



**CENTRAL ARIZONA WATER CONSERVATION DISTRICT
(Central Arizona Project)**

**Annual Water User Information Briefing
Wednesday, August 21, 2019 – 9am-11:30am**

**Central Arizona Project
23636 N. 7th Street
Phoenix, Arizona
Lake Mead Conference Room**

AGENDA

1. Welcome
2. 2020 Colorado River Outlook – August 24-month study
3. Status of 2019 Lake Mead Contributions – Outlook for 2020
4. 2020 Outlook for CAP Delivery Supply
5. 2020-2024 Excess Water Policy
6. 2020 CAP Energy Resources
7. Salt River Siphon Coating Project – Outage Review
8. Capital Program Update
9. Expanded Water Quality Program
10. 2019 Biology Report
11. Alamo Dam Water Control Plan Update
12. Questions/Discussion

Colorado River Water Supply Update

August 21, 2019

Chuck Cullom
Colorado River Programs Manager

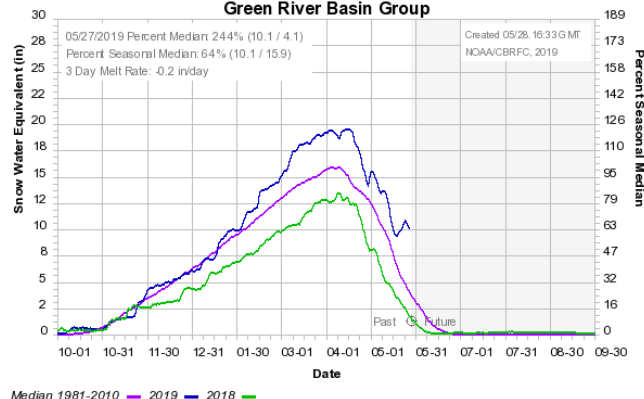


YOUR WATER. YOUR FUTURE.

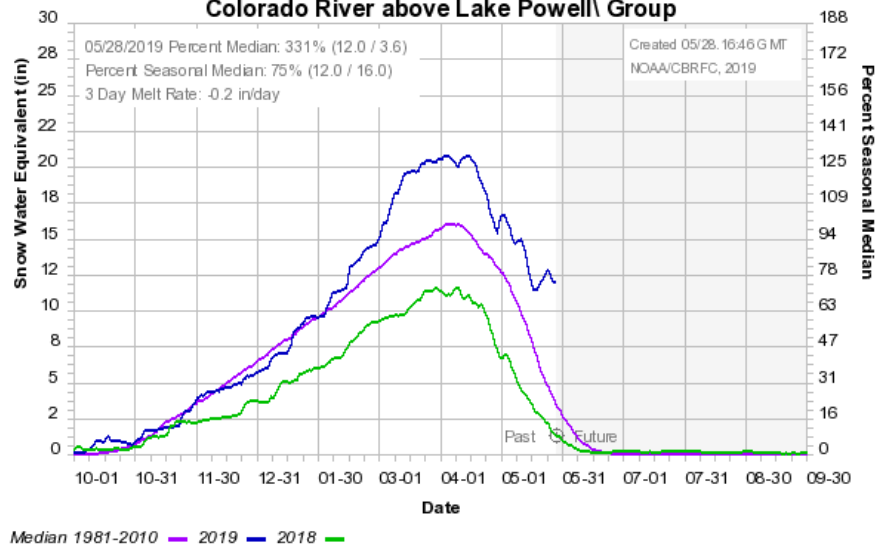
Water Year 2019 Recap & Current Status

- Big Snowpack & Runoff ~145% of 30 yr avg.
- Arizona LBDGP Implementation Process
- Completed DCP
- ALMOST ACHIEVED NORMAL SUPPLY
 - EOY = 1089.4', ~50,000 af shy of 1090'
- 2020 = Tier Zero
 - 192,000 af reduction to CAP supplies
- Most Likely Tier Zero for 2021
- Possibility for Equalization in 2020

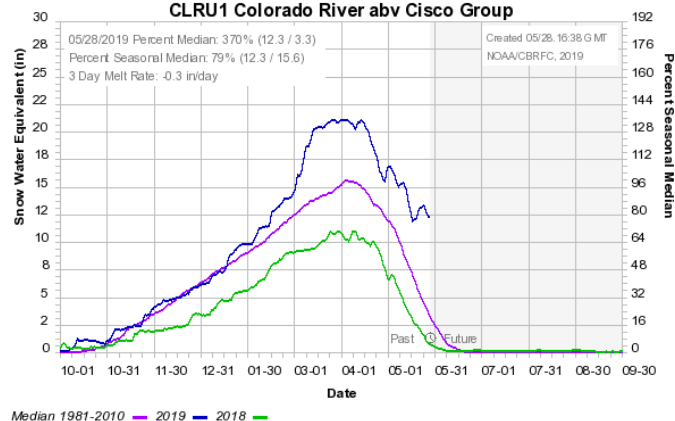
Colorado Basin River Forecast Center Green River Basin Group



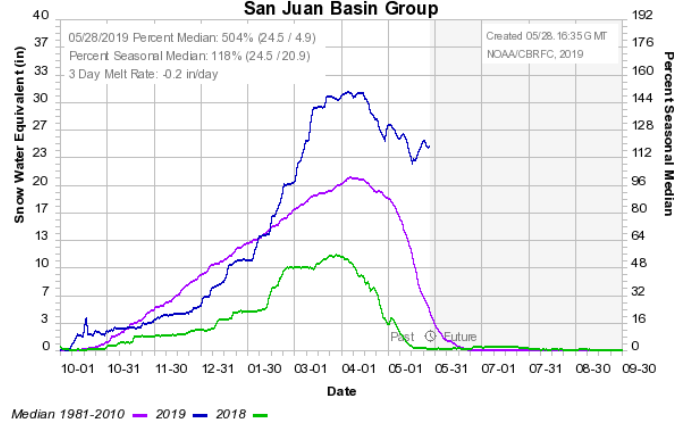
Colorado Basin River Forecast Center Colorado River above Lake Powell Group



Colorado Basin River Forecast Center CLRU1 Colorado River abv Cisco Group



Colorado Basin River Forecast Center San Juan Basin Group



Blue Line = Current

Purple Line = 30-Year Median

Green Line = Last Year Accumulation

Snow Accumulation as of May 28, 2019

The snow accumulation in each of the major tributaries and overall Colorado River Basin above Lake Powell is still showing amounts well above the 30-year median seasonal values for this date. Late spring storms have extended the accumulation.

The forecasted April-July runoff forecast is 9.2 MAF (129% of average); however late May storms may increase this forecast. The forecasted runoff for WY 2019 is 12.1 MAF (112% of average).

