Central Arizona Project

Authorized by Colorado River Basin Project Act
Cost more than $4 billion
336-mile aqueduct from Lake Havasau to Tucson
14 pumping plants lift water nearly 3000 feet
8 siphons, 3 tunnels
1 dam & reservoir
Delivers 1.5+ MAF of AZ
2.8 MAF allocation/year
CAP Service Area

• 3 counties (Maricopa, Pinal, Pima
• 5 million people (80% of Arizona’s population)
• 350,000 acres of irrigated ag
• 11 Native American tribes
• 2014 CAP Deliveries - 1.525 MAF
  – 35% Tribes
  – 33% Municipal & Industrial
  – 26% Non-Indian Agriculture
  – 6% Recharge
CAP Mission

• Operate and maintain the CAP system
• Deliver the remainder of Arizona’s Colorado River apportionment
• Repay reimbursable costs to U.S.  
  – Approx. $1.65 billion, plus interest
• Develop and operate recharge projects
• Operate the Central Arizona Groundwater Replenishment District
CAP Economic Study

• *What is the value of CAP to the state of Arizona?*

• ASU study asked the question: What if CAP was never built and no CAP water was delivered?

• Two periods considered
  – Construction (1973-1993)
  – Water delivery (1986-2010)

• In 2010, CAP generated **$128 billion** (49.5%) of Arizona’s gross state product

• In 2010, CAP generated over 1.6 million job-years
CAP’s Critical Energy Challenge

CAP uses about 2.8 million megawatt hours of electrical energy each year to deliver about 1.6 million acre-feet of water for municipal, agricultural and industrial uses.

CAP is the single, largest end user of power in Arizona.
CAP Generation Resources

>90% of CAP’s Energy Comes From the Navajo Generating Station

CAP (through BOR) 24.3% interest in NGS
Arizona’s Colorado River Use Summary

- Requires Delivery Contract
- Sec V. Boulder Canyon Project Act
- PPR or Decreed Right
- Consumptive Use:
  - Diversions – Return Flows
- Arizona = 2.8 MAF
- Arizona Priorities:
  - P1 (e.g. CRIT & YCWUA)
  - P2/P3 (e.g. WMIDD & YMIDD)
  - P4 (e.g. CAP & MVIDD)
  - P5/P6 Excess & Surplus (e.g. CVIDD)
- CAP Unquantified Contract:
  - 1.415 MAF PLUS access to **unused** Arizona supply
Lower Colorado River Supply to: Arizona & CAP

Arizona’s Colorado River Supply (Normal = 2.8 MAF)

- Arizona’s P1 - P3 “On-River” Depletions
- Upper Basin Depletions
- Mead-Powell Operations
- Lower Basin Demands

Arizona’s Colorado River Supply

- CAP P4 Depletions
  - Long-term Contractors
  - Excess Customers

- AZ P4 “On-River” Depletions
- AZ P5 “On-River” Depletions

Unused
Current Status of Shortage

• Current Bureau of Reclamation 24-month study forecasts
  • 0% of shortage in 2016,
  • 18% in 2017
  • 52% in 2018
• This is a considerable improvement vs. May
• It is a “nail-biter” - all of the parameters that influence the determination of shortage remain close to critical levels
Current Status of Shortage

- 15 years of drought in the Colorado River Basin
- Lake Powell and Lake Mead reservoirs have done their job but are currently at 40-45% combined capacity
- “Normal” releases or more to Lake Mead from Lake Powell every year during the drought
- Structural Deficit exists – annual releases from Lake Mead exceed annual inflows by about 1.2 MAF
- The basic problem is that evaporation and transportation losses were not taken into account
Water Budget at Lake Mead

- **Inflow**
  - (release from Powell + side inflows) = 9.0 maf

- **Outflow**
  - (AZ, CA, NV, and Mexico delivery + downstream regulation and gains/losses) = -9.6 maf

- **Mead evaporation losses** = -0.6 maf

- **Balance** = -1.2 maf

Given basic apportionments in the Lower Basin, the allotment to Mexico, and an 8.23 maf release from Lake Powell, Lake Mead storage declines about 12 feet each year.
Lake Mead Elevation

Lower Basin Structural Deficit
Potential Shortage & Structural Deficit

Lake Mead Since 2000

- 91% Full (25 MAF)
- 8.23 MAF Powell Release
- 12.52 MAF Powell Release
- 9.00 MAF Powell Release

Lake Mead Elevation (ft)

- Observed Elevation
- Projected 24 Month
- 1075 - First Shortage Level
- Tier 2
- Tier 3
Shortage Under 2007 Guidelines

- Arizona and Nevada share Lower Basin shortages under the 2007 Guidelines
- Mexico voluntarily agreed in Minute 319 to accept reductions in its deliveries at the same elevations

<table>
<thead>
<tr>
<th>Lake Mead Elevation</th>
<th>Arizona Reduction</th>
<th>Nevada Reduction</th>
<th>Mexico Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1075’</td>
<td>320,000 AF</td>
<td>13,000 AF</td>
<td>50,000 AF</td>
</tr>
<tr>
<td>1050’</td>
<td>400,000 AF</td>
<td>17,000 AF</td>
<td>70,000 AF</td>
</tr>
<tr>
<td>1025’</td>
<td>480,000 AF</td>
<td>20,000 AF</td>
<td>125,000 AF</td>
</tr>
</tbody>
</table>

- No reductions to California under 2007 Guidelines
Impact of Structural Deficit

- Results in a decline of 12+ feet in Lake Mead every year when releases from Powell are “normal” (8.23 MAF)
- Results in a decline of 4 feet in Lake Mead every year when releases from Powell are “balancing” (9.0 MAF)
- Undermines effectiveness of the 2007 Guidelines
- Drives Lower Basin to shortage
- CAP forced to bear obligations of others
  - Evaporation and other system losses
  - Lower Basin’s half of Mexican Treaty obligation
What Will Happen to Arizona?

