Recovery of Arizona Water Bank Credits: Mitigating Shortages on the Colorado River
Planning for Colorado River Shortage

• Many years of ADWR, AWBA and CAP coordination to ensure Arizona is prepared for shortage

• High level of stakeholder participation

• Increased probability of shortage requires in-depth analysis of infrastructure and recovery agreements

• Recovery Planning Advisory Group convened

• Preparing to release an updated Recovery Planning document to provide additional clarity
Colorado River Allocations

1922 Colorado River Compact established Upper and Lower Basin States’ allocations

UPPER DIVISION STATES - 7.5 MAF
1948 Upper Colorado Basin Compact established the Upper Basin States’ apportionment

LOWER DIVISION STATES - 7.5 MAF
California – 4.4 MAF
Arizona – 2.8 MAF
Nevada – 0.3 MAF
1928 Boulder Canyon Project Act established the Lower Basin States’ apportionment

MEXICO - 1.5 MAF
1944 Treaty with Mexico established Mexico’s treaty deliveries
Arizona’s Priority System

2019 Available Supply ≈ 1.7 MAF

2019 Consumptive Use ≈ 1.1 MAF

Priority 1

Priority 2 & 3

Priority 4

On-River

CAP

Priority 3

Priority 4
Overview of Shortage Impacts

Elevation of Lake Mead

Supply to AZ

Supply to CAP

Use by On River P1-3

Supply to On-River P4

Supply by CAP Priority

Impact to NIA and M&I firmed by AWBA

Impact to P4 M&I Firmed by AWBA
AZ Strategies for Mitigating Effects of Shortage

• Conservation/Demand Management
• CAP Tiered Priorities
• Shortage Sharing Agreement
• Drought Plans and Provisions
• Long-Term Storage by Cities and Tribes
• Arizona Water Banking Authority (AWBA) Storage and Recovery
AZ Water Banking Authority (AWBA)

- Water Bank begins storing water in 1997
- Firming Responsibilities & Obligations
  - CAP M&I subcontractors
  - On-River fourth priority M&I users
  - Tribal Settlements
  - Interstate banking
- Transitioning to a new phase – recovery focus
- Water Bank distributes credits during shortage (does not perform recovery)
What is “firming”? 

• Firming water is pumped from underground storage to replace reductions in Colorado River supplies due to shortages.

• Arizona Water Banking Authority Long-Term Storage Credits (LTSCs) can be recovered (pumped) during a shortage to provide back-up water supplies (known as "firming") for Arizona water users.
Funding, Purpose and Location of Credits

AWBA Credits Accrued (through 2019)

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>LTSCs (AF)</th>
<th>Phoenix AMA</th>
<th>Pinal AMA</th>
<th>Tucson AMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Storage Tax</td>
<td>2,227,745</td>
<td>68%</td>
<td>10%</td>
<td>22%</td>
</tr>
<tr>
<td>Withdrawal Fees</td>
<td>884,436</td>
<td>38%</td>
<td>49%</td>
<td>12%</td>
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<tr>
<td>General Fund</td>
<td>403,830</td>
<td>10%</td>
<td>76%</td>
<td>14%</td>
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<tr>
<td>Shortage Reparation</td>
<td>109,489</td>
<td>19%</td>
<td>55%</td>
<td>26%</td>
</tr>
<tr>
<td>Interstate - Nevada</td>
<td>613,846</td>
<td>10%</td>
<td>72%</td>
<td>19%</td>
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</table>

- AWBA credits were accrued with multiple funding sources
- The funding sources used dictate the allowable uses of those credits

AZ Water Bank GIS Map - https://waterbank.az.gov/ltscc-map
Arizona Firming Obligations

• Tribes firmed under the Arizona Water Settlements Act (CAP NIA Priority)
• CAP NIA priority water is likely the first supply requiring AWBA firming (Tier 1)
• On-River fourth priority M&I users (MCWA)
• CAP M&I Subcontractors (Cities and Industrial)
CAP Priority Pools – Firmed Portions

- Excess
- Firmed by AWBA
- Cities & Industry
- Long-Term Contracts

Acre Feet

- Other Excess = 141 KAF
- NIA = 201 KAF
- Ag Pool = 300 KAF
- Indian = 337 KAF
- M&I = 597 KAF
- P3 = 68 KAF

Total Available = 186,557 AF
Interstate Banking - Nevada

• Interstate Banking – Southern Nevada Water Authority (SNWA)

• Recovery agreement between CAP and interstate parties to address recovery schedules, quantities, payments etc.

