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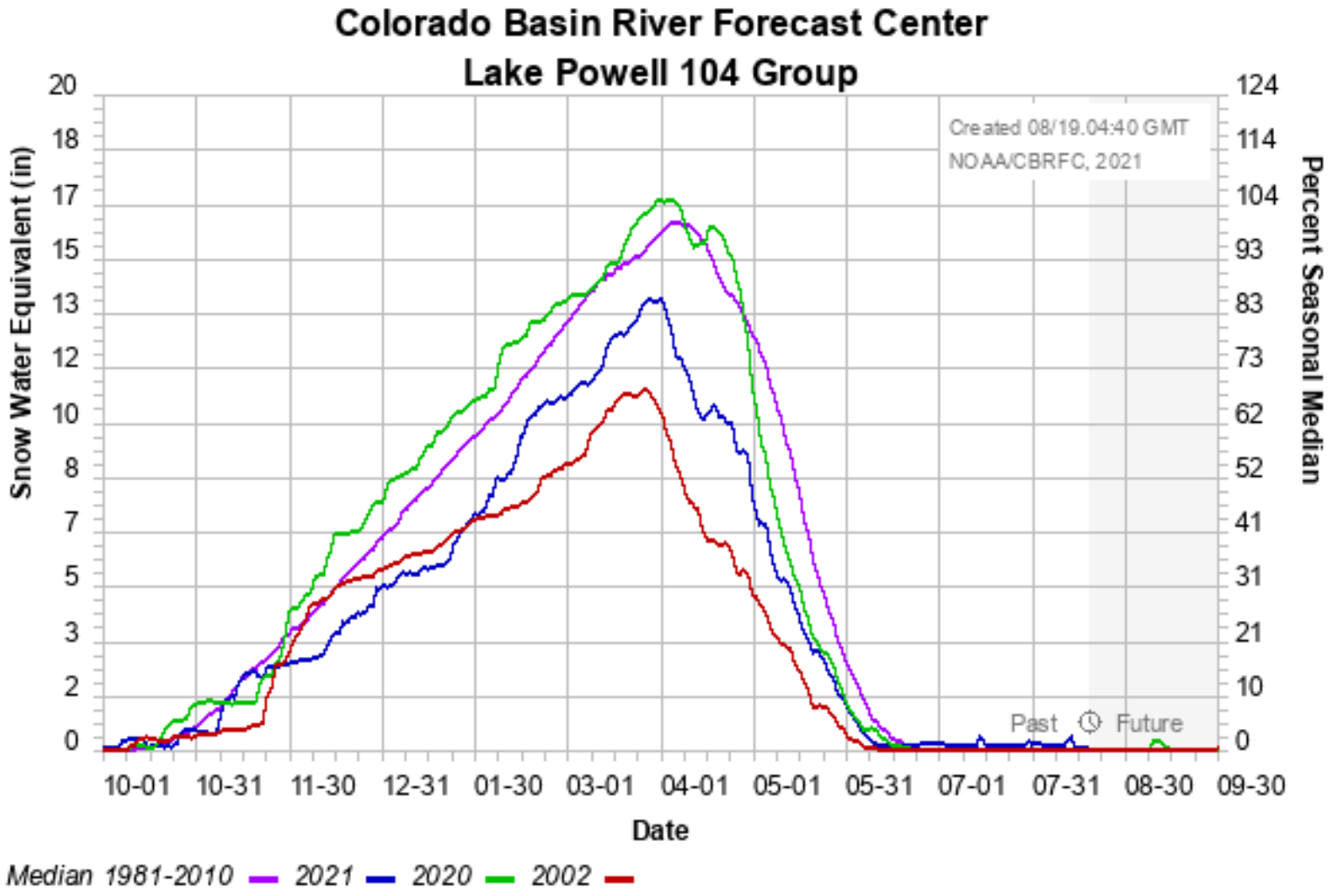
2021 Annual Water User Briefing

Colorado River Update

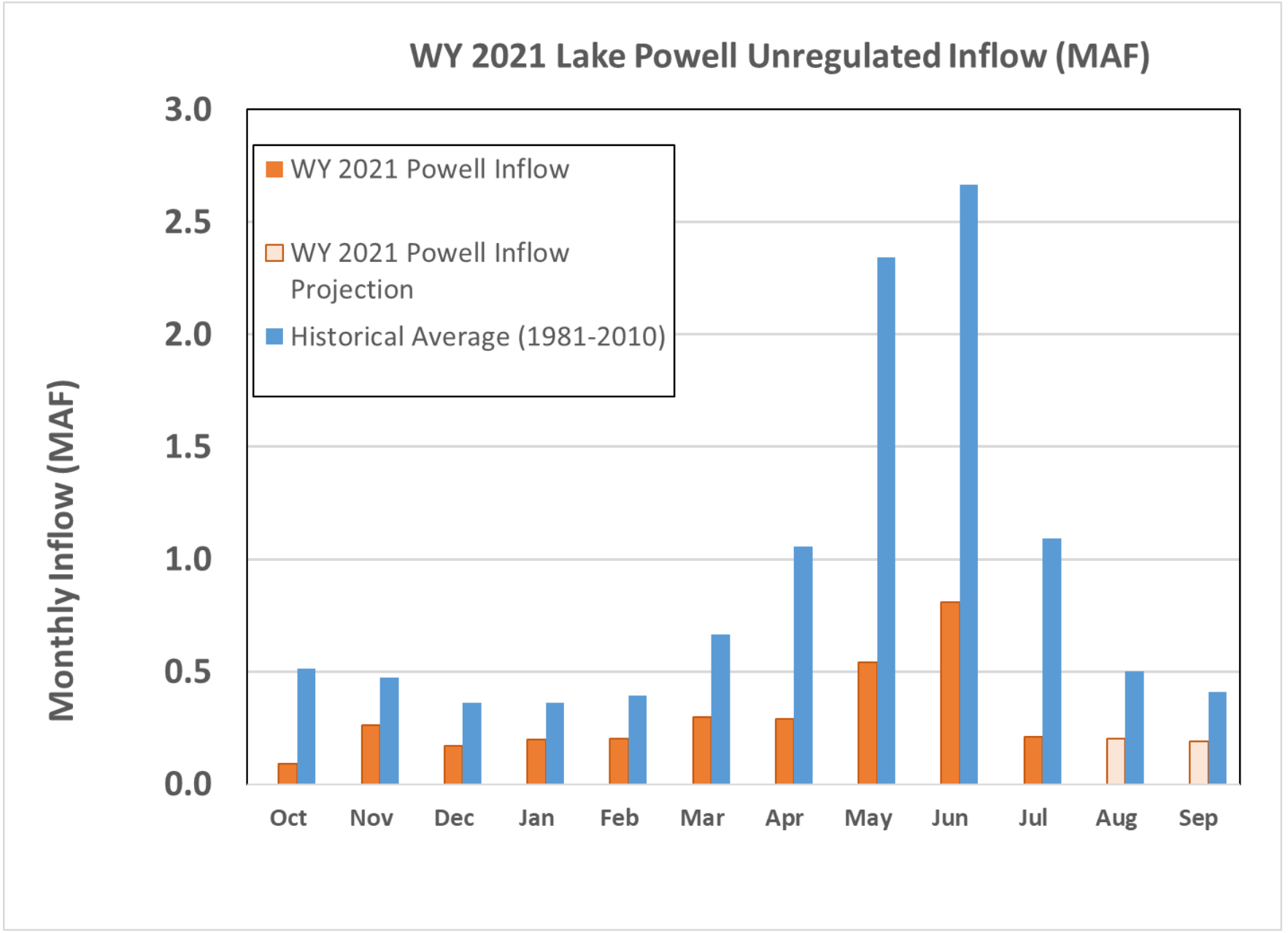


2020-2021 Snowpack Summary

- Difference between
  - Lowest runoff year since 1964 (2002 in red)
  - 30-yr median (1981-2010 in purple)
  - 2021 (in blue)
- Soil conditions leading into the winter were very dry

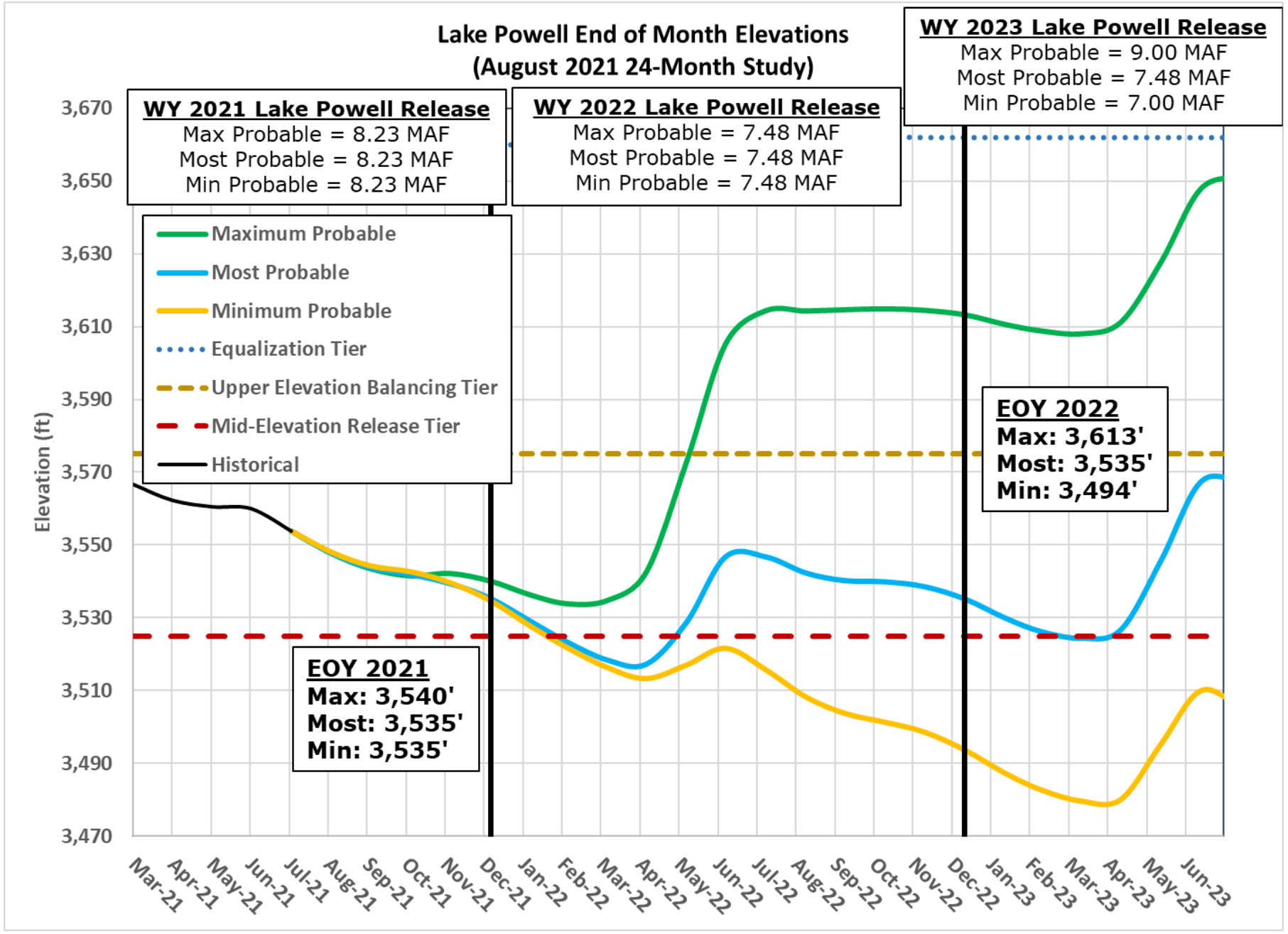
Powell Unregulated Inflows 2021

- WY 2021 projected to be 2nd lowest inflow
  - 3.46 MAF – WY 2021
- April – July inflow was 26% of 30-year average
- WY 2021 projected to be 32% of 30-year average
- Late summer storms have slightly improved inflows and projections
  - Projection for July was 10% of average – Actual July was 19% of average



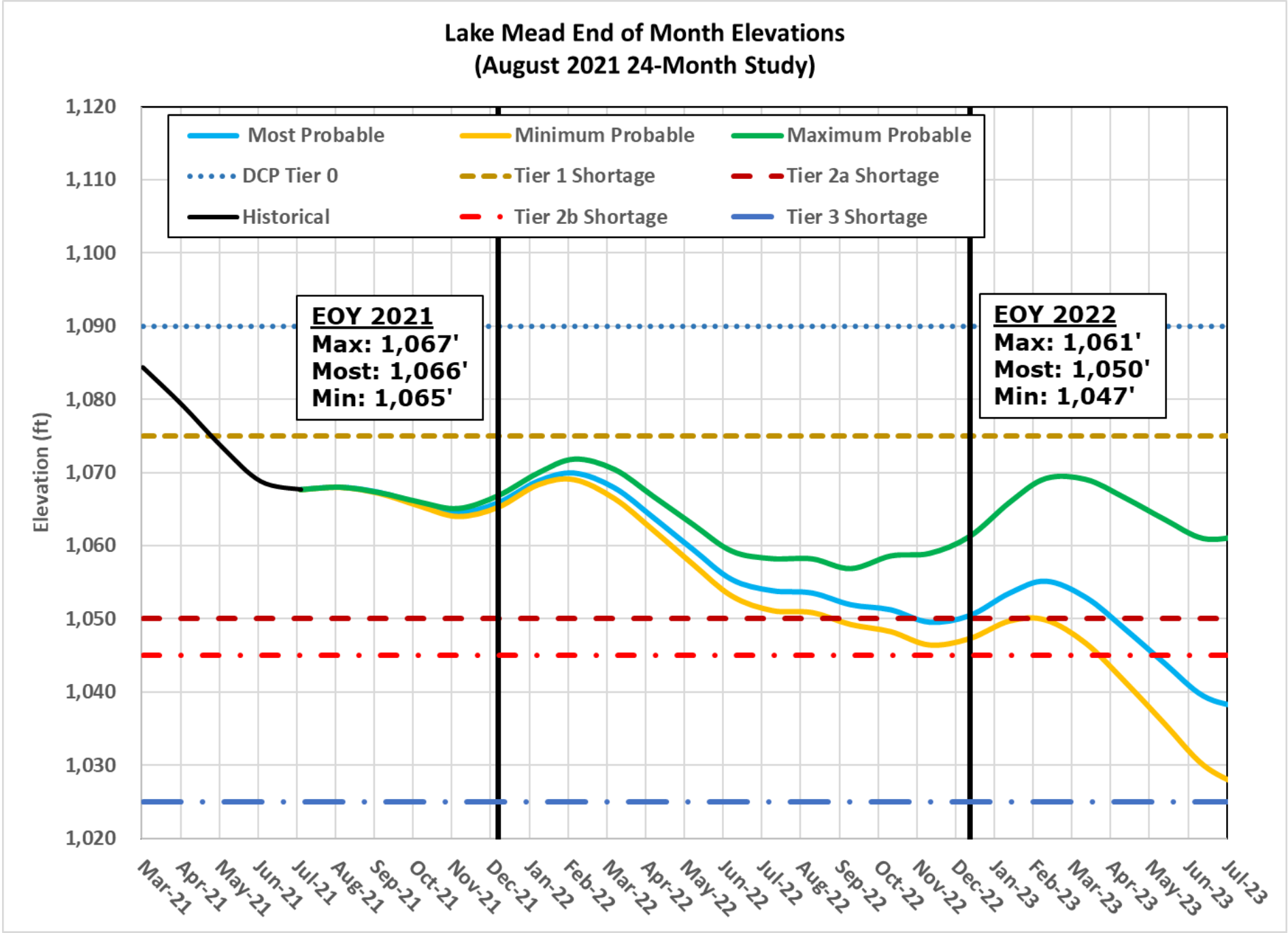
Powell End of Month Elevations

- 24-Month Study August 2021
- In WY 2021, release is 8.23 MAF for min, most, and max probable scenarios
- In WY 2022, projected release is 7.48 MAF for min, most, and max probable scenarios



Mead End of Month Elevations

- 24-Month Study
  August 2021



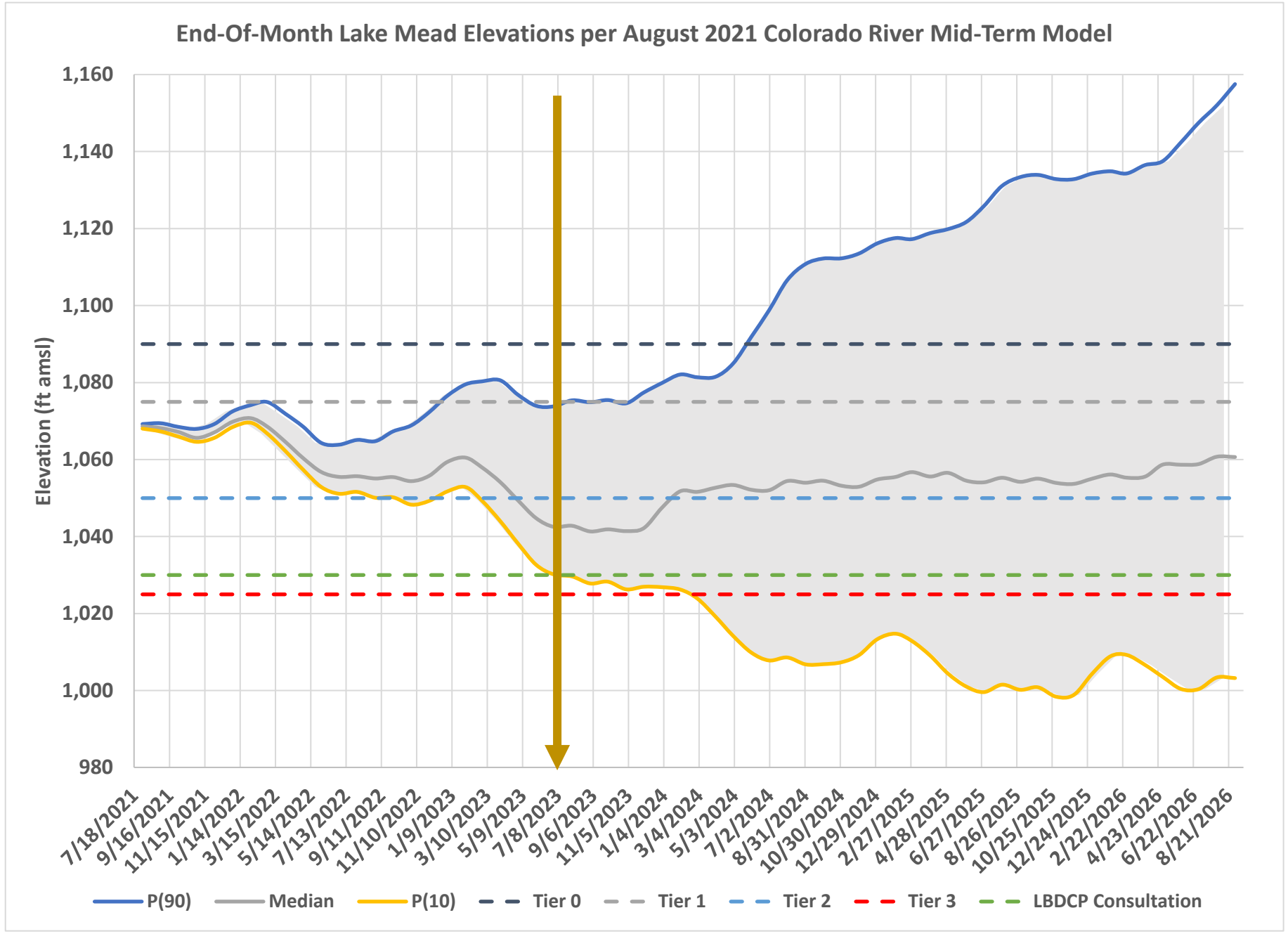
Probability of System Conditions - June 2021 (Observed, Stress Test)