• The first two tiers of shortage will reduce CAP deliveries to Recharge and Non-Indian Ag customers
• Because of reduced deliveries, the price of CAP water will go up for everyone else
• Impending shortage in Arizona is serious, but is not a crisis due to decades of work to prepare
• Ongoing efforts address both the short-term threat of shortage and the long-term threat of structural deficit
• More work is needed
So - What Are We Doing?

• Arizona Water Banking Authority has stored 3.4 MAF underground to firm M&I and Indian supplies and others have stored nearly 6 MAF

• CAP (AZ) has entered into a Memorandum of Understanding with MWD (CA), SNWA (NV) and Reclamation to leave 720 KAF in Lake Mead through 2017 (shortage mitigation)
  – CAP share is 345 KAF

• Pilot System Conservation Program among these parties and Denver Water to identify and fund efforts to create “system water” (also begins to address structural deficit)

• Many other actions in addition to these recent programs
<table>
<thead>
<tr>
<th><strong>Goal</strong></th>
<th><strong>Lower Basin Pilot Drought Response Actions MOU</strong></th>
<th><strong>Pilot System Conservation Agreement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESERVOIR PROTECTION</strong> - Store or conserve 740 kaf in Lake Mead</td>
<td>Create <strong>SYSTEM WATER</strong> in Lake Mead / Lake Powell (est. 75 kaf)</td>
<td></td>
</tr>
</tbody>
</table>

| **Parties** | BOR, ADWR, CAP, SNWA, CRCN, MWD, CRBC | BOR, CAP, MWD, SNWA, Denver Water |

| **Term** | 2014 – 2017 | 2015 – 2016, or until funds expended |

| **Scope** | Lower Basin Colorado River contractors (AZ, CA, NV) and entitlement holders | Basin-wide: contractors and entitlements holders |

| **Commitments** | **Res. Protection Total = 740 kaf**<br>**CAP = 345 kaf,**<br>MWD = 300 kaf,<br>SNWA = 45 kaf,<br>BOR = 50 kaf<br>ADWR, CRCN, CRBC = 0 | **Total = $11 M**<br>BOR = $3 M,<br>**CAP = $2 M,**<br>MWD = $2 M,<br>SNWA = $2 M,<br>Denver Water = $2 M |

| **CAP Commitments** | Create 345 kaf through conservation/storage in Lake Mead by EOY '17<br>- **ICS Programs:** Ag Pool, and Local Supply Replacement<br>- **System Water:** YMIDD, AZ Unused (Art. II.B.6), Turnback | Contribute funding ($2 M)<br>- All System water |

| **CAWCD Board Activities** | Dec. '14 Board Approval of Agreement – including CAP Reservoir Protection Plan components,<br>Oct. '14 Board Approval of Ag Pool program (~$5 M reserves),<br>Nov. '14 briefing on ICS program including Local Supply Replacement | April '14 Board Approval of Agreement authorizing $2 M contribution and to implement necessary agreements |

| **Additional CAP Actions** | Develop Local Supply Replacement ICS project for '16, | Participate with funders in review/approval of conservation projects. Arizona Colorado River conservation projects must obtain CAP forbearance to be approved/funded. CAP has veto authority for any projects in Arizona. |
“Bending the Curve”

- Requires significantly reducing or eliminating the structural deficit in the Lower Basin
- Benefits accrue to both Upper and Lower Basins
- Ultimately, there are only three ways to slow the decline of Upper and Lower Basin reservoirs:
  - Reduce system losses
  - Reduce demand
  - Augment supply
Ongoing Efforts and Objectives

• 5-year pilot programs (2015-2019)
• Build on and protect 2007 Guidelines
• Restore risk to levels in 2007 Guidelines
• Begin addressing structural deficit and prepare for 2020 re-consultation on Guidelines
• Remain within the “Law of the River”
• Cooperative and voluntary actions
• Avoid unilateral action by United States
Water Quality

CAP has an extensive monitoring program
CAP water is generally well below the Primary Maximum Contaminant Levels (MCLs) established by the Safe Drinking Water Act

### Example Water Quality Measurements

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Measured*</th>
<th>MCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>2.3 – 4.4</td>
<td>10</td>
</tr>
<tr>
<td>Benzene</td>
<td>ND – 1.4</td>
<td>5</td>
</tr>
<tr>
<td>Chromium</td>
<td>ND – 6.1</td>
<td>100</td>
</tr>
<tr>
<td>Copper</td>
<td>ND – 4.0</td>
<td>1300</td>
</tr>
<tr>
<td>Nitrate</td>
<td>ND – 0.30</td>
<td>10</td>
</tr>
<tr>
<td>Uranium</td>
<td>ND – 4.1</td>
<td>30</td>
</tr>
</tbody>
</table>

* From 2013 Annual Water Quality Report
Water Quality

• Primary MCLs are presumptive standard

• Measurement is at point of introduction
  ◦ CAP aqueduct cannot be used for dilution

• Water quality impact analysis required

• Contracts will include monitoring and enforcement provisions
Questions?