• SNWA makes a request → AWBA credits are pumped and delivered to an Arizona water user instead of CAP water → water remains in Lake Mead to be diverted by SNWA
How do we plan for recovery?
2014 Joint Recovery Plan


• Roadmap for the recovery of AWBA credits

• Defines roles, reviews modeling efforts, identifies recovery methods, recovery opportunities and implementation concepts
Recovery Planning Advisory Group

- 14-member advisory group convened in 2018
  - Representatives - agricultural, municipal, tribal, utilities and on-River
- Addresses recovery planning and implementation for AWBA firming
  - Recovery modeling
  - Shortage impacts
  - Implementation & Costs
- Objectives
  - Greater planning clarity
  - Gather stakeholder input
- Key questions
  - When will recovery occur?
  - How much recovery capacity is needed?
  - How much will recovery cost?
  - How will recovery work?

https://new.azwater.gov/rpag
2021 Recovery Planning Update

• Updated planning document will be released in early 2021
• General Approach – expand on 2014 Plan and discuss updates
• Role of the Recovery Planning Advisory Group and stakeholders
• Updated modeling for AWBA firming
• Analyze impact of DCP reductions on firming volumes
• Identify the recovery capacity required (CAP Recovery & Independent Recovery)
• Identify key decision points and actions within the planning horizon (2045)
• Provide the framework for continued cooperation among ADWR, AWBA, CAP and stakeholders
Recovery Roles & Responsibilities

- **AWBA** – Firming | Credit Distribution
- **CAP** – Shortage Notifications | Recovery Agent
- **ADWR** – Advisory | Regulatory
- **Arizona Beneficiaries** – on-River P4 M&I, CAP M&I subcontractors and Tribal Settlements firmed by AWBA
- **Interstate Beneficiaries** – Southern Nevada Water Authority
- **Bureau of Reclamation** – Contracting authority for water on the Lower Colorado River
- **Recovery Partners** – CAP vs. Independent Recovery
When will recovery occur?
Colorado River Simulation System model (CRSS)
Water Bank Recovery Modeling

• Colorado River Simulation System (CRSS)
  o Bureau of Reclamation model used by the Colorado River basin states
  o Long-term projections of Lake Powell and Lake Mead elevations

• Joint Recovery Model (JRM)
  o Multiple Scenario Planning
  o Developed collaboratively by ADWR, AWBA and CAP
  o Supply and Demand scenarios using shortage sequences from CRSS
CRSS—Annual Probabilities

Full Observed Hydrology (112 years), no Upper Basin adjustment

Annual Probabilities

RPAG Planning Periods: Near, Mid, Long

Legend:
- Surplus
- Normal
- Tier 0
- Tier 1
- Tier 2a
- Tier 2b
- Tier 3
Firming Volumes: All Traces
Firming Volumes: **All Traces, Same Scale**

**On River**

**NIA**

**M&I**

**Total**
CAP M&I Modeling Results

Maximum Annual Firming Volume

<table>
<thead>
<tr>
<th>Tier</th>
<th>Near (2021-2026)</th>
<th>Mid (2027-2035)</th>
<th>Long (2036-2045)</th>
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<tbody>
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<td>0</td>
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<td>1</td>
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<td>35,700</td>
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<td>2a</td>
<td>8,300</td>
<td>41,100</td>
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<td>2b</td>
<td>43,000</td>
<td>75,800</td>
<td>133,600</td>
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<td>3</td>
<td>94,600</td>
<td>123,000</td>
<td>133,600</td>
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How much recovery capacity is needed?
CAP M&I Recovery Capacity Analysis

