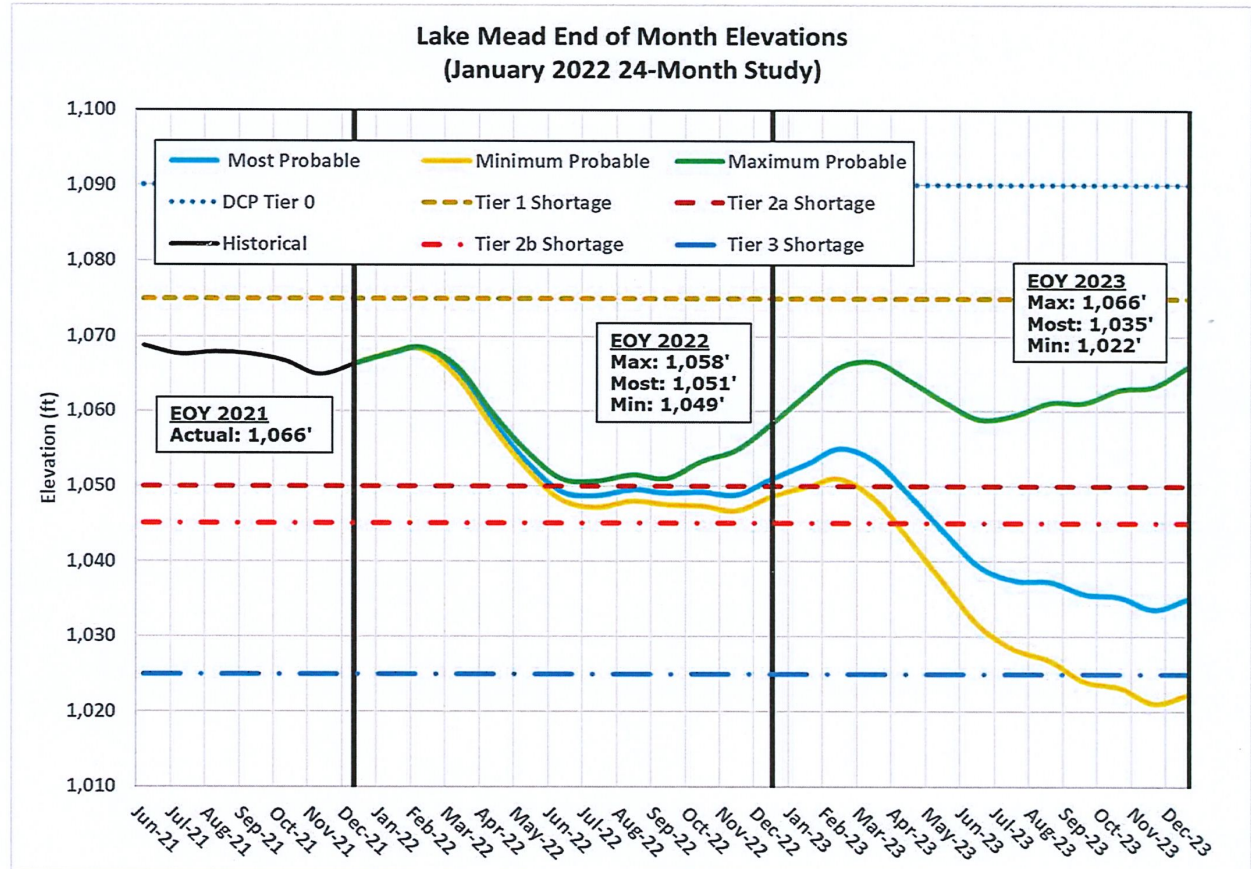
### Potential Effects of Reduced Agricultural Production

This study estimates the economic impacts of changes in wheat, alfalfa, and cotton acreage resulting from a hypothetical reduction of 300,000 acre-feet of irrigation water for Pinal County agriculture. Changes in acreage, agricultural production, and broader impacts to the Pinal County economy were estimated under different following scenarios. A hypothetical 300,000 AF water cutback (based on 2016 data), could lead to the following losses in Pinal County:

- \* **\$63.5 million - \$66.7 million loss in gross farm-gate sales** (~7% of on-farm agricultural sales)
- \* **\$94 million—\$104 million loss in total county sales** (farm and non-farm sales)
- \* **\$31.7 million - \$35 million loss in county value added** (value added combines net farm income, profits in other industries, employee compensation, and tax revenues)
- \* **270 - 480 full-and part-time jobs lost**