	2021		2022		2023		2024		2025	
Lake Powell Release > 8.23 MAF	**0**	**0**	**0**	**0**	**28**	**16**	**47**	**33**	**55**	**37**
Equalization > 8.23 MAF	0	0	0	0	3	0	9	<1	14	4
Upper Elevation > 8.23 MAF	0	0	0	0	25	16	38	33	41	33
Lake Powell Release = 8.23 MAF	**100**	**100**	**0**	**0**	**0**	**0**	**1**	**0**	**8**	**8**
Equalization = 8.23 MAF	0	0	0	0	0	0	0	0	0	0
Upper Elevation = 8.23 MAF	100	100	0	0	<1	<1	1	<1	5	<1
Mid-Elevation = 8.23 MAF	0	0	0	0	0	0	<1	<1	3	8
Lake Powell Release < 8.23 MAF	**0**	**0**	**91**	**91**	**55**	**72**	**37**	**48**	**23**	**33**
Upper Elevation < 8.23 MAF	0	0	0	0	<1	0	<1	0	0	0
Mid-Elevation = 7.48 MAF	0	0	91	91	55	72	37	48	23	33
Lake Mead Elevation Reduction Tiers	**100**	**100**	**>99**	**>99**	**100**	**99**	**97**	**100**	**91**	**98**
DCP Tier 0 (1090'-1075')	100	100	0	0	3	5	9	3	9	<1
Tier 1 Shortage (1075'-1050')	0	0	>99	>99	74	60	31	30	23	28
Tier 2 Shortage (1050'-1025')	0	0	0	0	23	34	54	65	39	32
Tier 3 Shortage (< 1025')	0	0	0	0	0	0	3	2	20	38

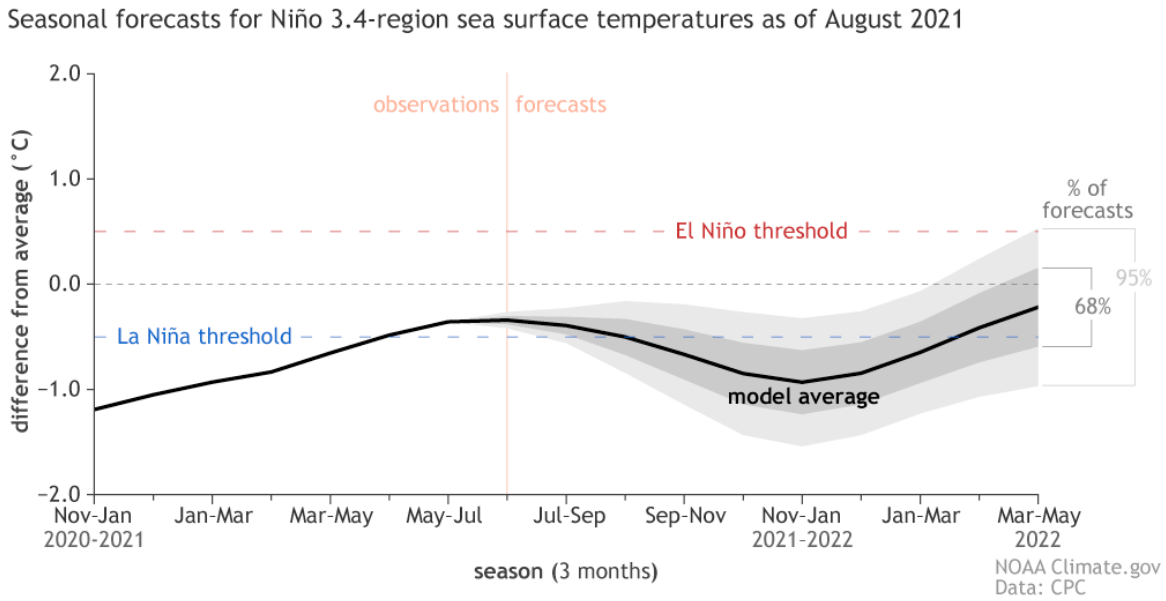
Source: U.S. Bureau of Reclamation

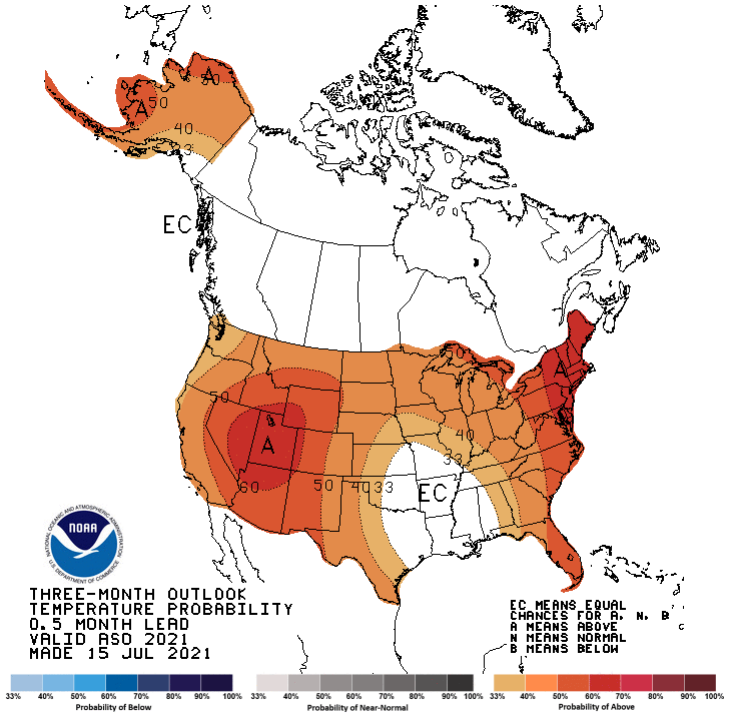
Observed Record: 1906-2018

Stress Test Period: 1988-2018


End-Of-Month Lake Mead Elevations per August 2021 Colorado River Mid-Term Model
Elevation (ft amsl)
1,160
1,140
1,120
1,100
1,080
1,060
1,040
1,020
1,000
980
7/18/2021
9/16/2021
11/15/2021
1/14/2022
3/15/2022
5/14/2022
7/13/2022
9/11/2022
11/10/2022
1/9/2023
3/10/2023
5/9/2023
7/8/2023
9/6/2023
11/5/2023
1/4/2024
3/4/2024
5/3/2024
7/2/2024
8/31/2024
10/30/2024
12/29/2024
2/27/2025
4/28/2025
6/27/2025
8/26/2025
10/25/2025
12/24/2025
2/22/2026
4/23/2026
6/22/2026
8/21/2026
P(90)
Median
P(10)
Tier 0
Tier 1
Tier 2
Tier 3
LBDCP Consultation

ENSO Forecast

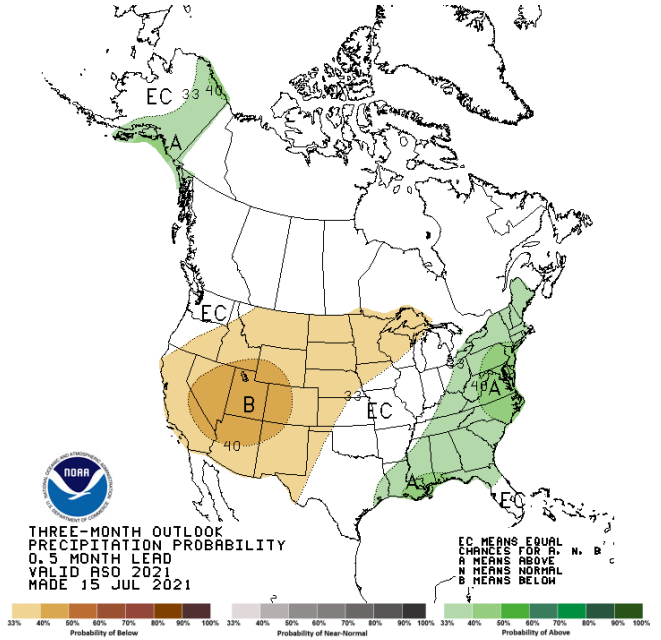




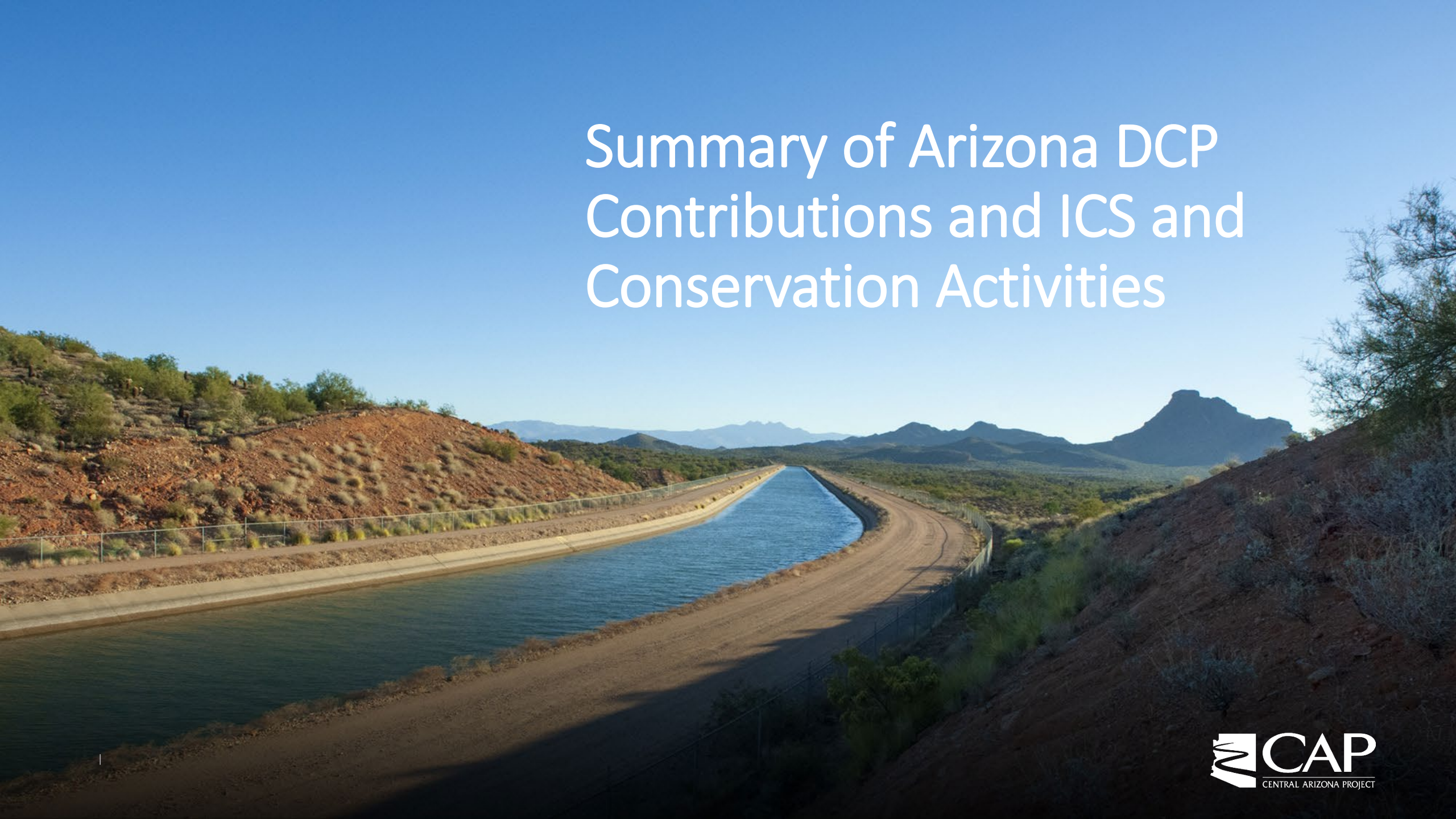
Climate 90-Day Outlooks

Climate Projections for 2022

- ENSO forecast favors La Nina conditions
- 90-day forecast shows above average temperatures and below average precipitation probabilities
- Runoff greater than 7.0 MAF into Powell required to avoid 3,490’ in Powell (min power pool)



Summary of Arizona DCP Contributions and ICS and Conservation Activities



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Arizona Lake Mead Contribution Volumes DCP Implementation & Related Actions		ICS[1]	2019[2] (ac-ft)	2020[3] Tier 0 (ac-ft)	2021[4] Tier 0 (ac-ft)	2022[4,5] Tier 1 (ac-ft)
Arizona LBDCP (Tier 0: 192k ac-ft)	CAWCD EC ICS Creation	EC ICS	24,283	44,310[6]		
	CAWCD Compensated Conservation	EC ICS		3,124[6,7]		
	CAWCD DCP ICS Creation	DCP ICS			57,000	125,500
	CAWCD Excess Water[8]		119,942	133,174	146,392	66,500
	LBDCP Total		**144,225**	**180,608**	**203,392**	**192,000**
Additional CAWCD Conservation	CAWCD Compensated Conservation	EC ICS			3,500	
	CAWCD Total				**206,892**	**192,000**
Arizona DCP Mitigation Offset (400k ac-ft total)	GRIC - Reclamation	EC ICS	100,000			
	GRIC - AWBA	EC ICS	17,000	33,000		
	GRIC[9]	EC ICS		50,000	40,000	73,950
	CRIT System Conservation			50,000	50,000	50,000
	Total		**117,000**	**133,000**	**90,000**	**123,950**
Reclamation DCP	FMYN System Conservation			10,000	13,933	13,933
	MVIDD System Conservation			6,137	6,925	6,925
	GRIC System Conservation				40,000	
	242 Wellfield Expansion					11,000
	Total		**0**	**16,137**	**60,858**	**31,858**
Additional Arizona ICS Creation	CRIT	EC ICS	6,274	3,736	4,685	4,685
	Total		**6,274**	**3,736**	**4,685**	**4,685**
Pilot System Conservation Program (PSCP)	Bullhead City		306	349	360	360
	CRIT		26,805			
	FMYN		13,683			
	Total		**40,794**	**349**	**360**	**360**
Total Arizona Lake Mead Contributions			**308,293**	**333,830**	**362,795**	**352,853**

Notes:

[1] ICS Volumes reflect creation volumes contributed to Lake Mead and do not reflect account balances after losses and assessments.

[2] 2019 reflects proactive actions prior to DCP execution and full implementation in 2020.

[3] 2020 reflects the first full year of DCP implementation of Lake Mead contributions and related actions.

[4] Values reflect estimated volumes, subject to final accounting.

[5] Includes pending and projected projects and subject to creation and accumulation limits.

[6] Actual Jan. 1 Lake Mead elevation was above 1,090'; therefore this ICS will remain as EC ICS (LBOps III.E.3).

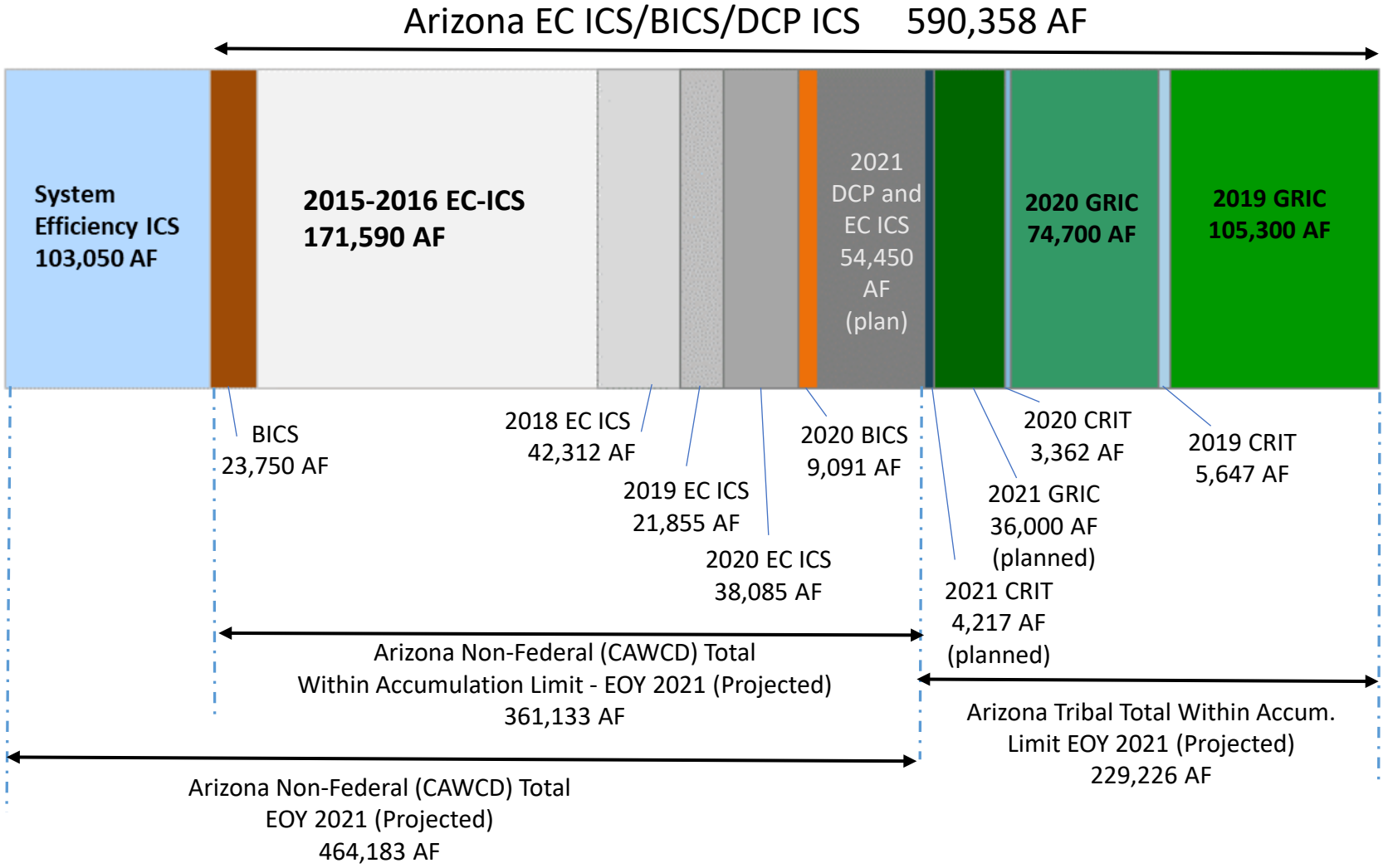
[7] 3,500 AF was conserved per the agreement between CAWCD and MDWID; per history of use provisions in ICS Exhibit R, 3,124 AF counts as ICS creation.

[8] Volume will vary based on available Colorado River water, on-river use forecast, and CAP operations.

