I. Welcome – Cheryl Lombard and Warren Tenney, Committee Co-Chairs

II. Presentations on Hydrologic Disconnect
   I. ADWR – Jenna Norris, Governor’s Water Council Coordinator
   II. Salt River Project – Christa McJunkin, Director of Water Strategy
   III. Central Arizona Groundwater Replenishment District – Viviane Baji, Planning Analyst

III. Discussion of Potential Concepts to Address Hydrologic Disconnect

IV. Next Steps

V. Adjournment
Webinar Logistics

- Please state your name when speaking.
- Mute yourself when not speaking.
- Indicate you wish to speak by typing your name in the chat box, and you will be invited to unmute and speak.
- Please message “Everyone” in the chat.
- The meeting and chat will be recorded.

Technical issues? Send a direct message to ADWR-Host in the chat, call the ADWR Help Desk at 602-771-8444 or email tickets@azwater.gov.
I. Welcome

Cheryl Lombard and Warren Tenney
Post-2025 Active Management Areas
Committee Co-Chairs
Timeline

Presentations plus Discussion of Ideas

- June 22\textsuperscript{nd} – Groundwater in the Assured Water Supply Program
- August 10\textsuperscript{th} – Unreplenished Groundwater Withdrawals
- September 9\textsuperscript{th} – Hydrologic Disconnect
- GWAICC September 16\textsuperscript{th} – Committee Update
Timeline

- October through December – Fine-tune most realistic, supported strategies and solutions
- GWAICC December 9th – Present general-consensus proposals
- 2022 – Continue discussion to develop additional strategies and solutions
II. Hydrologic Disconnect

Jenna Norris, Governor’s Water Council Coordinator
Arizona Department of Water Resources

Christa McJunkin, Director of Water Strategy
Salt River Project

Viviane Baji, Planning Analyst
Central Arizona Groundwater Replenishment District
When qualified water supplies are stored underground within an AMA those supplies can be recovered within the same calendar year via annual storage and recovery (AS&R) or, with certain exceptions, they can generate long-term storage credits (LTSC) for recovery in future years.
**What is the Hydrologic Disconnect?**

**Hydrologic Disconnect**: The ability to legally recover or replenish water that was respectively stored or pumped in a different location.

Pursuant to A.R.S. § 45-834.01, a person who holds long-term storage credits or who stores water on an annual basis may recover the water stored pursuant to a water storage permit if:

1. the well is permitted for recovery
2. the well is located **within the area of impact of the stored water**; OR
3. the recovery well is located **outside the area of impact of the stored water and certain additional criteria are met.**

*pulled from Hydrologic Disconnect Issue Brief*
Area of Impact (AOI) for an Underground Storage Facility (USF):
1. the area contained within the 1-mile buffer of the facility ("the 1-mile safe harbor") OR;
2. the area of hydrologic impact (AOHI)

Area of Impact (AOI) for a Groundwater Savings Facility (GSF):
1. the area contained within the exterior boundary of the GSF
Recovery that will occur outside the Area of Impact (AOI) of the stored water must be consistent with the Management Plan Storage and Recovery Siting Criteria. Two of the three criteria require that:

1. At the time of the application, the maximum projected depth to water at the location of the recovery well after 100 years does not exceed the general 100-year depth-to-static water level for the active management area specified by A.A.C. R12-15-716
2. The recovery well is in an area experiencing an average annual rate of groundwater decline that is less than 4.0 feet per year.
Differences between Annual vs. LTSC Recovery

**Annual Recovery:**
1. Decreed and Appropriative (D&N) surface water supplies (Salt & Verde river water, etc.) must be stored and recovered within the same month. Therefore, all surface water storage and recovery is accounted for as AS&R*.

2. Annual storage and recovery is not subject to a cut to the aquifer*.

**Long-Term Storage Credits:**
1. Typically, with some exceptions, there is a 5% cut to the aquifer for water stored at a recharge facility, which is intended to provide a general benefit to the aquifer from the recharge activity.
Annual Recovery for All AMAS = ~2,700,000 AF
Long-Term Storage Credits Recovered = ~450,000 AF
Wet Water Delivered = ~15,000,000 AF
Available LTSC for Recovery = ~11,500,000 AF


~85% of Recovery has been AS&R
~20% of Water Delivered has been recovered
Data Dashboard (linked)
Thank you!

Questions?