# Mead End of Month Elevations – January 24-Month Study

- Projected 2023 Conditions:
  - T1 = Most and Max Probable
  - T2a = Min Probable
- Anticipated 2024 Conditions:
  - T2b = Most Probable
  - T3 = Min Probable



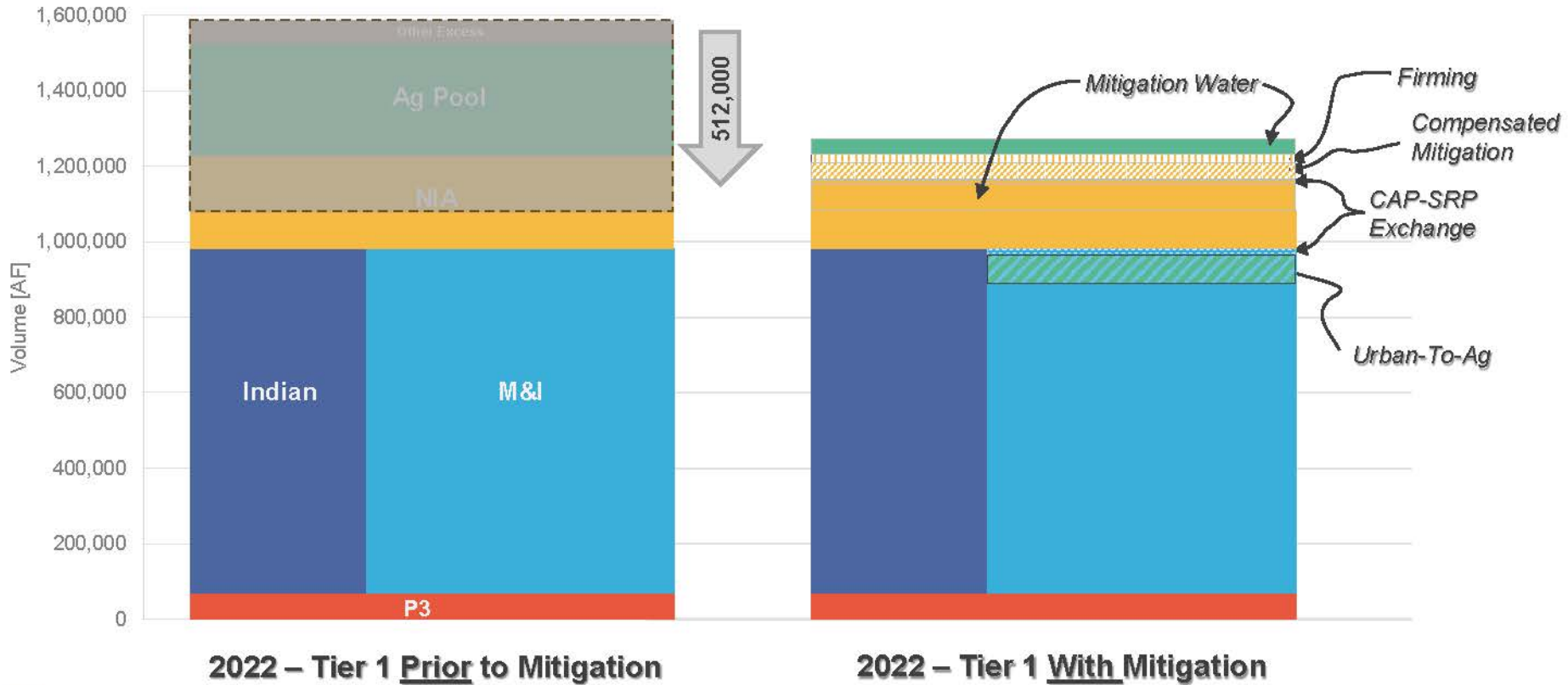
## 2007 Interim Guidelines, Minute 323, Lower Basin Drought Contingency Plan, and Binational Water Scarcity Contingency Plan Total Volumes (kaf)

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	<i>Lower Basin States + Mexico</i>	AZ	NV	CA	Mexico	AZ Total	NV Total	CA Total	Lower Basin States Total	Mexico Total	<i>Lower Basin States + Mexico</i>
1,090 - 1,075	0	0	0	0	192	8	0	41	192	8	0	200	41	241
1,075 - 1050	320	13	50	383	192	8	0	30	512	21	0	533	80	613
1,050 - 1,045	400	17	70	487	192	8	0	34	592	25	0	617	104	721
1,045 - 1,040	400	17	70	487	240	10	200	76	640	27	200	867	146	1,013
1,040 - 1,035	400	17	70	487	240	10	250	84	640	27	250	917	154	1,071
1,035 - 1,030	400	17	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

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.

