Water Demand & Supply Projections

Long Term Water Augmentation Committee Meeting
March 3, 2017

Pam Muse
Planning & Data Management
Arizona Department of Water Resources
• Projections aren’t predictions
• Tool to help plan; to explore; what IF…
• Only as useful as the data/assumptions that go into them
• Ranges are good, but…
• Reality usually falls somewhere in between
• Relationships are key
• Research
• Always another component you can add;
  o How coarse/detailed?
  o Purpose?

“The future ain’t what it used to be.” Yogi Berra
• ADWR re-aggregated AOEP population projections to water planning area boundary
• Projections released 2013 & 2015
  ○ 2013 projections generally higher than 2015’s
• ADWR has a low, mid & high projection for each planning area, basin & place in AZ
• **Current use rates will not persist**
  
  - New plumbing fixtures use less than those replaced
  - EPA “WaterSense” plumbing fixtures in new construction
  - Water conservation ethic?
  - Landscaping in new subdivisions?
  - Existing landscape conversion to Xeriscape?
What kind of a water provider are you?
- Mobile Home Park
- Seasonal population
- Lots of parks, golf courses?
- Older community, not growing
- Brand new homes, granite yards, new fixtures
- Swimming pools?
• The non-residential component
  o No non-res/commercial now, but will add some – GPCD goes up
  o Have some non-res, but all commercial zoned land is built out – all future growth will be residential – GPCD goes down
MUNICIPAL DEMAND - GPCD Pitfalls

• Water loss
  o Component of water production – it comes out of the aquifer/river
  o Does your system have a high rate of water loss? Is that likely to continue?

• What about private well uses?
• MUNICIPAL ASSUMPTIONS:
  o Traffic Analysis Zone (TAZ) projections
    ▪ Disaggregated (individual providers, exempt wells)
  o Large provider individual projections
    ▪ Water supply use history
    ▪ Designation pledged supplies
    ▪ Other information
  o Supply priority for each provider
4MP GENERAL ASSUMPTIONS

• SMALL MUNICIPAL PROVIDER ASSUMPTIONS
  - Differed by AMA
  - Generally trend lines, unless other information available (AWS determinations)
  - Historical supply portfolio (mostly groundwater), unless other information available (wwtps, recharge permits)
• EXEMPT WELL DEMAND ASSUMPTIONS
  o Differed by AMA
  o Projected population = remainder of AMA population minus providers
  o Used models for new SF homes
    ▪ EPA “WaterSense” fixtures
    ▪ Updated landscape assumptions
4MP GENERAL ASSUMPTIONS

• UNTREATED DEMAND ASSUMPTIONS
  o Flood irrigation for non-agricultural purposes (PHOENIX, PINAL)
  o Maintain historical pattern (generally constant, or long-term average)
  o Historical average supply portfolio
Inside AMAs, Industrial is what the USGS considers “Self-Supplied” – not provided water by a municipal water provider but has their own well/source of water supply.

What’s there now, and what’s likely to come = research.
• How much water is used per unit, and how many units will there be?
  o Dairy = number of cows
  o Power plants
    ▪ Operation cycle
    ▪ Megawatts
    ▪ Type
      ❖ Steam electric (not likely)
      ❖ Combustion turbine
      ❖ Solar
      ❖ Other?
    ▪ Where will the power be used?
INDUSTRIAL DEMAND

• How much water is used per unit, and how many units will there be?
  o Sand and gravel operations
  o Metal mines
  o Feedlots
  o Golf courses and large turf areas (inside AMAs > 10 acres of turf/lake)
  o Other uses
    ▪ Factories
    ▪ Processing plants
    ▪ Nurseries (container grown plants)
    ▪ Other?
• INDUSTRIAL ASSUMPTIONS:
  o Differed by AMA
  o Differed by industrial sub-sector
  o Trend lines, unless other information (new industry start up)
  o Each sub-sector historical supply portfolio (mostly groundwater) unless other information
• Agricultural economy (fluctuations)?
• Cropped vs. fallow?
• Crops grown vs. changes in crop types?
• Double-cropping?
• Irrigation system types/efficiency?
• Weather patterns?
• How much can agriculture expand?
  - Canal system/infrastructure limitations, or not?
  - Depth to water limitations, or not?
  - Other limitations?
    - Cost of power to pump
    - Cost of materials and supplies
    - Economic factors that can be measured
4MP GENERAL ASSUMPTIONS