LBDCP - Arizona Came Together & Got It Done

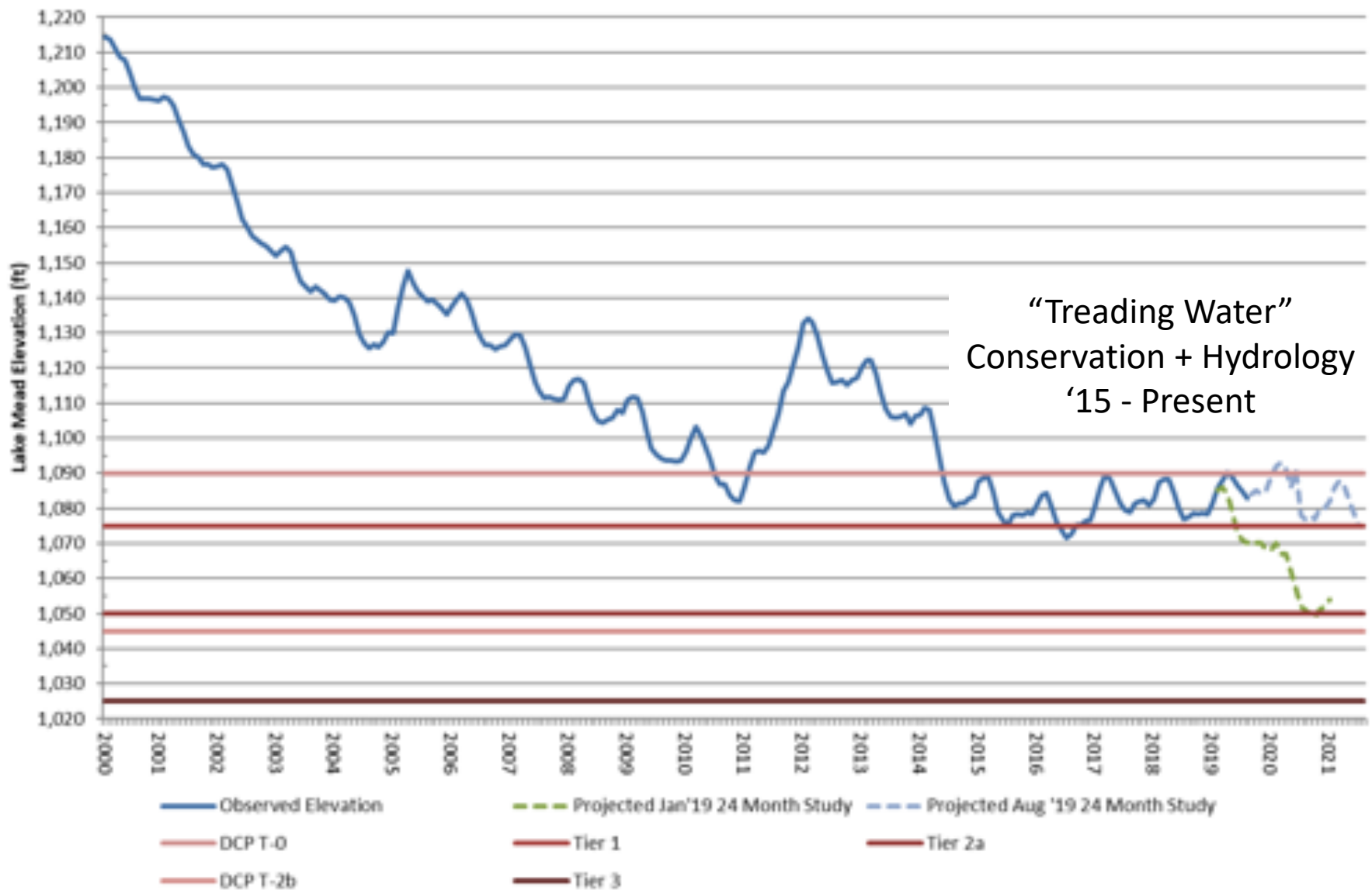


DCP Signing Event Hoover Dam

5/20/19



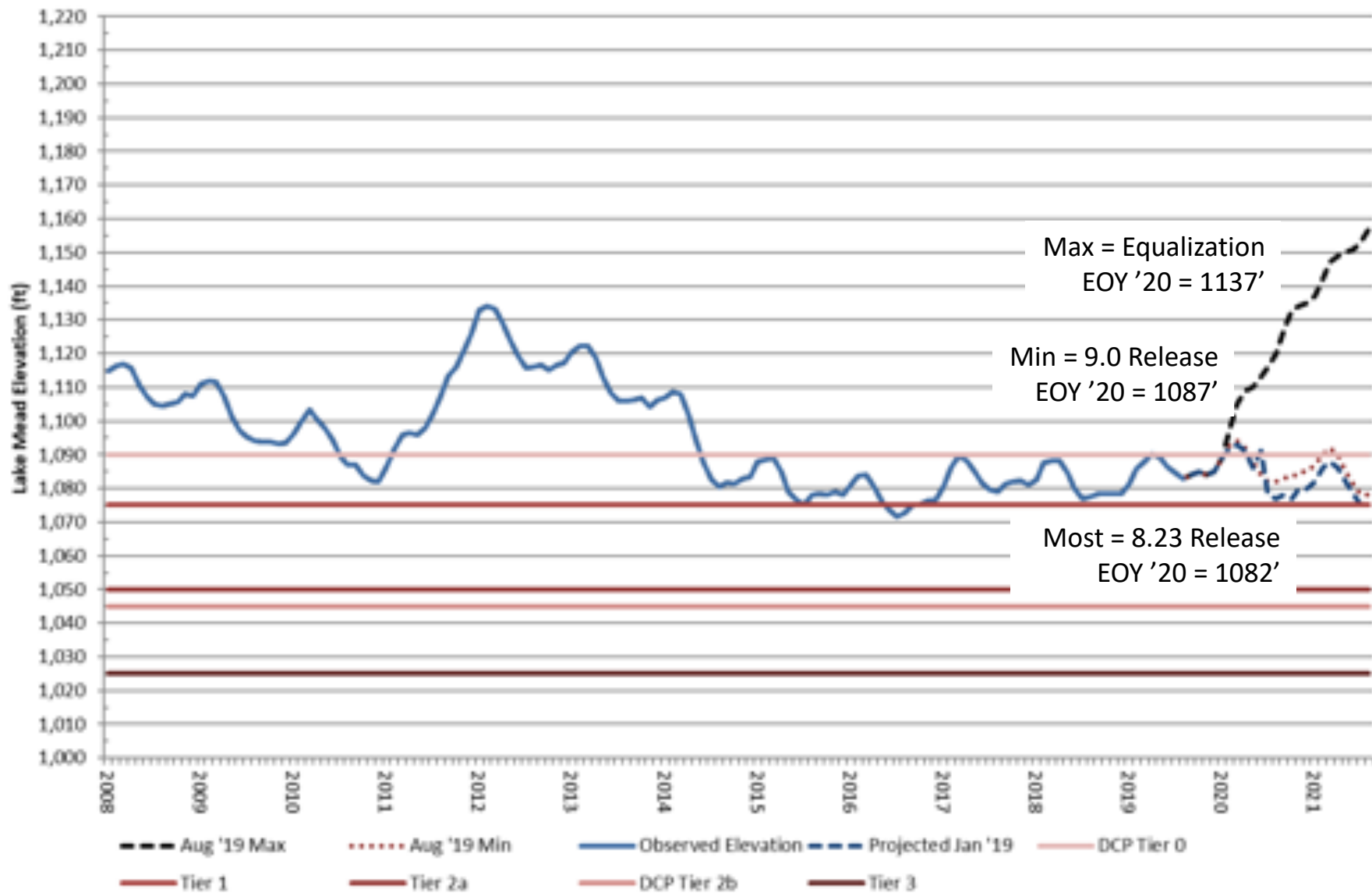
Lake Mead Elevation Projected Elevation: Shift from Jan '19 to Aug '19 (EOM Jan 2000 - Jan '19, Aug '19 24 Month Studies)



EOY 2019 – Aug 24 Month Study Projection

- 22' increase from January Projection (1067' vs 1089.4')
- Increases due to:
 - Shift to 9.0 MAF Powell in '19 (~750,000 af increase vs Jan. projection)
 - Storage (ICS) contributions = 626,000 af, due to implementation of DCP
 - Side Inflows ~400,000 af greater than average
- NORMAL Supply > 1090'
- EOY '19 Year Projection = 1089.4'
 - ~50,000 af below Normal Supply Trigger
 - DCP Tier Zero = 192,000 af reduction to CAP supplies
 - Eliminates Other Excess Pool and potentially into the Ag Pool

Lake Mead Elevation '07 Guidelines Period Aug '19 24 Month Study Most, Min, and Max Projections



EOY 2020 – Aug 24 Month Study Projection

- EOY 2020 Most Probable = 1082', DCP Tier Zero for 2021
 - 7' decrease from EOY '19 due to 8.23 MAF Powell Release
 - DCP Tier Zero Reductions (CAP = 192 kaf) + Offset Contributions
- EOY 2020 Min Probable = 1087', DCP Tier Zero for 2021
 - ~Treading Water from EOY '19 due to 9.0 MAF Powell Release
 - DCP Tier Zero Reductions (CAP = 192 kaf) + Offset Contributions
- EOY 2020 Max Probable = 1127', NORMAL Supply for 2021
 - ~30' increase from EOY '19 Year due to Powell Equalization Release
 - Offset Contributions and Zero Reductions

Winter '19 – '20: ~Normal, Dry, or Wet?

- Equalization in 2020 ~ 28% (need ~110% of Avg., ~12 MAF inflow)
- Tier Zero most likely through '23
- Climate Signal?
 - ENSO Neutral forecast
- Natural Signal?
 - Signs of early winter?



Probability of System Conditions - June 2019					
	2020	2021	2022	2023	2024
Lake Powell Release > 8.23 MAF	19	71	60	63	60
Equalization > 8.23 MAF	13	28	25	29	27
Upper Elevation > 8.23 MAF	6	43	35	34	33
Lake Powell Release = 8.23 MAF	80	27	23	21	23
Equalization = 8.23 MAF	0	0	0	1	1
Upper Elevation = 8.23 MAF	80	27	23	20	20
Mid-Elevation = 8.23 MAF	0	0	0	0	2
Lake Powell Release < 8.23 MAF	0	3	17	17	15
Upper Elevation < 8.23 MAF	0	1	0	1	1
Mid-Elevation = 7.48 MAF	0	2	17	16	14
Lake Mead Elevation Tiers	71	78	69	63	61
DCP Tier 0 (1090'-1075')	71	72	42	32	25
Tier 1 Shortage (1075'-1050')	0	6	26	24	25
Tier 2 Shortage (1050'-1025')	0	0	1	7	9
Tier 3 Shortage (< 1025')	0	0	0	0	2

Source: U.S. Bureau of Reclamation

**Contributions to Lake Mead
CAP Forbearance Volumes (ac-ft)**

CAP Conservation Activities							
Program Name	2014	2015	2016	2017	2018	2019	Total
Yuma Mesa Irrigation and Drainage District Following Program	6,827	7,180	7,509	-	-	-	21,516
Ag Forbearance 1 Program EC-ICS	-	80,922	82,922	-	-	-	163,844
Ag Forbearance 3 Program	-	-	10,627	41,763	2,323	-	54,713
Ag Forbearance 3 Program EC-ICS	-	-	-	-	42,340	20,671	63,011
Ag Forbearance 4 Program EC-ICS	-	-	-	-	4,673	5,475	10,148
Municipal Forbearance - Supply Replacement EC-ICS	-	15,000	16,000	-	-	-	31,000
CAP Excess	18,290	81,921	9,957	150,042	106,411	85,953	452,574
Note 1: Ag Forbearance 3 and 4 Program volumes in 2018 have been submitted as EC-ICS							
CAP Subtotals by Year	25,117	185,023	127,015	191,805	155,747	112,099	796,806
Pilot System Conservation Program (PSCP)							
Program Name	2014	2015	2016	2017	2018	2019	Total
Ag Forbearance 2 Program	-	-	25,265	-	-	-	25,265
Ag Forbearance 5 Program	-	-	-	-	5,042	-	5,042
Bullhead City	-	-	-	40	542	840	1,422
Tohono O'odham Phase 1 & 2	-	10,080	9,817	10,080	-	-	29,977
Tohono O'odham Phase 3	-	-	-	-	11,050	-	11,050
GRC System Conservation Phase 2	-	-	10,000	-	-	-	10,000
CBE System Phase 1	-	-	1,137	7,435	-	-	8,572
CBE System Phase 2	-	-	-	1,137	7,435	-	8,572
CBE System Phase 3	-	-	-	-	1,424	9,317	10,741
CBE System Phase 4	-	-	-	-	-	17,488	17,488
Fort McDowell Yavapai Nation	-	-	-	-	13,463	-	13,463
PSCP Program Subtotals by Year	-	10,080	46,219	18,492	25,493	41,328	141,612
Other System Conservation Activities							
Program Name	2014	2015	2016	2017	2018	2019	Total
Fort McDowell Yavapai Nation Systems Conservation	-	-	13,933	-	-	-	13,933
GRC SCIA Phase 1	-	-	-	40,000	-	-	40,000
GRC SCIA Phase 2	-	-	-	40,000	-	-	40,000
GRC ICS (Reclamation)	-	-	-	-	-	100,000	100,000
GRC ICS (AWBA)	-	-	-	-	-	17,000	17,000
CBE ICS	-	-	-	-	-	6,274	6,274
Other Subtotals by Year	-	-	13,933	80,000	-	123,274	217,207
Grand Total Savings in Acre Feet	25,117	195,103	187,147	290,497	181,240	276,701	1,155,825

2019 CAP Lake Mead Contributions

<https://www.cap-az.com/documents/water-operations/Lake-Mead-Conservation-Programs-2014-2019-Colorado-River.pdf>

CAP Conservation Activities							
Program Name	2014	2015	2016	2017	2018	2019	Total
Yuma Mesa Irrigation and Drainage District Fallowing Program	6,827	7,180	7,509	-	-	-	21,516
Ag Forbearance 1 Program EC-ICS	-	80,922	82,922	-	-	-	163,844
Ag Forbearance 3 Program	-	-	10,627	41,763	2,323		54,713
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CAP Subtotals by Year	25,117	185,023	127,015	191,805	155,747	112,099	796,806

- CAP Ag Forbearance 3 and 4 Programs – 26,146 af toward EC-ICS
- CAP Excess – 85,953 af

Pilot System Conservation Program (PSCP)							
Program Name	2014	2015	2016	2017	2018	2019	Total
Ag Forbearance 2 Program	-	-	25,265	-	-	-	25,265
Ag Forbearance 5 Program	-	-	-	-	5,042	-	5,042
Bullhead City	-	-	-	40	542	840	1,422
Tohono O'odham Phase 1 & 2	-	10,080	9,817	10,080	-	-	29,977
Tohono O'odham Phase 3	-	-	-	-	11,050	-	11,050
GRIC System Conservation Phase 2	-	-	10,000	-	-	-	10,000
CRIT System Phase 1	-	-	1,137	7,435	-	-	8,572
CRIT System Phase 2	-	-	-	1,137	7,435	-	8,572
CRIT System Phase 3	-	-	-	-	1,424	9,317	10,741
CRIT System Phase 4	-	-	-	-	-	17,488	17,488
Fort McDowell Yavapai Nation	-	-	-	-	-	13,683	13,683
PSCP Program Subtotals by Year	-	10,080	46,219	18,692	25,493	41,328	141,812

- Pilot System Conservation Programs create system water not dedicated to any entity and CAWCD provides forbearance
- Bullhead City projected to create 840 af
- 2 CRIT projects perform ag fallowing for 26,805 af
- Ft. McDowell Yavapai Nation is forgoing 13,683 af of CAP water

Other System Conservation Activities								
Program Name	2014	2015	2016	2017	2018	2019	Total	
Fort McDowell Yavapai Nation System Conservation	-	-	13,933	-	-	-	13,933	
GRIC SCIA Phase 1	-	-	-	40,000	-	-	40,000	
GRIC SCIA Phase 2	-	-	-	40,000	-	-	40,000	
GRIC ICS (Reclamation)	-	-	-	-	-	100,000	100,000	
GRIC ICS (AWBA)	-	-	-	-	-	17,000	17,000	
CRIT ICS	-	-	-	-	-	6,274	6,274	
Other Subtotals by Year	-	-	13,933	80,000	-	123,274	217,207	
Grand Total Savings in Acre Feet	25,117	195,103	187,167	290,497	181,240	276,701	1,155,825	

- GRIC is creating 117,000 af of ICS
- CRIT is creating 6,274 af of ICS
- Total projection of 276,701 af in 2019
- As of 2019, CAP and its partners have contributed more than 1 Maf to Lake Mead from Arizona programs

Planned DCP Reductions and Contributions in 2020

- CAWCD DCP Reductions = 192 kaf
 - CAP ICS Ag Forbearance Programs – 25 kaf
 - CAP ICS Compensated Conservation with MDWID – 3 kaf
 - Cuts to Excess Pool – 164 kaf
- AZDCP Offset Contributions = 133 kaf
 - GRIC ICS – 83 kaf
 - CRIT System Conservation – 50 kaf
- Individual ICS Creation = 13 kaf
 - MVIDD ICS – 10 kaf
 - CRIT ICS – 3 kaf