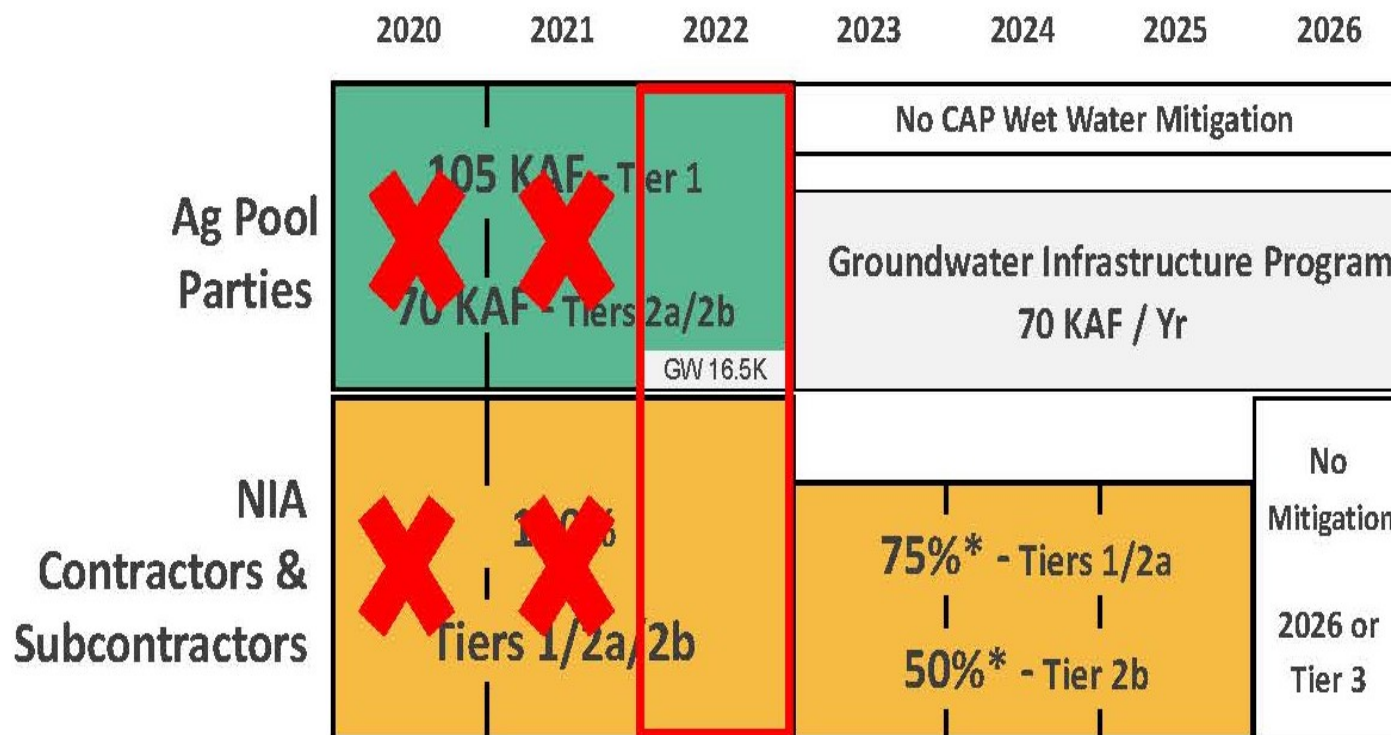


# 2022 – Tier 1 Shortage





# Mitigation Commitments



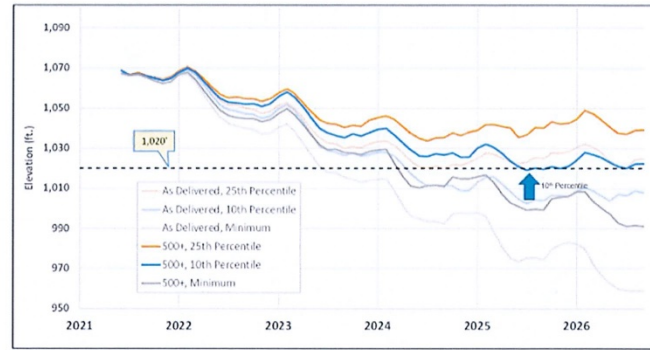
# Update: Ag Mitigation

2022 Only

	Ag Pool Volume (300K)	% Mitigation	Total Mitigation Water	USF-> GSF	GW Infrastructure	Wet Water Mitigation Resources
<b><u>Pinal AMA</u></b>						
Central Arizona IDD	83,302	34%	35,700	19,800	6,105	9,795
Hohokam IDD	26,924	11%	11,550	6,400	1,980	3,170
Maricopa Stanfield IDD	81,886	33%	34,650	19,300	5,940	9,410
San Carlos IDD	25,237	10%	10,500	0	1,815	8,685
<b>Subtotal</b>	<b>217,349</b>	<b>88%</b>	<b>92,400</b>	<b>45,500</b>	<b>15,840</b>	<b>31,060</b>
<b><u>Phoenix AMA</u></b>						
Chandler Heights CID	407					
MWD	3,000					
New Magma IDD	20,494					
Queen Creek ID	9,000	2%	2,100	0	660	1,440
Roosevelt WCD	3,750					
SRP	2,850					
San Tan ID	1,050					
Tonopah ID	2,595					
<b>Subtotal</b>	<b>43,146</b>	<b>2%</b>	<b>2,100</b>	<b>0</b>	<b>660</b>	<b>1,440</b>
<b><u>Tucson AMA</u></b>						
BKW Farms	1,226					
Cortaro-Marana ID	4,313					
FICO	2,323					
Kal Farms/Marana	1,575					
Kal Farms/Red Rock	750					
<b>Subtotal</b>	<b>10,187</b>	<b>0%</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b><u>Outside AMA</u></b>						
Harquahala Valley ID	24,403	10%	10,500	1,000		9,500
<b>Subtotal</b>	<b>24,403</b>	<b>10%</b>	<b>10,500</b>	<b>1,000</b>		<b>9,500</b>
<b>TOTAL</b>	<b>295,085</b>	<b>100%</b>	<b>105,000</b>	<b>46,500</b>	<b>16,500</b>	<b>42,000</b>

## Analysis of Additional Conservation

- 500 KAF of additional conservation was also effective over the remainder of the Interim Period
- 10<sup>th</sup> percentile stays above 1,020'



11 | CAP WATER USER ROUNDTABLE | NOVEMBER 9, 2021



## Lower Basin 500+ Plan

- Two-year plan, with expected ongoing activity through 2026
- Funding commitments from AZ, CA, NV and the U.S.
- 2022 target volumes identified:
  - Arizona: 223 KAF
  - California: 215 KAF