Jenna Norris
Council Coordinator
jnorris@azwater.gov
Office Phone: 602-771-5262

Website:
www.new.azwater.gov
Twitter: @azwater
Analysis of Long-Term Storage Credits in the Phoenix AMA

A Three-Pronged Approach at Evaluating the Hydrologic Disconnect Between Water Storage and Recovery
The Three Components of Hydrologic Disconnect

- Long-Term Storage Credits for Future Recovery
- Annual Storage and Recovery
- Long-Term Storage Credits for Replenishment
The Three Components of Hydrologic Disconnect

- Long-Term Storage Credits for Future Recovery
- Annual Storage and Recovery
- Long-Term Storage Credits for Replenishment
Objectives

Part 1
Analyze Long-term Storage Credit (LTSC) locations within Phoenix AMA

Part 2
Determine the extent of hydrologic disconnect between LTSC location and probable recovery location

Part 3
Propose potential solutions for LTSC stored in less desirable locations
Part 1 - Analysis of LTSC holders within Phoenix AMA

Includes:
- Accumulated LTSC balances through 2019
- Facility where each LTSC is stored
- Water type (CAP, surface, effluent, NCS)

Each entity’s LTSC volumes summed, regardless of water type

Most recent LTSC data for all Phoenix AMA LTSA holders provided by ADWR
More than 6.2M LTSC for future recovery remain in storage in the Phoenix AMA.
Part 2 - Analysis of Municipal Providers’ LTSC Locations

LTSC volumes for municipal providers evaluated by:

Credits located:
- Inside provider’s service area
- Outside provider’s service area, but inside sub-basin
- Outside provider’s sub-basin

Demonstrate extent of hydrologic disconnect between water storage location and probable recovery & use location
Part 2 – Hydrologic Disconnect

Municipal Providers

2.82M LTSC held by Phoenix AMA Municipal Providers
Part 2 – Hydrologic Disconnect

AWBA

1.98MAF

Distribution of AWBA LTSC in Phoenix AMA in relation to beneficiaries of those LTSC
Part 2 – Hydrologic Disconnect

Other Entities

1.40M LTSC held by 57 non-Municipal entities – about 23% of Phoenix AMA LTSC for future recovery

Of that volume, 83% is held by six entities:

LTSC Distribution by Sub-basin for Selected Top Entities in Phoenix AMA

<table>
<thead>
<tr>
<th>LTSA Holder</th>
<th>Total (AF)</th>
<th>LTSC Distribution by Sub-basin (AF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ESRV</td>
</tr>
<tr>
<td>GRWS + GRIC</td>
<td>414,072</td>
<td>309,154</td>
</tr>
<tr>
<td>Tohono O’Odham Nation of Arizona</td>
<td>266,413</td>
<td>172,900</td>
</tr>
<tr>
<td>Resolution Copper</td>
<td>256,356</td>
<td>237,811</td>
</tr>
<tr>
<td>Freeport</td>
<td>128,777</td>
<td>118,239</td>
</tr>
<tr>
<td>Salt River Project</td>
<td>102,159</td>
<td>99,728</td>
</tr>
<tr>
<td><strong>Total (AF)</strong></td>
<td><strong>1,167,777</strong></td>
<td><strong>937,832</strong></td>
</tr>
</tbody>
</table>
Part 3 – Potential Solutions - Trading Credits

The easiest and least expensive solution for Providers with LTSC outside their Service Area: LTSC transfers.
Part 3 – Potential Solutions – CAP Wheeling w/Existing Wells

LTSC stored at facilities with nearby well fields could be recovered and wheeled through CAP Canal

Goodyear LTSC @ NMIDD
GSF: Recovered by wells near NMIDD & wheeled downstream via CAP Canal; Goodyear receives equivalent amount of CAP water through CSIF

City of Goodyear

City of El Mirage

El Mirage LTSC @ TID
GSF: Recovered by wells near TID & wheeled to El Mirage via CAP Canal

City of El Mirage
Part 3 – Potential Solutions – CAP Wheeling w/New Wells

New well fields could be constructed near facilities like Tonopah & Hieroglyphics to recover LTSC and wheel them via CAP Canal.
Hydrologic Disconnect Bottom Line

• Hydrologic disconnect can only be quantified when likely recovery location is known

• For municipal providers, of 2.82 MAF of LTSC in storage
  • 621,595 AF (22%) located outside of the service area
  • Of those only 253,510 AF are located outside of the same subbasin (equals 9% of the total)