2020 CAP Delivery Supply



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2020 DCP Implementation

Implement Tier Zero

1. DCP Reductions become Mandatory (Tier Zero) 192KAF - AZ
2. Offset Program in process; Offsets are meant to keep Lake Mead whole while using CAP ICS as a mitigation resource. Lake Mead contributions related to the offset program are occurring in 2019 and are planned to occur in 2020.
3. Central Arizona Regional Irrigation Efficiency Conservation Project – Develop Groundwater/Recovery/Irrigation Efficiency

Specific 2020 Actions

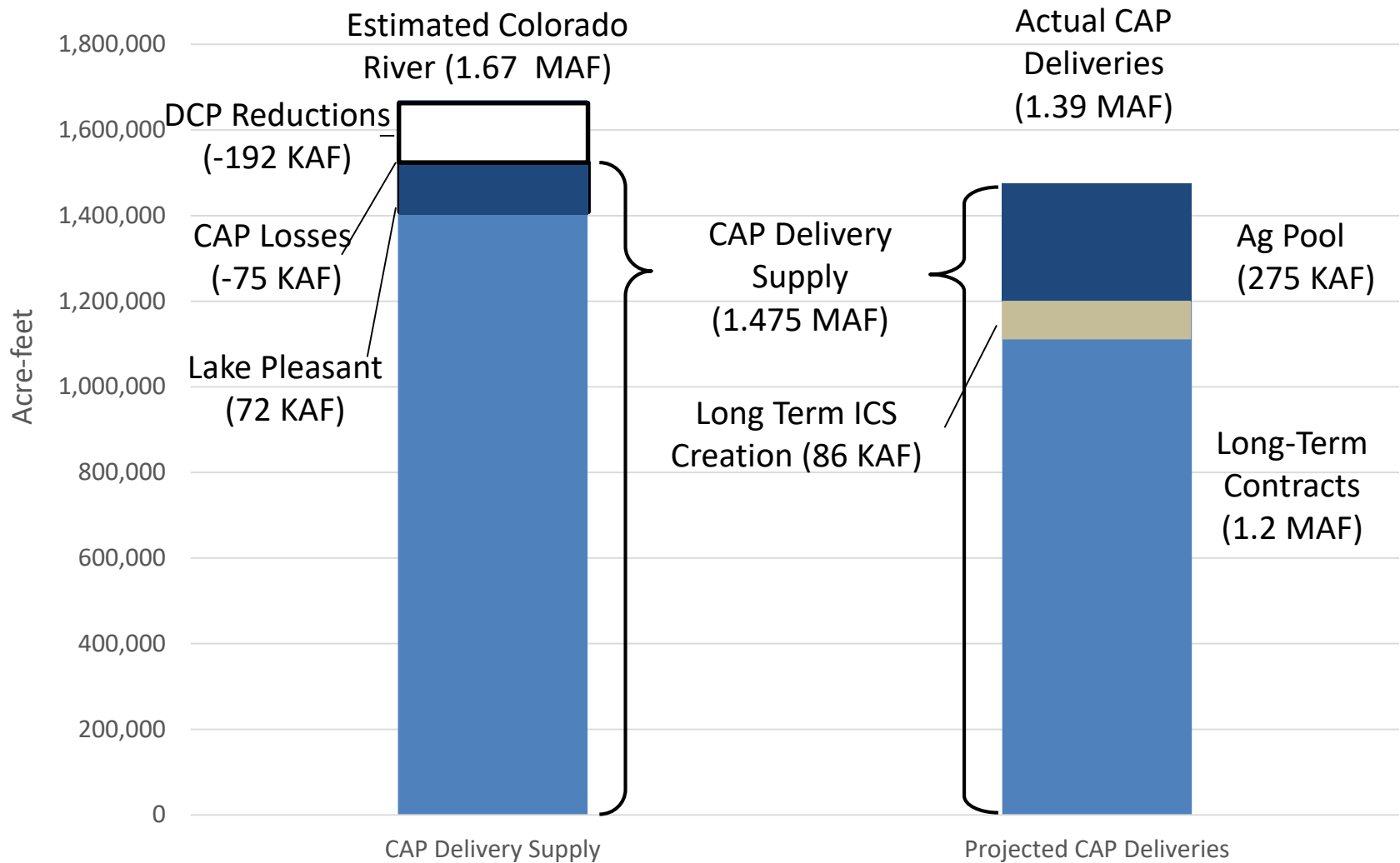
DCP Reductions

1. CAP DCP/ICS – AG Forbearance 3 25KAF
2. CAP DCP/ICS – Metro Water 3.5KAF
3. The remainder (164KAF) is CAP “Other Excess”

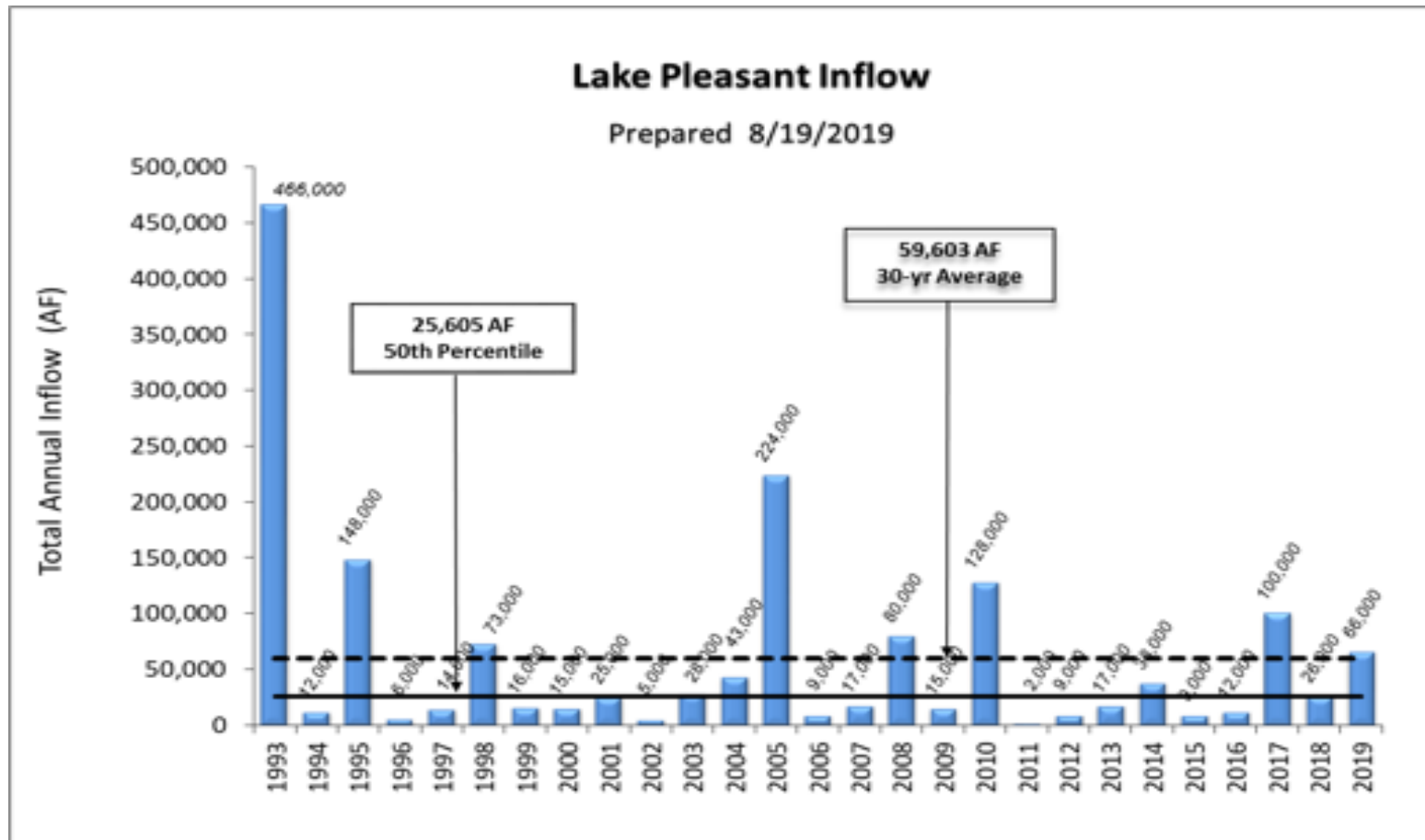
Offset Program – CAP Related Deliveries

1. GRIC AWBA Firming ICS – 33KAF
2. GRIC Reclamation ICS – 50KAF

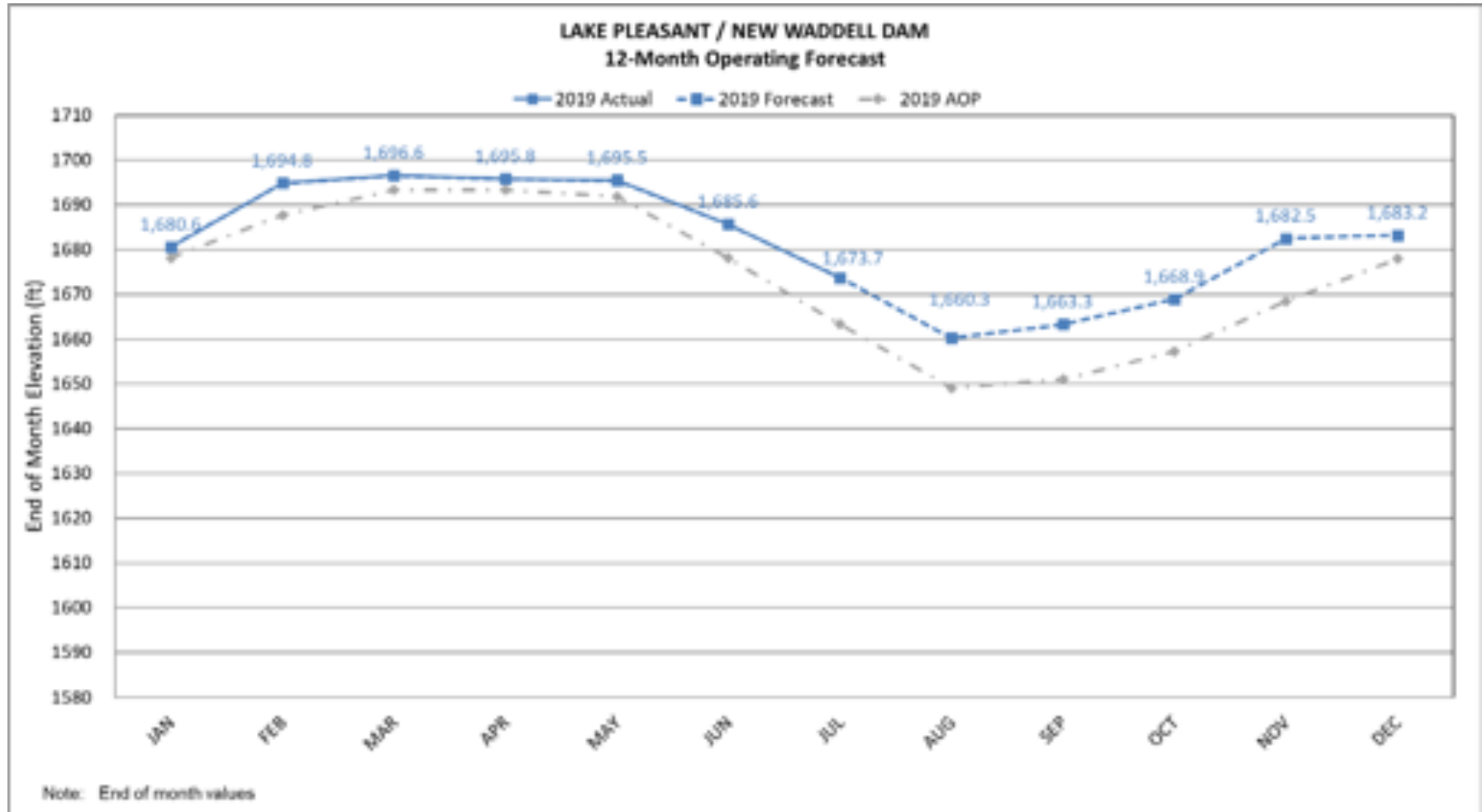
CAP Delivery Supply Projection 2020



Lake Pleasant Agua Fria Inflow



Lake Pleasant Elevation Forecast



Questions?