  - Reclamation: 62 KAF
- 2023 volumes under further development
- Four types of activities
  - Additional ICS
  - Reduction in planned ICS releases
  - System Conservation
  - System Efficiency

12 | CAP WATER USER ROUNDTABLE | NOVEMBER 9, 2021



Voluntary only. – why is California lower than AZ?

# Arizona Contributions to 500+ Plan

- Arizona's target of 223 KAF anticipates participation from both on-River and CAP water users
  - Includes both tribal and non-tribal participants
  - 30 KAF on-River
  - 193 KAF from CAP water users
- All contributions will directly benefit Lake Mead, through System Water or Storage, including reduced release of ICS
- CAP and ADWR are providing funding, and have established guiding principles for Arizona's contributions:
  - Voluntary ▪ Temporary ▪ Compensated

13 | CAP WATER USER ROUNDTABLE | NOVEMBER 9, 2021



## CAP User Contributions to 500+ Plan

- Reclamation anticipates funding **~78 KAF** of Gila River Indian Community ICS creation for use as a future firming supply
  - This will fully utilize the 300 KAF of Tribal ICS space
- SRP is willing to increase the CAP-SRP Exchange by **10 KAF**
- CAP has determined an additional of Lake Pleasant water is available as part of the pre-Mitigation delivery supply which reduces CAWCD ICS by **~12 KAF**
- ⇒ • CAP is soliciting interest in **93 KAF** of additional conservation
  - This includes ~40 KAF that Reclamation is discussing with tribes
  - Seeking the remaining 50 to 60 KAF as Compensated Conservation
  - Reduces release of CAWCD ICS to zero, and leaves additional in Lake Mead

14 | CAP WATER USER ROUNDTABLE | NOVEMBER 9, 2021



## SHORT TERM

# Colorado River Conditions – 5 Year Projected Operating Conditions

Lower Basin – Lake Mead

Percent of Traces with Event or System Condition

Results from August 2021 CRSS **without Upper Basin Drought Response Operations** (values in percent)