• Of the credits located outside of the service area
  • 69,452 AF can be traded to a location inside of the service area
  • 301,836 AF can be recovered from existing wells adjacent to the CAP canal
  • 237,608 AF need new wells and other infrastructure for recovery (stored at Tonopah Desert, TID, and Hieroglyphic Mt.)
CAGRD Obligation and Replenishment- Relationship to Hydrologic Disconnect

GWAICCC Post-2025 AMAs Committee
Thursday, September 9, 2021

Viviane Baji
Planning Analyst, Resource Planning & Analysis
vbaji@cap-az.com
CAGRD Background

• Central Arizona Groundwater Replenishment District (CAGRD) made possible by Arizona State Legislature in 1993

• Members may enroll in the CAGRD as Member Service Area water providers or as individual Member Land subdivisions

• CAGRD plays an important role in Arizona’s groundwater management by replenishing excess groundwater pumped by its members
Statute and Guidance on Replenishment

**KRA: Groundwater Replenishment**
Fulfilling CAP’s groundwater replenishment responsibilities in accordance with statutory requirements

**Strategic Issues:**
- Responsibly meet CAP’s statutory replenishment obligation
- Participate actively in dialogues regarding the resilience and long-term role of the Central Arizona Groundwater Replenishment District (CAGRD)
- Consider the hydrologic relationship between member pumping and CAGRD replenishment
- Ensure continued effective management, reasonable pricing, and financial viability of CAGRD
- Enhance public outreach and education regarding the importance of water conservation and groundwater replenishment
What is Hydrologic Disconnect?

Spatial separation from where water is stored and where it is removed
• Recharge and Recovery
• Pumping and Replenishment

“… Anyone holding long-term storage credits may recover stored water from anywhere within the same Active Management Area (AMA) in which it was stored…”
-ADWR page on underground water storage, savings and replenishment

However:
• Recovery well siting rules – favor locations with stable water levels/within area of impact
• Limits on excessive drawdown resulting from stored water recovery
• “To the extent feasible, replenish in areas of hydrologic impact” – Guidance on replenishment from CAWCD Board 2016 Strategic Plan
Pumping by AMA and Subbasin

Withdrawals by Type Across the AMAs

<table>
<thead>
<tr>
<th>AMA</th>
<th>Volume Pumped in 2018 (AF)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phoenix AMA</strong></td>
<td>836,000</td>
</tr>
<tr>
<td>ASR</td>
<td>37,000</td>
</tr>
<tr>
<td>LTSC Recovery</td>
<td>15,000</td>
</tr>
<tr>
<td>Excess GW (CAGRD)</td>
<td>26,000</td>
</tr>
<tr>
<td>Other Pumping</td>
<td>759,000</td>
</tr>
<tr>
<td><strong>Pinal AMA</strong></td>
<td>442,000</td>
</tr>
<tr>
<td>ASR</td>
<td>&lt;1,000</td>
</tr>
<tr>
<td>LTSC Recovery</td>
<td>&lt;1,000</td>
</tr>
<tr>
<td>Excess GW (CAGRD)</td>
<td>&lt;1,000</td>
</tr>
<tr>
<td>Other Pumping</td>
<td>446,000</td>
</tr>
<tr>
<td><strong>Tucson AMA</strong></td>
<td>230,000</td>
</tr>
<tr>
<td>ASR</td>
<td>101,000</td>
</tr>
<tr>
<td>LTSC Recovery</td>
<td>&lt;1,000</td>
</tr>
<tr>
<td>Excess GW (CAGRD)</td>
<td>3,000</td>
</tr>
<tr>
<td>Other Pumping</td>
<td>127,000</td>
</tr>
</tbody>
</table>
Pumping and Replenishment