YOUR WATER. YOUR FUTURE.

Draft Excess Water Policy

Water Users Briefing

August 21, 2019

Ken Seasholes

Manager, Resource Planning & Analysis

Central Arizona Project



CAP
CENTRAL ARIZONA PROJECT

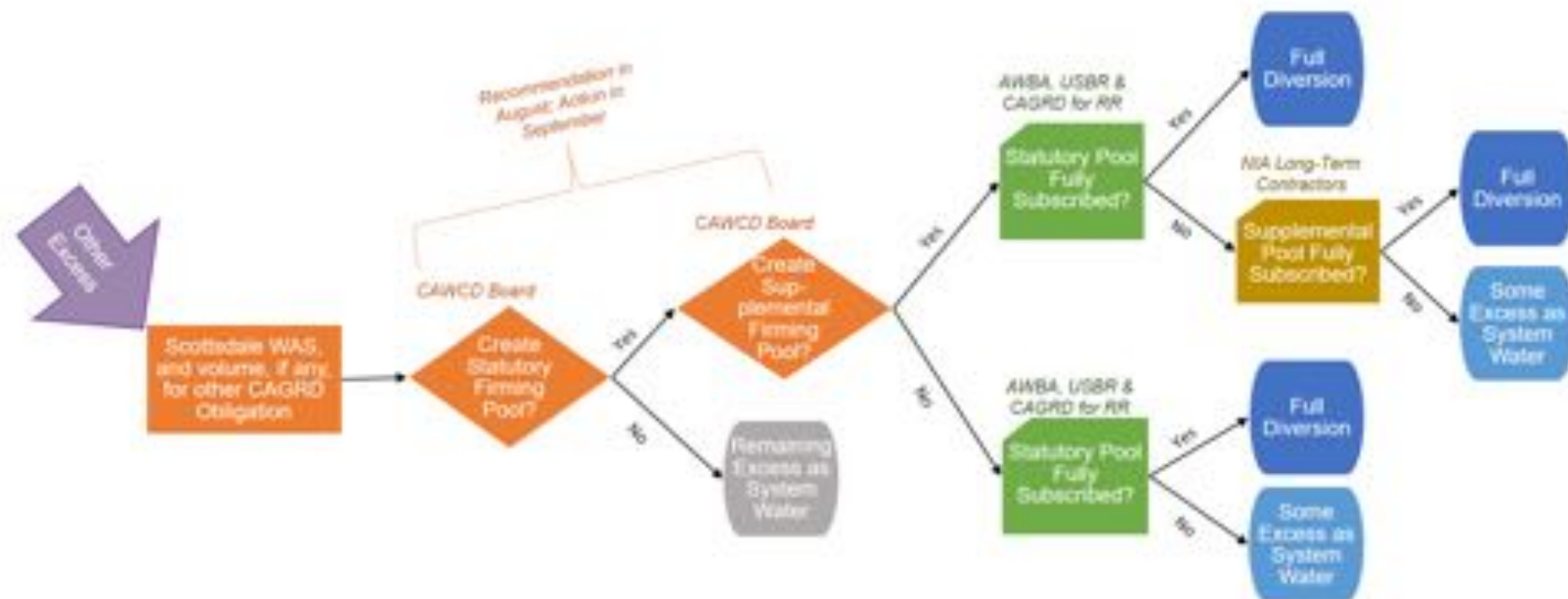
YOUR WATER. YOUR FUTURE.

Draft Excess Water Policy

- Carries forward many provisions of the current, but expiring “Access to Excess” policy*
- Incorporates recommendations from the Board’s Excess Water Task Force and the June 20th Roundtable on Excess Water
- Clarifies use of Excess Water for CAGRD replenishment, including Scottsdale Water Availability Status
- Contemplates annual Board action for the establishment of the “Statutory Firming Pool,” and an option for an additional “Supplemental Firming Pool”
- Provides guidance on turn-back water

* “CAWCD Procedure to Distribute Excess Water in 2015 Through 2019,” adopted March 6, 2014

Draft Excess Water Policy Decision Tree



Draft Excess Water Policy Timeline



Questions?

CAP Energy Resources

Brian Young

August 21, 2019



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Energy Resource Topics

- 2019 Energy Supply
- Long-Term Resources Starting 2020
- Market Energy Purchases
- 2020 Purchase Status
- Purchases for Later Years

2019 Energy Supply

- NGS is expected to operate into early November until coal stockpile is exhausted.
- Nov and Dec energy will be supplied primarily from market energy.
- A significant portion of Nov & Dec energy has been purchased at favorable prices.
- Lower than expected NGS costs and prices for market purchases will result in average energy costs significantly below projections in 2019 energy rate.

Long-Term Resources Starting 2020

- APA Hoover Power Contract: Existing 50-year agreement until 2067 that provides up to 162 MW of capacity and associated energy from Hoover Dam.
- 30 MW Solar PPA: 20-year agreement for output of a 30 MW solar facility in Salome AZ directly connected to the CAP Transmission System.
- SRP Fleet Agreement: 5-year agreement for 35 MW of capacity and associated energy from SRP's fleet of generation.
- Combined these long-term resources provide only about 20% of total expected CAP energy needs but fully cover the energy needed in summer peak hours.

Market Energy Purchases

Market energy will provide for the remaining 80% of CAP energy needs and are purchased under 3 processes:

- Energy Auctions - Run by a vendor and are used for largest energy purchases. Designed to maximize competition and reduce risk by making purchases over time. Expected to be 35%-40% of annual energy needs.
- Monthly Energy Purchases – Targeted monthly purchases are negotiated by our scheduling agent. Designed to take advantage of favorable prices in forward market and fill in monthly energy needs. Expected to be about 20% of annual energy needs.

Market Energy Purchases (Cont.)

- Short-Term Purchases – Mostly day-ahead purchases to balance to load and take advantage of daily energy pricing variations. In addition, a substantial amount of energy is required to be left to short-term purchases to allow for deviations from planned monthly energy requirements. Expected to be about 20%-25% of annual energy needs.

2020 Energy Purchases

- One energy auction was held earlier this year and are currently making targeted monthly purchases of 2020 energy.
- We currently have about 70% of estimated 2020 energy needs secured and expect to be between 75% to 80% by the start of 2020.
- Total energy purchase costs are about \$2/MWh lower than projected at this time and we expect that 2020 will finish below estimated average prices in energy rate.

Energy Purchases for Later Years

- First energy auction for 2021 and 2022 held in May of this year provided roughly 15% of the expected purchases.
- Next energy auction is planned for October this year also for 2021 and 2022 products.
- Still early in the process, but outlook is favorable for 2021 and 2022 energy purchase prices to average equal to or less than 2020 purchases.

KNOW YOUR WATER

Questions?

CentralArizonaProject.com ~ CAGRd.com



Salt River Siphon Update

CAP Annual Water Users Meeting
August 21st, 2019

Phillip Pagels, PE,
CAP Water Transmission Supervisor



Salt River Siphon Update

CAP Annual Water Users Meeting
August 21st, 2019

Phillip Pagels, PE,
CAP Water Transmission Supervisor


Outreach

Inspection

Repairs





An aerial photograph of a construction site, likely a water treatment facility, showing a large circular concrete structure under construction. The structure is surrounded by a dirt road and several white pickup trucks. A large, semi-transparent circular overlay is centered on the image, containing a timeline of project milestones. The background image shows the circular structure's edge and the surrounding area with workers and vehicles.

February 2017

Customer Focus Group

March 2017

Siphon Outage Memo and Maps

June 2017

Outage Schedule Letter

September 2017

Siphon Outage and Dates

June 2018

Salt River Siphon Project Update #1

<http://www.srp-ar.com/departments/water-operations/salt-river-siphon-outage>



Facts



- 21 foot diameter
- 8,700 feet long
- Steel
- Constructed 1995
- Interior Coating:
 - Original – Coal Tar Epoxy
 - Repair – Devco 238
- Repaired in 2001
- 70% of Water Deliveries



Salt River Siphon Update

CAP Annual Water Users Meeting
August 21st, 2019

Phillip Pagels, PE,
CAP Water Transmission Supervisor

Outreach

Inspection

Repairs





2018 Inspection

- November 6 - 9
- 72 hour outage
- 22 millions gallons of water
- 8 entities participated

Photos

Evacuation Structure





Ventilation



Inspection



Inspection





spection







Salt River Siphon Update

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CAP Water Transmission Supervisor

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Repairs





2019 Repairs

- Scope
- Schedule

Scope

Schedule

Scope of Work



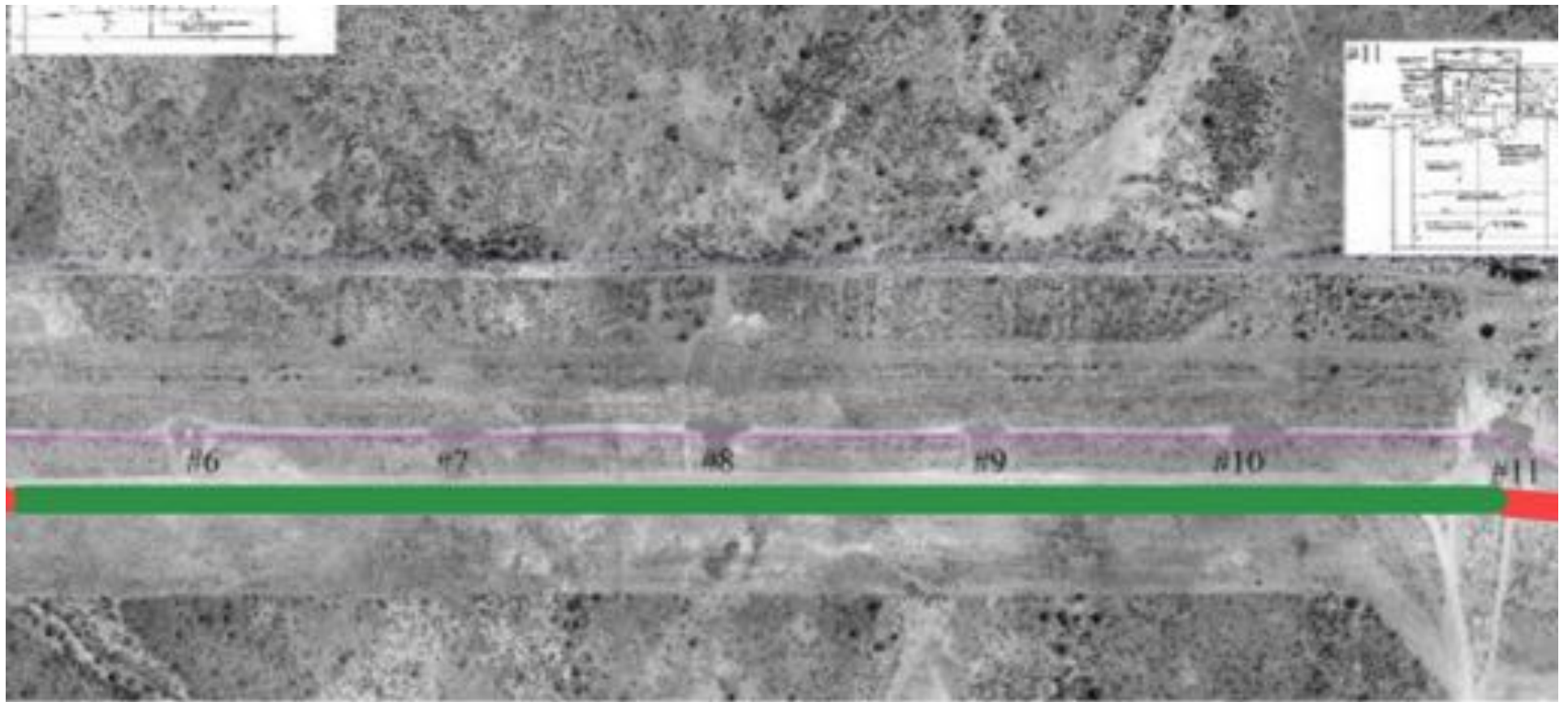
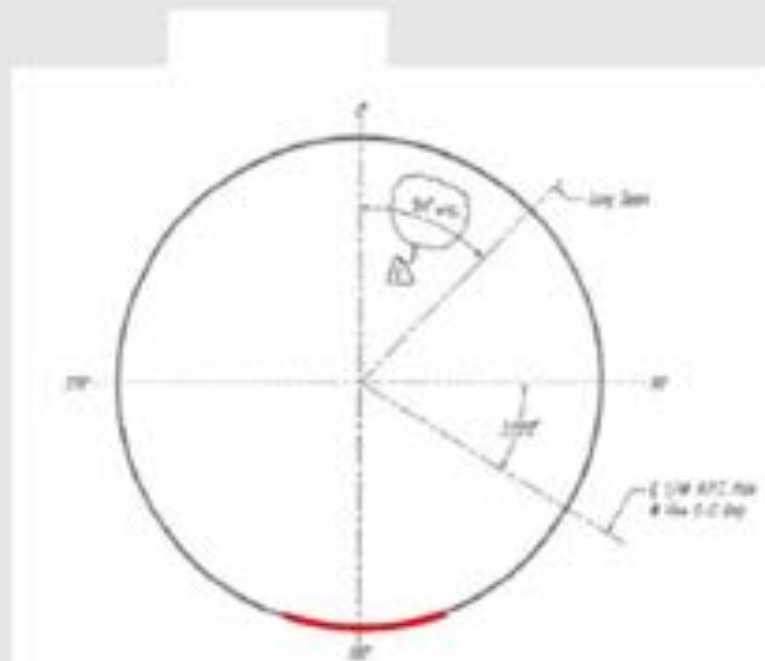


