

# **Supply & Demand – Scenario Planning**

**Ken Seasholes**

*Resource Planning & Analysis Manager*

**Austin Carey**

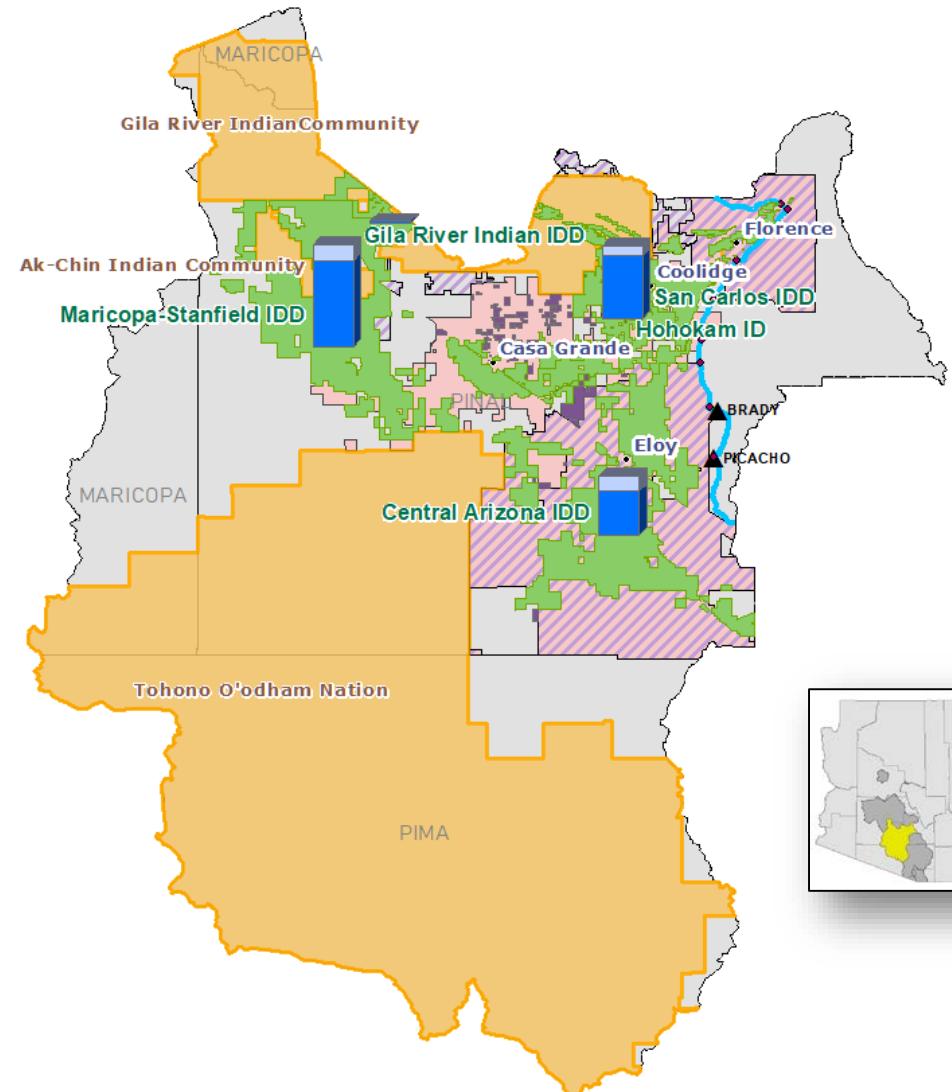
*Planning Analyst*

# CAP's Support for the EMS Basin Study

- CAP is regularly engaged with the Pinal Partnership, and helped support the WaterSmart application
- CAP has provided similar support for the West Valley and Lower Santa Cruz River Basin Studies
- CAP is identified as a non-federal cost-share partner in the scope of work
  - CAP's contributions are in-kind, and are focused on supply & demand modeling

# CAP's Roles & Relationships in Pinal AMA

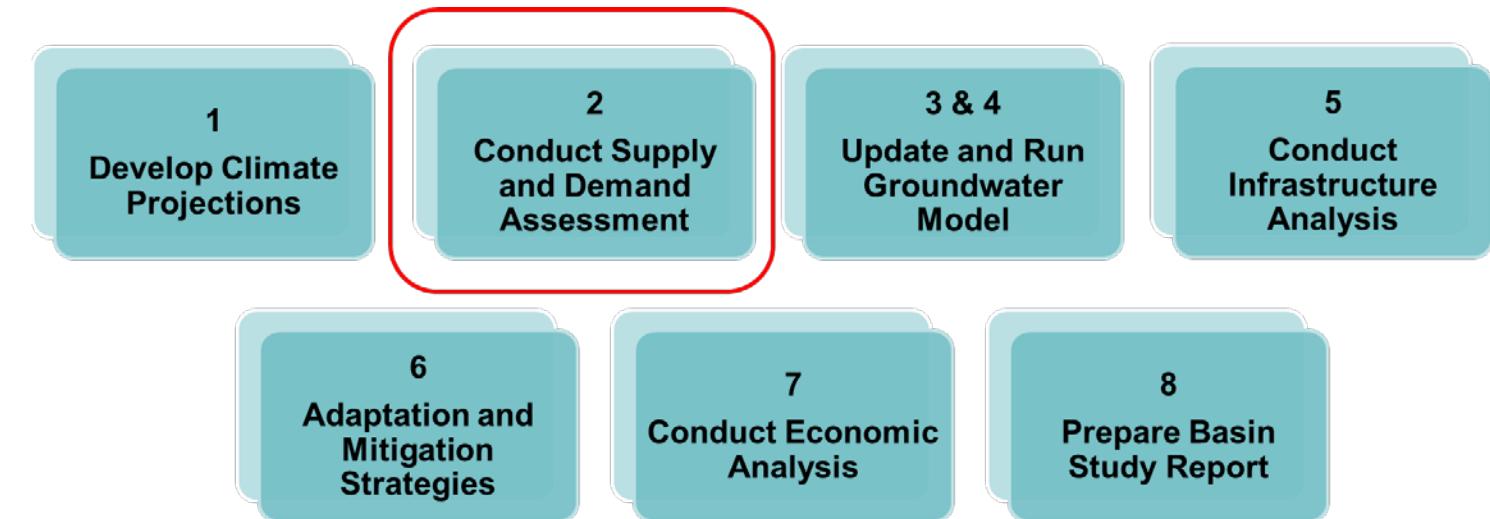
- **CAP Infrastructure**
  - 2 Pumping Plants
  - 38.5 Miles of Canal
  - 8 Active Turnouts
- **Tribal Contractors**
  - Ak-Chin Indian Community
  - Gila River Indian Community
  - Tohono O'odham Nation
- **M&I Subcontractors**
  - Arizona Water Company
  - Coolidge
  - Eloy
  - Florence
- **CAP Ag Districts**
  - Central Arizona IDD
  - Hohokam IDD
  - Maricopa-Stanfield IDD
  - San Carlos IDD
- **CAGRD Members**
  - Member Service Areas
    - Casa Grande
    - Eloy
    - Florence
    - Johnson Utilities
  - 137 Member Land subdivisions
    - ~62,000 homes
- **AWBA Recovery**
  - 1.4 MAF of credits
- **CAWCD Credits**
  - 316,216 AF
- **Taxpayers**



# CAP's Involvement in EMS Study

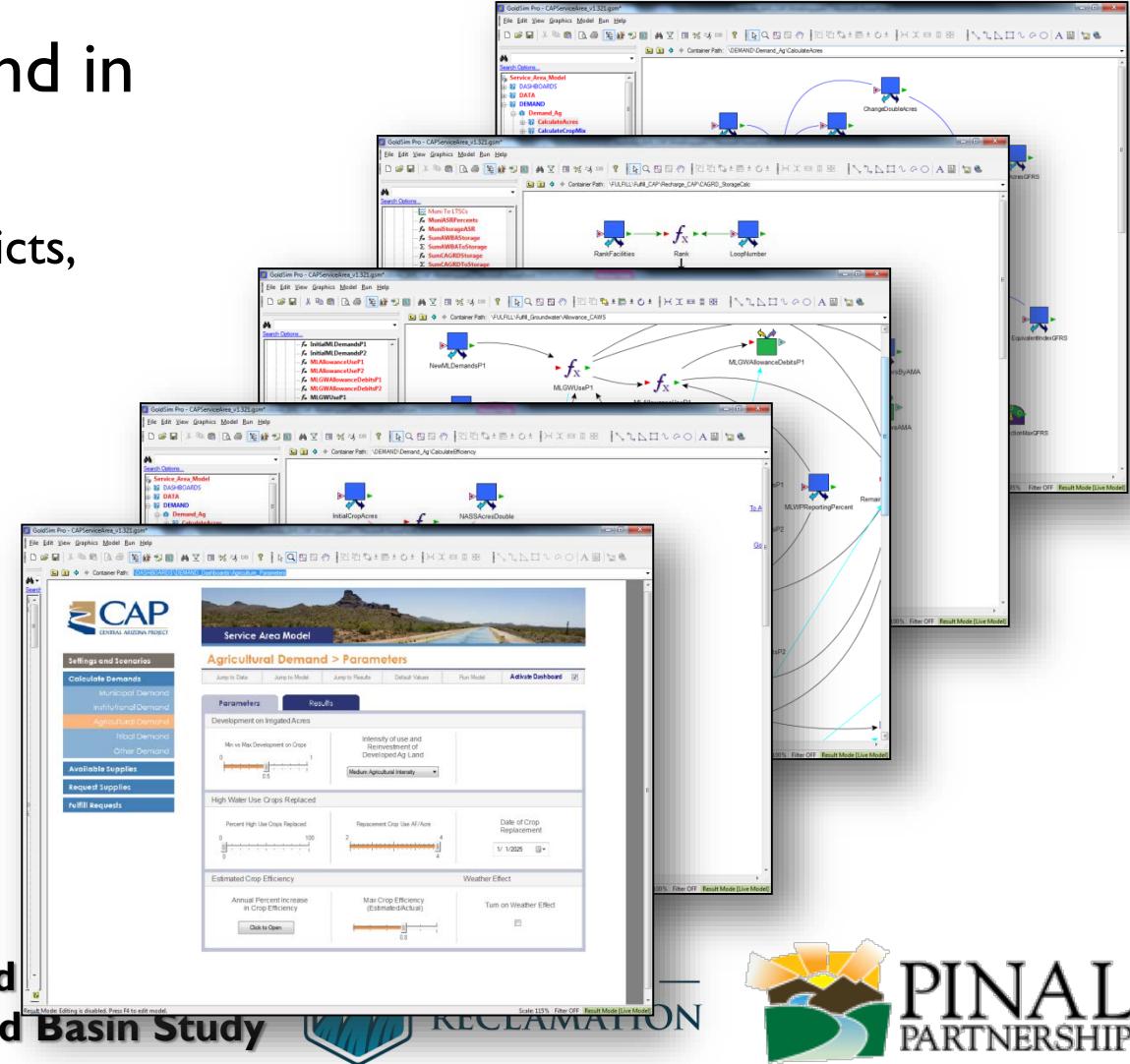
- Develop future water supply and demand projections
  - Scope of Work, Tasks 5.2.2 & 5.2.4
- Challenges
  - Complex relationships among supply & demand factors
  - Significant uncertainties across multiple dimensions