Event or System Condition	2022	2023	2024	2025	2026
<b>Surplus Condition – any amount (Mead ≥ 1,145 ft)</b>	0	0	0	0	0
Surplus – Flood Control	0	0	0	0	0
<b>Normal or ICS Surplus Condition (Mead &lt; 1,145 and &gt; 1,075 ft)</b>	0	3	3	0	9
Recovery of DCP ICS / Mexico's Water Savings (Mead >/≥ 1,110 ft)	0	0	0	0	0
DCP Contribution / Mexico's Water Savings (Mead ≤ 1,090 and > 1,075 ft)	0	3	3	0	3
<b>Shortage Condition – any amount (Mead ≤ 1,075 ft)</b>	100	97	97	100	91
<i>Shortage / Reduction – 1<sup>st</sup> level (Mead ≤ 1,075 and ≥ 1,050)</i>	100	75	28	22	16
DCP Contribution / Mexico's Water Savings (Mead ≤ 1,075 and > 1,050 ft)	100	75	28	22	16
<i>Shortage / Reduction – 2<sup>nd</sup> level (Mead &lt; 1,050 and ≥ 1,025)</i>	0	22	66	38	34
DCP Contribution / Mexico's Water Savings (Mead ≤ 1,050 and > 1,045 ft)	0	16	3	6	3
DCP Contribution / Mexico's Water Savings (Mead ≤ 1,045 and > 1,040 ft)	0	6	13	6	3
DCP Contribution / Mexico's Water Savings (Mead ≤ 1,040 and > 1,035 ft)	0	0	13	9	3
DCP Contribution / Mexico's Water Savings (Mead ≤ 1,035 and > 1,030 ft)	0	0	13	9	3
DCP Contribution / Mexico's Water Savings (Mead ≤ 1,030 and ≥/ > 1,025 ft)	0	0	25	6	22
<i>Shortage / Reduction – 3<sup>rd</sup> level (Mead &lt; 1,025)</i>	0	0	3	41	41
DCP Contribution / Mexico's Water Savings (Mead </≤ 1,025 ft)	0	0	3	41	41

Notes:

<sup>1</sup> Modeled operations include the 2007 Interim Guidelines, Lower Basin Drought Contingency Plan, and Minute 323, including the Binational Water Scarcity Contingency Plan.

<sup>2</sup> Reservoir initial conditions on December 31, 2021 were simulated using the August 2021 Most Probable 24 Month Study.

<sup>3</sup> Stress Test Hydrology uses 32 hydrologic inflow sequences that resamples the observed natural flow record from 1988-2019 for 32 traces analyzed.

<sup>4</sup> Percentages shown in this table may not be representative of the full range of future possibilities that could occur with different modeling assumptions.

<sup>5</sup> Percentages shown may not sum to 100% due to rounding to the nearest percent.