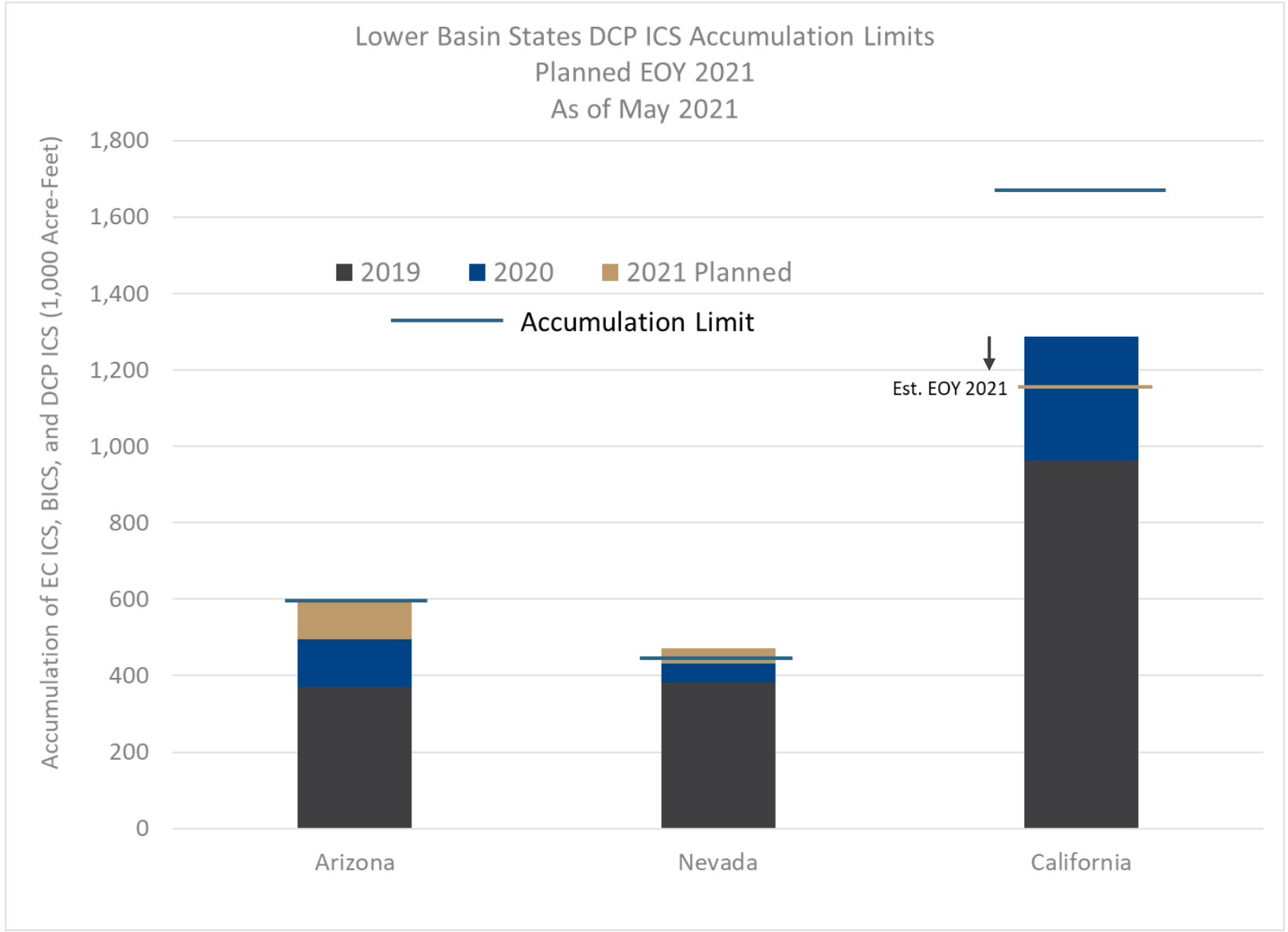
[9] GRIC to fully utilize the Arizona ICS Accumulation Capacity in 2021, up to 45,000 ac-ft is in GRIC's ICS Creation Plan.

Arizona ICS Accumulation – Planned EOY 2021

- Arizona approaching DCP ICS Accumulation Limit of 600 KAF
- By EOY 2021, CAWCD projected to have created over 450 KAF of ICS credits
- Arizona Tribal ICS projected to be close to 230 KAF by EOY 2021



ICS and Accumulation Limits



- ICS plans through 2021:
  - Arizona will approach shared-capacity limit
  - Nevada may exceed shared-capacity limit
  - California is below limit
- Sharing Agreement reached between the 3 Lower Basin states to share Accumulation Limit capacity
- ICS creation activity in 2022 expected to move Arizona ICS and potentially Nevada ICS into California's Shared Space

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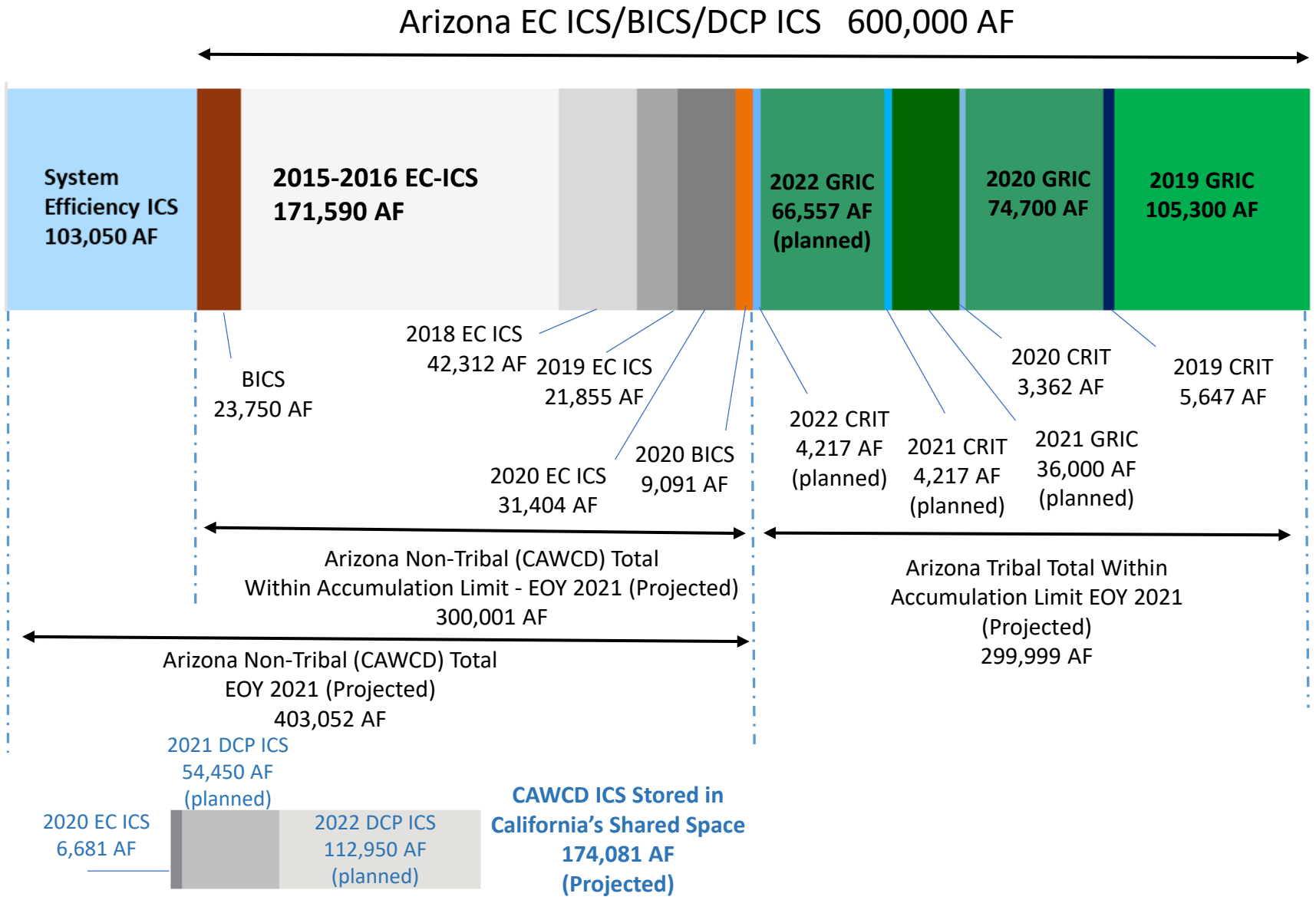
Arizona ICS Accumulation – Planned EOY 2022

- Arizona projected to maximize its DCP ICS Accumulation Limit of 600 KAF
- Tribal ICS planned in 2022 expected to fill the 300 KAF Accumulation Limit capacity identified in the Arizona ICS Framework Agreement
- With planned 2021 and 2022 ICS creation, CAWCD will likely need to:
  - Evacuate Accumulation Limit space within Arizona
  - Store ICS credits in California's Shared Space (Sharing Agreement)
- California can claim their Shared Space back; however it is still beneficial for CAWCD to be able to store ICS credits here



2022 CAP System Conservation Plans

- Supplemental guidance on rate setting regarding the collection of Fixed OM&R on System Conservation provides for stakeholder input on rate and water supply impacts

- Fort McDowell Yavapai Nation (FMYN) and Reclamation CAP System Conservation Project
  - Agreement was executed September 11, 2020 for System Conservation created in 2021 and 2022
  - Estimated 2022 conservation volume = 13,933 af
  - FMYN has leased or conserved its 13,933 af CAP entitlement in recent years, and qualifies as having a history of use

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2022 CAP System Conservation Plans – cont.

- Positive water supply impact through creation of System Conservation in Lake Mead
  - Part of the US obligation to provide 100 KAF of DCP Contributions

- Increased O&M rate impact projected to be ~$1.20/AF for CAWCD customers

- Stakeholder feedback requested by CAWCD Board
  - Please use “raise hand” feature for WebEx participants
  - Please send comments to questions@cap-az.com
  - Comments taken now and at the end of this briefing

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Outlook for the 2022 CAP Delivery Supply

Don Crandall – Water Control Manager

CAP Annual Operating Plan Timeline

CAP Rate Letter Schedule Request	Jun 30, 2021
Annual Water Users Briefing	**Aug 25, 2021**
Water Delivery Requests	Oct 1, 2021
Final Water Schedules	Nov 15, 2021

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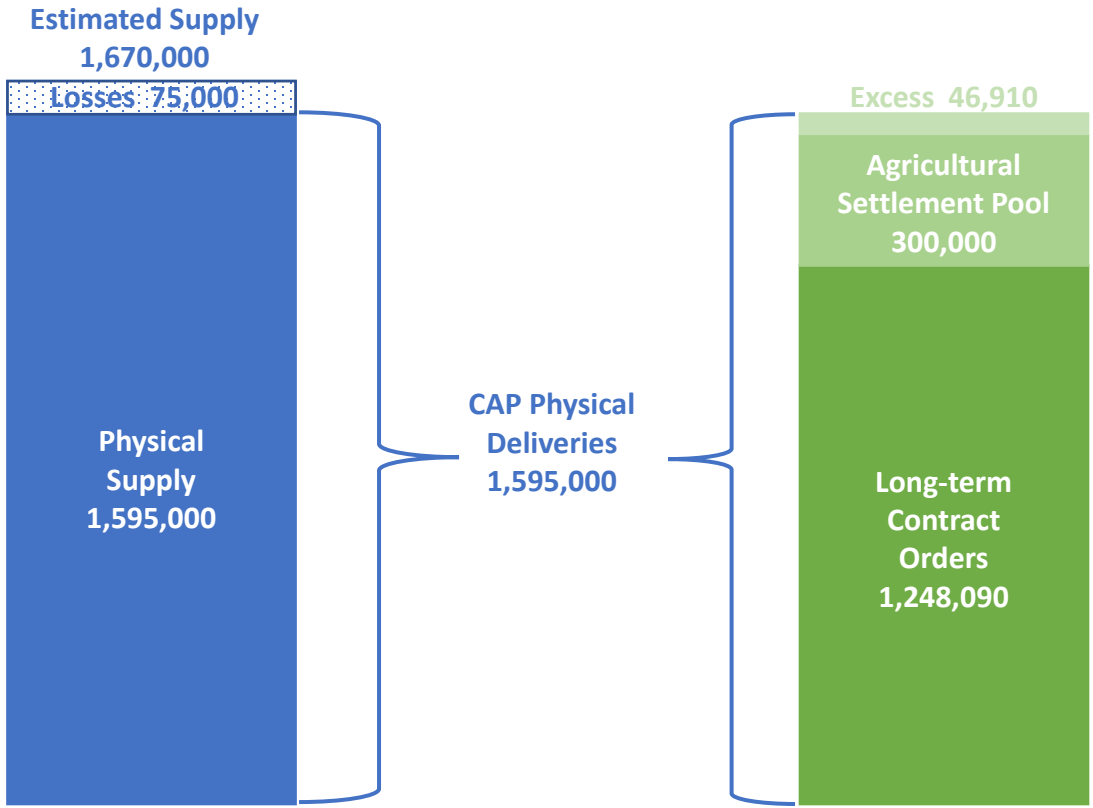
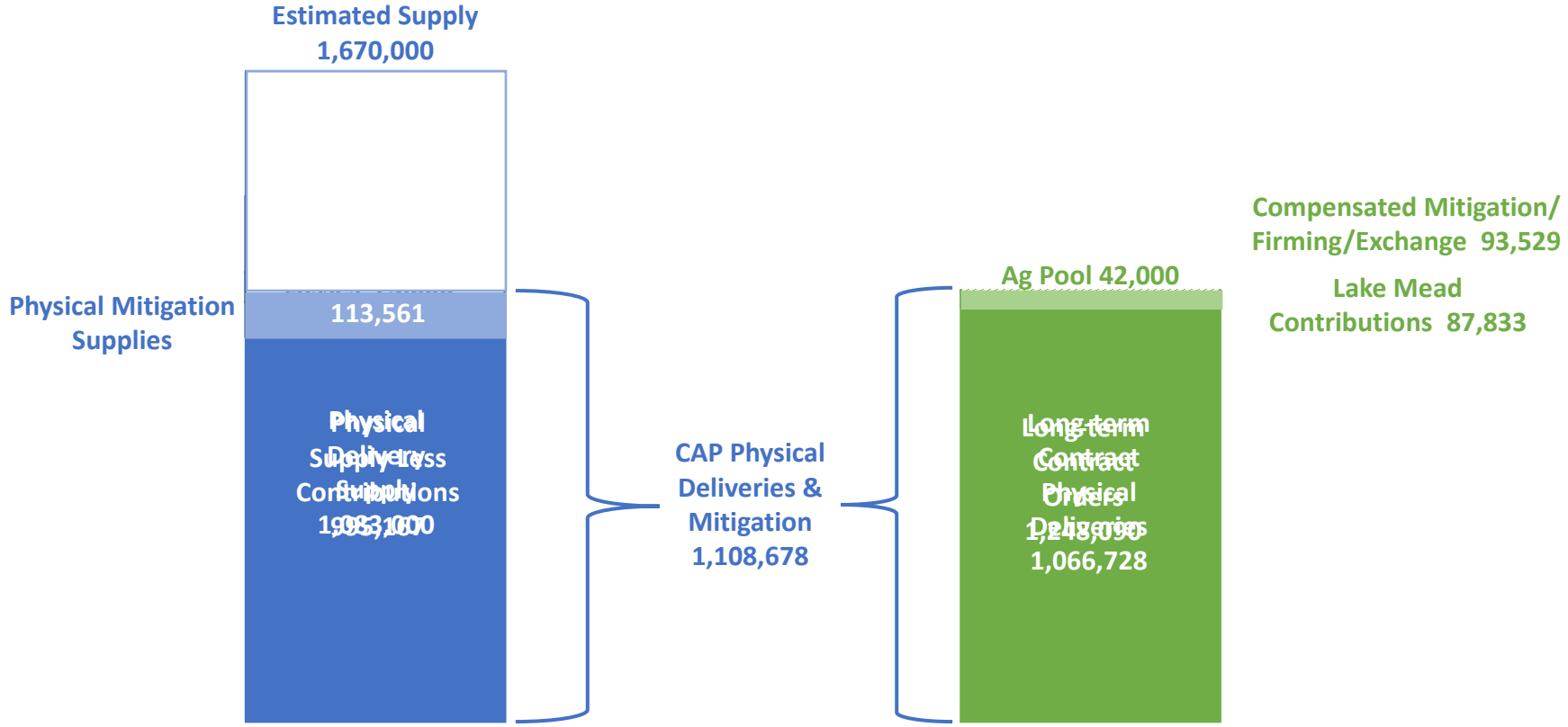
CAP Delivery Supply Outlook – Normal Year



CAP Delivery Supply Outlook – Mitigation

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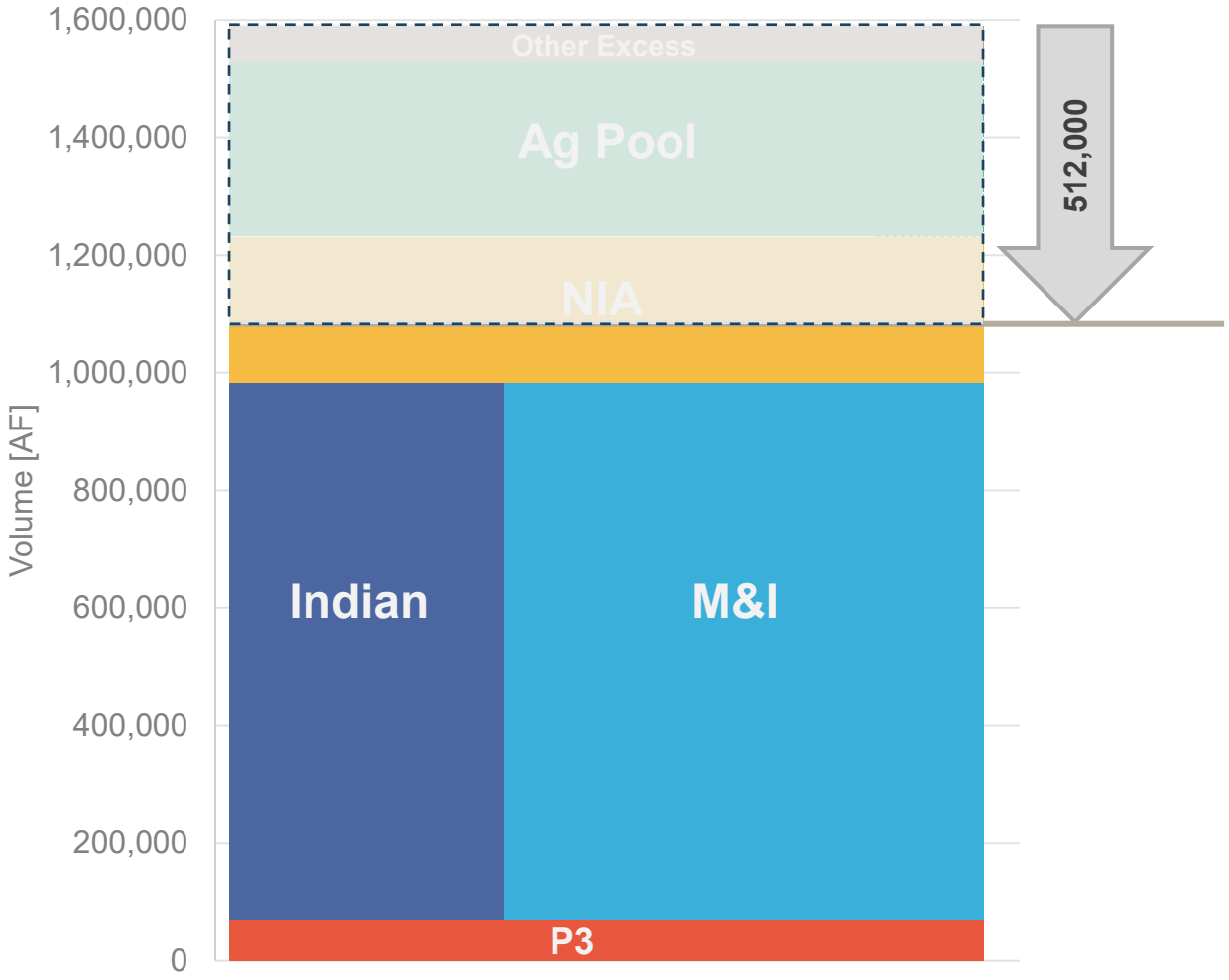
dcrandall@cap-az.com

CAP Priorities—2022 Tier 1 Shortage



- 512,000 AF* Reduction/Contribution
  - 320,000 AF per 2007 Guideline
  - 192,000 AF per LBDCP
- Pre-Mitigation Impacts
  - 100% Reduction to Ag Pool
  - ~63% Reduction to NIA Pool

* P5/6 reductions accounted for separately.