- M&I firming volumes vs. estimating required recovery well capacity
- Comparing total CAP supplies available during a Tier 3 reduction & annual direct use demands
- Stakeholder feedback and refining the assumptions
CAP M&I Subcontractor Example (Full Projection Period)

Annual Direct Use - CAP Supply Available = Recovery Volumes

<table>
<thead>
<tr>
<th>Year</th>
<th>Total CAP Portfolio</th>
<th>Available CAP Supply Under T3</th>
<th>Shortage to CAP Supply</th>
<th>Direct Use of CAP Supplies</th>
<th>Recovery Volume</th>
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<td>2021</td>
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## Total AWBA Recovery Capacity Required

<table>
<thead>
<tr>
<th>Tier 3 Reduction – M&amp;I Impacts (AFY)</th>
<th>2026(^3)</th>
<th>2035(^3)</th>
<th>2043(^3)</th>
<th>2045(^3)</th>
</tr>
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<tbody>
<tr>
<td>AWBA M&amp;I Recovery Capacity Needed(^2)</td>
<td>27,000</td>
<td>51,100</td>
<td>71,000</td>
<td>68,000</td>
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<tr>
<td>Capacity Met by CAP</td>
<td>11,500</td>
<td>15,100</td>
<td>18,800</td>
<td>21,700</td>
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<tr>
<td>Capacity Met by Independent Recovery(^4)</td>
<td>15,500</td>
<td>36,000</td>
<td>52,200</td>
<td>46,300</td>
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</tbody>
</table>

\(^1\) Includes Phoenix, Pinal and Tucson AMAs. All values in acre-feet per year (AFY).

\(^2\) Recovery capacity past 2026 is capped at 20% of the total M&I priority pool, excluding the San Carlos Apache Tribe’s M&I priority supply of 18,145 acre-feet.

\(^3\) Reflects the final year of each planning period, with 2043 and 2045 separated to show certain NIA priority supply converting to M&I priority in 2044.

\(^4\) Estimates based on feedback provided by subcontractors. Numbers may not sum due to rounding.
How will recovery work?
CAP System Use Agreement

- CAP and Reclamation staff developed a framework for wheeling new supplies, exchanges of CAP water with other supplies, and firming

- Influenced recovery implementation in two ways
  - Defined “firming water”
  - Defined Exchanges including AWBA recovered LTSC’s exchanged for CAP water

- Altered CAP’s role in recovery
Recovery Implementation

• Recovery Methods
  o Direct - Pump water from storage and deliver via the CAP canal
  o Indirect - Credits assigned to (sub)contractor and (sub)contractor recovers and uses the water or delivers water
  o Credit Exchange - Credits assigned to (sub)contractor for storage in place of wet water

• Independent Recovery
  • M&I subcontractors recover AWBA credits using their own infrastructure (or with a partner)

• CAP Recovery
• Progressive levels of recovery implementation in the three years leading up to a shortage

• Proposed triggers for M&I firming
  
  o Trigger 1: The April 5-year table > 15% probability of M&I shortage in third year
  
  o Trigger 2: The “Min Probable” forecast, April 24-Month Study - M&I shortage in second year
  
  o Trigger 3: The “Most Probable” forecast, April 24-Month Study - M&I shortage in following year
How much will recovery cost?

• CAP recovery agreements, each with unique costs and terms
• Recovery costs are partly dependent on the volume of requested
  – Higher volumes = higher average costs
• For planning purposes, it is anticipated that CAP recovery costs
  will be comparable to CAP delivery rates
Next Steps

• Release the 2021 Update to the 2014 Joint Recovery Plan
• Both AWBA and CAP have additional work to continue preparing for recovery implementation
• Recovery Planning Advisory Group will continue to meet regularly
Questions?