Exhibit C: Limits of Invert Coating

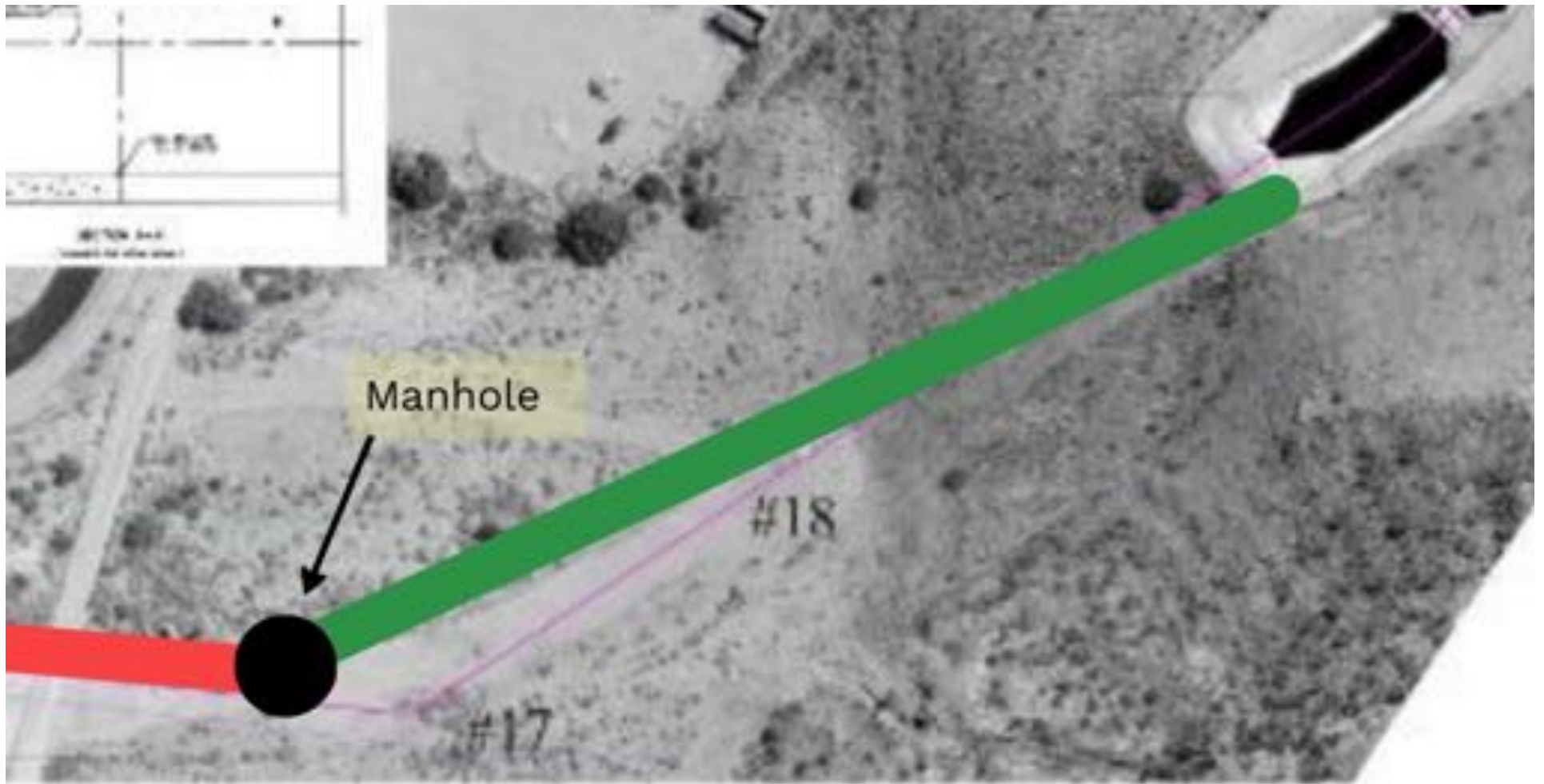


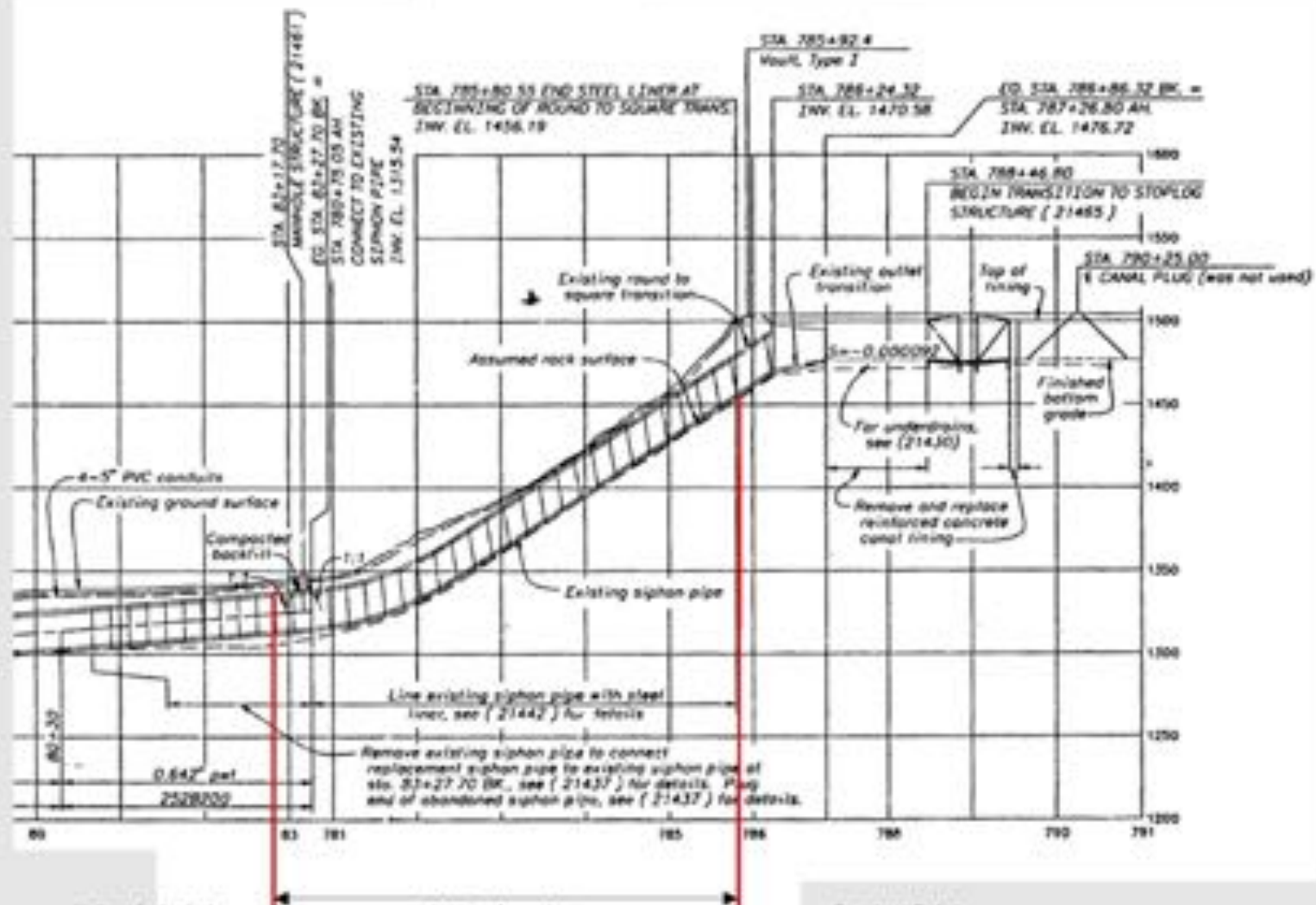
Typical 5.5 ft. Arc Invert Coating
(Including Tie In)