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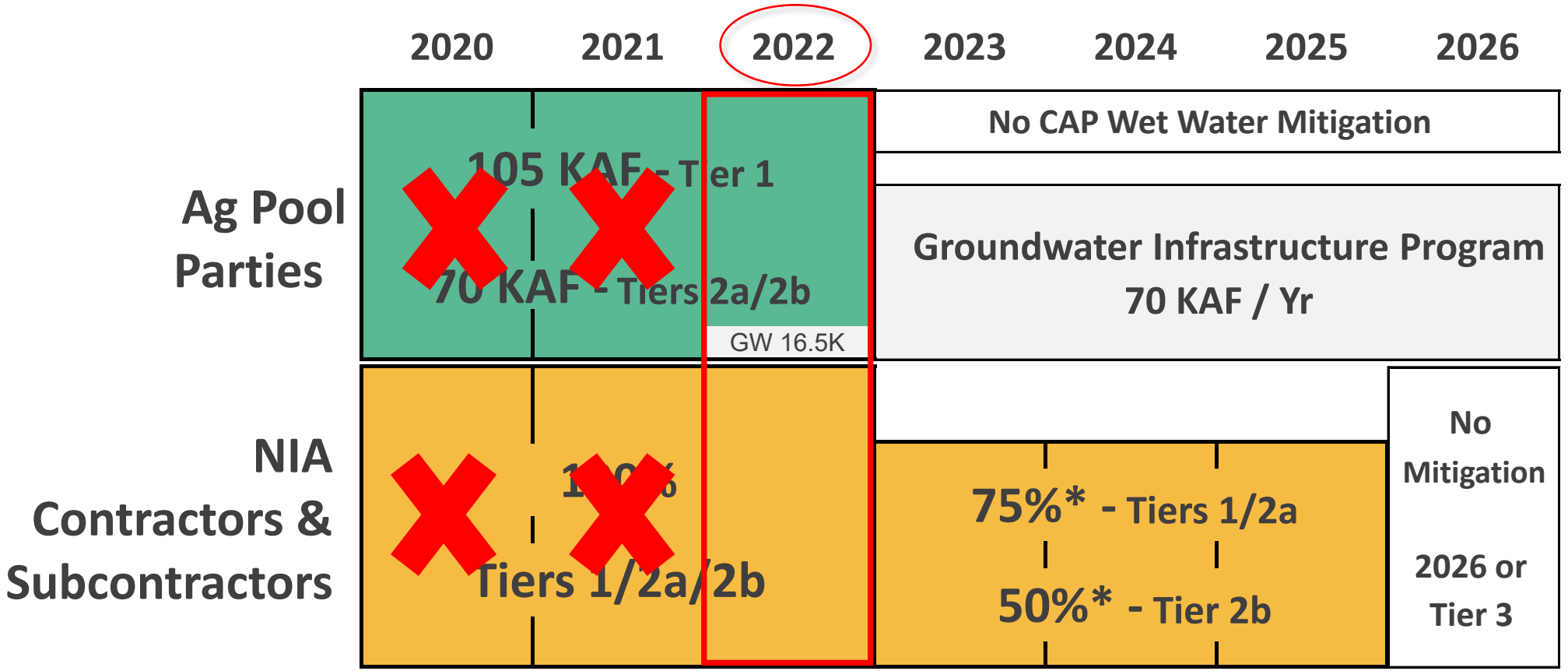
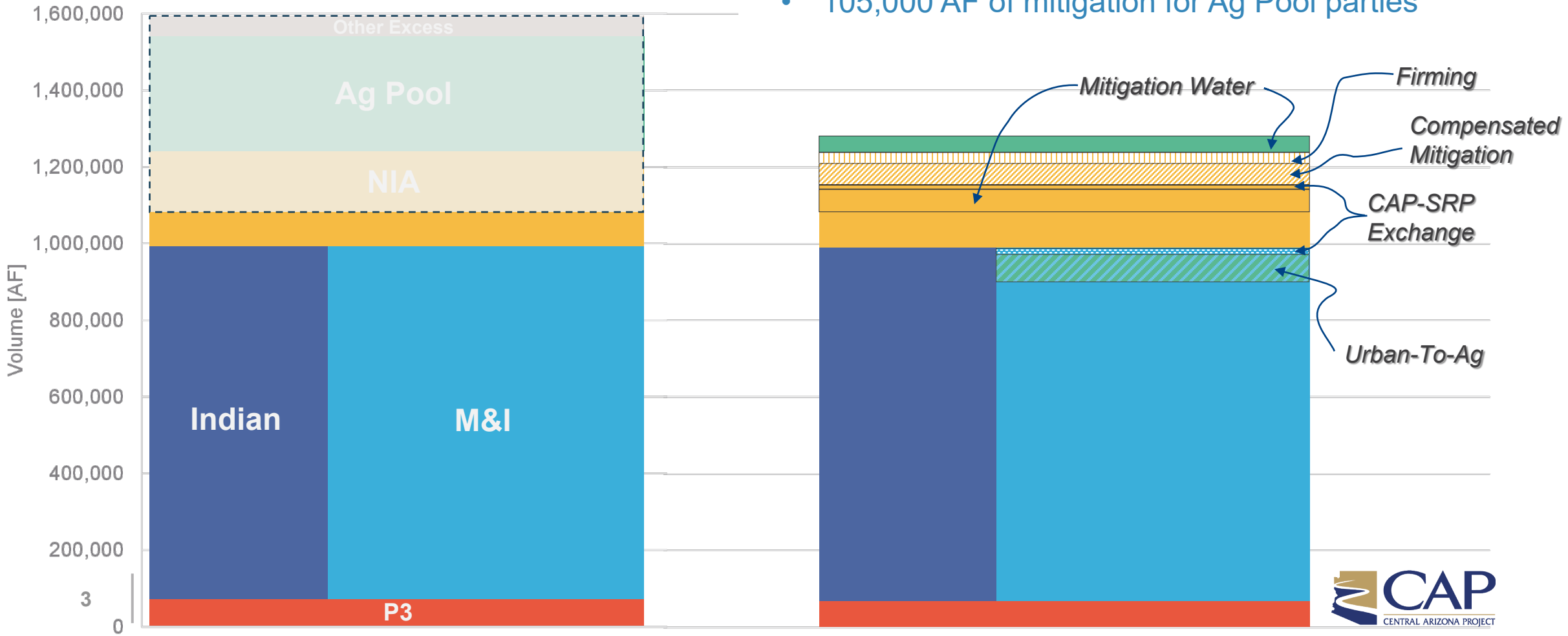
Mitigation Commitments



2022 – Tier 1 Shortage

- Pre-Mitigation Impacts
  - 100% Reduction to Ag Pool
  - ~63% Reduction to NIA Pool
- Mitigation Commitments
  - 100% mitigation for NIA pool
  - 105,000 AF of mitigation for Ag Pool parties

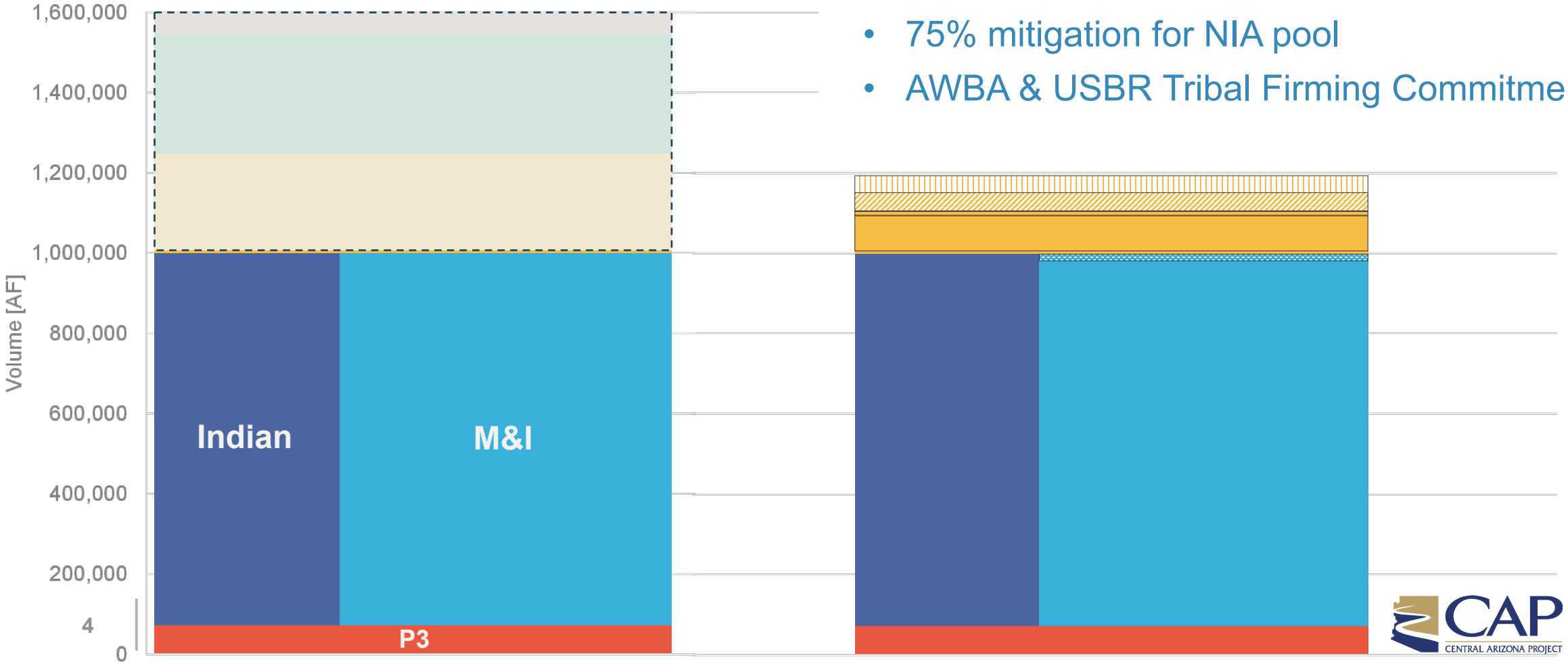


EXAMPLE – Near-Term Tier 2a Shortage

- Estimated Pre-Mitigation Impacts
  - 100% Reduction to Ag Pool
  - ~97% Reduction to NIA Pool

DRAFT, for illustration only.
Based on estimated 2023 orders

- 2023-2025 Mitigation Commitments
  - 75% mitigation for NIA pool
  - AWBA & USBR Tribal Firming Commitments



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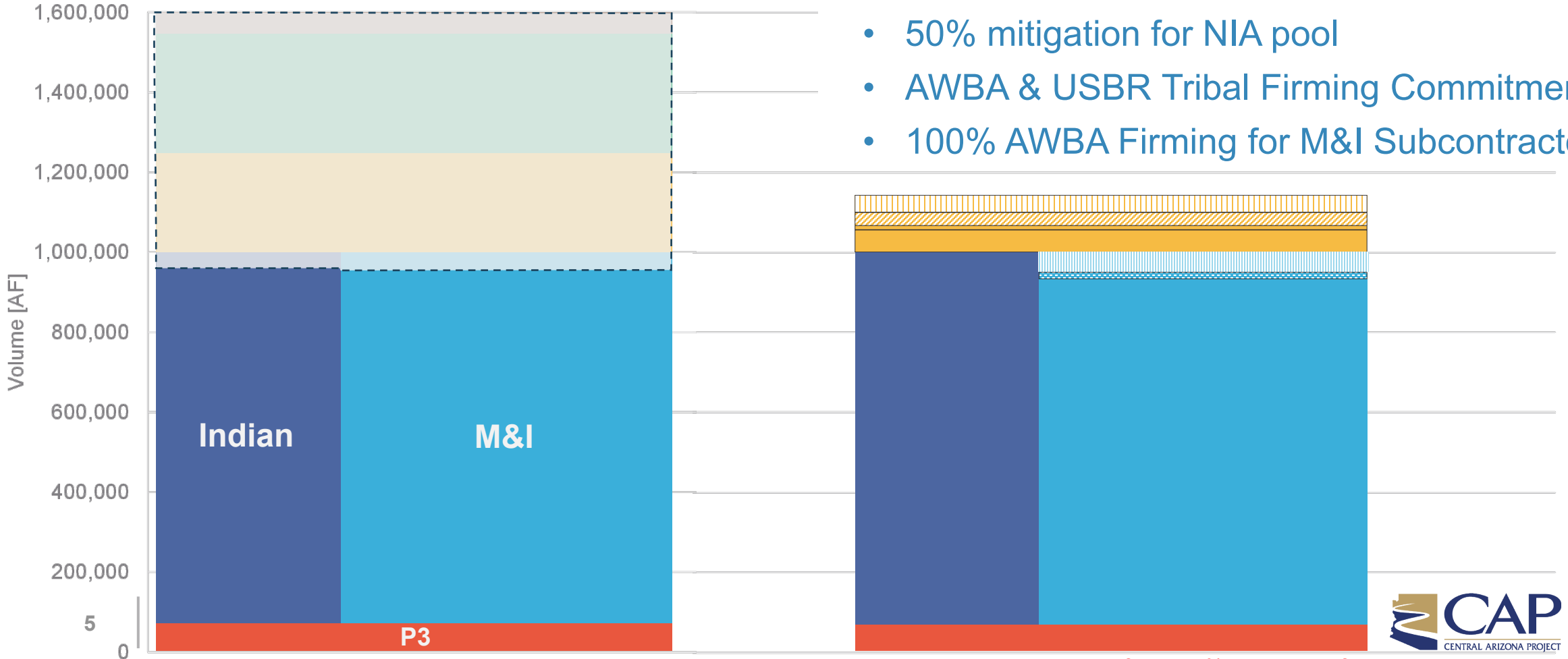
EXAMPLE – Near-Term Tier 2b Shortage

- Estimated Pre-Mitigation Impacts
  - 100% Reduction to Ag Pool
  - 100% Reduction to NIA Pool
  - ~4% Reduction to Indian Pool
  - ~5% Reduction to M&I Pool

DRAFT, for illustration only.
Based on estimated 2023 orders

- 2023-2025 Mitigation Commitments
  - 50% mitigation for NIA pool
  - AWBA & USBR Tribal Firming Commitments
  - 100% AWBA Firming for M&I Subcontractors



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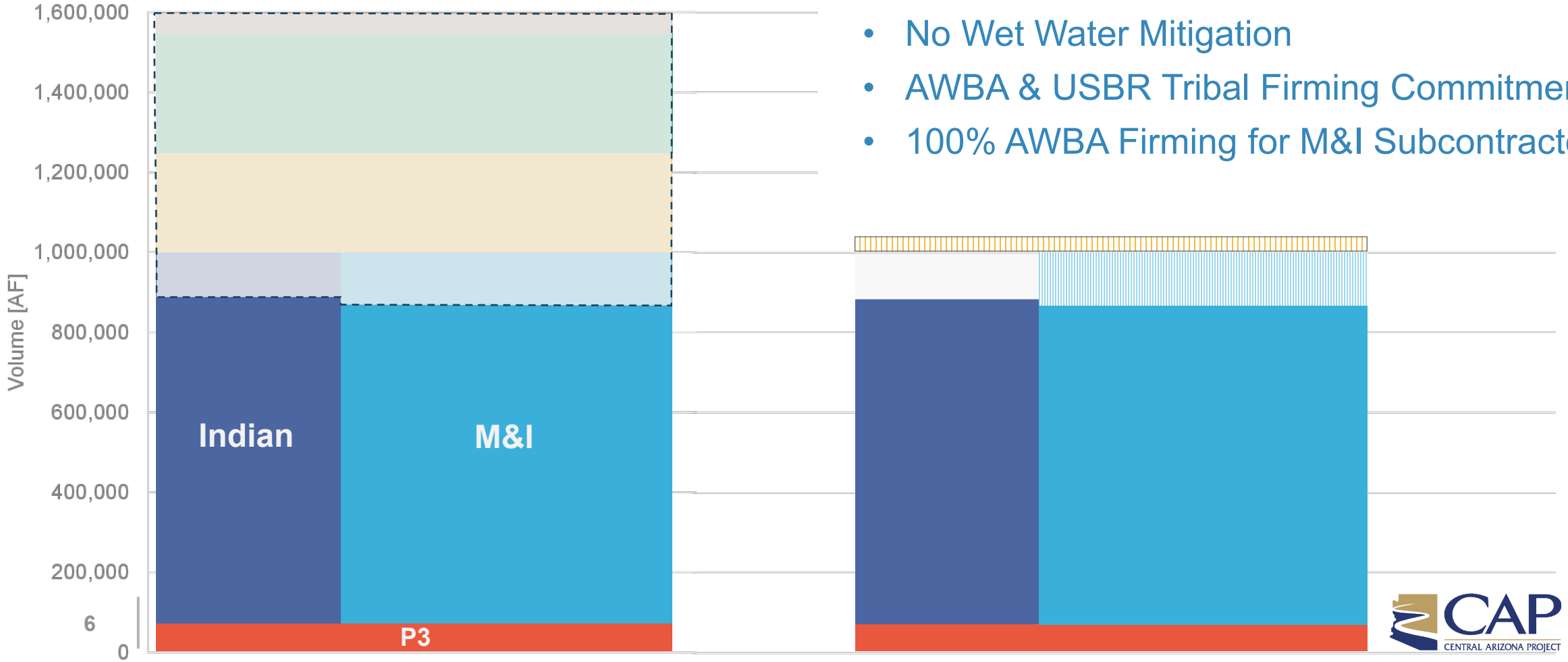
Note: This slide was corrected to reflect 100% Mitigation of the Indian Priority supply

EXAMPLE – Near-Term Tier 3 Shortage

- Estimated Pre-Mitigation Impacts
  - 100% Reduction to Ag Pool
  - 100% Reduction to NIA Pool
  - ~12% Reduction to Indian Pool
  - ~13% Reduction to M&I Pool

DRAFT, for illustration only.
Based on estimated 2023 orders

- 2023-2025 Mitigation Commitments
  - No Wet Water Mitigation
  - AWBA & USBR Tribal Firming Commitments
  - 100% AWBA Firming for M&I Subcontractors



BRIAN YOUNG

2021 Annual Water Users Meeting

2021/2022 Energy Costs

Current Market Conditions

- Recent events in the energy markets have caused forward and daily energy prices to be extremely elevated from a year earlier:
  - 2021 & 2022 forwards up >100%
  - 2023 and later forwards up >70%
- Retirements of large dispatchable generation facilities and increased reliance on renewable resources have reduced capacity margins in the region and made the likelihood of major market events much greater.
- Most utilities are very cautious about making forward sales and prices are much more volatile.
- Very unlikely to see a return to the very low pricing of previous years resulting from excess generation capacity and natural gas supply.