• NON-INDIAN AGRICULTURAL ASSUMPTIONS:
  o Differed by AMA
    ▪ By district
    ▪ IGFRs >10 acres
    ▪ Exempt IGFRs would remain
  o Regulatory/policy limits on water supplies
    ▪ CAP agricultural pool
    ▪ GSF permit limits
  o Infrastructure restrictions
    ▪ Canal capacity
    ▪ Well locations
  o Financial constrictions
    ▪ Ability to drill or deepen wells
    ▪ Electrical costs
  o Review of historical supplies
  o FORECAST
4MP GENERAL ASSUMPTIONS

• TRIBAL AGRICULTURAL ASSUMPTIONS:
  o Differed by AMA
  o Information for each community
    ▪ Settlement agreements
    ▪ Other information available (Bureau, leases of water with other entities, etc.)
WATER SUPPLIES

- **Groundwater**
  - Is water quality a concern? How could that affect demand?
  - Is depth to water a concern? How could that affect demand?

- **In-State Non-Colorado River surface water**

- **Colorado River water**
• **Reclaimed water (effluent)**
  
  o Reuse in any sector?
  
  o Reclaimed systems (non-potable distribution system) deliveries/uses (i.e. turf irrigation at golf courses)?
• What, if any, are the legal constraints to use of a supply?
• Is water storage an option?
• Is water importation an option?
• Are water exchanges an option?
• How might water supplies change over time?
4MP GENERAL ASSUMPTIONS

• OTHER ASSUMPTIONS
  o Availability and distribution of CAP water
  o Long-term storage and GSF of renewable supplies
  o AWBA storage assumptions
  o CAGRD replenishment obligation assumptions
  o Unused CAP assumptions
Impact of Changing Assumptions

Projected Water Demand in Acre-Feet in 2025

Source: Demand and Supply Assessments, Baseline Scenario Two, ADWR

<table>
<thead>
<tr>
<th></th>
<th>Municipal</th>
<th>Industrial</th>
<th>Agricultural</th>
<th>Tribal</th>
<th>Total</th>
<th>Overdraft</th>
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</thead>
<tbody>
<tr>
<td>Phoenix</td>
<td>225,666</td>
<td>2,799,264</td>
<td>424,836</td>
<td>533,315</td>
<td>1,763,467</td>
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<td>Tucson</td>
<td>63,782</td>
<td>279,264</td>
<td>435,843</td>
<td>69,806</td>
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<td>Pinal</td>
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<td>31,042</td>
<td>689,180</td>
<td>195,401</td>
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<tr>
<td>Prescott</td>
<td>21,495</td>
<td>30,703</td>
<td>2,140</td>
<td>1,329</td>
<td>53,750</td>
<td></td>
</tr>
</tbody>
</table>

Overdraft

- Phoenix: 323,603
- Tucson: 69,806
- Pinal: 173,485
- Prescott: 23,750
Impact of Changing Assumptions

Projected Water Demand in Acre-Feet in 2025

Source: Adopted or Draft Fourth Management Plan, ADWR

### Municipal
- Phoenix: 1,258,255
- Tucson: 581,213
- Pinal: 1,079,730
- Prescott: 6,469

### Industrial
- Phoenix: 213,229
- Tucson: 53,046
- Pinal: 813,704
- Prescott: 2,476,908

### Agricultural
- Phoenix: 58,202
- Tucson: 179,225
- Pinal: 813,704
- Prescott: 783

### Tribal
- Phoenix: 19,262
- Tucson: 96,136
- Pinal: 424,211
- Prescott: 1,640

### Total
- Phoenix: 2,476,908
- Tucson: 1,079,730
- Pinal: 1,079,730
- Prescott: 2,476,908

### Overdraft/Surplus
- Phoenix: 2,476,908
- Tucson: 349,735
- Pinal: 1,079,730
- Prescott: 500,000

Legend:
- Municipal
- Industrial
- Agricultural
- Tribal
- Total
- Overdraft/Surplus
## Impact of Changing Assumptions
### 2035 Projected Water Demand (AF)