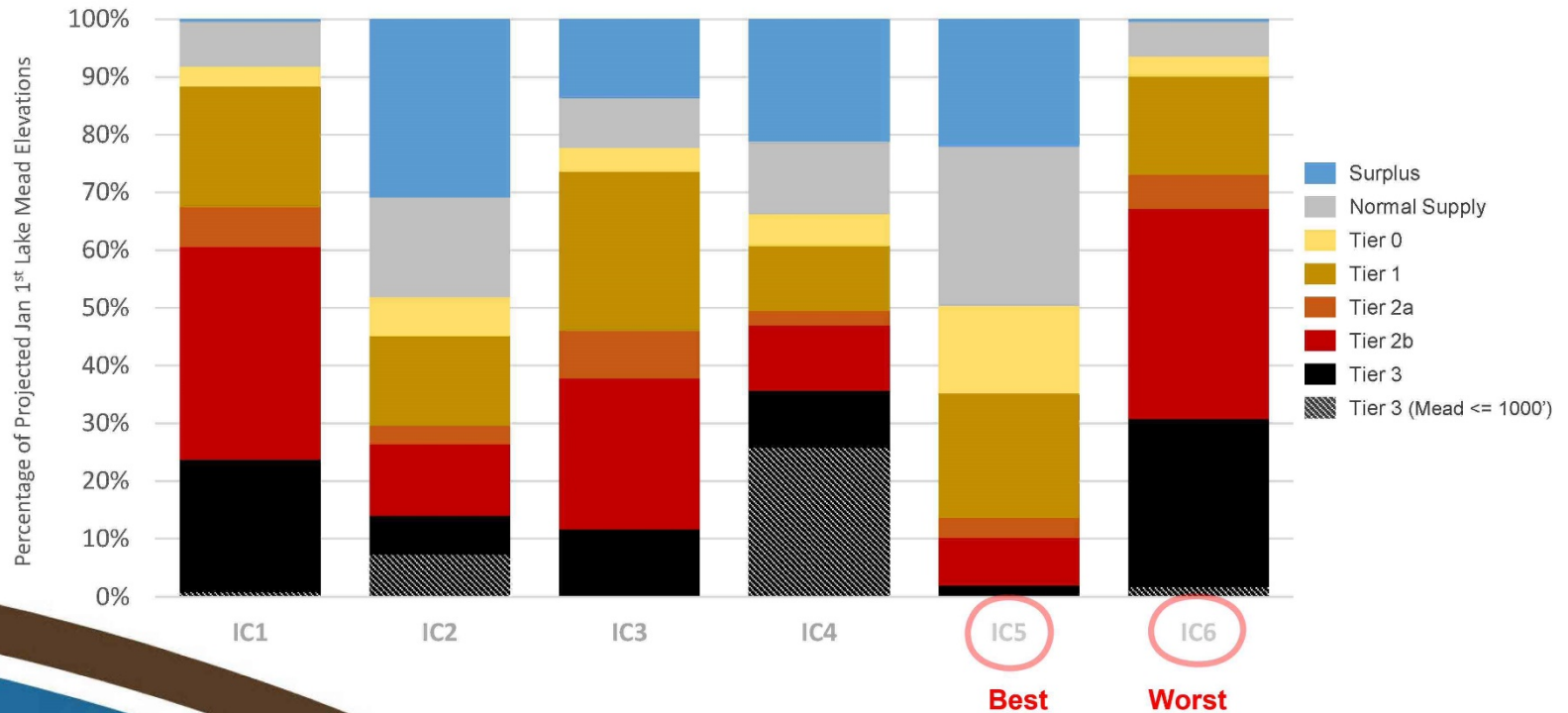


# LONG TERM

## Tier Occurrence

Scenario	Hydrology	Upper Basin Demand	Arizona On-River Demand	CAP Utilization
IC #1	Stress Test	Guidelines Period UB Use Extended	0.1% Growth	Medium
IC #2	Paleo-Conditioned	2016 UCRC Upper Basin Growth	0.2% Growth	Medium
IC #3	Pluvial-Removed	Guidelines Period UB Use Extended	0.1% Growth	Medium
IC #4	Downscaled GCM	2016 UCRC Upper Basin Growth	0.2% Growth	Fast
IC #5	Pluvial-Removed	Upper Basin Guidelines Period Average	On-River Guideline Average	Medium
IC #6	Stress Test	2012 Basin Study Current Trends Growth	0.2% Growth	Fast

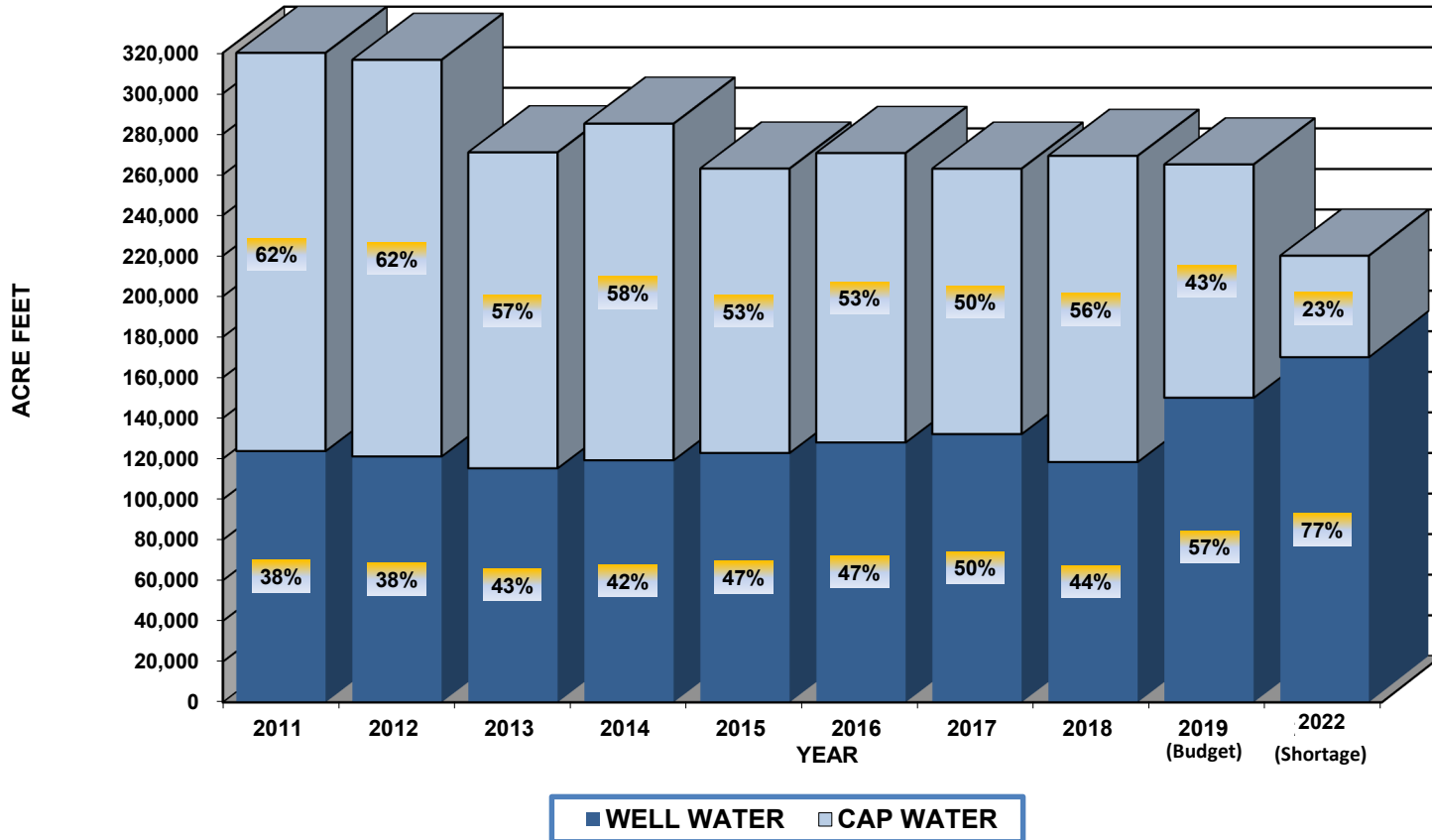
**Tier Occurrence During Projection Period (2023-2059)**