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2021 CAP Energy Outlook

- We entered 2021 with approximately 70% of estimated pumping energy purchased prior to large market price increases.
- Pre-year estimate of 2021 energy costs were estimated to be right at the 2021 Energy Rate of $56/AF.
- Since the start of this year we have been able to make extremely high-priced sales during major energy spike events and summer forward products through load shaping or shifting pumping:
  - February Texas event ~$3M sales in one week
  - June heatwave >$3M sales in less than one week
  - Summer forward sales >$7M

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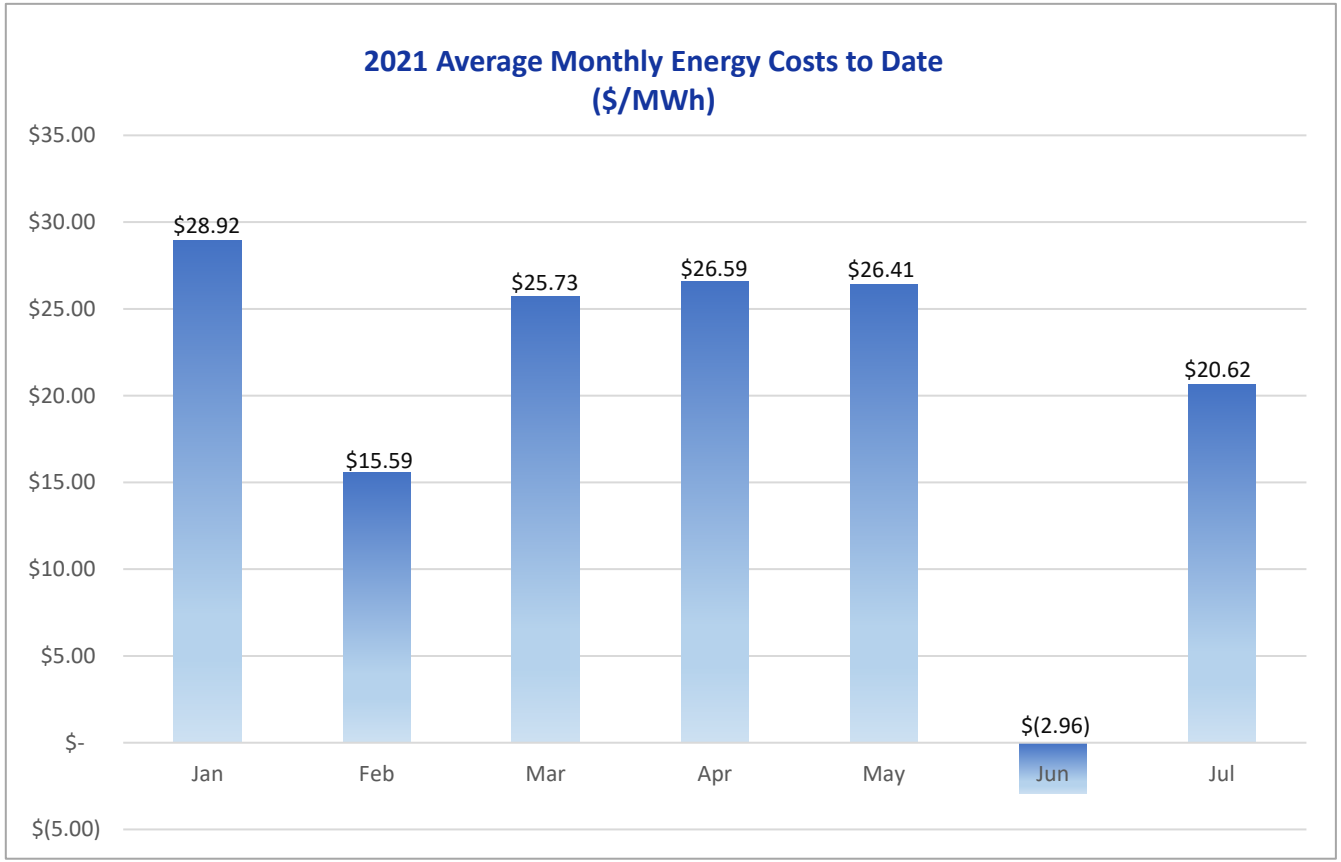

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2021 CAP Energy Costs

- The revenue from the high-priced sales have more than offset our higher energy purchases made year to date.
- Current estimate for total year energy cost are $3/AF-$4/AF below the pre-year projection of $56/AF.
- **While there is some risk for the remainder of the year, we expect to come in at or below the 2021 Energy Rate of $56/AF despite the extreme increase in market prices this year.**

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2022 CAP Energy Outlook

- We have purchased approximately 70% of estimated pumping energy anticipated for 2022 prior to large market price increases.
- Pre-year estimate of 2022 energy costs are estimated to be about $1/AF over the 2022 Energy Rate of $56/AF.
- Our position and market prices for 2022 look very similar to the start of 2021.
- **We anticipate that we will likely end 2022 within a few dollars of the 2022 Energy Rate regardless of market volatility.**

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CAP Annual Water Users Briefing – CAP Website Update

Crystal Thompson, Communications Manager

August 25, 2021

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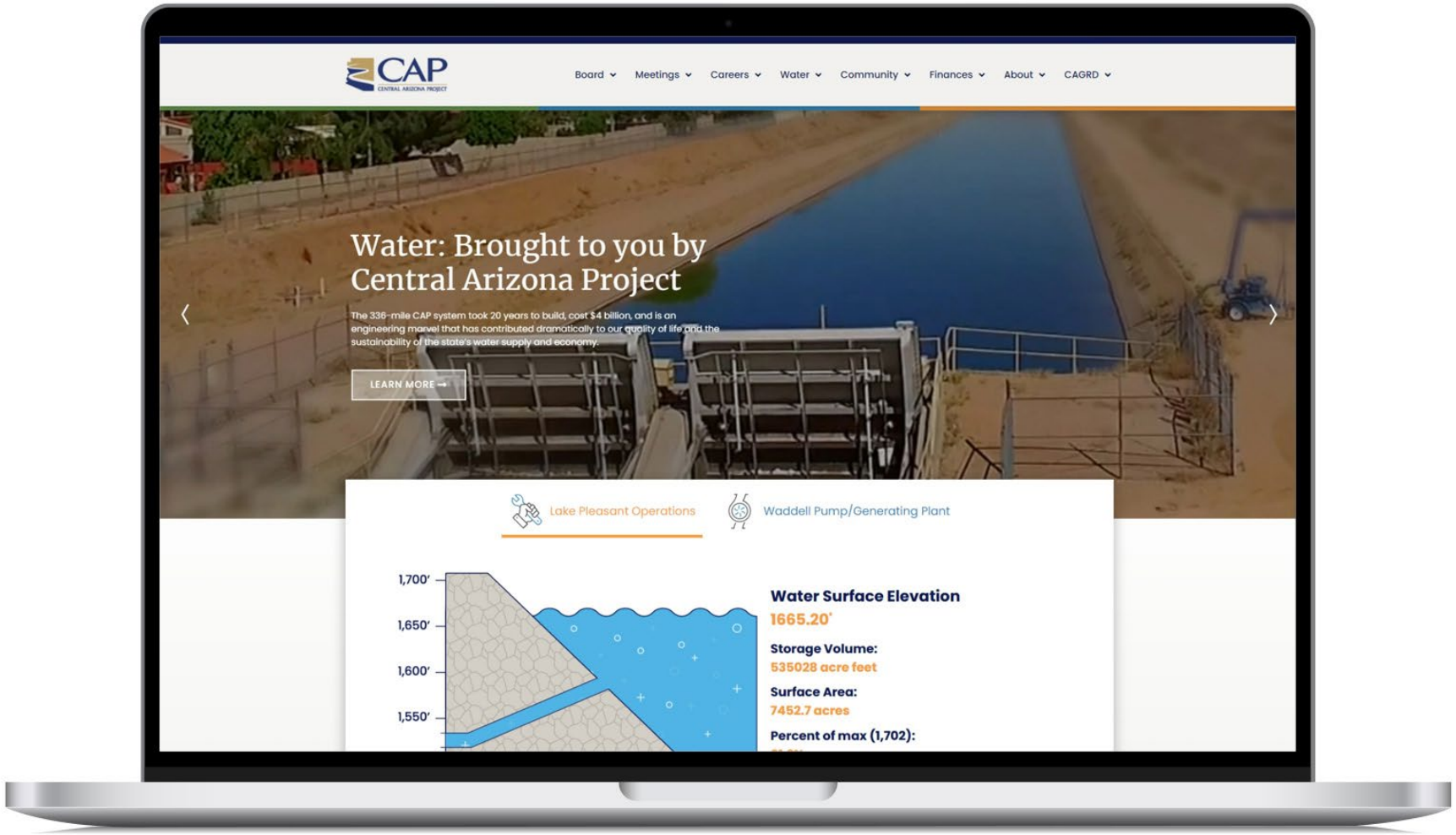

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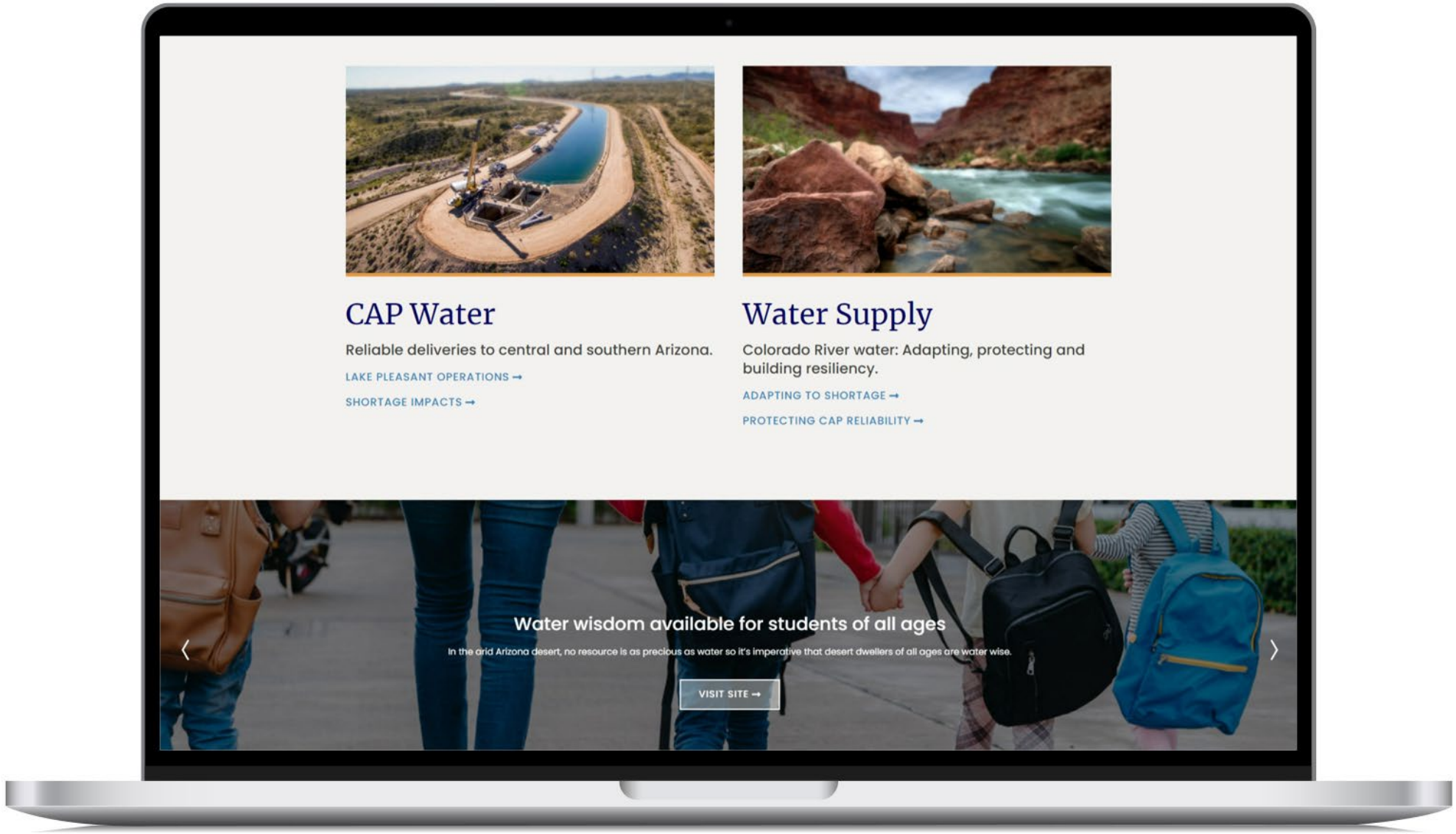

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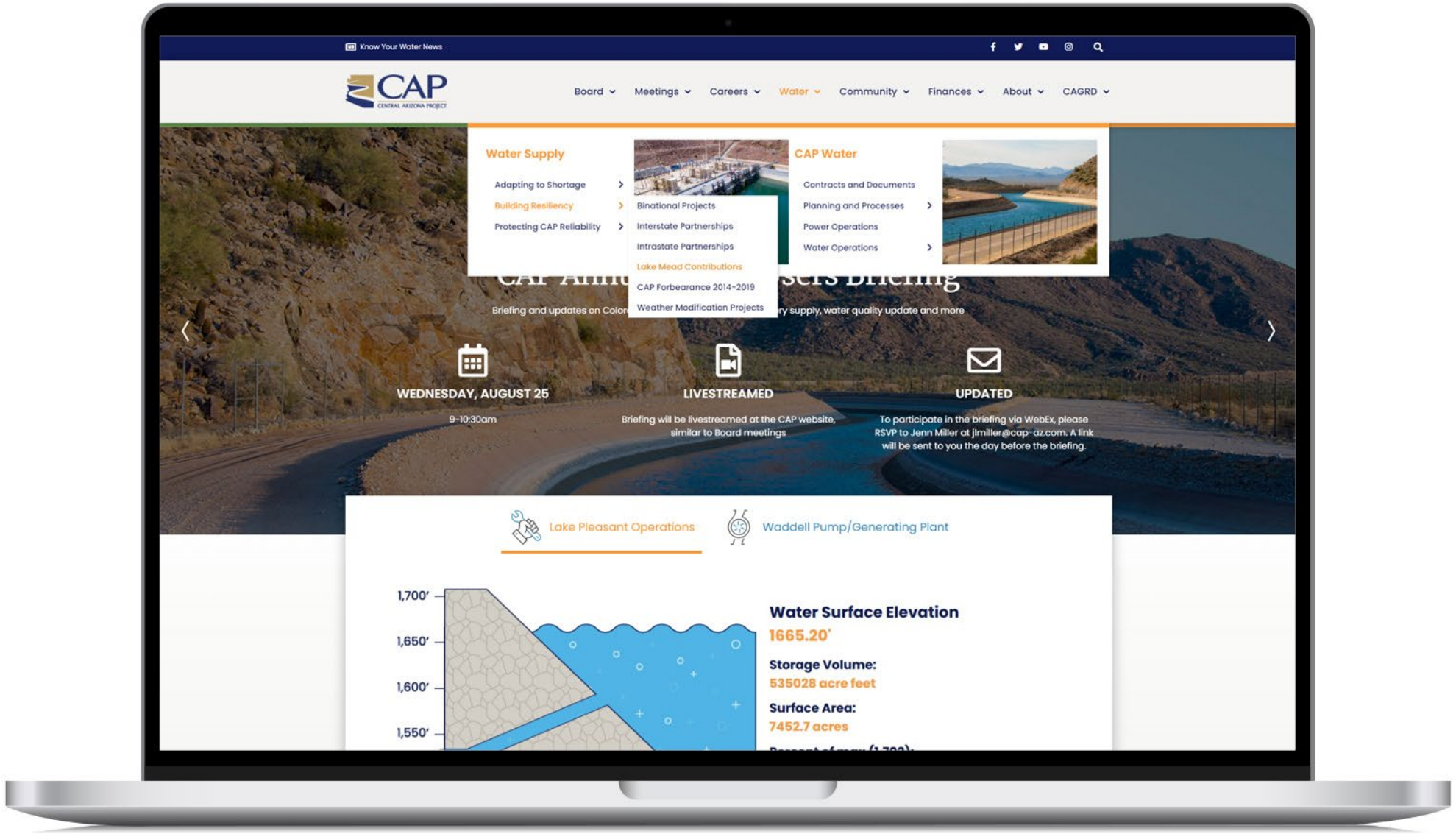

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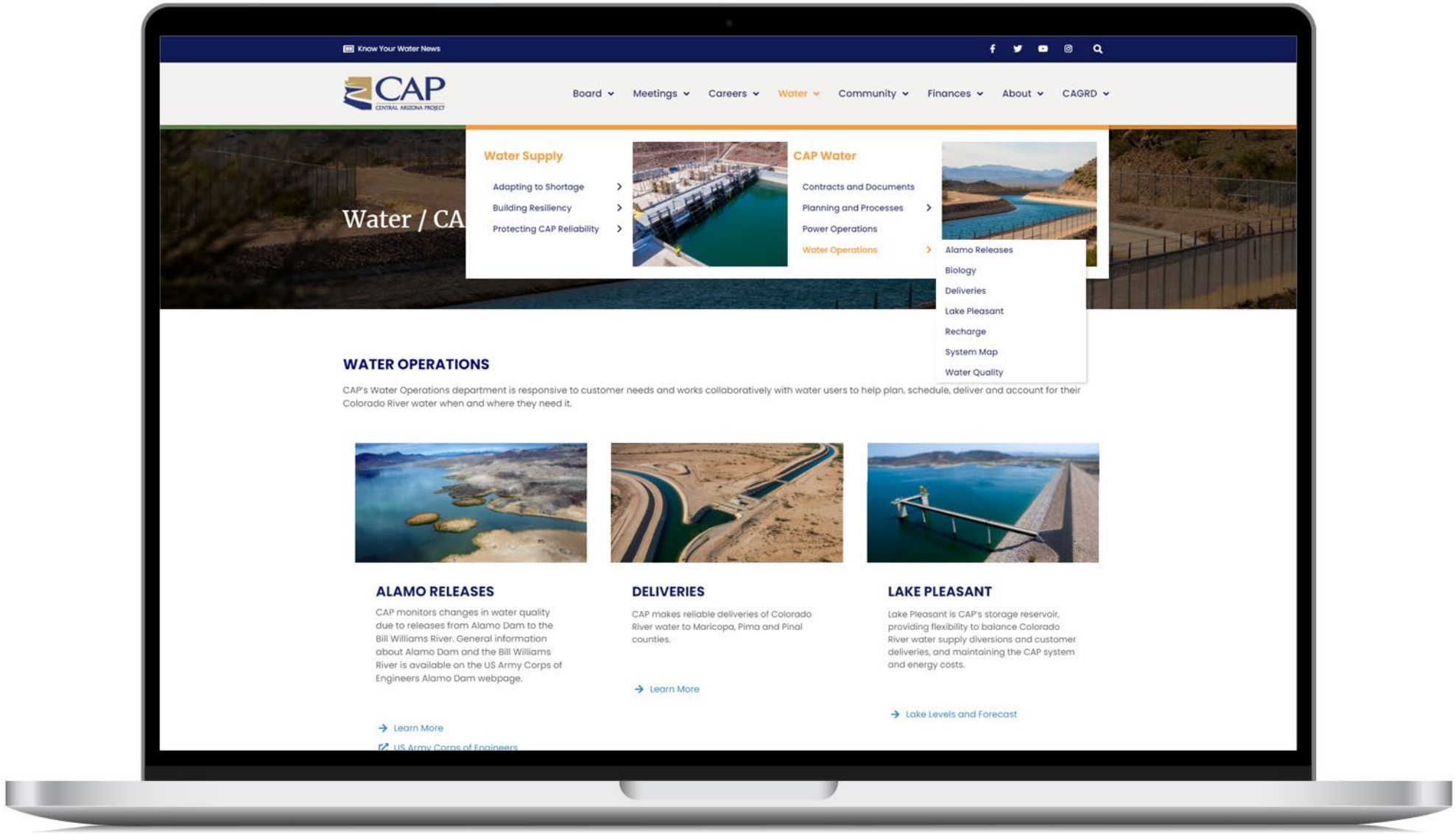

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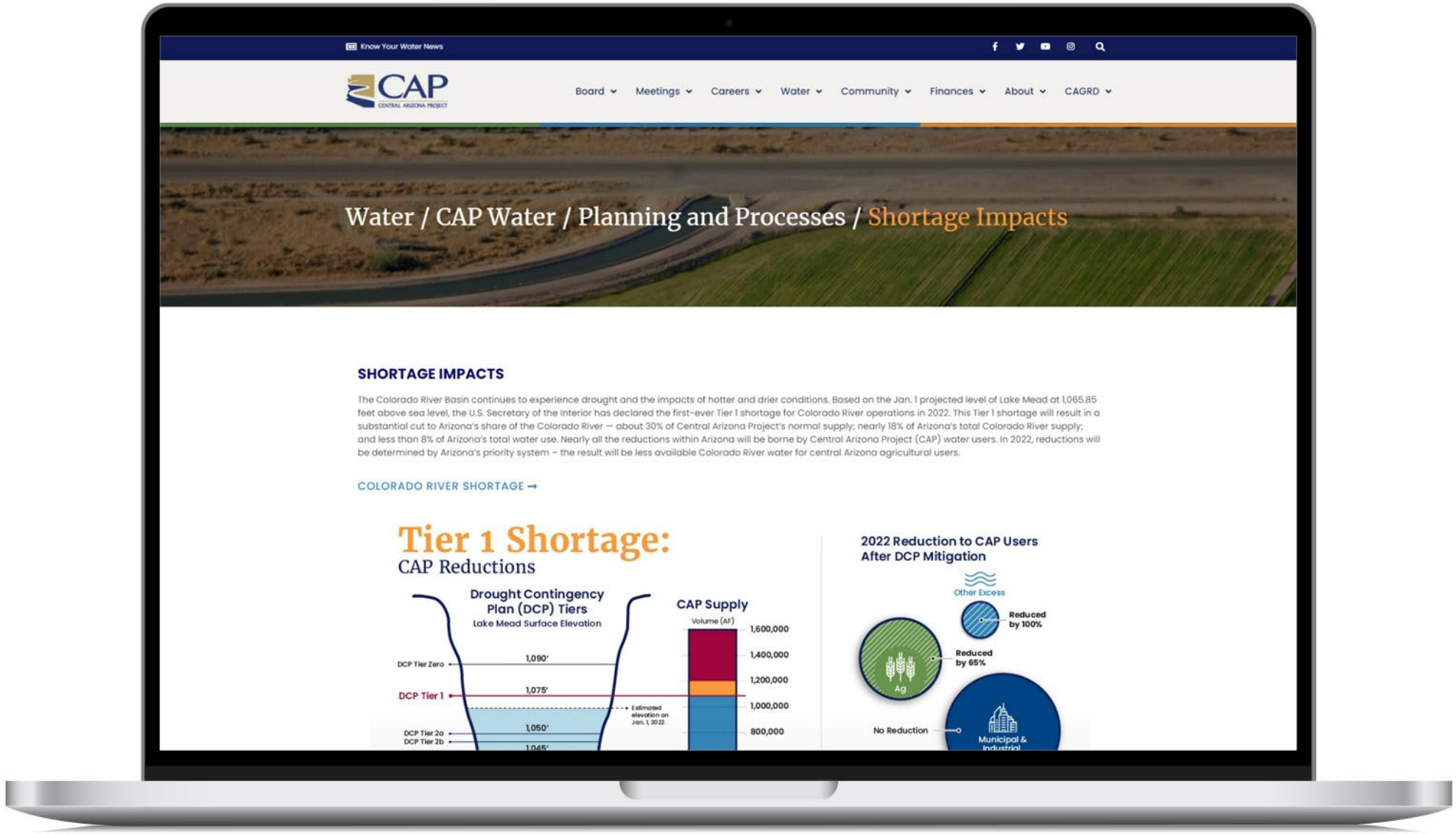