— : Limits of Invert Coating

Scope of Work



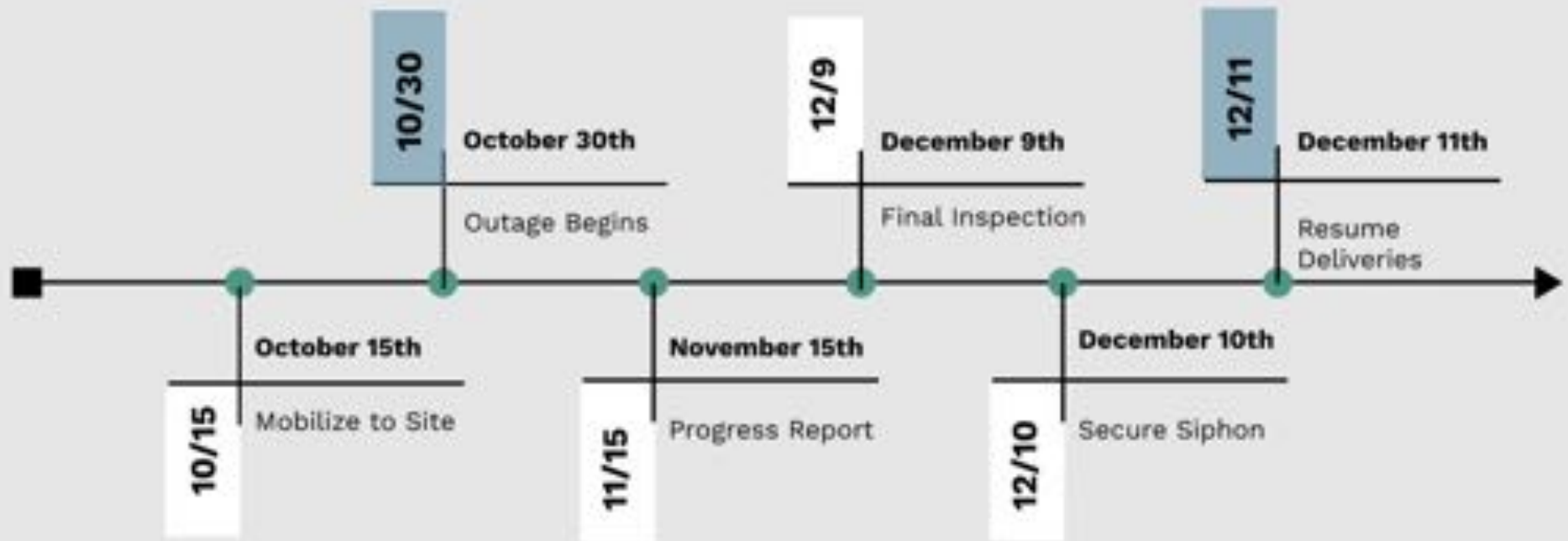


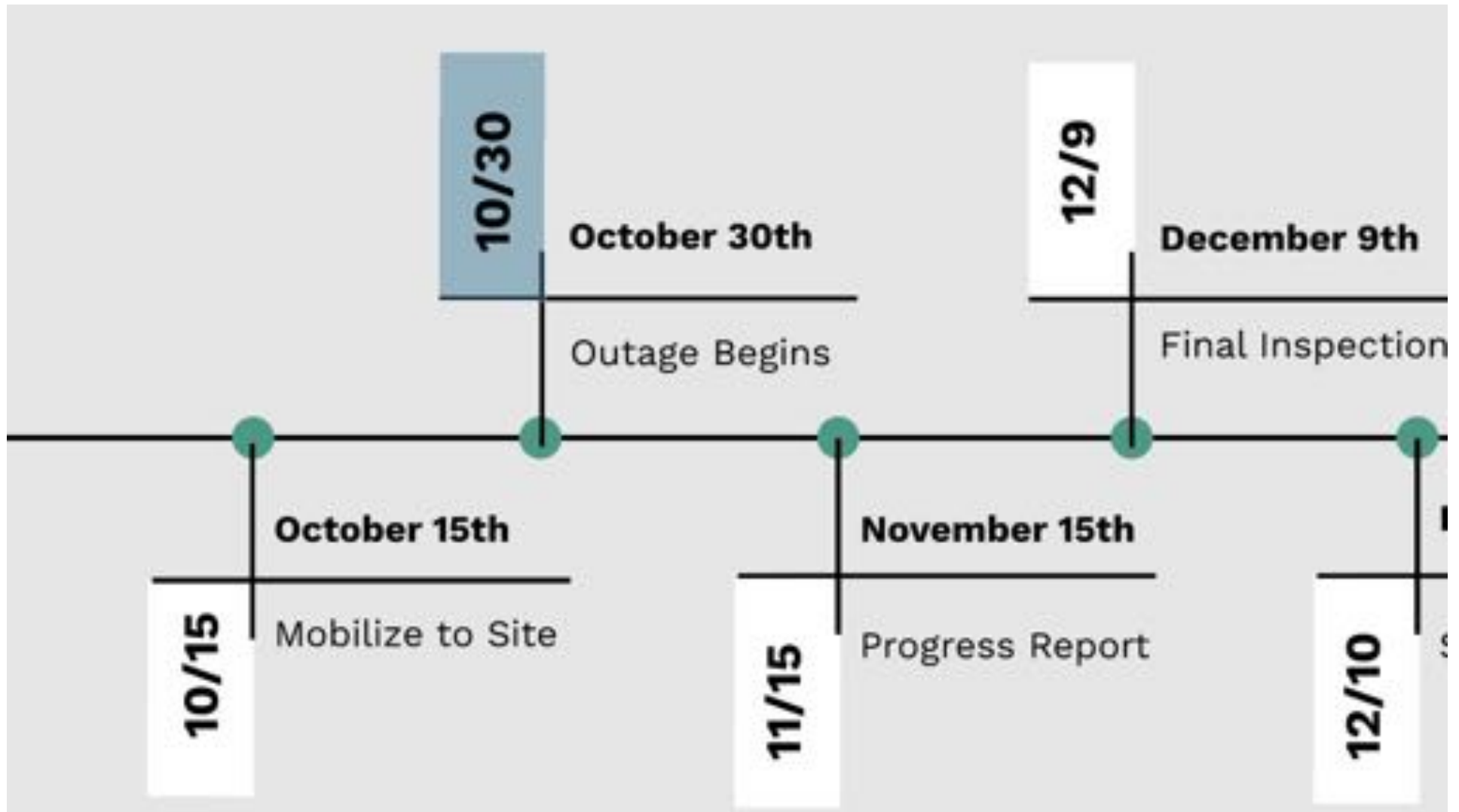


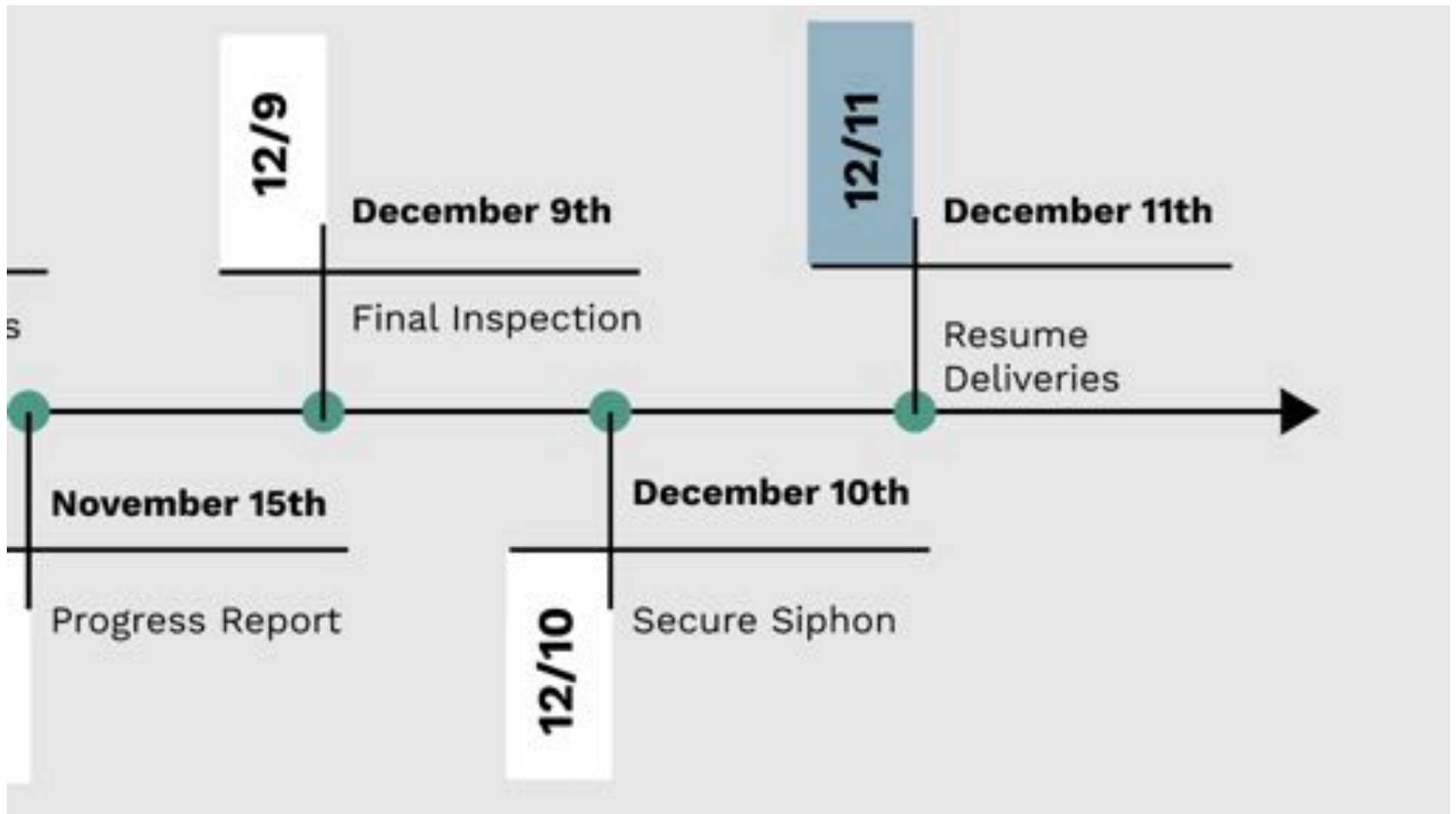
Salt River Outage Timeline



Salt River Outage Timeline







Salt River Siphon Update

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Phillip Pagels, PE,
CAP Water Transmission Supervisor

Outreach

Inspection

Repairs



Annual Water User Information Meeting

Upcoming Capital Projects

Ryan Johnson
Engineering Services Manager
August 21, 2019

- **Mark Wilmer Pump Unit Circuit Breaker Replacements**
- **Backup Power System Replacement at Checks, Turnouts, and Microwaves**
- **Mark Wilmer Unit 6 Motor Repair**
- **Mark Wilmer HVAC Replacement**
- **Hassayampa Discharge Valve Replacement**
- **Elevator System Replacement – Phase 2**

Mark Wilmer Pump Unit Circuit Breaker Replacements



Project Scope

- Replace air-blast breakers with SF6 type breakers across all six units
- Eliminate intrusive maintenance requirements
- Address obsolete and non-supported equipment
- Highly critical system to reliable water delivery



Mark Wilmer Pump Unit Circuit Breaker Replacements



2020				Budget	2021				Budget
Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
Design	Construction			\$1.5 Mil	Close Out				\$24 K

Backup Power System Replacement at Checks Turnouts and Microwave Sites

Project Scope

- Large system-wide program to replace original equipment that has exceeded useful life.
- Protect critical systems and operational uptime when power is interrupted.
- Replace original generators, propane tanks, automatic transfer switches, surge protection, and consolidate battery backup power system.
- All check structures, microwave sites, turnout buildings (71 total sites)



Backup Power System Replacement at Checks Turnouts and Microwave Sites



2020				Budget	2021				Budget
Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
Construction				\$2.03 Mil	Construction				\$2.1 Mil

Mark Wilmer Unit 6 Motor Repair

Project Scope

- Experienced failure in November 2018 due to reported ground fault
- Belly brace insulation and bolt failures
- Fragmented pieces caused damage to stator core and rotor poles
- Full motor stator rewind and new rotor poles