## Study Tasks



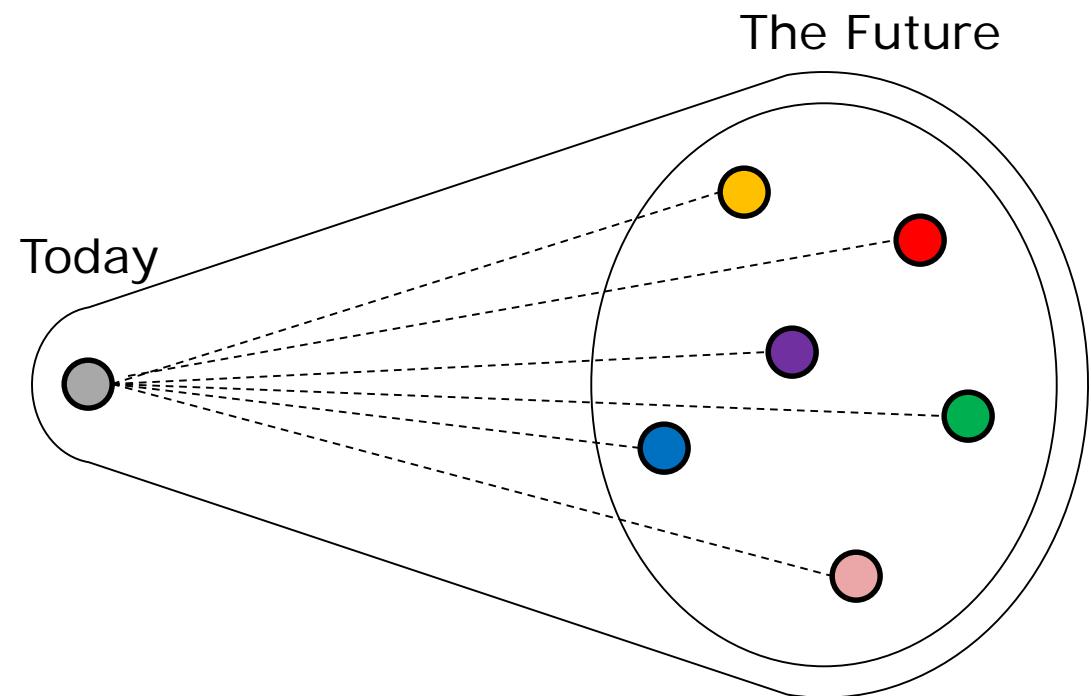
# CAP Service Area Model (CAP: SAM)

- Tool for projecting supply and demand in CAP's three county service area
  - 135 entities (municipal providers, irrigation districts, Tribes, AWBA, CAGRD, etc.)
  - 16 water supply types
- Accounts for complex legal and physical characteristics of users and supplies
- Designed to easily generate “what-if” scenarios



# Scenario Planning Approach

- The future is uncertain!
- Evaluate and compare a large, plausible range of future conditions
- Scenarios represent a unique combination of supply and demand factors



# Supply and Demand Factors

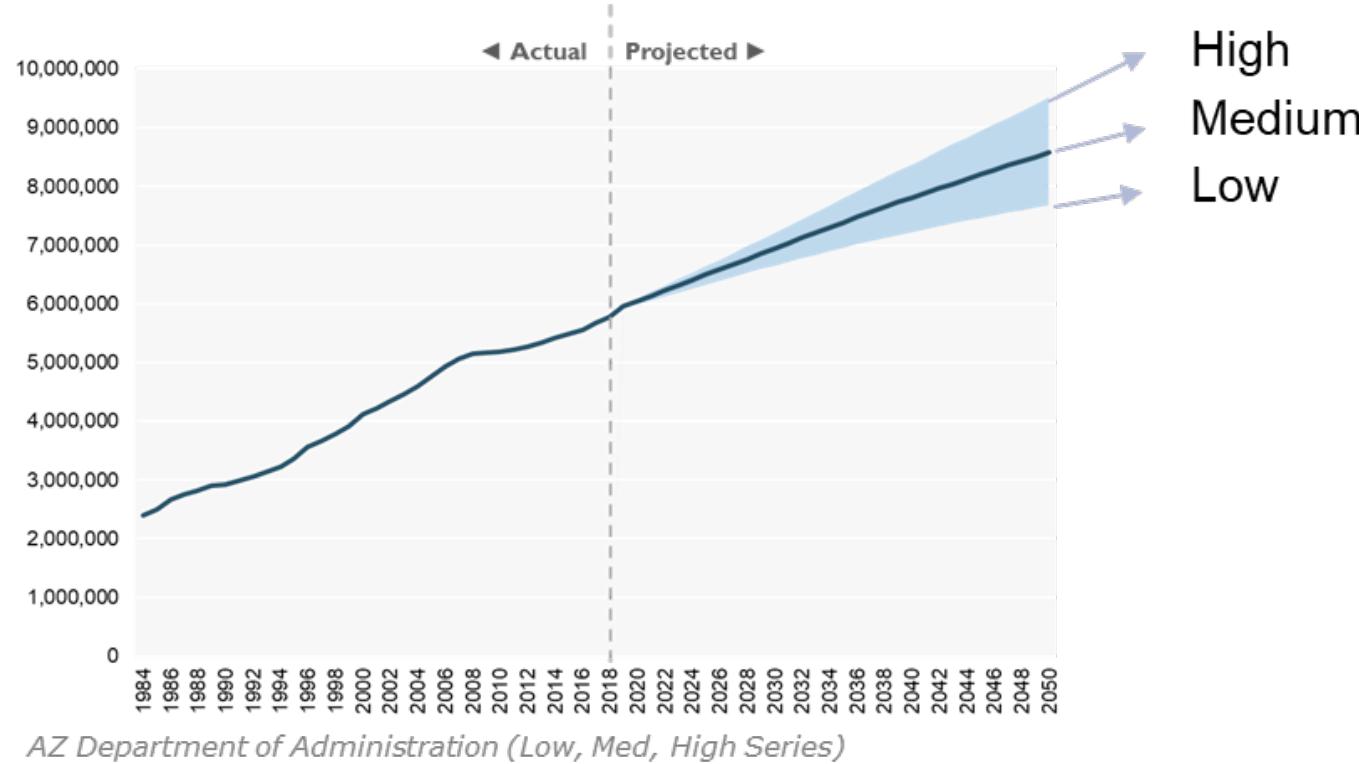
Some of the major factors that affect water supply, demand & reliability:

- Growth
- Shortage
- Climate Variability
- Socio-Economic Changes
- Agricultural Trends
- Water Storage Preferences
- Policy Changes
- Behavioral Shifts
- ....

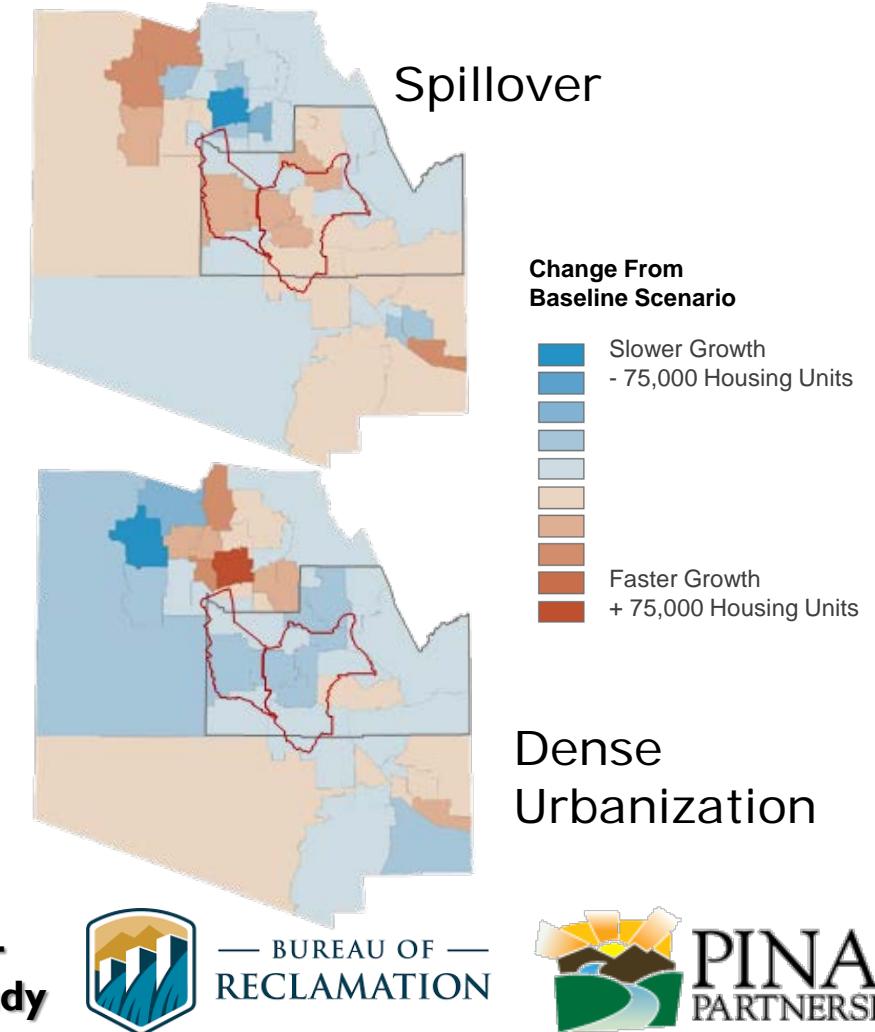
**“Driving Forces”**

# Growth

Rate:

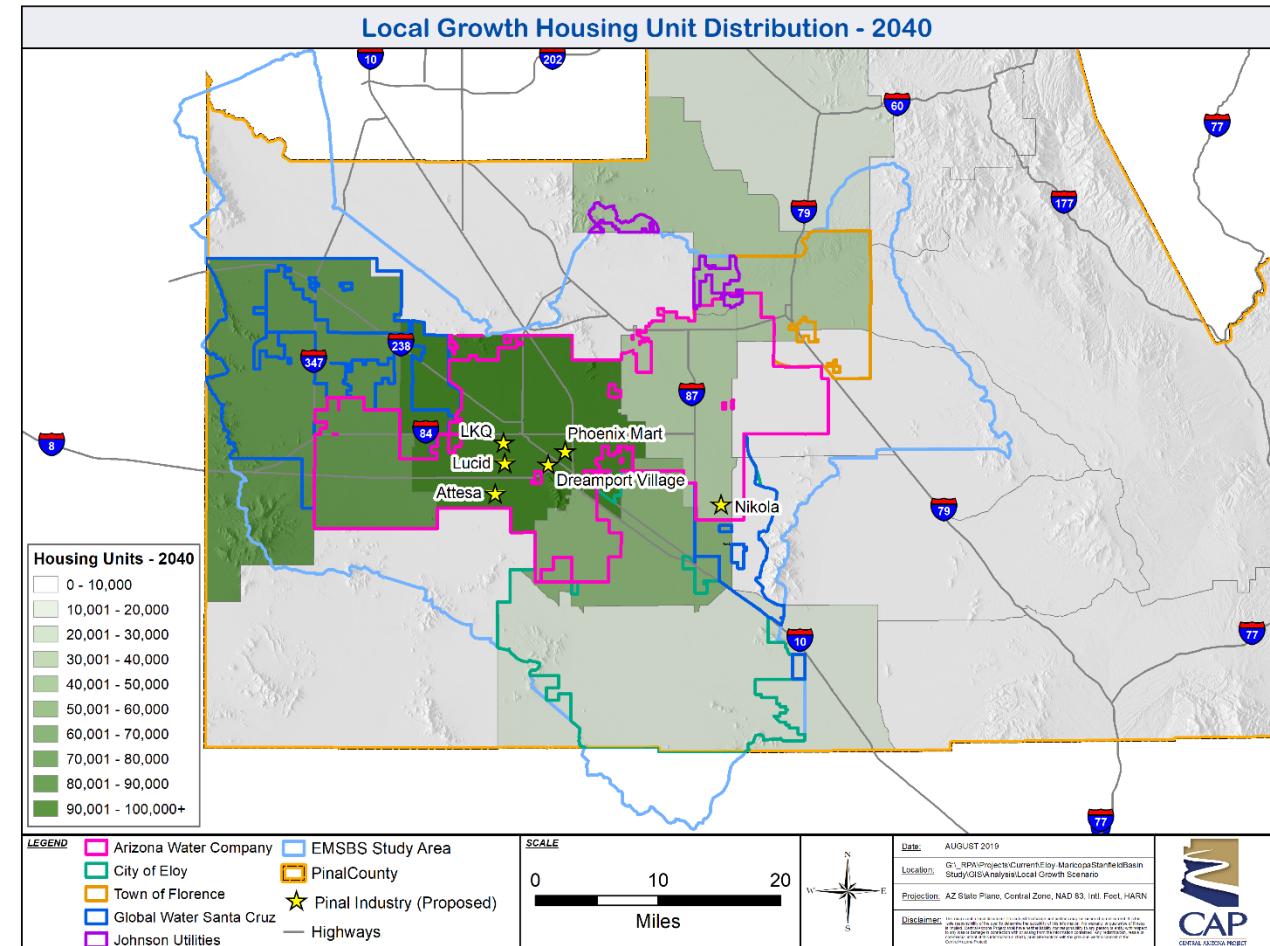


## Spatial Distribution:



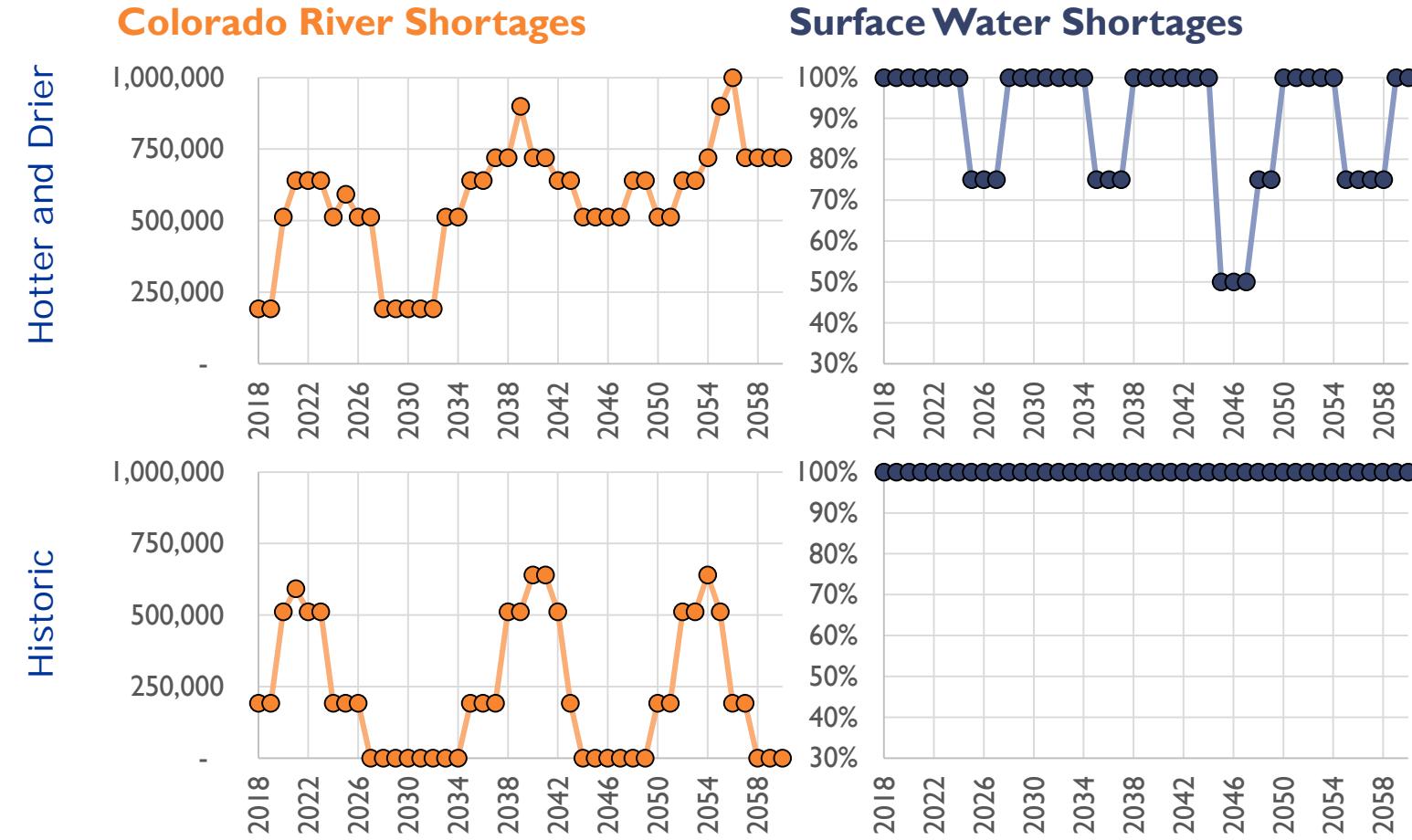
# Growth - Local Focus

- Preference for a local growth pattern
  - Modified spillover pattern

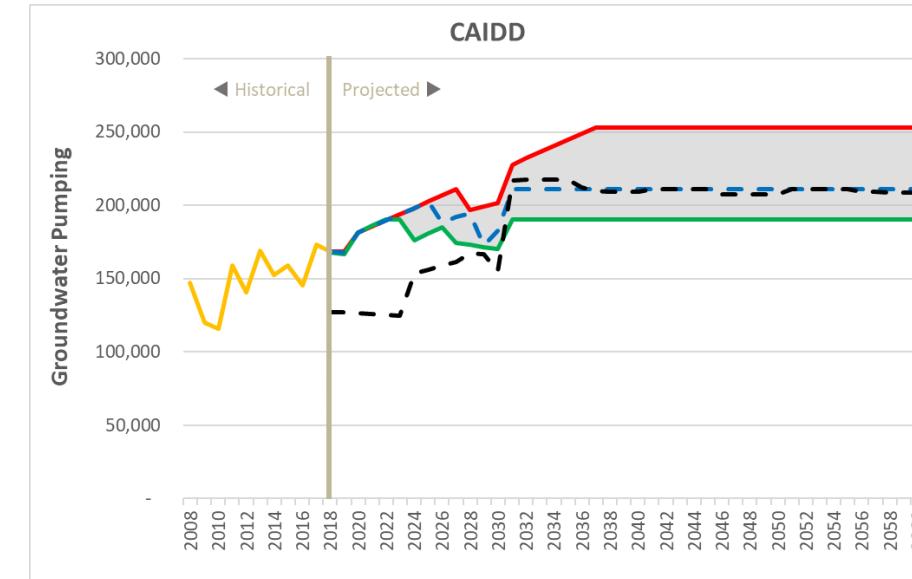
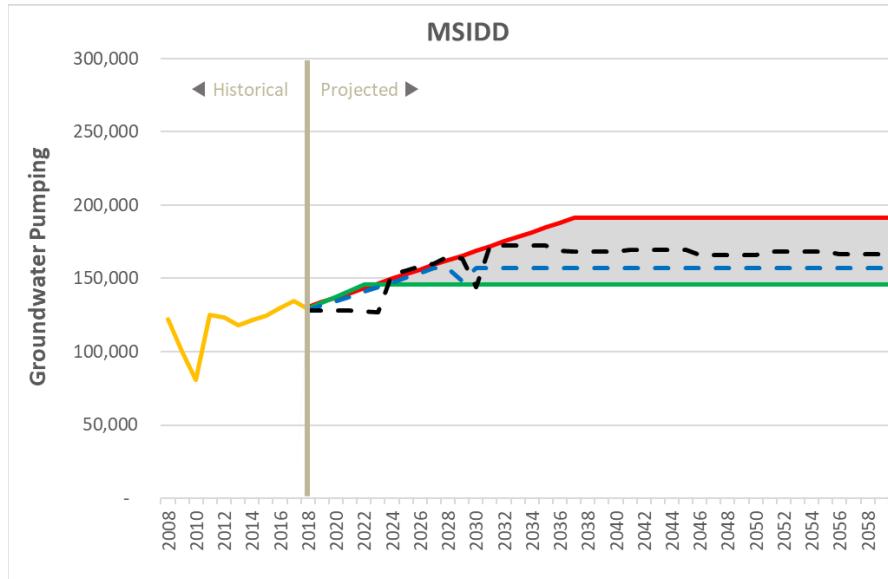


# Climate

- Per capita water use
- Increase in crop consumptive use
- Shortages to water supply
  - Frequency
  - Duration
  - Severity