# MSIDD

## Last Decade

TOTAL WATER DELIVERED



# The Shortage Challenge

	<u>Recent Supplies</u>		<u>Supplies During Level 1 Shortage</u>
CAP:	140,000		50,000**
GW:	<u>130,000*</u>	> > > ? ?	<u>170,000</u>
	270,000		220,000

**Can MSIDD Increase Groundwater Production to 200,000 AFA?**

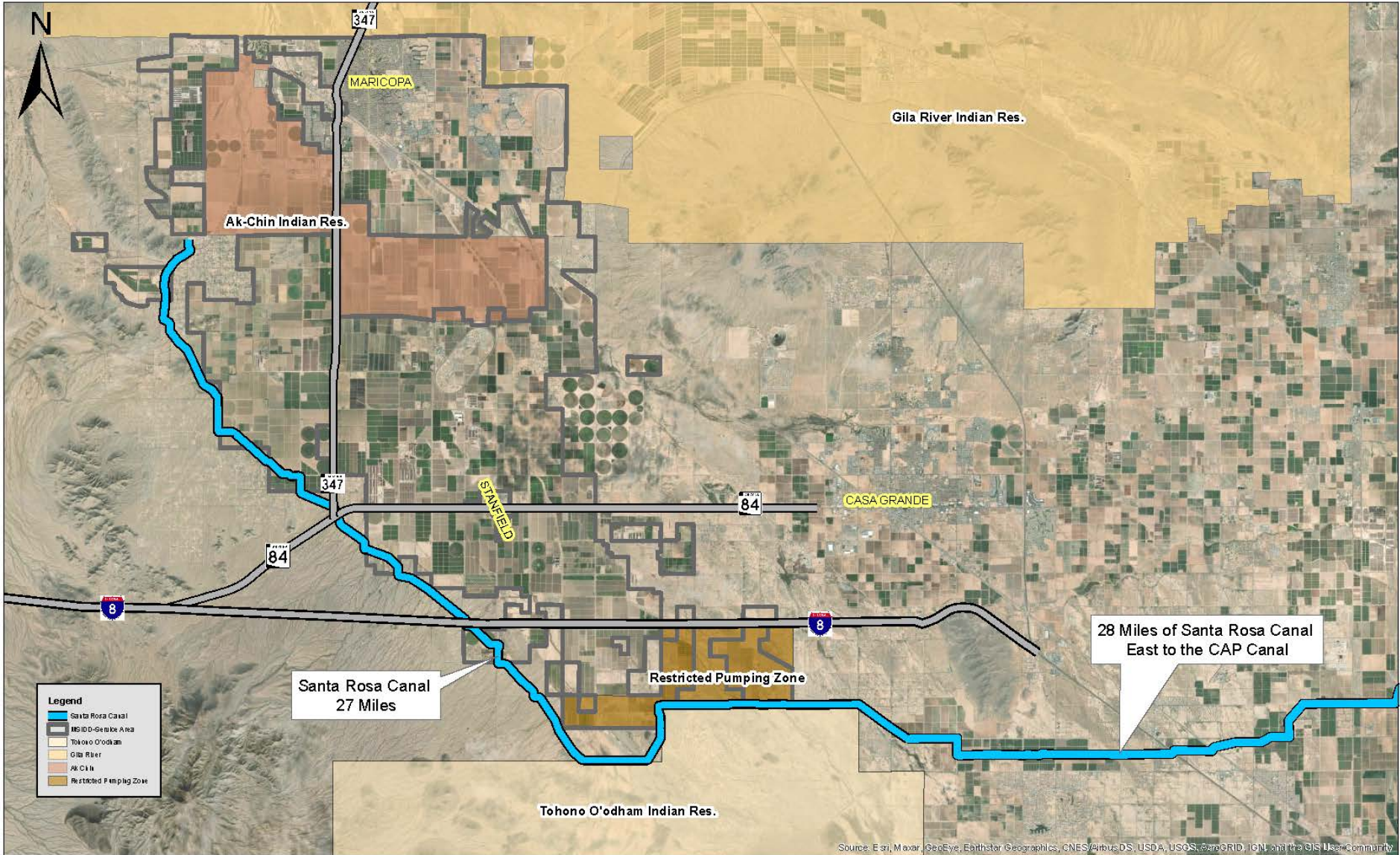
\* District Capability 180,000 – 190,000 AFA