Mark Wilmer Unit 6 Motor Repair

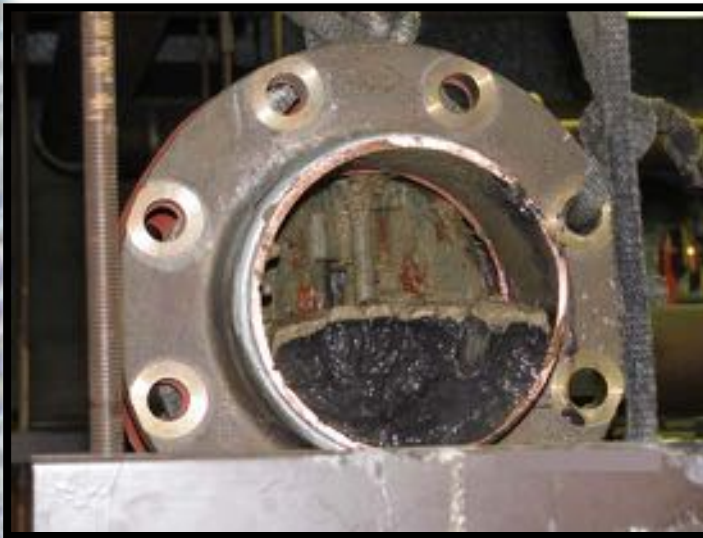


2020				Budget	2021				Budget
Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
Construction		Close Out		\$3.14 Mil					

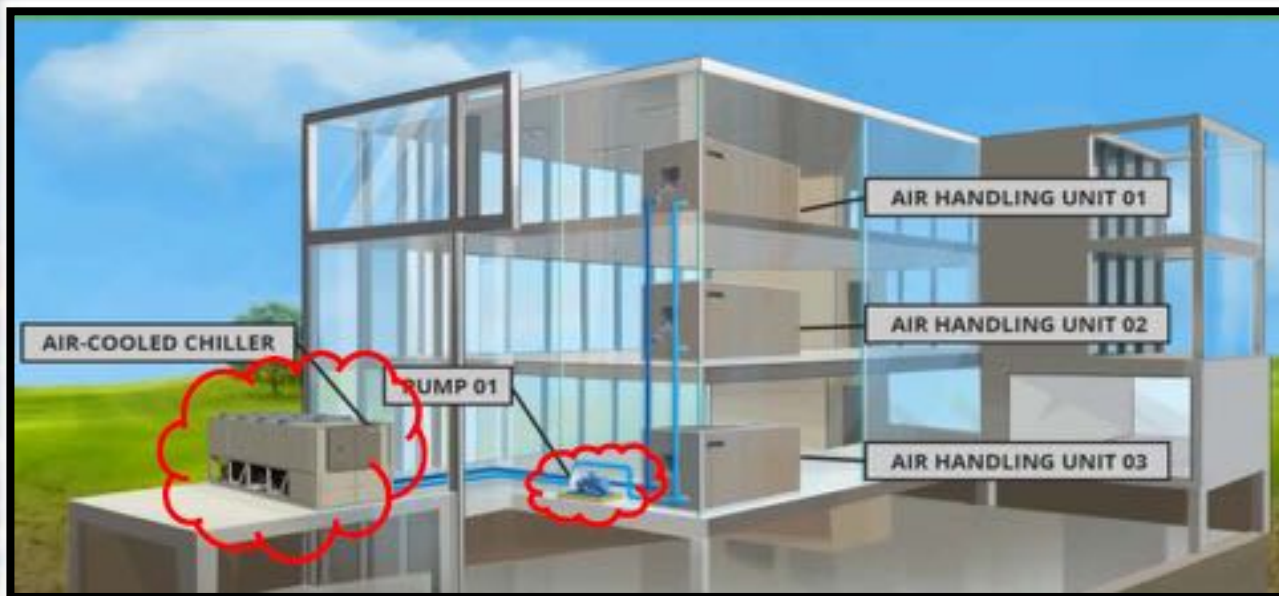
Mark Wilmer HVAC Replacement

Project Scope

- Remove two water-cooled chillers, air handler coils, water pumps, and isolation valves - all at end of useful service life
- Raw water utilized from forebay used to exchange heat
- Corrosion and clogging of chiller condensers due to silt, salts, and weeds in the raw water
- Poor efficiency and frequent maintenance
- Install two new air-cooled chillers, air handler components, water pumps and valves.



Mark Wilmer HVAC Replacement



2020				Budget	2021				Budget
Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
Design				\$670 K	Construction		Close Out		\$1.4 Mil

Hassayampa Discharge Valve Replacement

Project Scope

- Replace 6 Discharge Valves at Hassayampa
- Replace 2 Discharge Valves at Little Harquahala
- Four: 90-inch
- Two: 66-inch
- Two: 48-inch
- Original valves are old and obsolete equipment and leaking
- Cost-effective solution



Hassayampa Discharge Valve Replacement



2020				Budget	2021				Budget
Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
	Construction			\$921 K		Construction		Close Out	\$845 K

Elevator System Replacement – Phase Two (7 sites)

Project Scope

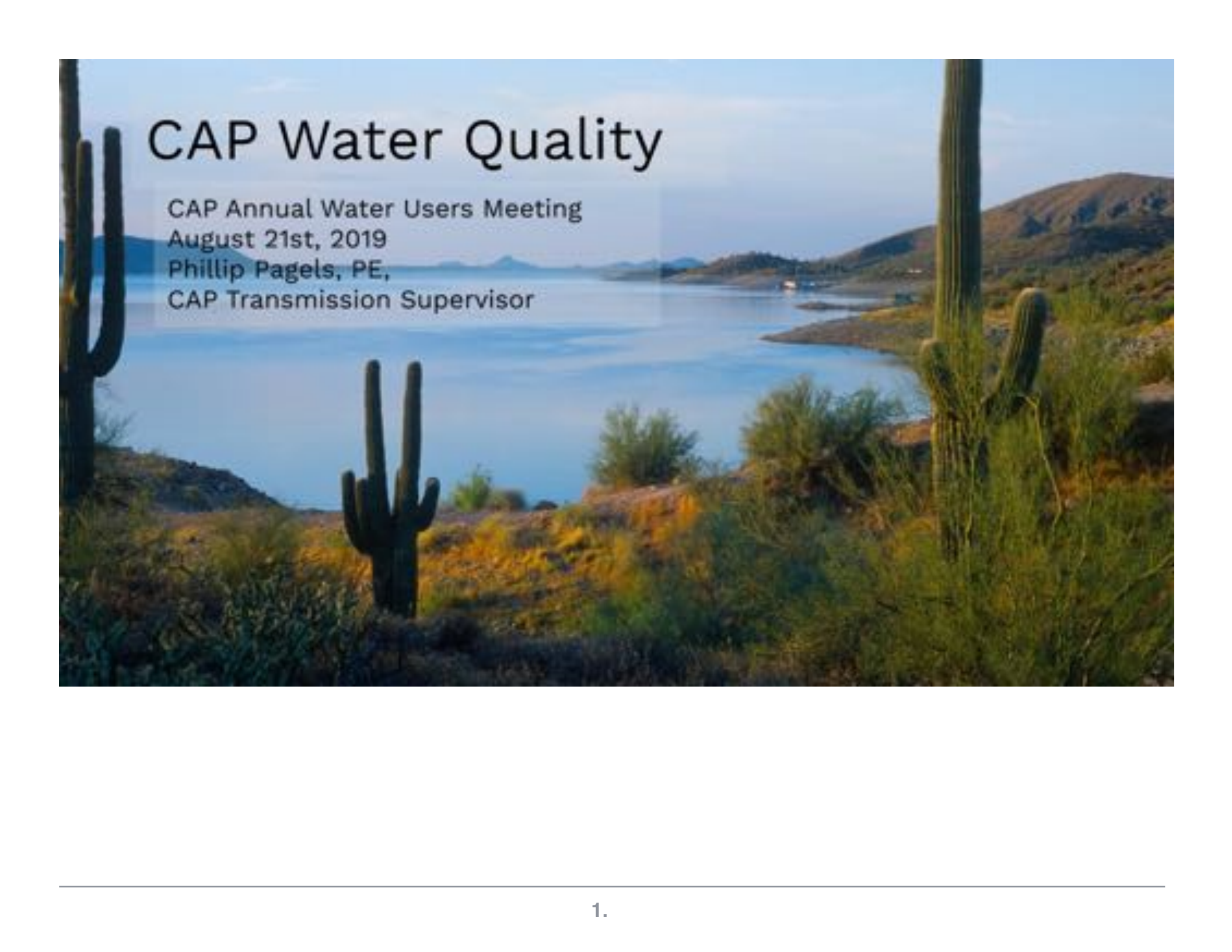
- Mark Wilmer, Bouse, Hassayampa, Waddell, Red Rock, Brawley, San Xavier
- Replace obsolete and out-dated equipment
- Critical support system for safety and maintenance
- Controls, cables, hoists, motors, doors, fire alarm recall control, braking, switching



Elevator System Replacement – Phase Two (7 sites)




2020				Budget	2021				Budget
Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
Construction	Design			\$3.4 Mil	Construction			Close Out	\$2.8 Mil

The background of the slide is a photograph of a desert landscape. In the foreground, there are several saguaro cacti of varying sizes, some with arms. The ground is covered with low-lying desert vegetation, including yellow wildflowers and green shrubs. In the middle ground, a large, calm body of water, likely a reservoir, stretches across the frame. The water is a deep blue color. In the background, there are rolling hills and mountains under a clear, light blue sky.

CAP Water Quality

CAP Annual Water Users Meeting
August 21st, 2019
Phillip Pagels, PE,
CAP Transmission Supervisor






History

Sampling and Reporting

2020-2021 Studies/Improvements



History

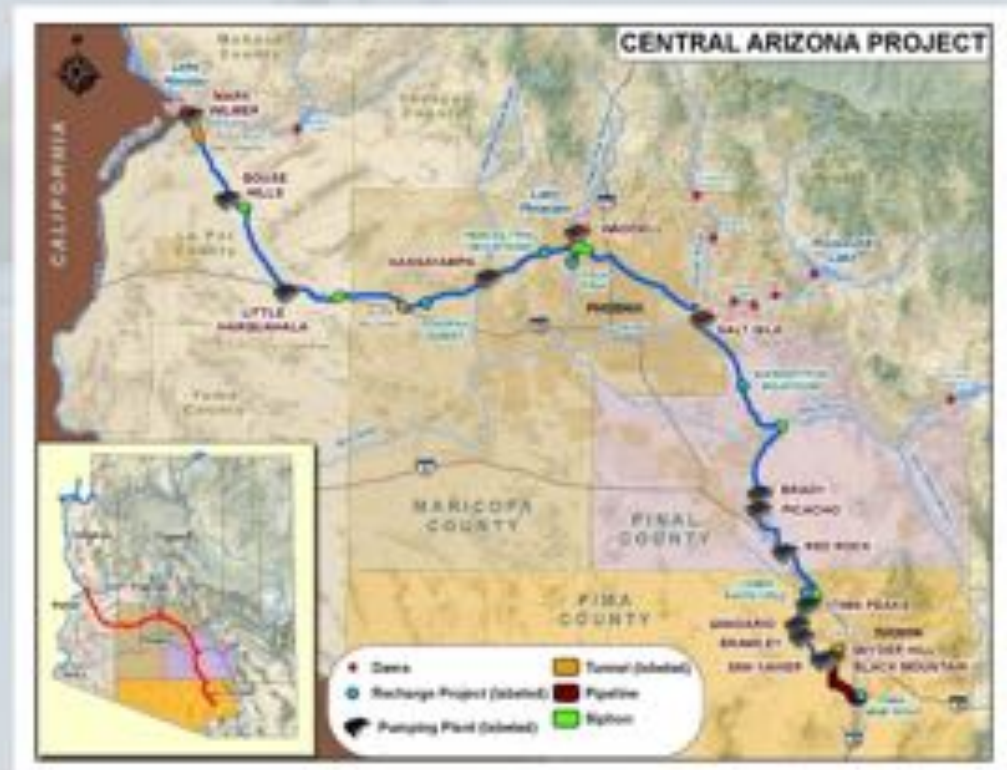
Sampling and Reporting

2020-2021 Studies/Improvements

Sampling and Monitoring Expanded Program

- 39 Constituents
- 246 Non-detection
- 7 Locations
- 3 Real Time

Location	Constituent	Result	Unit	Notes
Mesa Verde	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
Mesa Verde	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
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	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
Mesa Verde	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
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	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
Mesa Verde	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	
	Ammonia	Detected	mg/L	