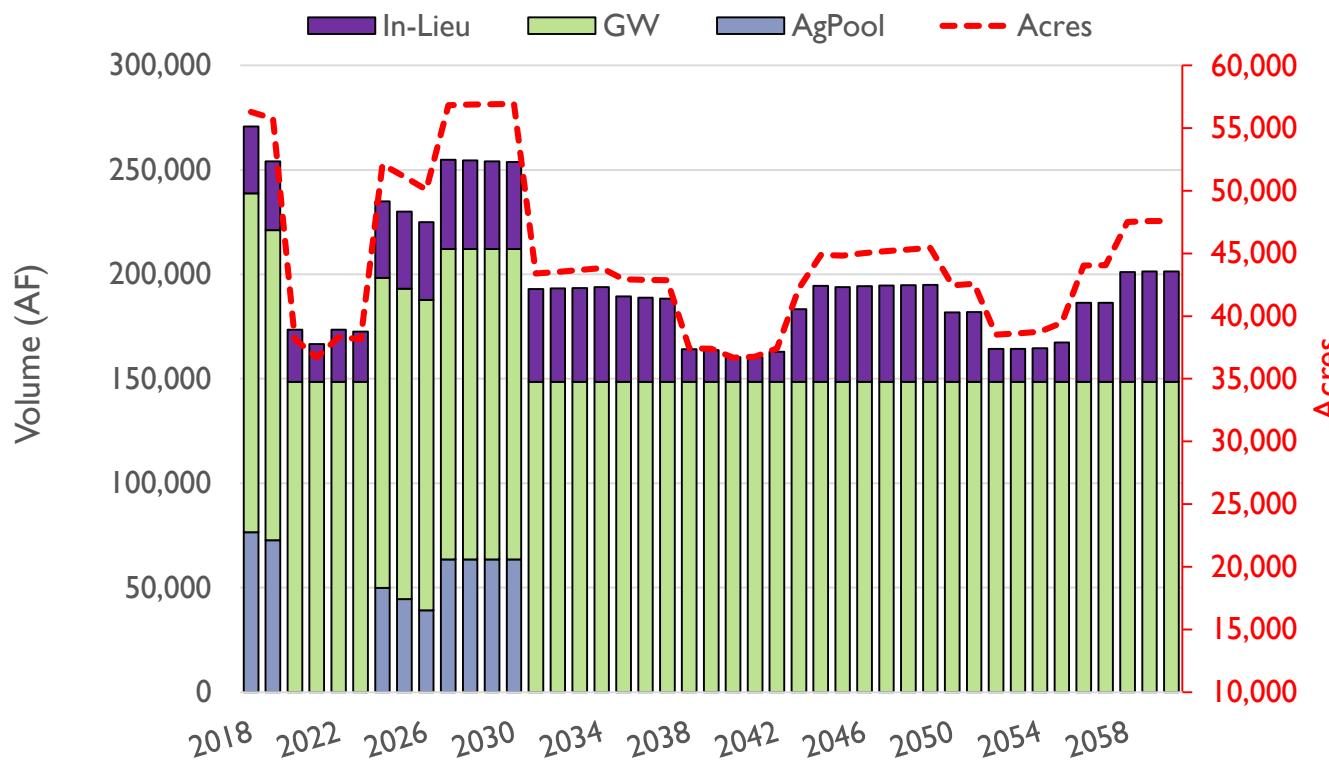


# Agriculture - Pumping

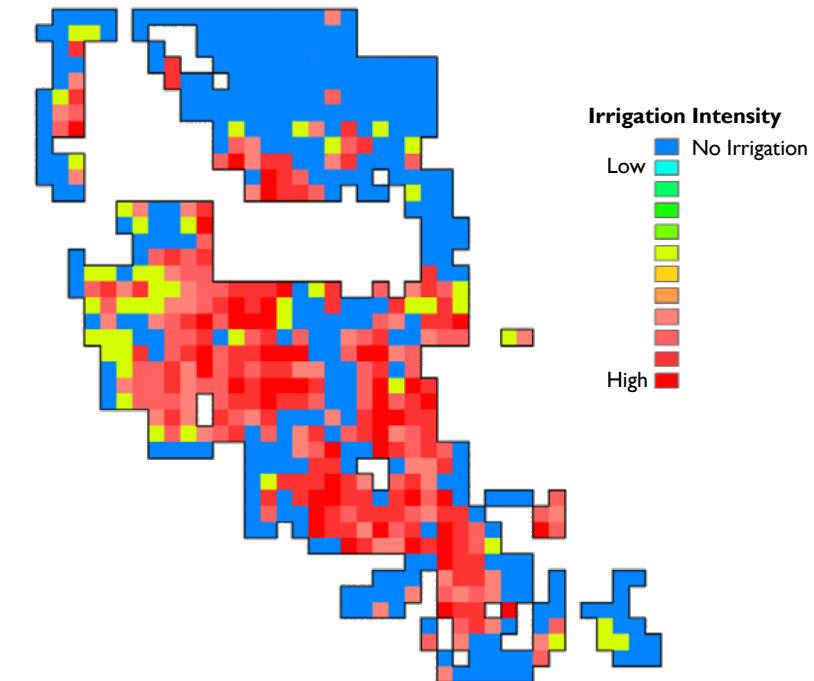


- Ag accounts for ~95% of the demand in the Pinal AMA
- Multiple future pumping projections

# Agriculture – Fallowing and Urbanization



*Example: MSIDD*



# Scenarios & Stakeholder Engagement

- Supply and demand committee has met nine times
- Data review
- Group exercises to identify & prioritize factors
- Developed & evaluated individual scenarios

Entity	2017 Portfolio for Municipal Water Providers in the Pinal AMA						Other (in M <sup>3</sup> )	Total Water Used for Water Demand	
	Available	Used for Water Use	Average Monthly Demand (M <sup>3</sup> )	Storage	Reservoir Available	Used for Water Demand			
AS Water Company - Pinet Valley System	10,884	1,833	6,837	128	2,821	187	2,854	9,832	1,238
Santa Cruz Water Co.	2,649	2,649	2,649	1,341	1,341	1,341	1,341	7,513	4,409
Town of Florence	2,649	2,649	2,649	1,341	1,341	1,341	1,341	7,513	3,008
City of Apache - Prent	2,171	2,171	2,171	971	971	971	971	5,751	3,861
City of Eloy	2,171	2,171	2,171	971	971	971	971	5,751	3,417
Pinal Water Company	1,800	1,800	1,800	474	474	474	474	5,323	3,223
Total	18,209	1,896	6,832	122	3,279	769	4,805	21,809	10,722
AS Dept. of Corrections - Yuma									990
AS Water Company - Gila River									144
AS Water Company - Phoenix Independent District									277
AS Water Company - Terra Grande									150
AS Water Company - Tucson Municipal Water Utility District									150
City of Casa Grande									178
AS Water Company - Stanfield									178
United Utilities - Gilbert									178
Casa Grande River Water Co.									83
City of Glendale									83
Pinal Water Improvement									58
City of Laveen									58
Pinal River Water Delivery									20
South Mountain Water Company									20
Park Water Co.									43
AS Water Company - David									43
Seven Ranches Domestic WID									43
Seven Ranches Irrigation and Drainage District									27
AS Water Company - Maricopa (Coronado)									27
New Goldwater Water Treatment WID									23
AS Water Company - Coolidge Airport System									23
AS Water Company - Buckeye									23
Buckles at Maricopa									5
Central Water Co.									5

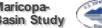
**Rank Each by How Interesting/Useful/Important (1 = High)**  
First rank the categories, then rank within the categories

- Development on Ag Land
  - Incentives to develop on Ag land
  - Disincentives to develop on Ag land
- Irrigation District pumping
  - Pumping constrained to current levels
  - Pumping constrained to 150 % of current levels
  - Pumping unconstrained
- Ag Water Use Factors
  - Substitution from higher to lower water use crops
  - Extensive adoption of new irrigation technology
  - Higher leaching due to WQ
- Growth Rate
  - High population growth
  - Medium population growth
  - Low population growth
- Growth Pattern
  - Official growth pattern
  - Outward growth pattern
  - Infill/redevelopment
  - Local industrial growth
  - Constrained local development
- Muni Conservation Ethic
  - Stronger muni conservation ethic
  - Current muni conservation ethic
- Future Climate
  - Hotter & drier
  - Warmer & wetter
  - Historic climate
- Other

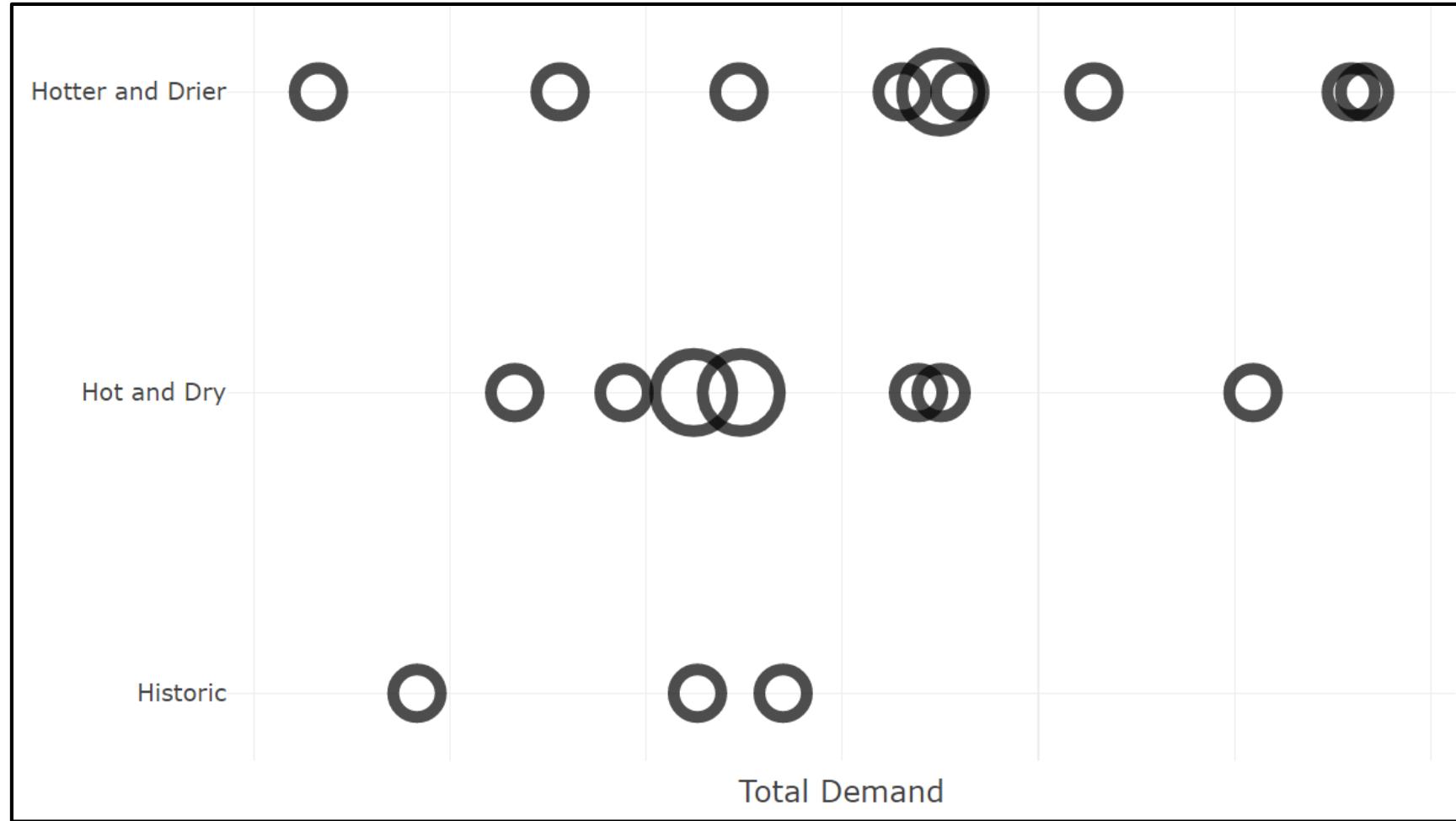
**Scenario A: Highest Demand**

<b>Pumping</b>	<b>Growth Pattern</b>	<b>Climate</b>
<ul style="list-style-type: none"> <li>Fully replaces</li> <li>Partially replaces</li> <li>Limited to current/planned</li> </ul>	<ul style="list-style-type: none"> <li>Spillover</li> <li>Official</li> <li>Dense urbanization</li> <li>Local growth</li> </ul>	<ul style="list-style-type: none"> <li>Hotter and drier</li> <li>Hot and dry</li> <li>Historic</li> </ul>
<b>Irrigation Efficiency</b>	<b>Conservation</b>	
<ul style="list-style-type: none"> <li>Rapid</li> <li>Steady (i.e. current)</li> <li>Slow</li> </ul>	<ul style="list-style-type: none"> <li>Rapid</li> <li>Steady (i.e. current)</li> <li>Slow</li> </ul>	
<b>Development</b>	<b>Growth Rate</b>	
<ul style="list-style-type: none"> <li>Preference for on Ag</li> <li>No preference</li> <li>Preserve Ag (bare desert)</li> </ul>	<ul style="list-style-type: none"> <li>High</li> <li>Official</li> <li>Low</li> </ul>	

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Eloy and Maricopa-Stanfield Basin Study  PINAL PARTNERSHIP 

# Scenarios & Stakeholder Engagement



[https://austincarey.shinyapps.io/2019\\_ActivityApplication/](https://austincarey.shinyapps.io/2019_ActivityApplication/)