<table>
<thead>
<tr>
<th>West Phoenix AMA</th>
<th>East Phoenix AMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agua Fria RP</td>
<td>Gold Canyon RP</td>
</tr>
<tr>
<td>Hieroglyphic Mountains RP</td>
<td>New Magma IDD (GSF)</td>
</tr>
<tr>
<td>Liberty Utilities Facilities</td>
<td>Queen Creek ID (GSF)</td>
</tr>
<tr>
<td>Maricopa Water District</td>
<td>Superstition Mountains RP</td>
</tr>
<tr>
<td>(GSF)</td>
<td></td>
</tr>
<tr>
<td>Tonopah Desert RP</td>
<td></td>
</tr>
<tr>
<td>Tonopah ID (GSF)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tucson AMA</th>
<th>Pinal AMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avra Valley RP</td>
<td>Central Arizona IDD (GSF)</td>
</tr>
<tr>
<td>BKW Farms (GSF)</td>
<td>Maricopa-Stanfield IDD (GSF)</td>
</tr>
<tr>
<td>Kai Farms (GSF)</td>
<td></td>
</tr>
<tr>
<td>Lower Santa Cruz RP</td>
<td></td>
</tr>
<tr>
<td>Pima Mine Road RP</td>
<td></td>
</tr>
</tbody>
</table>
### CAGRD Obligation and Replenishment Activity

#### Obligation and Replenishment in Thousands of Acre-Feet (KAF), 2001-2018

<table>
<thead>
<tr>
<th>Subbasin</th>
<th>Obligation</th>
<th>Replenishment</th>
<th>Balance</th>
<th>RR</th>
<th>Other Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hassayampa</td>
<td>-</td>
<td>123.5</td>
<td>123.5</td>
<td>44.8</td>
<td>38.3</td>
</tr>
<tr>
<td>WSRV</td>
<td>225.3</td>
<td>101.6</td>
<td>(-123.7)</td>
<td>30.0</td>
<td>127.9</td>
</tr>
<tr>
<td>ESRV</td>
<td>207.6</td>
<td>163.8</td>
<td>(-43.8)</td>
<td>90.4</td>
<td>387.1</td>
</tr>
<tr>
<td>Lake Pleasant</td>
<td>12.9</td>
<td>58.9</td>
<td>46</td>
<td>16.9</td>
<td>-</td>
</tr>
<tr>
<td>Fountain Hills</td>
<td>7.4</td>
<td>-</td>
<td>(-7.4)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Maricopa-Stanfield</td>
<td>1.5</td>
<td>2.4</td>
<td>0.9</td>
<td>3.8</td>
<td>379.8</td>
</tr>
<tr>
<td>Eloy</td>
<td>3.4</td>
<td>1.4</td>
<td>(-2.0)</td>
<td>1.1</td>
<td>309.5</td>
</tr>
<tr>
<td>Avra Valley</td>
<td>2.9</td>
<td>68.5</td>
<td>65.6</td>
<td>29.6</td>
<td>118.4</td>
</tr>
<tr>
<td>Upper Santa Cruz</td>
<td>89.5</td>
<td>20.9</td>
<td>(-68.6)</td>
<td>8.1</td>
<td>12.7</td>
</tr>
</tbody>
</table>
CAGRD Activity - East Salt River Valley Subbasin

East SRV Obligation and Replenishment

CAGRD Obligation and Replenishment: Relationship to Hydrologic Disconnect | September 9, 2021
CAGRD Activity- Hassayampa Subbasin

Hassayampa Subbasin Obligation and Replenishment

- Obligation: 100 AF
- Replenishment: 124 KAF
- Rep. Reserve: 45 KAF
- Other Credits: 38 KAF

Hassayampa Subbasin Obligation and Replenishment Chart

- Replenishment
- MSA Obligation
- ML Obligation
- Net Balance


Member Lands
Underground Storage Facilities
Member Service Areas
Groundwater Savings Facilities

Outside AMA
CAGRD Activity - Avra Valley Subbasin

Avra Valley Obligation and Replenishment

- Obligation: 2.7 KAF
- Replenishment: 69 KAF
- Rep. Reserve: 29 KAF
- Other Credits: 118 KAF

Avra Valley Study Area

Member Lands
Underground Storage Facilities
Member Service Areas
Groundwater Savings Facilities

Eloy Subbasin
Outside AMA
PINAL COUNTY
MARANA COUNTY
Eloy Subbasin
Outside AMA
PINAL COUNTY
MARANA COUNTY

CAGRD Obligation and Replenishment: Relationship to Hydrologic Disconnect | September 9, 2021
CAGRD Activity- Upper Santa Cruz Subbasin

CAGRD Obligation and Replenishment - Relationship to Hydrologic Disconnect | September 9, 2021
Thank You
Questions?

Viviane Baji
Planning Analyst, Resource Planning & Analysis
vbaji@cap-az.com

GWAICC Post-2025 AMAs Committee
Thursday, September 9, 2021
Discussion