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Water Quality and Biology Update

Scott Bryan, Senior Biologist
Phillip Pagels, Water Transmission Supervisor

CAP Water Quality

- System Use Agreement (SUA)
  - Expand CAP Water Quality Program
  - Establish Uniform Water Quality Standards
  - Improve Stakeholder Relations
  - Improve Data Sharing
- Alamo Dam Update
- Sediment

Expanded Water Quality Program

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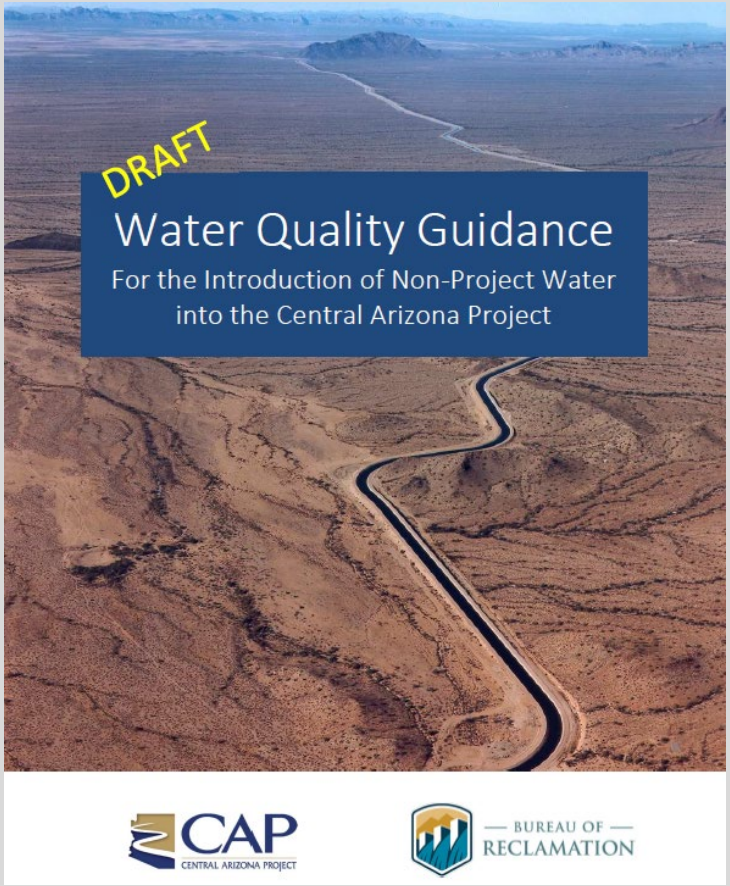
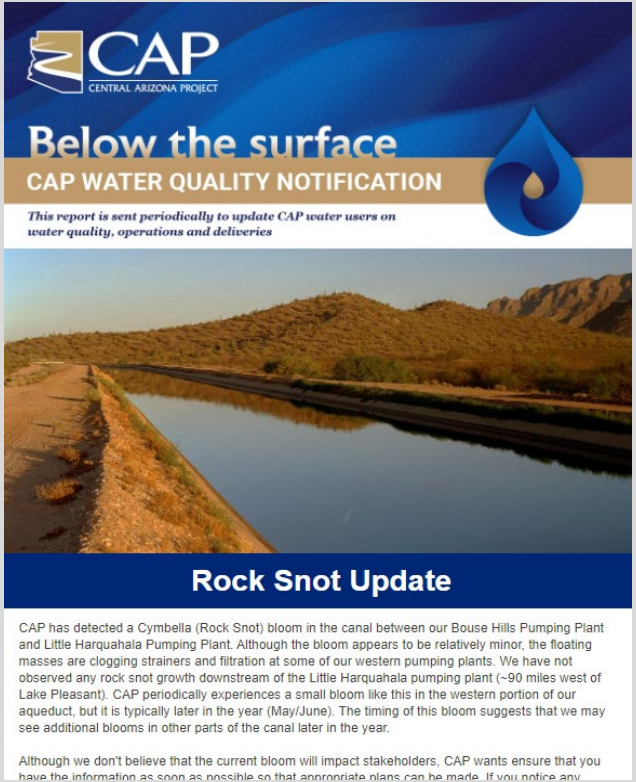
Water Quality Guidance Document

***Table A-1. List** of CAP Priority Constituents and their respective Introduction and Delivery standards. Reporting Limits (or MRLs) are derived from a survey of ADHS licensed laboratories. Reporting limits that are lower than published values may be used, but higher values will not be accepted. Introduction and Delivery Standards were determined as described in Section 2.3.*

Constituent	Units	Reporting Limit	Introduction Standard	Delivery Standard
General Constituents				
Dissolved Oxygen	mg/L		Narrative	
pH	Units	2	6.5 - 9.5	
Temperature	°F		Narrative	
CAP Priority Constituents				
Alkalinity (CaCO3 units)	mg/L	20	250	170
Alpha, Gross	pCi/L	3	15	6
Aluminum, Total	µg/L	50	50	50
Ammonia Nitrogen	mg/L	0.5	0.5	0.5
Antimony	µg/L	1	6	2
Arsenic	µg/L	2.5	10	5
Barium, Total	µg/L	2.5	2000	230
Beryllium	µg/L	1	4	1
Beta, Gross	pCi/L	4	50	16
Boron	mg/L	0.2	1	0.5
Bromide	µg/L	50	650	125
Cadmium	µg/L	1	5	1
Calcium, Total	mg/L	2	200	160
Chloride	mg/L	10	450	170
Chromium	µg/L	3	100	10
Cobalt, Total	µg/L	2	2	2
Copper, Dissolved	µg/L	10	64	64
Fluoride	mg/L	0.5	4	0.7
Hexavalent Chromium	µg/L	0.05	16	3
Iron, Dissolved	mg/L	0.02	1	0.1
Lead	µg/L	2.5	15	3
Manganese, Total	µg/L	20	250	27
Mercury	mg/L	0.2	2	0.5



Stakeholder Relations



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Below the surface

CAP WATER QUALITY NOTIFICATION

This report is sent periodically to update CAP water users on water quality, operations and deliveries

Rock Snot Update

CAP has detected a Cymbella (Rock Snot) bloom in the canal between our Bouse Hills Pumping Plant and Little Harquahala Pumping Plant. Although the bloom appears to be relatively minor, the floating masses are clogging strainers and filtration at some of our western pumping plants. We have not observed any rock snot growth downstream of the Little Harquahala pumping plant (~90 miles west of Lake Pleasant). CAP periodically experiences a small bloom like this in the western portion of our aqueduct, but it is typically later in the year (May/June). The timing of this bloom suggests that we may see additional blooms in other parts of the canal later in the year.

Although we don't believe that the current bloom will impact stakeholders, CAP wants ensure that you have the information as soon as possible so that appropriate plans can be made. If you notice any

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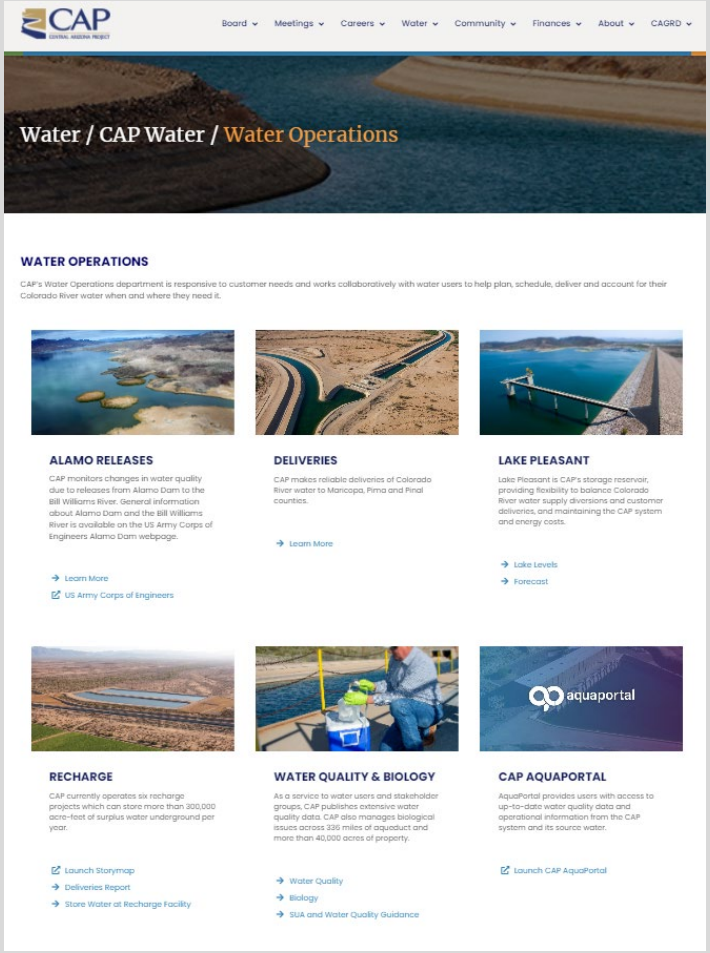
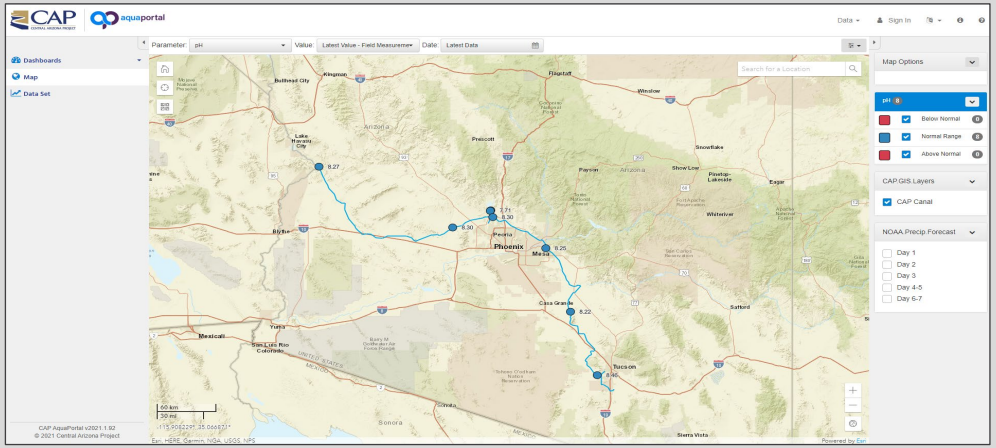
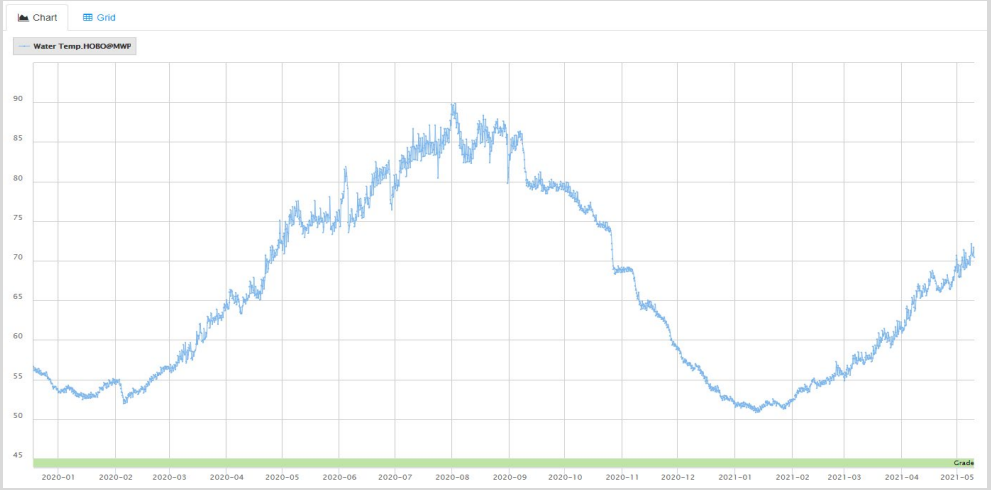
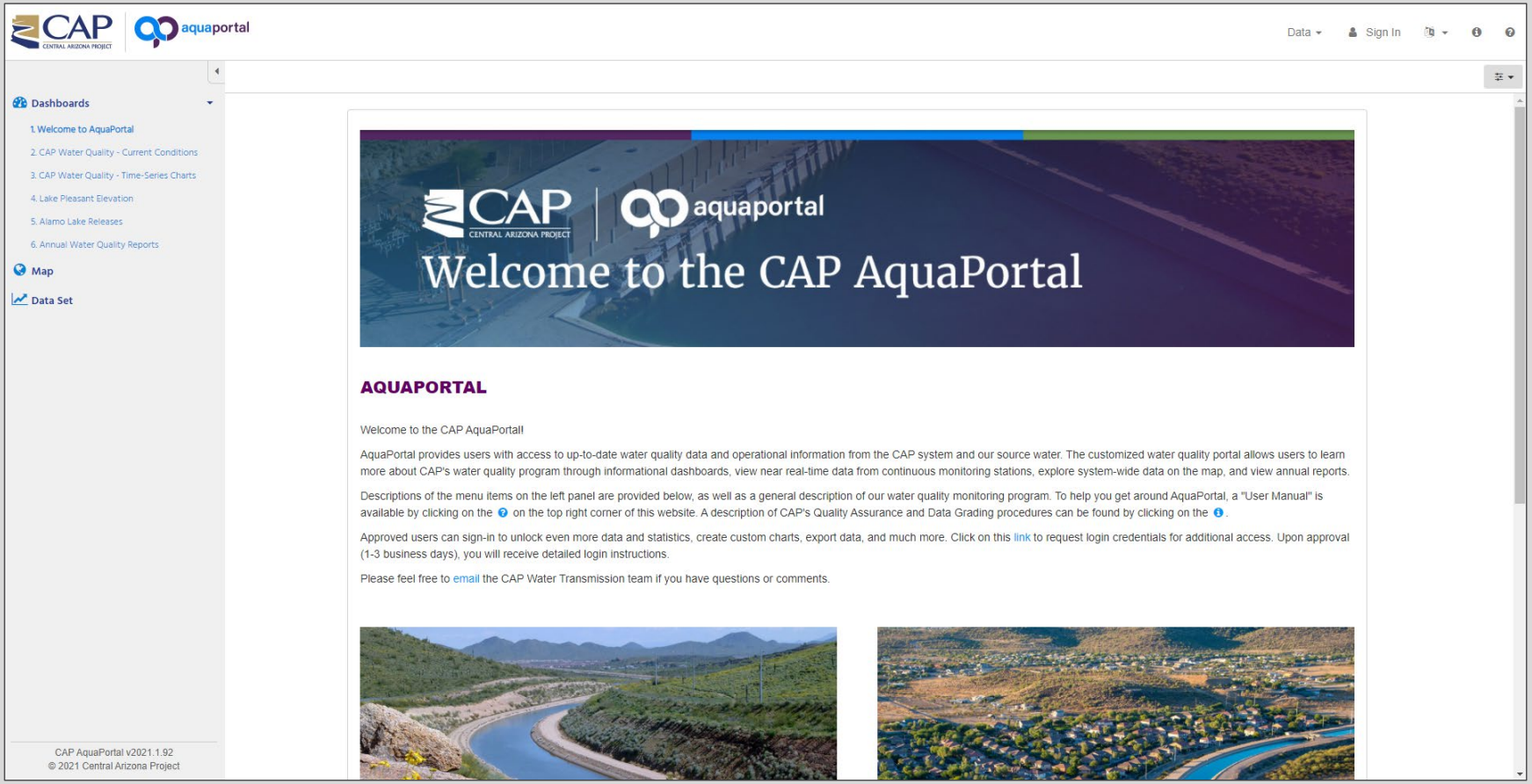
Data Sharing - AquaPortal







https://aquaportal.cap-az.com



Alamo Lake Releases

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Alamo Lake Releases

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CAP Sediment Study

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CAP Biology

- Aquatic Vegetation
- Algae
- Cymbella (Rock Snot)
- Quagga Mussels

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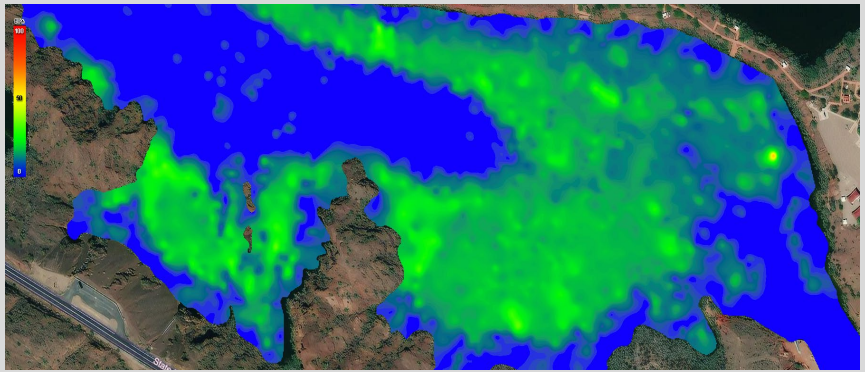
Aquatic Vegetation Control (Lake Havasu)



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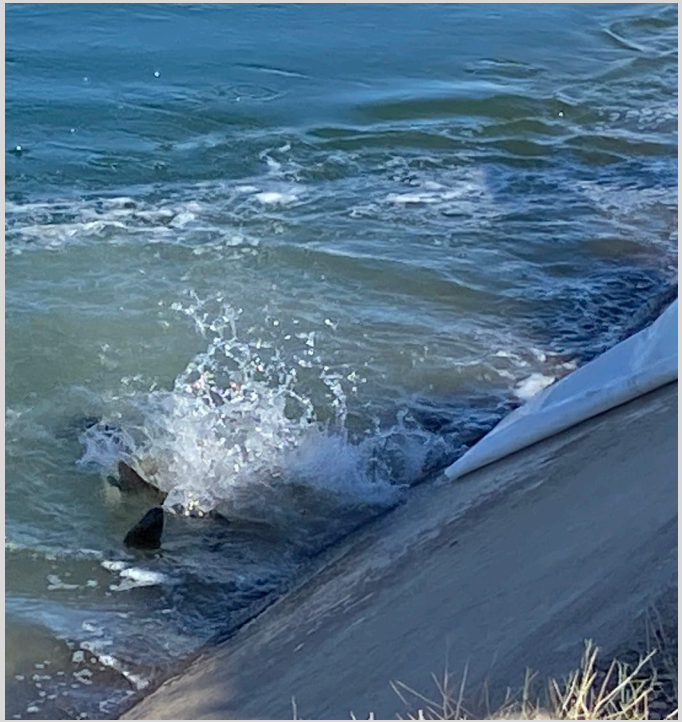
Aquatic Vegetation Control (Canal)



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Filamentous Algae

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Cymbella (Rock Snot)

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Cymbella – ASU Preliminary Findings

- Novel *Cymbella* species
- Prefers high phosphorus and low nitrogen conditions
- Blooms occur from late spring (Western canal) to late summer (Waddell Canal)
- Rock snot can be removed from equipment using chemical wash
- Microbial sensors can measure changes in algae composition and detect blooms

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Quagga Mussels

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KNOW YOUR WATER
Thank You
sbryan@cap-az.com

Engineering Capital Projects

Ryan Johnson, Engineering Services Manager
Annual Water User Information Briefing
August 25, 2021

2021 CIP Budget – Project Budgets

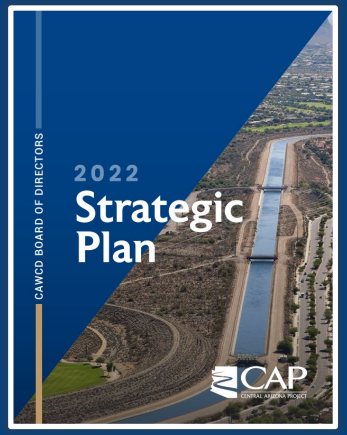
CAP Biennial Budget

Capital Budget Summary

(Thousands)