\*\* Assumes 15,000 AF from GSF Partners



# Factors Affecting Future GW Pumping

- **Does Demand Remain Constant *i.e.* GW Replaces All Lost CAP**
  - Or Reduce Acres to Match GW Capability
  - Effects of Ag Economy
- **Infrastructure: Can CAP be replaced by GW where needed**
  - New Pipelines to Connect More Wells to Canal System
  - More Point Sources - Reduce “GW Poor/Dry” Areas
    - Rehab Old
    - Drill New (Partnering for Recovery May Help)
  - Redundancy to Match Farm System Capacities (Even More Wells!)
- **Cost of Increased GW Water Pumping**
  - Cost of Maintaining More Wells
  - More Energy Needed for Groundwater Pumping
    - Drought Reduces Hydropower Availability
    - Increased Use of Supplemental Power – Spot Market
  - Increased Depths to Groundwater (Tribal Concerns)
    - More Energy per Unit Produced
    - Potential Quality Degradation
    - Risk Return of Subsidence
- **Neighboring Tribes Water Quality Concerns**
- **Concerns About Increased Groundwater Pumping For Development and Recovery**



**Legend**

- Santa Rosa Canal
- MSID-Service Area
- Tohono O'odham
- Gila River
- Ak-Chin
- Restricted Pumping Zone

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



05/21/21 TLR  
 DCL/AMER:  
 EGM/BJD  
 Do not warrant the accuracy or  
 location of the satellite data.

## CHALLENGES AT THE DISTRICT LEVEL

1. How to Most Efficiently Increase and Transport Available Groundwater Throughout The District (165,000 A/F – 250,000 (for MSIDD))
  - (a) Placement of new wells and pipelines (well sites)
  - (b) Use of existing CAP delivery system (localized networking)
  - (c) Managing lower flows
  - (d) Funding for new infrastructure
  - (e) Dealing with increased power costs resulting from reduced Hoover power (12-14%) due to significantly less water coming out of Lake Mead and the need to purchase replacement power on open market
  - (f) General budget pressures resulting from loss of irrigation water sales and increased costs of power and materials (supply chain)
  
2. Pressures Against Increased Groundwater Pumping
  - (a) ADWR Assured Water Supply Rules/Model
  - (b) Neighboring Reservations/Tribal Concerns
  - (c) Use of the Santa Rosa Canal

## **CHALLENGES AT THE GROWER/LANDOWNER LEVEL**

### **1. How to Manage Reduced Water Supply on Farm?**

- (a) Which Acres to Irrigate (1/2 Water Supply?)
- (b) Which Acres Can Received Adequate Head of Groundwater
- (c) How to Deal With Fallowed Lands (Weed Control)
- (d) Consider Other Crops – What Will Dairies Do?
- (e) Changes in Irrigation Methods

### **2. How to Manage Reduced Farm Revenues?**

- (a) Lay Off Employees
- (b) Delay Equipment and Other Purchases
- (c) Reduced Rent Payments or Restructure Land Debt