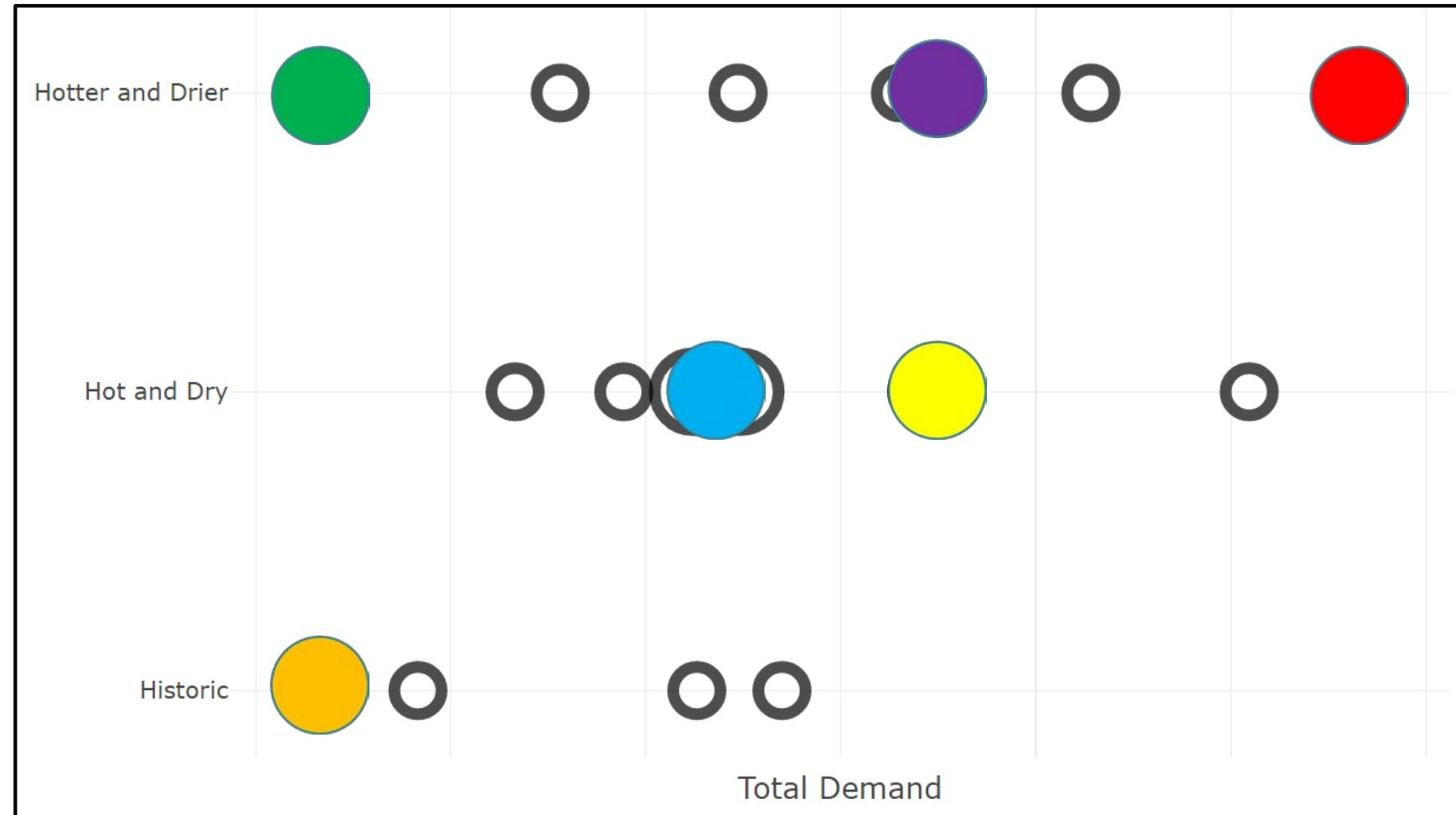
**Eloy and Maricopa-  
Stanfield Basin Study**



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# Scenarios & Stakeholder Engagement



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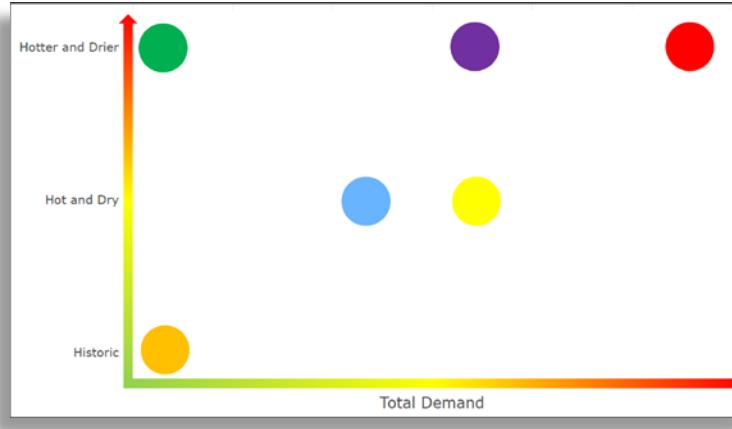
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# Scenarios & Stakeholder Engagement



- Six scenarios
- Bracketed by highest & lowest demand scenarios
- Pairwise comparisons

**Eloy and Maricopa-Stanfield Basin Study – Official Modeling Scenarios**

Scenario ID	Climate	Growth Rate	Growth Spatial Pattern	Ag Pumping Capacity
A	Hotter and Drier (Higher Emission Future)	High	Spillover	Increased – 150% <sup>1</sup>
B	Hotter and Drier (Higher Emission Future)	Official	Local	Increased – 150% <sup>1</sup>
C	Hot and Dry (Lower Emission Future)	Official	Official	Increased – 150% <sup>1</sup>
D	Hot and Dry (Lower Emission Future)	Official	Official	Increased - 125% <sup>2</sup>
E	Hotter and Drier (Higher Emission Future)	Slow	Dense Urbanization	Current <sup>3</sup>
F	Historic (Current Climate)	Slow	Dense Urbanization	Current <sup>3</sup>

<sup>1</sup> Pumping capacity set to 150% of the maximum historical use (2010 – 2015)

<sup>2</sup> Pumping capacity set to 125% of the maximum historical use (2010 – 2015)

<sup>3</sup> Maximum historical pumping (2010 – 2015) plus DCP pumping capacity

# **Supply & Demand – *Draft* Results**

**Austin Carey**  
*Planning Analyst*

## Eloy and Maricopa-Stanfield Basin Study – Official Modeling Scenarios

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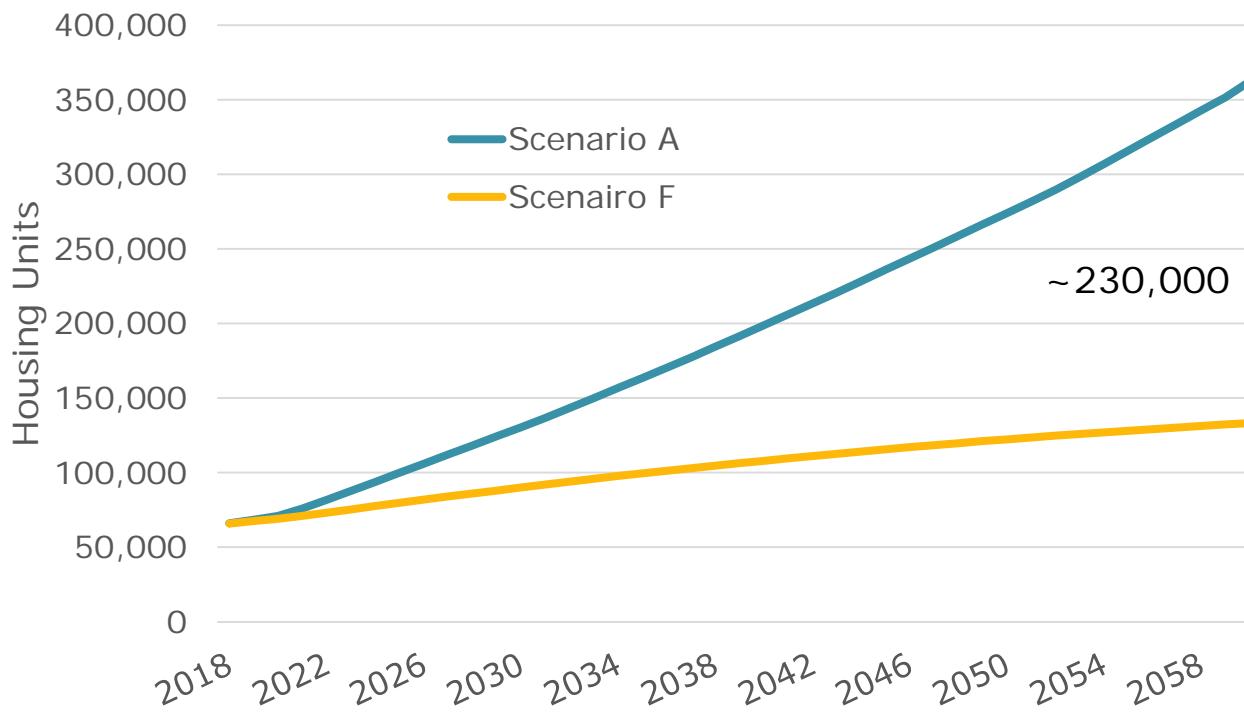
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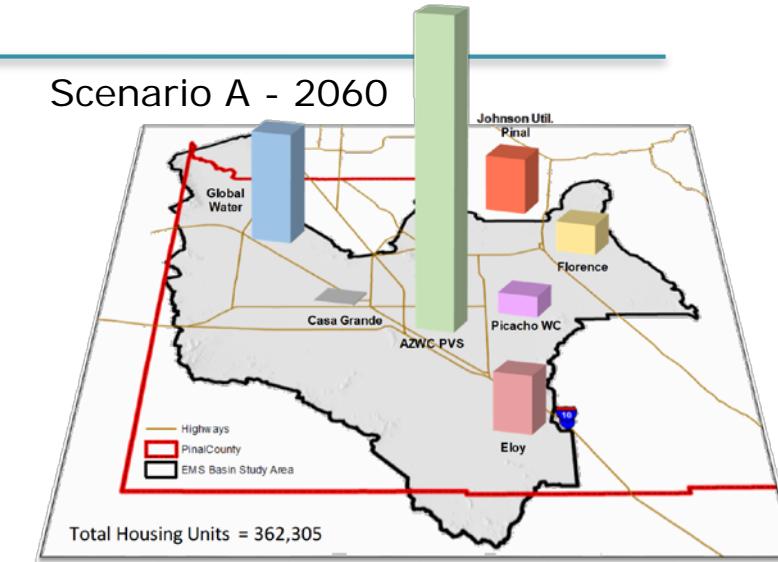
<sup>3</sup> Maximum historical pumping (2010 – 2015) plus DCP pumping capacity

# Housing Units

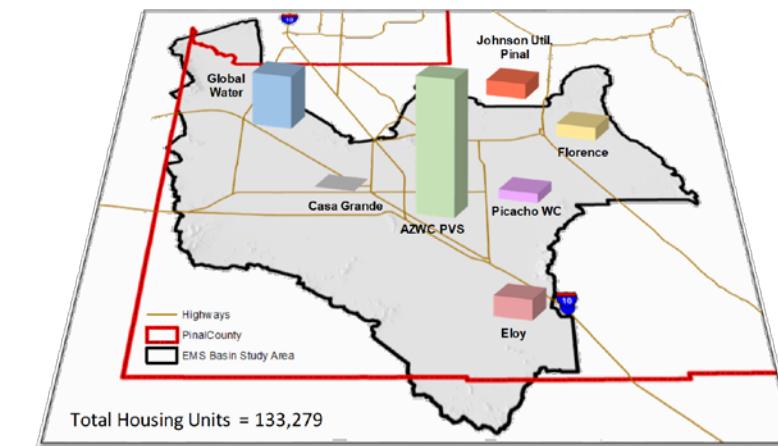
- Growth pattern & rate affect housing unit magnitude/distribution