	2017 Actual	2018 Actual	2019 Projection	2020 Budget	2021 Budget
Expenditures					
Salaries and related costs	$ 5,044	$ 4,075	$ 3,201	$ 4,283	$ 3,784
Equipment, buildings, and structures	11,387	18,306	15,700	30,922	23,639
Other expenses					
Outside services	14,203	7,769	2,595	4,651	2,160
Materials, supplies & other expenses	556	483	392	374	287
Capitalized interest	3,330	-	-	-	-
Overhead expenses	5,156	4,116	3,237	4,465	3,943
Subtotal other expenses:	23,245	12,368	6,224	9,490	6,390
Total capital	$ 39,676	$ 34,749	$ 25,125	$ 44,695	$ 33,813
Less Reimbursement-Pima Mine Road	(3)	-	-	-	-
Net capital	$ 39,673	$ 34,749	$ 25,125	$ 44,695	$ 33,813

2022 CAWCD Board Strategic Plan



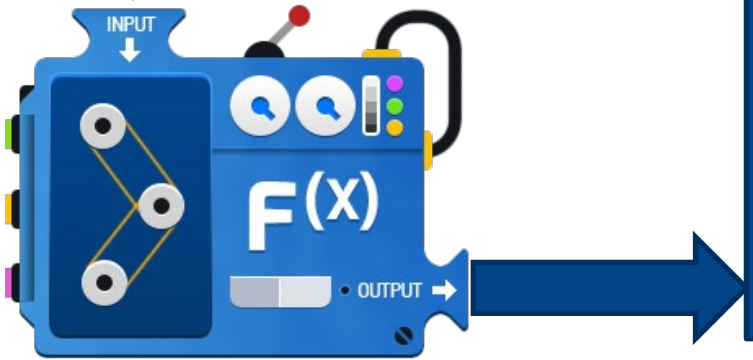
KRA: Project Reliability

Providing reliable and cost-effective operations, maintenance, and replacement of CAP infrastructure and technology assets

CAP CENTRAL ARIZONA PROJECT

2021 Capital Projects - Engineering

- Return to Work
- Abundance of Caution
- Projects from 2020
- Risk-Based Prioritization
- Phase Balancing
- Operational Impacts



- 26 Capital Projects
- $28.3 Mil Budget
- $25.5 Mil Estimated Spending

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Prioritizing & Executing Capital Projects

- Strategies Implemented:
  - Decisions Based on Asset Criticality & Condition
  - Balance Resources and Outage Constraints – Timing and Cost
  - Risk Register – Communication & Collaboration Tool

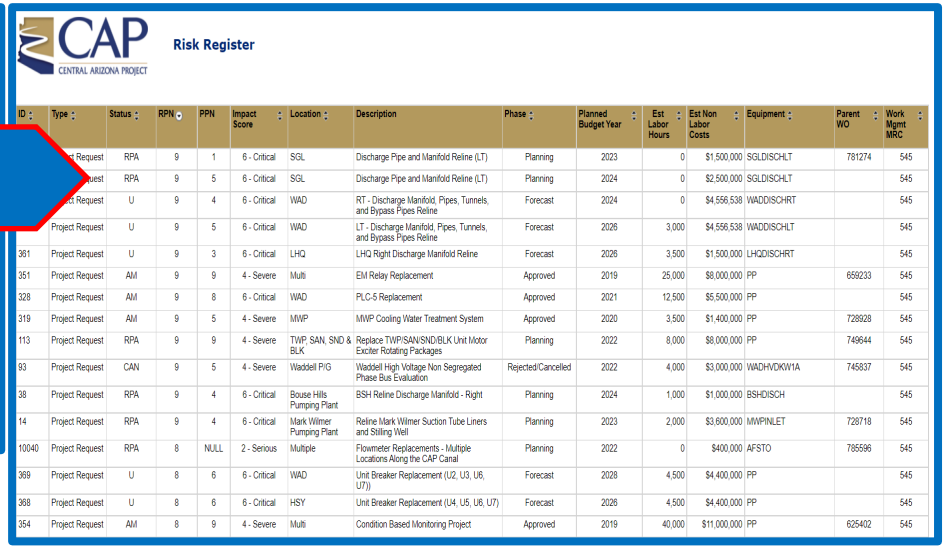
Condition Assessments

Motors

A B C D

Please use CTRL+Click to navigate to corresponding GIS location.

Plant	M01	M02	M03	M04	M05	M06	M07	M08	M09	M10
MWP	C	A	B	B	B	A				
BSH	A	A	A	A	A	B	A	C	A	A
LHQ	A	A	B	A	A	B	A	A	A	
HSY	A	A	A	A	A	A	B	A	A	A
WAD	A	A	B	A	A	B	B	A		
SGL	C	C	C	B	B	C	C	B	C	C
BRD	A	B	B	B	A	B	A	A		
PIC	B	B	A	A	A	A				



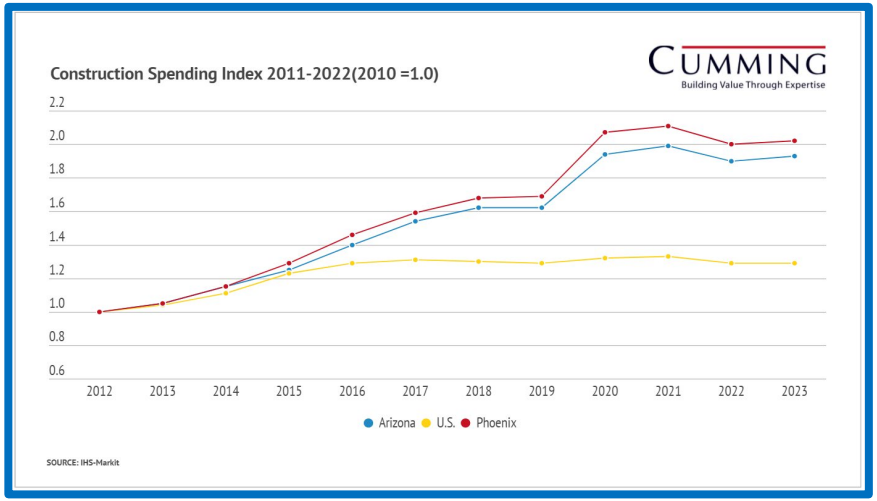
CAP Central Arizona Project

Risk Register

ID	Type	Status	RPN	PPN	Impact Score	Location	Description	Phase	Planned Budget Year	Est Labor Hours	Est Non Labor Costs	Equipment	Parent WO	Work Mgmt MRC
	Request	RPA	9	1	6 - Critical	SGL	Discharge Pipe and Manifold Reline (LT)	Planning	2023	0	$1,500,000	SGLDISCHLT	781274	545
	uest	RPA	9	5	6 - Critical	SGL	Discharge Pipe and Manifold Reline (LT)	Planning	2024	0	$2,500,000	SGLDISCHLT		545
	ct Request	U	9	4	6 - Critical	WAD	RT - Discharge Manifold, Pipes, Tunnels, and Bypass Pipes Reline	Forecast	2024	0	$4,556,538	WADDISCHRT		545
	Project Request	U	9	5	6 - Critical	WAD	LT - Discharge Manifold, Pipes, Tunnels, and Bypass Pipes Reline	Forecast	2026	3,000	$4,556,538	WADDISCHLT		545
361	Project Request	U	9	3	6 - Critical	LHQ	LHQ Right Discharge Manifold Reline	Forecast	2026	3,500	$1,500,000	LHQDISCHRT		545
351	Project Request	AM	9	9	4 - Severe	Multi	EM Relay Replacement	Approved	2019	25,000	$8,000,000	PP	659233	545
328	Project Request	AM	9	8	6 - Critical	WAD	PLC-5 Replacement	Approved	2021	12,500	$5,500,000	PP		545
319	Project Request	AM	9	5	4 - Severe	MWP	MWP Cooling Water Treatment System	Approved	2020	3,500	$1,400,000	PP	728928	545
113	Project Request	RPA	9	9	4 - Severe	TWP, SAN, SND & BLK	Replace TWP/SAN/SND/BLK Unit Motor Exciter Rotating Packages	Planning	2022	8,000	$8,000,000	PP	749644	545
93	Project Request	CAN	9	5	4 - Severe	Waddell P/G	Waddell High Voltage Non Segregated Phase Bus Evaluation	Rejected/Cancelled	2022	4,000	$3,000,000	WADHVDKW1A	745837	545
38	Project Request	RPA	9	4	6 - Critical	Bouse Hills Pumping Plant	BSH Reline Discharge Manifold - Right	Planning	2024	1,000	$1,000,000	BSHDISCH		545
14	Project Request	RPA	9	4	6 - Critical	Mark Wilmer Pumping Plant	Reline Mark Wilmer Suction Tube Liners and Stilling Well	Planning	2023	2,000	$3,600,000	MWPINLET	728718	545
10040	Project Request	RPA	8	NULL	2 - Serious	Multiple	Flowmeter Replacements - Multiple Locations Along the CAP Canal	Planning	2022	0	$400,000	AFSTO	785596	545
369	Project Request	U	8	6	6 - Critical	WAD	Unit Breaker Replacement (U2, U3, U6, U7))	Forecast	2028	4,500	$4,400,000	PP		545
368	Project Request	U	8	6	6 - Critical	HSY	Unit Breaker Replacement (U4, U5, U6, U7)	Forecast	2026	4,500	$4,400,000	PP		545
354	Project Request	AM	8	9	4 - Severe	Multi	Condition Based Monitoring Project	Approved	2019	40,000	$11,000,000	PP	625402	545

Ongoing Construction Market Conditions

- Some Challenges we are Facing:
  - Contractor Availability
  - Difficulty with Coordinating Schedules
  - Scarcity in Labor and Materials
  - Increases in Pricing



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Capital Spending

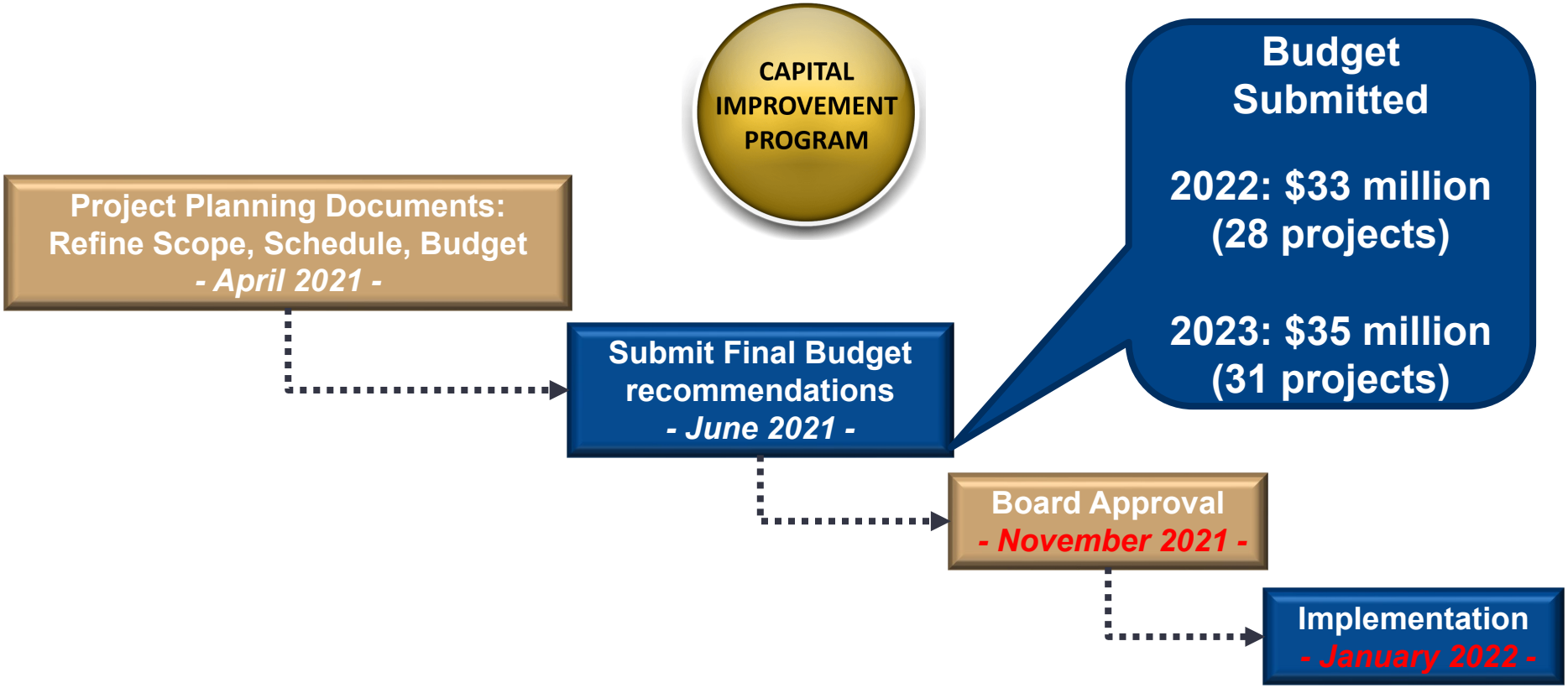
Balance and Prioritize spending through the Project Steering Committee

2020 & 2021 CIP Under Spending

2022 & 2023 CIP Budget Development

CAP CENTRAL ARIZONA PROJECT

2022-2023 Capital Budget - *Engineering*



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2022-2023 Budget – Multi Phase Projects

Discharge Valve Replacement Program

2022 Budget: $1.0 Million
2023 Budget: $0.8 Million

Fire Protection Upgrades

2022 Budget: $4.3 Million (MWP), $1.0 Million (South Plants)
2023 Budget: $2.7 Million (MWP), $4.5 Million (South Plants)

2022-2023 Budget – Multi Phase Projects

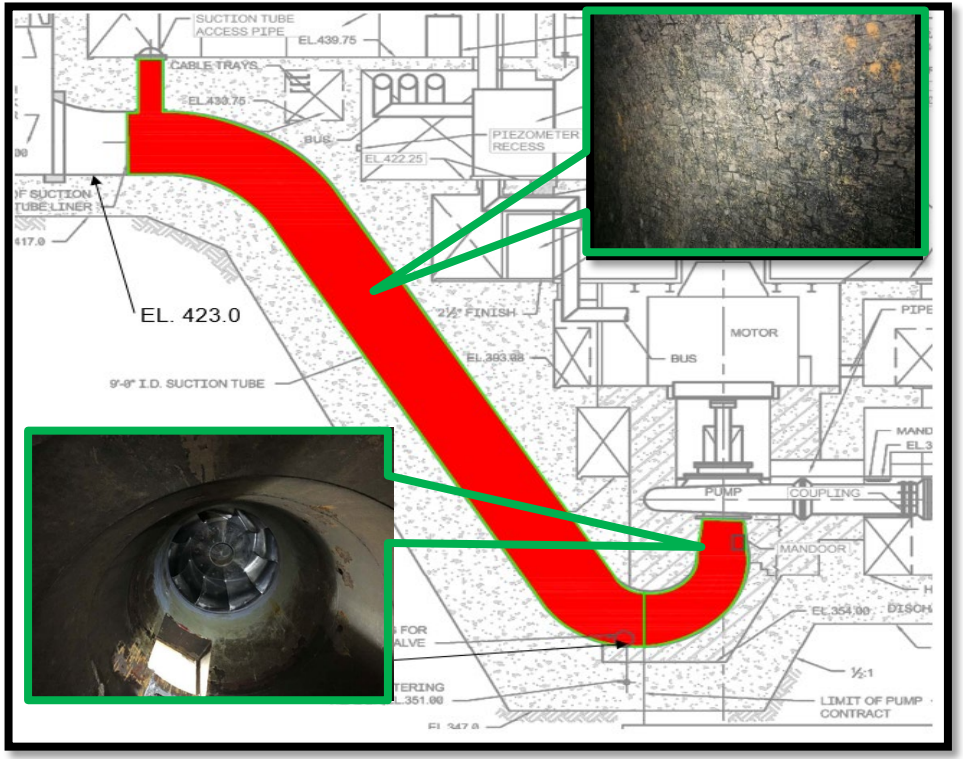
Backup Power System Replacements

2022 Budget: $2.6 Million
2023 Budget: $1.6 Million

HVAC Replacement Program

2022 Budget: $1.7 Million (MWP), $0.6 Million (HDQ)
2023 Budget: $4.9 Million (HDQ)

2022-2023 Budget – Multi Phase Projects



Electromechanical Relay Replacements

2022 Budget: $2.6 Million
2023 Budget: $1.6 Million

Pipeline Repair Program

2022 Budget: $4.2 Million
2023 Budget: $2.6 Million

2022-2023 Budget – New Capital Projects

Sump Pump Level Controls

2022 Budget: $1.1 Million
2023 Budget: $0.2 Million

Potable Water Skids Replacement

2022 Budget: $0.8 Million
2023 Budget: $1.1 Million

2022-2023 Budget – New Capital Projects

A-Plants DVOS Compressor Replacement
2022 Budget: $1.4 Million

Replace Valves at HQ for Fire Protection
2023 Budget: $700K

Thank You

Ryan Johnson
rjohnson@cap-az.com

Maintenance Update

Robert Hitchcock
Maintenance Control Manager

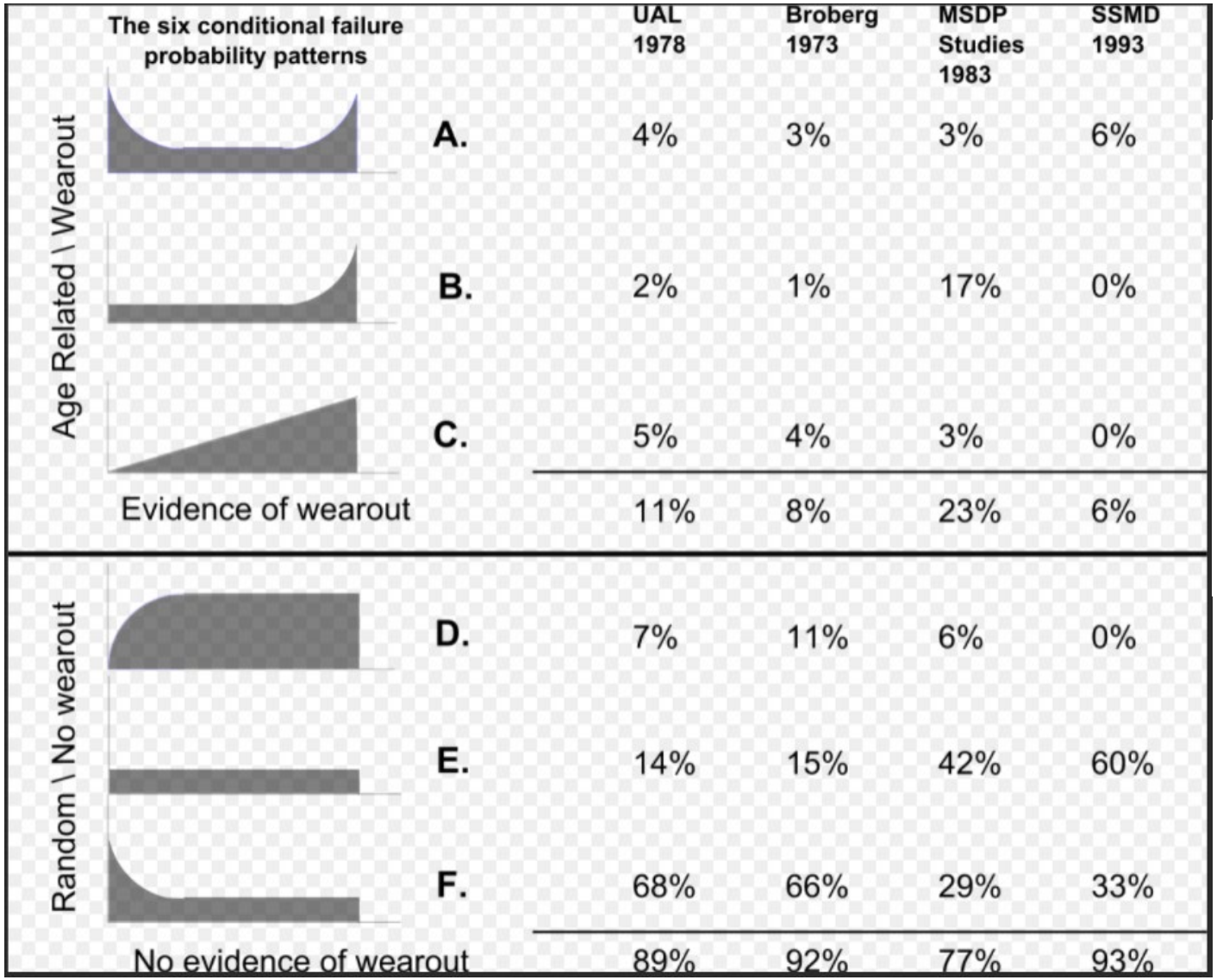
Annual Water User Meeting
August 25th, 2021

YOUR WATER. YOUR FUTURE.