<table>
<thead>
<tr>
<th>Planning Area</th>
<th>WRDC Projection</th>
<th>“Back of the envelope” Projection</th>
<th>Change</th>
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<tbody>
<tr>
<td>Apache</td>
<td>38,214</td>
<td>27,520</td>
<td>(10,694)</td>
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<tr>
<td>Arizona Strip</td>
<td>17,265</td>
<td>3,455</td>
<td>(13,810)</td>
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<tr>
<td>Basin and Range AMAs</td>
<td>4,423,780</td>
<td>3,869,574</td>
<td>(554,206)</td>
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<td>Bill Williams</td>
<td>14,807</td>
<td>21,385</td>
<td>6,578</td>
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<td>Central Plateau</td>
<td>22,519</td>
<td>13,157</td>
<td>(9,362)</td>
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<tr>
<td>Cochise</td>
<td>276,213</td>
<td>374,638</td>
<td>98,425</td>
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<tr>
<td>Colorado Main Stem North</td>
<td>172,423</td>
<td>132,042</td>
<td>(40,381)</td>
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<tr>
<td>Colorado Main Stem South</td>
<td>1,519,080</td>
<td>1,491,960</td>
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<td>East Plateau</td>
<td>125,013</td>
<td>34,653</td>
<td>(90,360)</td>
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<td>Gila Bend</td>
<td>377,272</td>
<td>335,644</td>
<td>(41,628)</td>
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<tr>
<td>Hassayampa/Agua Fria</td>
<td>10,322</td>
<td>7,259</td>
<td>(3,063)</td>
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<tr>
<td>Lower Gila</td>
<td>497,669</td>
<td>493,190</td>
<td>(4,479)</td>
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<tr>
<td>Lower San Pedro</td>
<td>14,876</td>
<td>14,830</td>
<td>(46)</td>
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<tr>
<td>Navajo/Hopi</td>
<td>72,027</td>
<td>32,121</td>
<td>(39,906)</td>
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<tr>
<td>Northwest Basins</td>
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<td>38,493</td>
<td>2,907</td>
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<td>Roosevelt</td>
<td>42,868</td>
<td>9,438</td>
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<tr>
<td>Upper Gila</td>
<td>151,162</td>
<td>150,513</td>
<td>(649)</td>
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<tr>
<td>Upper San Pedro</td>
<td>39,528</td>
<td>18,446</td>
<td>(21,082)</td>
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<td>Verde</td>
<td>84,876</td>
<td>30,184</td>
<td>(54,692)</td>
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<tr>
<td>West Basins</td>
<td>252,576</td>
<td>218,381</td>
<td>(34,195)</td>
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<tr>
<td>West Borderlands</td>
<td>2,048</td>
<td>2,192</td>
<td>144</td>
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<tr>
<td>Western Plateau</td>
<td>1,065</td>
<td>697</td>
<td>(369)</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>8,191,189</strong></td>
<td><strong>7,319,771</strong></td>
<td><strong>(871,418)</strong></td>
</tr>
</tbody>
</table>
Impact of Changing Assumptions

Planning Area Demands in Acre-Feet and by Sector, 2035


- Total
- Agricultural
- Industrial
- Municipal
Impact of Changing Assumptions

Planning Area Demands in Acre-Feet and by Sector, 2035

Source: USGS Data, simple trend projection, ADWR Planning & Data Management

Western Plateau
West Borderlands
West Basins
Verde
Upper San Pedro
Upper Gila
Roosevelt
Northwest Basins
Navajo/Hopi
Lower San Pedro
Lower Gila
Hassayampa/Agua Fria
Gila Bend
East Plateau
Colorado Main Stem South
Colorado Main Stem North
Cochise
Central Plateau
Bill Williams
Arizona Strip
Apache

Total
Agricultural
Industrial
Municipal
Questions?

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