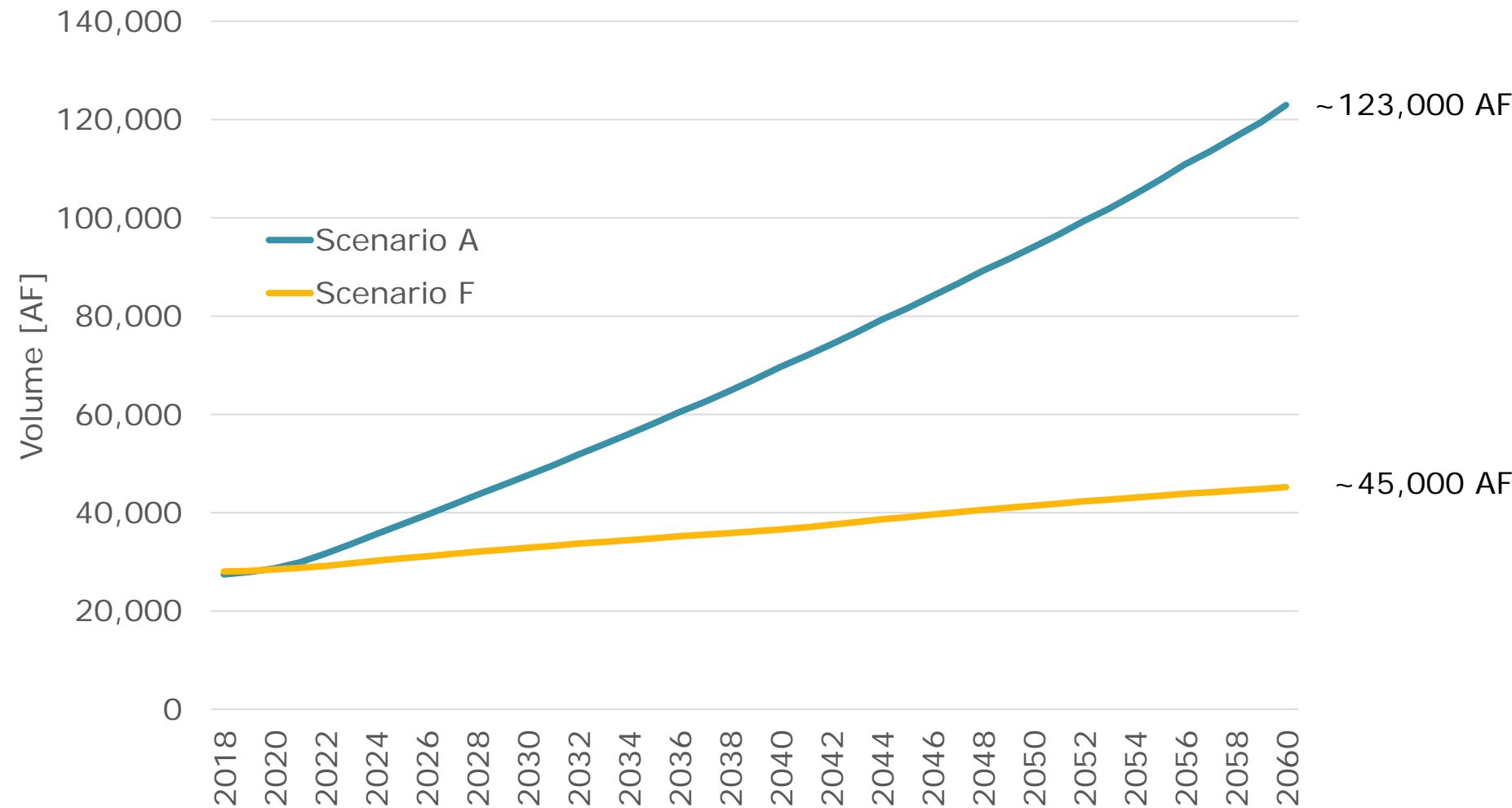
Scenario A - 2060



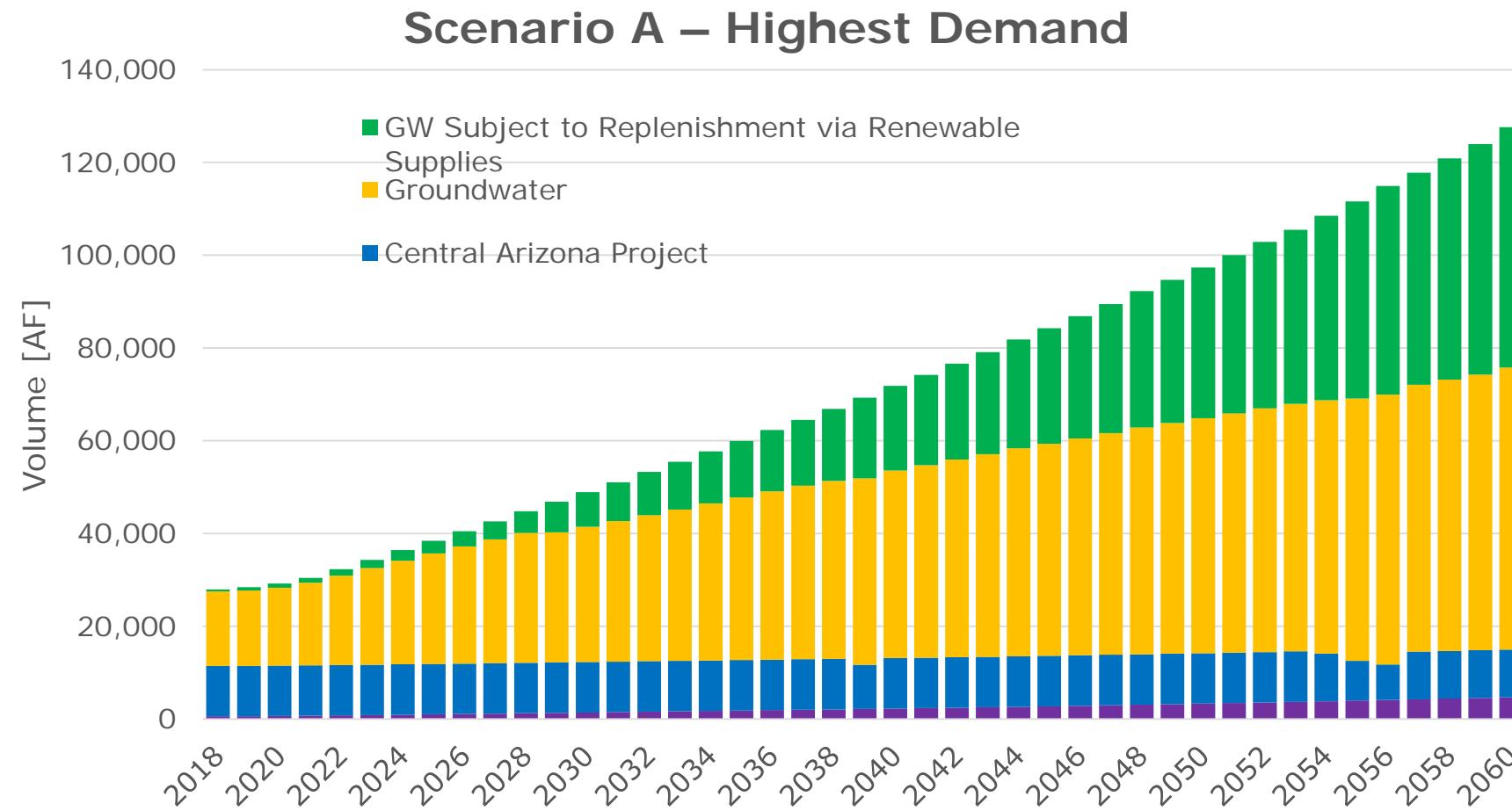
Scenario F - 2060



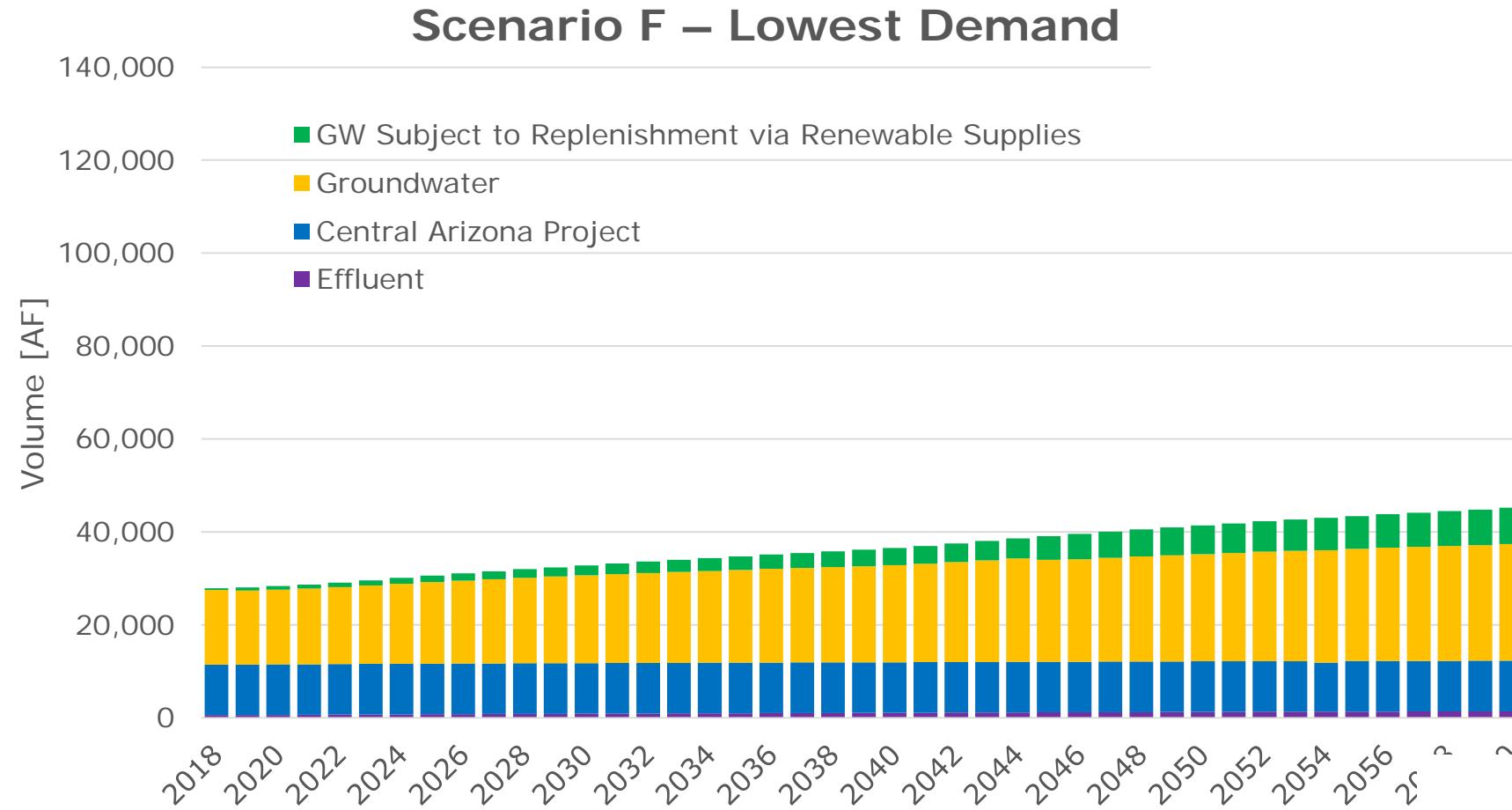
# Municipal – Demand



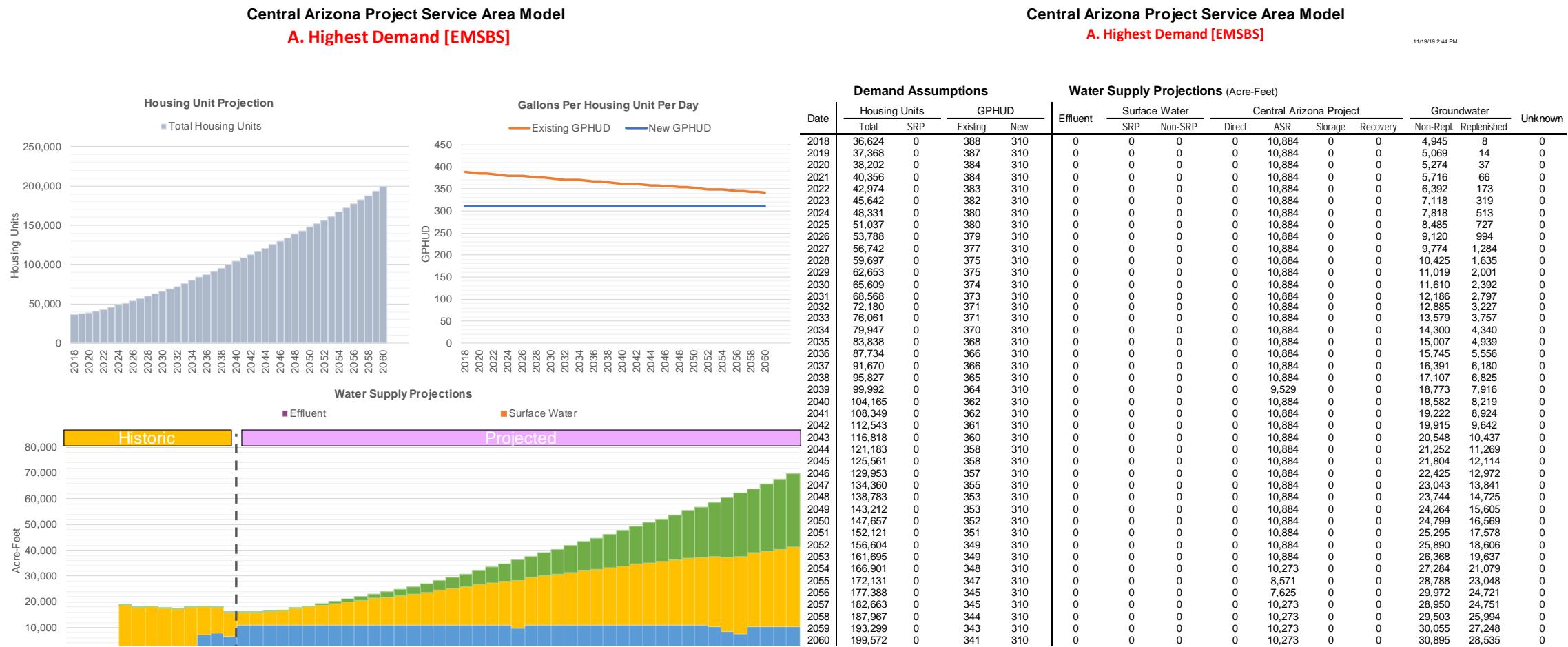