How Failures Actually Occur

Generally, less than 20% of failure modes of components are wear or age related. Time or usage based strategies can actually decrease reliability and introduce new issues.

This is why CAP has chosen to follow a condition driven Maintenance, Refurbishment, and Replacement strategy.



	UAL 1978	Broberg 1973	MSDP Studies 1983	SSMD 1993
A.	4%	3%	3%	6%
B.	2%	1%	17%	0%
C.	5%	4%	3%	0%
Evidence of wearout	11%	8%	23%	6%
D.	7%	11%	6%	0%
E.	14%	15%	42%	60%
F.	68%	66%	29%	33%
No evidence of wearout	89%	92%	77%	93%

- Pattern A; High incidence of failure at the beginning followed by a constant or increasing conditional probability of failure then a wear-out (*Bathtub* curve)
- Pattern B; Classic wear-out, shows constant or increasing conditional probability of failure then a wear-out.
- Pattern C; Gradual aging wear out age is not identifiable
- Pattern D; Best new, low conditional probability of failure
- Pattern E; Totally random, constant conditional probability of failure at all ages
- Pattern F; High rate of failure probability at the beginning but decreasing and getting constant after coming into service

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Motor Con

Alarm Score	GST Power Factor			GST Tip-U	
	13.8 kv	6.9 kv	4.16 kv	13.8 kv	6.9 kv
New - 0	< 1.0	< 1.0	< 1.0	< 0.5	< 0.5

MAINTelligence - DMSI_CAP_PROD

BRD	A	B
PIC	B	B
RED	B	A
TWP	A	B
SAN	B	B
BRW	D	C
SXV	C	C
SND	C	D
BLK	B	B

BSHU01PR
BSHU02
BSHU03

CAP Motor Condition Assessment

BRWU02MTR

A (<18) - Like new, nearly ideal. Continue normal monitoring.

B (18-50) - Some wear, stable. Continue normal monitoring.

C (51-83) - Worn, assess restoration & monitoring frequency.

D (>83) - Approaching end of life, budget for restoration.

Asset Condition Grade C

Model	TBZBEUW
Make	MAGNETEK
HP	1750
Voltage	6600
RPM	720
Serial Number	8-276157-0
Overhaul Date	

Diagnosis / Justification	Status	Parameter Score
Rule Set AH-MTR-STATOR-OV2 — 6 Terminal 6.9 kV and 13.8 kV Motor		
Partial Discharge Qm	Critical	42
Rule : AH-MTR-STATOR-OV2-PD Stator Partial Discharge Rule Qm, which is a measure of the overall peak Partial Discharge (PD) magnitude in millivolts generated at 10 pulses per second is a good indicator of the size and volume of voids in the stator insulation. Alert levels have been set based on IRIS industry standard comparisons of Qm readings from similar air cooled synchronous machines with directional capacitive couplers (TGA).		
GST Power Factor Tip-Up	Caution	17
Rule : AH-MTR-STATOR-OV2-TIPUPG Stator GST Power Factor Tip-Up Rule Power factor is a measurement of insulation losses. When insulation voids are present this leads to partial discharge and causes the power factor of the insulation to increase with test voltage. The difference between the power factor at 100 percent and 25 percent of normal line-to-ground voltage is defined as the power factor tip-up. Grounded Specimen Test measures the phase-to-ground insulation.		
Single Phase Capacitance Change	Critical	9
Rule : AH-MTR-STATOR-OV2-CAP Stator Doble Baseline Capacitance Rule Stator Capacitance is an offline test measured with the Doble testing tool. Capacitance is dependent primarily on the motor geometry and dielectric constant of the insulation. Changes in the capacitance over the baseline for the motor can be indicative of physical changes to the winding geometry.		
GST Power Factor	Normal	3
Rule : AH-MTR-STATOR-OV2-PFG Stator GST Power Factor Rule Power factor is the cosine of the angle between the applied AC test voltage and the current through the insulation. This test is conducted with the Doble Testing Equipment. GST means the per phase winding ground insulation is tested. For most stator insulation in good condition the power factor will be near 1 percent.		
Insulation Thermal Aging	Normal	3
Rule : AH-MTR-STATOR-OV2-TEMP Stator Thermal Aging Rule This rule integrates the stator running hours at given stator temperatures. Thermal aging is based on the theory that an increase in operating temperature of 10 deg C will halve the life of the insulation. Class F insulation has a temperature rating of 155 deg C. This means that it should be able to withstand its rated voltage at that temperature for 20,000 hours. Industry standard practice is to treat Class F insulation as being rated Class B (130 deg C). Working backward from that provides a way to calculate a thermal aging score. This calculation is done in the alarm set.		
Total Number of Starts	Normal	1
Rule : AH-MTR-STATOR-OV2-STARTS Motor Total Starts Rule Total number of starts for this motor.		
Condition Score		75

Symptom	Parameter	Value	Limit	Status
Stator InsulationThermal Aging	Thermal Aging	2.00	2.00	Normal
Starts	Starts	4236.00	1.00	Normal
GST Power Factor	GST Power Factor A	1.18	1.00	Normal
GST Power Factor	GST Power Factor B	1.09	1.00	Normal
GST Power Factor	GST Power Factor C	1.23	1.00	Normal
1 Phase Capacitance Change	Capacitance Phase A	43730.60	5.00	Critical
1 Phase Capacitance Change	Capacitance Phase B	43423.80	5.00	Critical

	Partial Discharge Q_m (mV)		Thermal Aging			
	13.8 kv	6.9 kv	Run Hours	Stator Temp		
	< 265	< 177	< 40K	< 90	90-100	101-105

	A	A	
	A	B	C

ow	1.000	1.250	1.1
	0.000	0.000	0.0
	0.000	0.000	0.0

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Asset Health Statistics

Note: All asset scores have individual multipliers so that they are normalized to the same scoring scale

A (<=16) - Exceptional - Like new. Continue normal monitoring.

B (17-49) - Good - Some wear, stable. Cont. normal monitoring

C (50-82) - Fair - Worn, assess restoration & monitoring freq.

D (>=83) - Poor - Approaching end of life, budget for restoration.

Asset Health Statistics	Total Count	A	B	C	D	N/A
Pumps	109	37	71	1	0	0
Motors	109	58	31	19	3	0
Discharge Valves	109	72	36	1	0	0
Transformers	42	30	12	0	0	0
Radial Gates	91	24	65	2	0	0
Turnouts	51	24	22	0	0	5
Total	511	47.9%	46.4%	4.5%	0.6%	1.0%

2021 Annual Maintenance Outages

WEST OUTAGE

June 14th – Aug. 26th

Mark Wilmer Pumping Plant (MWP)

Bouse Hills Pumping Plant (BSH)

Little Harquahala Pumping Plant (LHQ)

Hassayampa Pumping Plant (HSY)

WADDELL OUTAGE

Sept. 7th – Oct. 5th

Waddell Pumping / Generating Plant (WAD)

SOUTH OUTAGE

Oct. 17th – Nov. TBD

Salt Gila Pumping Plant (SGL)

Brady Pumping Plant (BRD)

Picacho Pumping Plant (PIC)

Red Rock Plant (RED)

Twin Peaks Pumping Plant (TWP)

Sandario Pumping Plant (SAN)

Brawley Pumping Plant (BRW)

San Xavier Pumping Plant (SXV)

Snyder Hills Pumping Plant (SNH)

Black Mountain Pumping Plant (BLK)

Unit Availability for Additional Outages by Plant
Data Includes Planned MCOI Outage and Deliveries, 6/1/2021
Compiled by Water Control

	Unit Availability											
	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
MWP	0	0	0	0	0	Summer Outage			0	0	0	0
BSH	LG/MD/SM	LG/MD/SM	MD/SM	SM	MD/SM				LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM
LHQ	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	MD/SM				MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM
HSY	LG/MD/SM	LG/MD/SM	MD/SM	MD/SM	0				LG/MD/SM	MD/SM	MD/SM	LG/MD/SM
WAD-P/G	3	4	4	6	4	0	0	0	1	3	3	6
WAD-P						1	3	3				
SGL	LG/MD/SM	LG/MD/SM	LG/MD/SM	MD/SM	LG/MD/SM	0	0	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM
BRD	5	3	2	0	1	0	0	1	0	Fall Outage		4
PIC	3	1	1	0	1	2	1	2	2			3
RED	3	2	1	1	1	1	1	1	1			2
TWP	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM	SM	0.0	0.0	0.0			LG/SM
SAN	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM	SM	SM	LG/SM	LG/SM			LG/SM
BRW	LG/SM	SM	LG/SM	SM	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM			LG/SM
SXV	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM	LG/SM			LG/SM
SND	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM			LG/MD/SM
BMT	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	LG/MD/SM	SM	LG/MD/SM	LG/MD/SM	LG/MD/SM			LG/MD/SM

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West Outage 2021 – Major Activities

MWP Unit 1 & 2 Pump Cavitation Repair

MWP Unit 1 Discharge Valve Repair

LHQ & HSY Discharge Valve Replacement

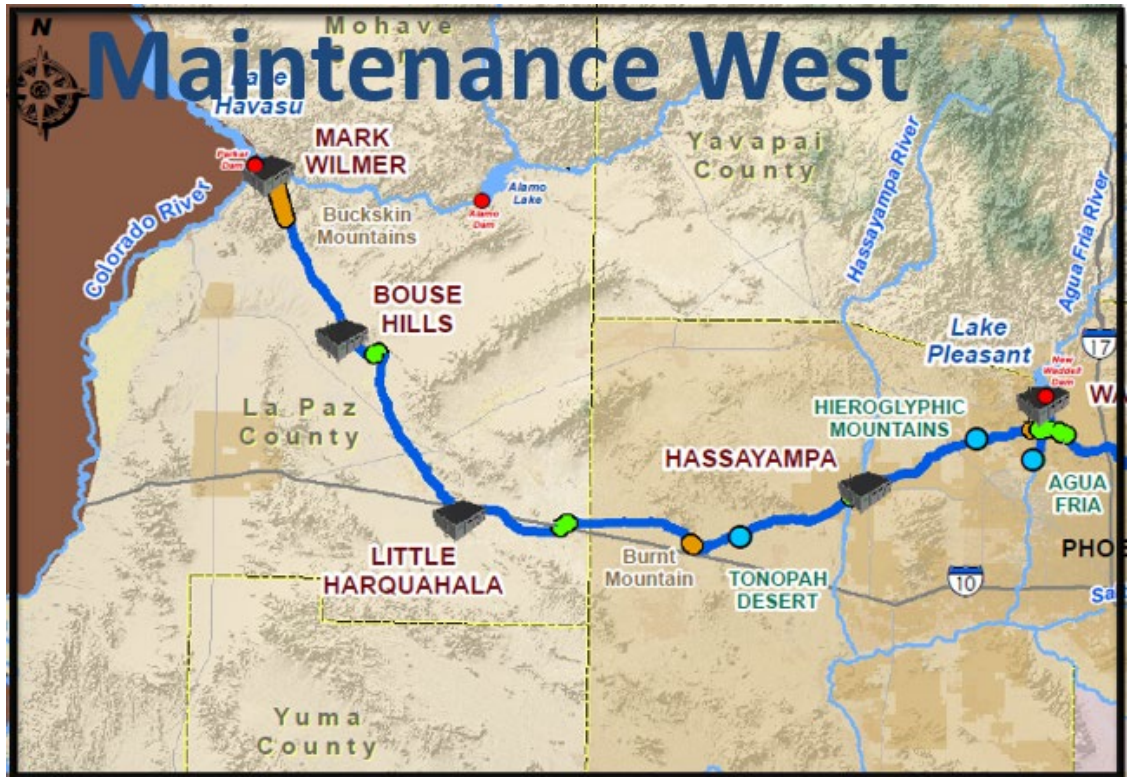
LHQ Right Discharge Manifold Inspection

MWP Unit 2 – 6 year PMs

BSH Unit 8 – 5 year PMs

LHQ Unit 4 & 5 – 5 year PMs

BSH Exciter Replacement project



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South Outage 2021 – Major Activities

Pool 37 Lining Repair

BRD & RED Non-segregated Bus replacement

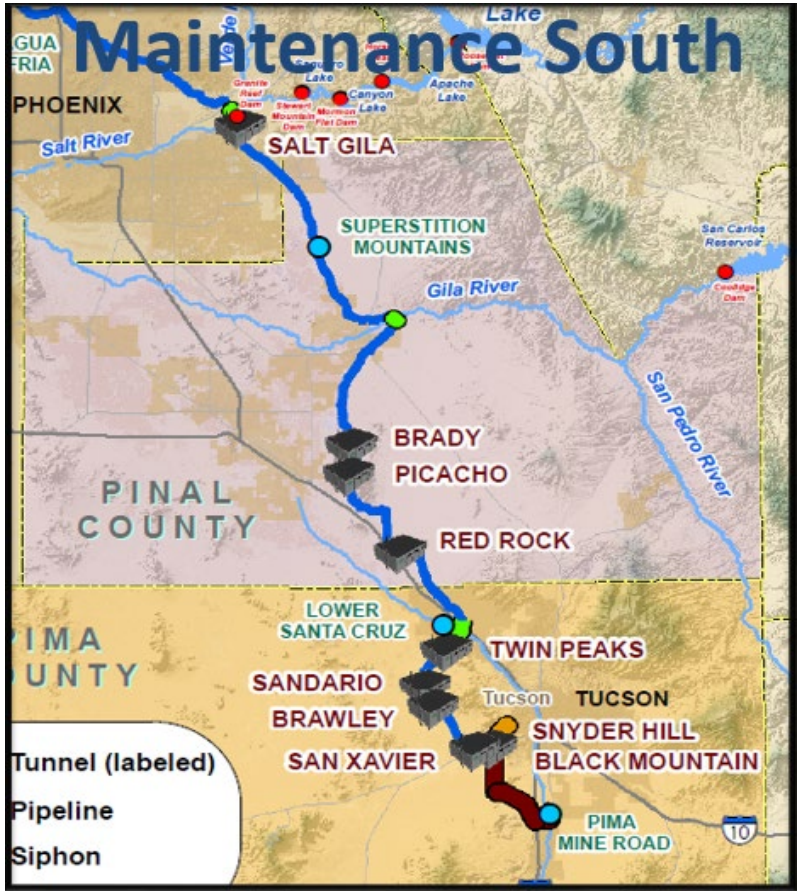
BRD Switchyard aggregate replacement

SAN Unit 5, BRW Units 3 & 4 Discharge Valve replacement

BRW & BLK Discharge pipe and manifold (right) – 5YR PM

RED UZ1A/UZ2A Station Switchgear 5YRPMs

SAN UZ1A Station Switchgear 5YRPMs



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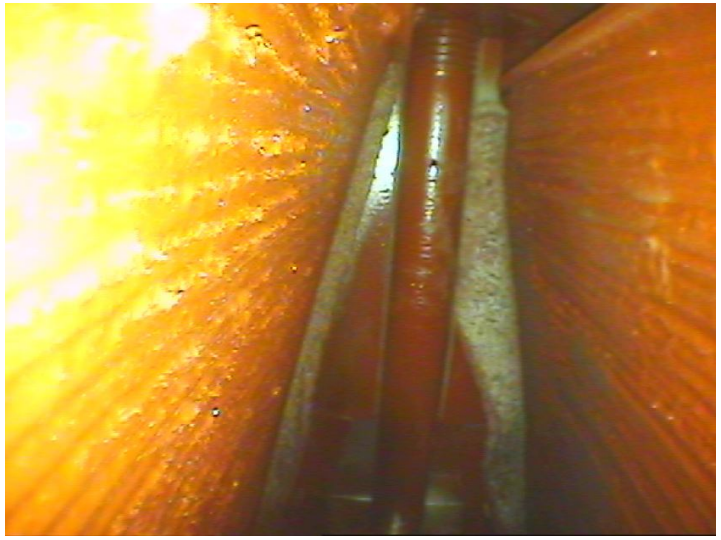
2021 Completed/In-Progress Overhauls

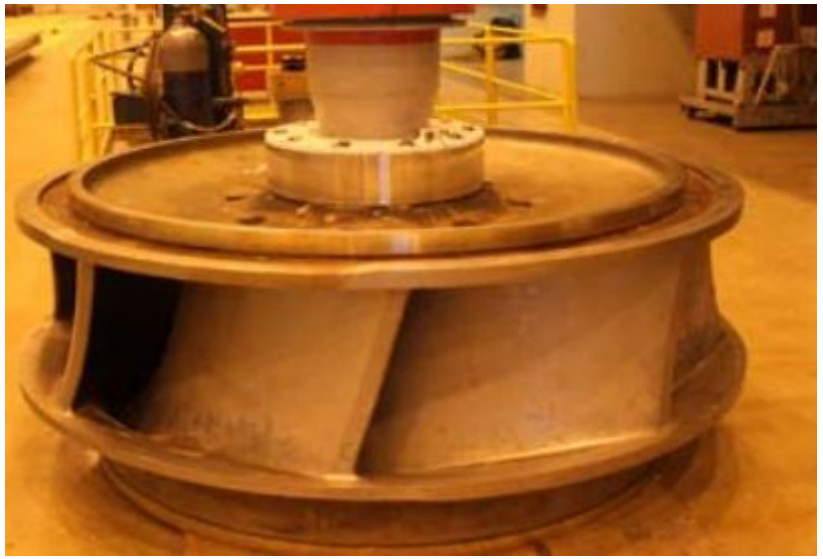
SGL UNIT 1 - COMPLETE

Reconditioning of Unit 1 Motor, Re-testing of Motor, and Pump Overhaul.



MWP UNIT 5 - COMPLETE

Replacing all rotor 14 pole pieces refurbished by ABB. Redesign & replacement of v-block between poles.



LHQ UNIT 4 – IN PROGRESS

Unit 4 Motor Cleaning, field touch-up of insulation on rotor & stator, Re-testing motor, and Pump Overhaul.

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2022 – Major Maintenance Activities

Salt River Siphon Coatings Inspection

MWP U03 Rotor Pole Replacement

LHQ U07 Overhaul

SAN Unit 5, BRW Units 3 & 4 Discharge Valve replacement

SGL U04 Overhaul

Gila River Siphon Inspection

Check 37 radial gate refurbishment

Check 11 radial gate refurbishment

SXV U02 Overhaul

BLK Discharge Manifold & line inspection

Santa Cruz Siphon Inspection

Civil Engineers inspecting 252”I.D. Steel Lined Salt River Siphon

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2022 Major Work – Snapshot

LHQ UNIT 7 OVERHAUL

Overhaul of Motor Cleaning and Re-testing & Pump Overhaul. Total estimated resources of 7,400 labor-hours (3.7 labor years). 6 month duration. 4 month outage with 2 months of machine shop & coatings booth work prior.

CHECK 11 RADIAL GATE REFURBISHMENT

Remove and refurbish both radial gates. Total estimated resource load of 1,800 labor-hours (0.9 labor-years). 5 month duration. 6 week outage (3 weeks per gate) with 3.5 months of machine shop & coatings booth work prior.

SANTA CRUZ SIPHON INSPECTION

Dewater and visual inspection of the 8,500LF, 152” I.D. CIP Santa Cruz Siphon. Total estimated resource load of 1,000 labor-hours (0.5 labor-years).

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Pool 34 Protective Dike Failure Event Map (July 25, 2021)