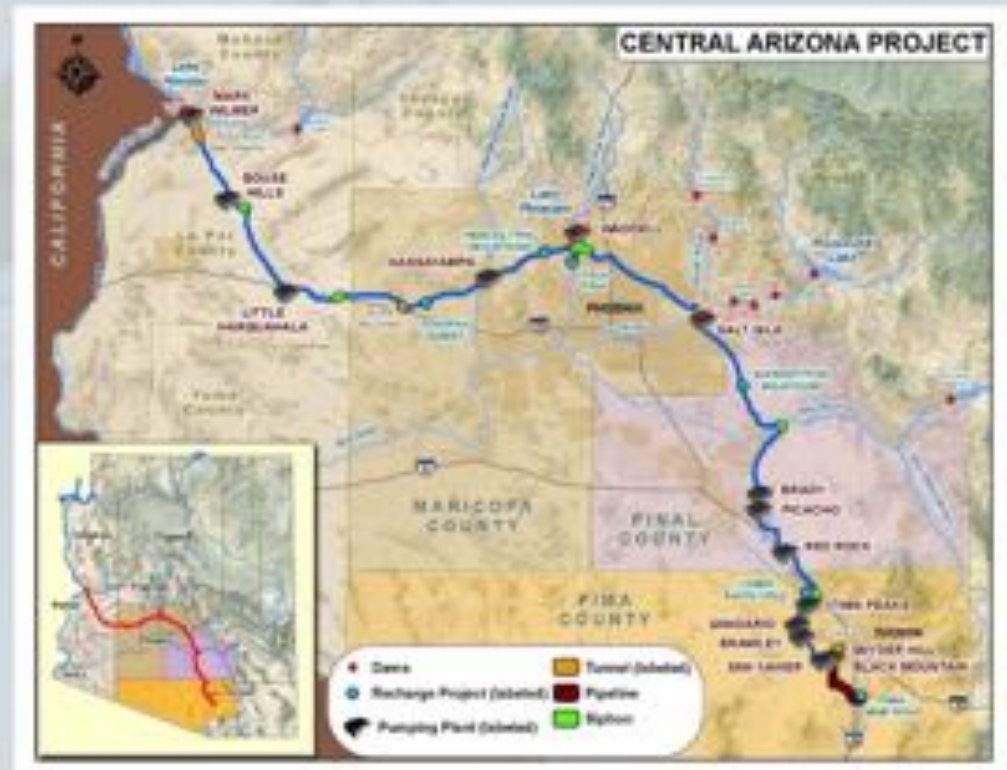
General	
Temperature	General
Dissolved Oxygen	General
pH	General
Turbidity	General
Total Dissolved Solids (TDS)	General
Total Suspended Solids (TSS)	General
Specific Conductance	General
Minor and Trace Metals	
Antimony	Priority Pollutant
Arsenic	Priority Pollutant
Barium, Total, ICAP/MS	General
Chromium	Priority Pollutant
Copper, Total	Priority Pollutant
Copper, Dissolved	Priority Pollutant
Hexavalent Chromium	General
Iron, Total, ICAP	Priority Pollutant
Iron, Dissolved ICAP	Priority Pollutant
Lead	Priority Pollutant
Magnesium, Total, ICAP	General
Manganese, Total, ICAP	General
Selenium	Priority Pollutant
Silver Total ICAP/MS	Priority Pollutant
Thallium, Total	Priority Pollutant
Uranium	General
Zinc	Priority Pollutant

Common Inorganic Compounds / Ions	
Alkalinity in CaCO ₃ units	General
Calcium, Total, ICAP	General
Chloride	General
Fluoride	General
Perchlorate	General
Silica	General
Sulfate	General
Strontium	General
Agricultural Concerns	
Boron	General
Sodium, Total, ICAP	General
Nutrients	
Ammonia Nitrogen	General
Nitrate as Nitrogen	General
Potassium, Total, ICAP	General
Orthophosphate as P	General
Phosphorus, Total-P	General
Dissolved Organic Carbon	General
Total Organic Carbon	General

Sampling and Monitoring Expanded Program

- 39 Constituents
- 246 Non-detection
- 7 Locations
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Location	Constituent	Result	Unit	Notes
Well 101	Arsenic	ND	mg/L	
	Boron	ND	mg/L	
	Calcium	ND	mg/L	
	Chloride	ND	mg/L	
	Copper	ND	mg/L	
	Fluoride	ND	mg/L	
	Iron	ND	mg/L	
	Magnesium	ND	mg/L	
	Manganese	ND	mg/L	
	Nitrate	ND	mg/L	
Well 102	Arsenic	ND	mg/L	
	Boron	ND	mg/L	
	Calcium	ND	mg/L	
	Chloride	ND	mg/L	
	Copper	ND	mg/L	
	Fluoride	ND	mg/L	
	Iron	ND	mg/L	
	Magnesium	ND	mg/L	
	Manganese	ND	mg/L	
	Nitrate	ND	mg/L	
Well 103	Arsenic	ND	mg/L	
	Boron	ND	mg/L	
	Calcium	ND	mg/L	
	Chloride	ND	mg/L	
	Copper	ND	mg/L	
	Fluoride	ND	mg/L	
	Iron	ND	mg/L	
	Magnesium	ND	mg/L	
	Manganese	ND	mg/L	
	Nitrate	ND	mg/L	
Well 104	Arsenic	ND	mg/L	
	Boron	ND	mg/L	
	Calcium	ND	mg/L	
	Chloride	ND	mg/L	
	Copper	ND	mg/L	
	Fluoride	ND	mg/L	
	Iron	ND	mg/L	
	Magnesium	ND	mg/L	
	Manganese	ND	mg/L	
	Nitrate	ND	mg/L	



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[illegible]

[illegible]

[illegible]

Water Quality Website

- Annual Reports
- Real Time Data
- Grab Sample Data

<https://www.cap-az.com/departments/water-operations/water-quality>



Water Quality

As a service to municipal and industrial customers and the thousands of people who will ultimately drink the water, CAP has developed a comprehensive water quality testing program. The canal water quality is sampled on a monthly and quarterly basis and consists of more than 150 constituents. Lake Pleasant is sampled on a quarterly basis.

Annual Water Quality Reports

- | | | | | | |
|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| • 2017 | • 2013 | • 2009 | • 2005 | • 2001 | • 1997 |
| • 2016 | • 2012 | • 2008 | • 2004 | • 2000 | • 1996 |
| • 2015 | • 2011 | • 2007 | • 2003 | • 1999 | |
| • 2014 | • 2010 | • 2006 | • 2002 | • 1998 | |

Canal Water Quality as of 2019-08-19 at 12:31:02

Location	Turbidity (ntu)	Temperature (F)	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/l)	Dissolved Oxygen (% Sat.)
Lake Havasu @ CAP Intake	0					
Phoenix @ 7th St	0	71	825.2	8.1	6.5	74.1
Mesa @ McDowell Rd	1	72	994.1	8.3	8.5	97.9



Sample Point

Lake Pleasant Parkway ▼

Sample Year

2019 ▼

Sample Date

1/29/2019 2:00 PM ▼

Lab Results

Field Results

 Export to Excel

Parameter ▼	Re... ▼	U... ▼	Met... ▼	Det. Li... ▼
Alkalinity in CaCO3 units	120	mg/L	SM 2320B	2
Ammonia Nitrogen	ND	mg/L	EPA 350.1	0.05
Barium Total ICAP/MS	110	ug/L	EPA 200.8	2.000
Bromide	73	ug/L	EPA 300.0	5
Calcium Total ICAP	70	mg/L	EPA 200.7	1

CAP Water Quality

CAP Annual Water Users Meeting
August 21st, 2019
Phillip Pagels, PE,
CAP Transmission Supervisor

Sampling

2020-21

History

Sampling and Reporting

2020-2021 Studies/Improvements

2020-21 Studies and Improvements

- Technical Studies
 - Buffering
 - Cymbella (Rock Snot)
- Upgrading Equipment
- Improved Website and Data Management
- Water Quality Model

CAP Water Quality

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CAP Transmission Supervisor

Sampling

2020-21

History

Sampling and Reporting

2020-2021 Studies/Improvements

CAP Biology Program

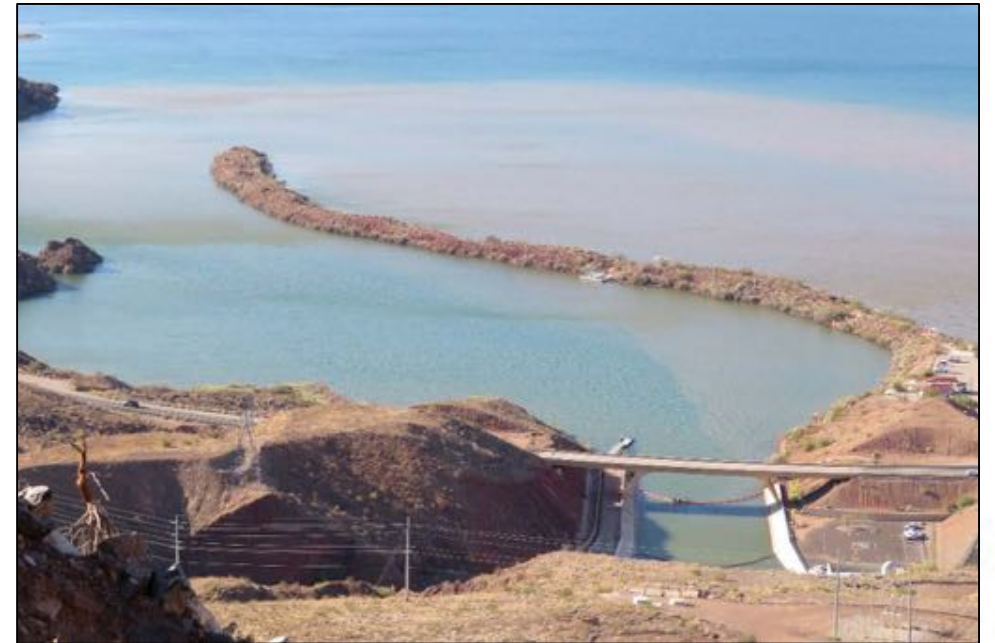
The CAP Biologist is responsible for addressing the multitude of biological issues that can affect CAP property, the aqueduct, and our ability to deliver water. Some of the issues facing CAP include:

- Quagga Mussels
- Fisheries and Wildlife Mgmt
- Caddisflies
- Sediment
- Invasive Diatoms (Cymbella)
- Aquatic and Terrestrial Weeds
- Green-up Areas
- Endangered Plants and Wildlife

The Biology Program has now been incorporated into CAP's Water Operations Department as part of the Water Transmission group and will play a bigger role in the expanded water quality program.

Alamo Dam Water Control Manual

The U.S. Army Corps of Engineers is updating their water control manual for the operation of Alamo Dam. The operation of the dam has the potential to impact water quality, especially turbidity, in Lake Havasu and could ultimately affect CAP customers. We are closely monitoring the progress of the updates and participating in meetings to ensure that CAP is not adversely affected by any proposed changes.



Aquatic Vegetation Control (Lake Havasu)

Floating weed mats in Lake Havasu have the potential to obstruct water flow and shut down CAP pumps

- Aquatic weed harvesting
- Aquatic vegetation treatment



Track | Layers | Polygons | Clear

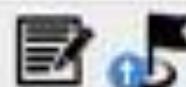


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Merged Trip
05/16/2015 16:10:07 (UTC)



Name	Action
<input type="checkbox"/> Main	-----
<input type="checkbox"/> West Addition	-----
<input type="checkbox"/> South Addition	-----
<input type="checkbox"/> Untreated 1	-----
<input type="checkbox"/> Untreated 2	-----
<input type="checkbox"/> 2015 Main	-----
<input type="checkbox"/> 2015 South	-----
<input type="checkbox"/> 2015 West Addition	-----
<input type="checkbox"/> 2015 Untreated 1	-----
<input type="checkbox"/> Full Treatment	-----
<input checked="" type="checkbox"/> Pilot Area	-----

Property	
Volume (ac ft)	72.47
Depth (avg ft)	14.34
Depth (max ft)	22.11
Depth (min ft)	1.18
Surface Area (ac)	5.055
Width (ft)	1114.67
Height (ft)	457.959
Perimeter (ft)	2381.721
Veg Avg BV (%)	25.8218
Veg PAC (%)	78.8107

Aquatic Vegetation Control (Canal)

Grass carp are stocked annually to ensure that rooted aquatic vegetation does not become established in the CAP. The grass carp also provide some algae control



Sediment

Sediment deposition in the CAP clogs filtration and strainers, and can increase turbidity

- Sediment Removal Efforts
- Slope Stabilization



Invasive Species

Various invasive species create impacts in the CAP by fouling critical infrastructure and restricting flow

- Quagga Mussels
- Diatoms (Rock Snot)



Quagga Control – Mark Wilmer Pumping Plant



Rock Snot (Cymbella)



Thank you!

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