# Municipal – Supply Utilization



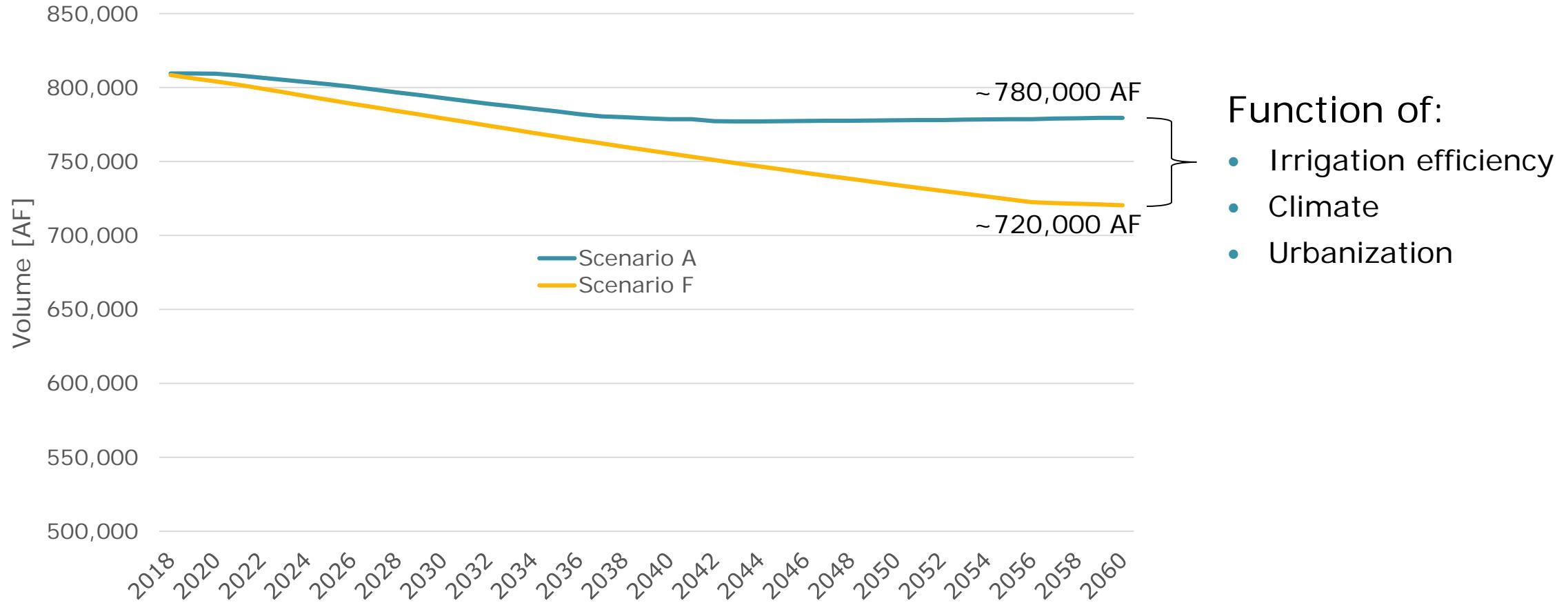
# Municipal – Supply Utilization



# Municipal -Individual Portfolios



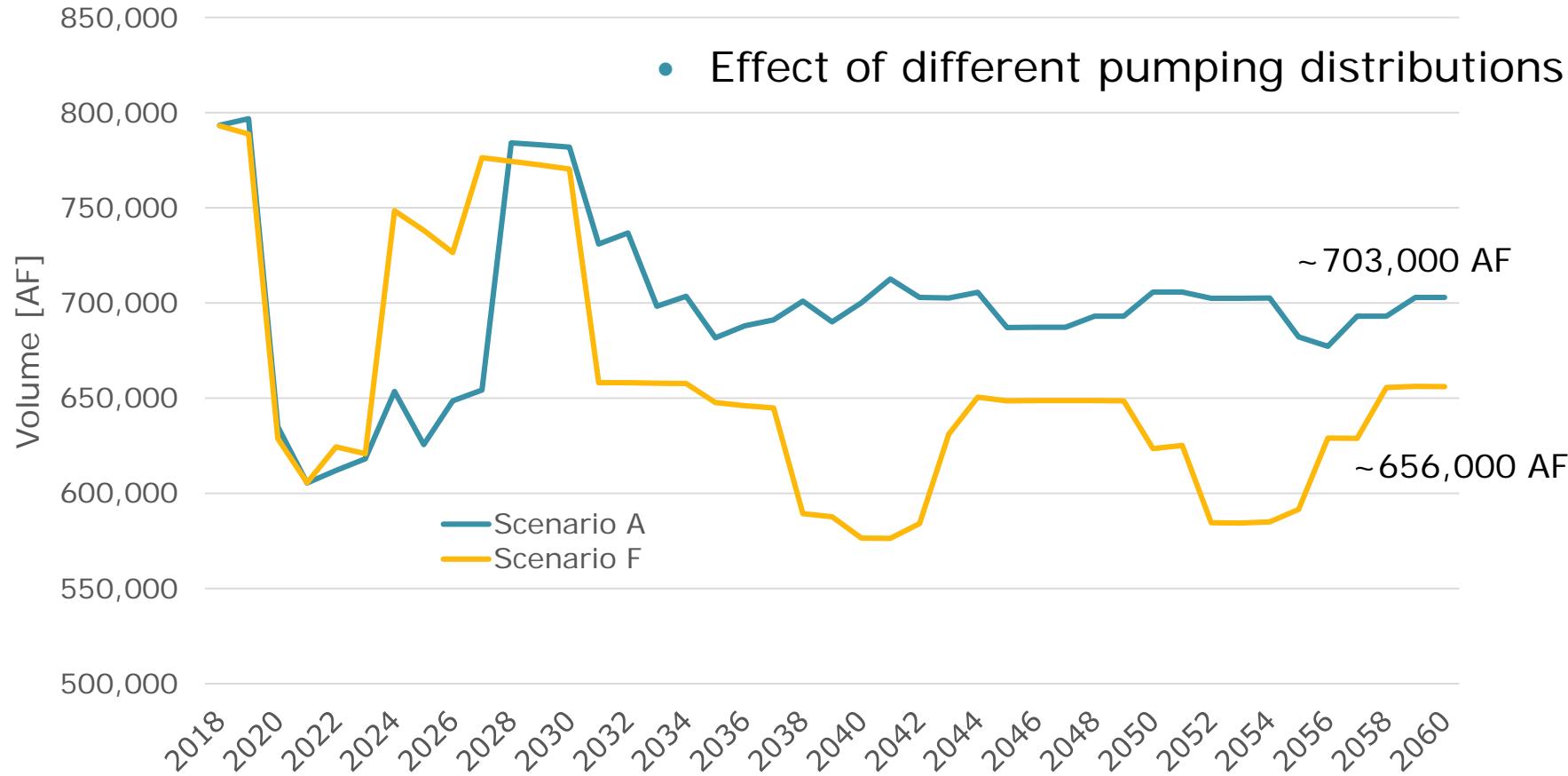
# Agriculture - Demand



Function of:

- Irrigation efficiency
- Climate
- Urbanization

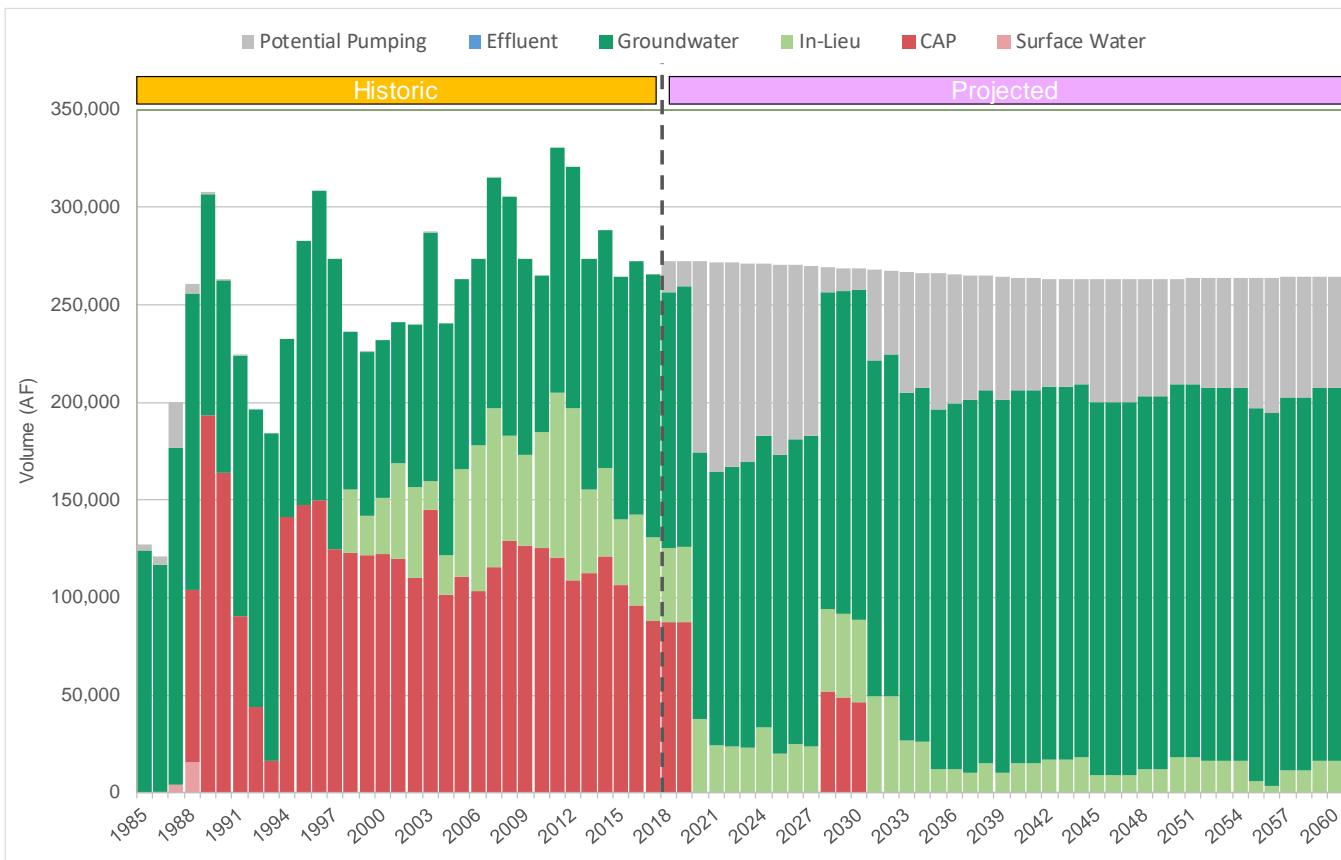
# Agriculture – Fulfilled Demand



# Agriculture - Individual Portfolios

Central Arizona Project Service Area Model

## A. Highest Demand [EMSBS]



Date	Effluent	Surface Water	CAP	In-Lieu	Groundwater	Unknwon
2018	0	0	87,706	37,969	130,602	16,187
2019	0	0	87,707	38,295	133,788	12,587
2020	0	0	0	37,744	136,973	97,542
2021	0	0	0	24,632	140,159	107,208
2022	0	0	0	23,999	143,344	104,337
2023	0	0	0	23,171	146,530	101,652
2024	0	0	0	33,552	149,715	87,750
2025	0	0	0	20,058	152,900	97,731
2026	0	0	0	24,869	156,086	89,378
2027	0	0	0	23,965	159,271	86,644
2028	0	0	52,028	42,336	162,457	12,593
2029	0	0	49,162	42,413	165,642	11,754
2030	0	0	46,329	42,431	168,828	10,927
2031	0	0	0	49,790	172,013	46,257
2032	0	0	0	49,354	175,198	43,012
2033	0	0	0	26,641	178,384	62,066
2034	0	0	0	26,042	181,569	58,987
2035	0	0	0	11,948	184,755	69,403
2036	0	0	0	11,934	187,940	65,718
2037	0	0	0	10,237	191,126	63,773
2038	0	0	0	15,316	191,126	58,351
2039	0	0	0	10,050	191,126	63,270
2040	0	0	0	15,236	191,126	57,713
2041	0	0	0	15,171	191,126	57,455
2042	0	0	0	16,929	191,126	55,346
2043	0	0	0	16,867	191,126	55,229
2044	0	0	0	18,354	191,126	53,723
2045	0	0	0	9,038	191,126	63,079
2046	0	0	0	9,050	191,126	63,077
2047	0	0	0	9,063	191,126	63,073
2048	0	0	0	11,918	191,126	60,194
2049	0	0	0	11,897	191,126	60,340
2050	0	0	0	18,197	191,126	54,144
2051	0	0	0	18,180	191,126	54,267
2052	0	0	0	16,508	191,126	56,006
2053	0	0	0	16,486	191,126	56,170
2054	0	0	0	16,511	191,126	56,248
2055	0	0	0	6,266	191,126	66,595
2056	0	0	0	3,812	191,126	69,112
2057	0	0	0	11,656	191,126	61,411
2058	0	0	0	11,639	191,126	61,532
2059	0	0	0	16,476	191,126	56,796
2060	0	0	0	16,520	191,126	56,804

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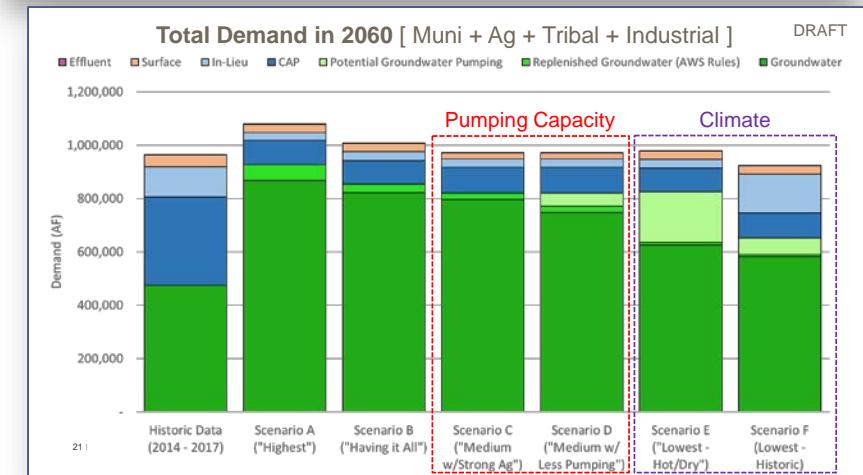
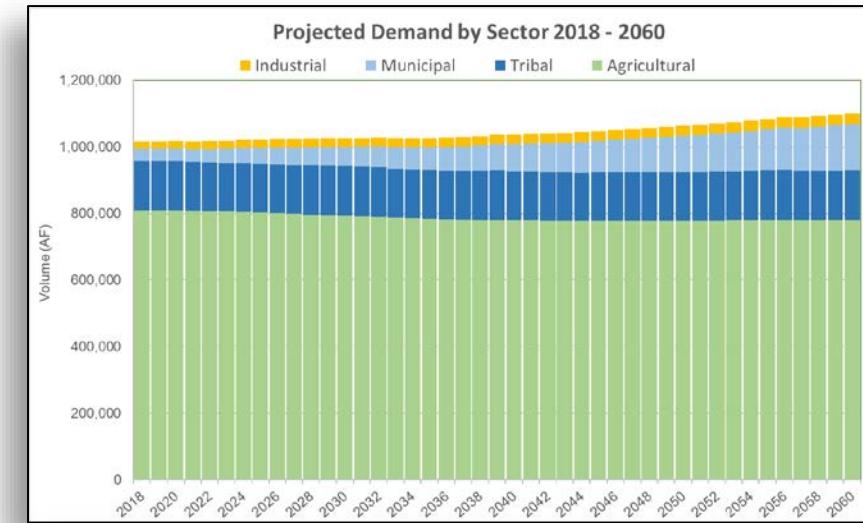
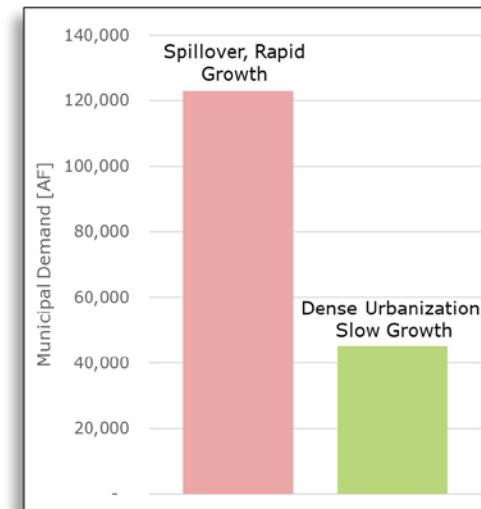


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# Main Takeaways

- Agriculture remains the dominant sector
- Growth rate & spatial pattern drive municipal sector demand
- Groundwater pumping generally increases from current levels



# Posted Results

**PINAL PARTNERSHIP** Uniting the vision for Pinal County

HOME ABOUT US + COMMITTEES + MEMBERSHIP MEETINGS & EVENTS NEWS CONTACT US

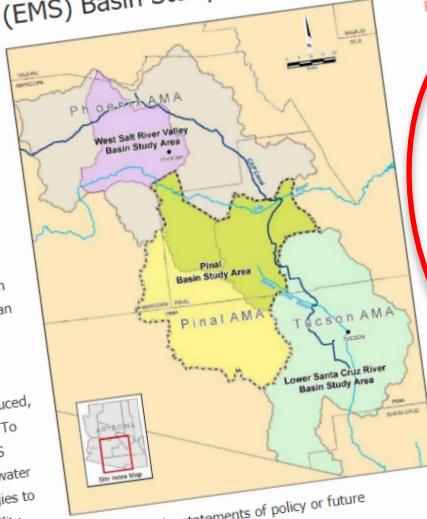
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**Eloy and Maricopa-Stanfield (EMS) Basin Study**

The Eloy and Maricopa-Stanfield (EMS) Basin Study is located in Central Arizona within the Arizona Department of Water Resources (ADWR) Pinal Active Management Area (Pinal AMA). Water demand in the Pinal AMA has historically been dominated by the agricultural sector. Pinal AMA management goals include: continue to develop non-irrigation water uses, support the agricultural economy as long as feasible, and preserve water supplies for future non-irrigation uses. In 1987, the Central Arizona Project began delivering Colorado River supplies to the Pinal AMA and surface water supplies replaced groundwater mining. If a water shortage is declared, surface water supplies may be reduced, leading to increased groundwater pumping. To address water supply uncertainties, the EMS Basin Study will assess current and future water demands and supplies and develop strategies to help ensure future water supply sustainability. The EMS Basin Study will be a technical assessment and will not make statements of policy or future commitments by Reclamation or its cost-share partners.



Meeting Documents

January 13, 2020  
Project Team and Supply & Demand Sub-Team meeting agenda

Documents

- DRAFT\_GlobalWaterSC
- SCIDD
- MSIDD
- DRAFT\_PicachoWC
- DRAFT\_JohnsonUtilities
- HIDD
- CAIDD
- DRAFT\_IndustrialDemand
- DRAFT\_CasaGrande
- DRAFT\_AZWC
- DRAFT\_Florence
- DRAFT\_Eloy

October 22, 2019  
Groundwater Modeling Agenda  
Final Performance Work Statement (scope of work)  
Schedule

August 7, 2019

<http://pinalpartnership.com/ems-basin-study/>

**Eloy and Maricopa-Stanfield Basin Study**



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