- The meeting is being recorded
- Please mute your microphone
- Please use the chat function for questions
  - Mayor McFarland and Fred Schneider will monitor the chat and read off the questions to the presenters
  - Questions not pertinent to a specific presentation will be saved to the end of the meeting

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PINAL PARTNERSHIP

Eloy and Maricopa-Stanfield Basin Study

Eloy And Maricopa-Stanfield Basin Study

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Stakeholder Meeting

Wednesday April 21, 2021, 1:00 PM – 3:00 PM

- The meeting is being recorded
- Please mute your microphone
- Please use the chat function for questions
  - Mayor McFarland and Fred Schneider will monitor the chat and read off the questions to the presenters
  - Questions not pertinent to a specific presentation will be saved to the end of the meeting

Basin Study Update

- First meeting Kickoff November 2018
- Last Annual Meeting January 2020
- Tasks Worked on Since Last Annual Meeting
  - Groundwater modeling
    - Historic and future
  - Climate
  - CAP-SAM

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Agenda

Welcome and Key Introductions	Mayor Craig McFarland, City of Casa Grande and Fred Schneider, Arizona Water Company
Basin Study Summary	Jake Lenderking, Global Water Resources
Tasks worked on during the past year	
Climate Analysis	Valerie Swick, Bureau of Reclamation
Supply and Demand Assessment review	Ken Seasholes and Austin Carey, CAP
Groundwater Model review and update	Juliet McKenna, Montgomery & Assoc.
Groundwater Model results	Austin Carey, CAP
Tasks to be worked on over the next 12 months	
Adaptation and Mitigation Strategies	Jake Lenderking, Global Water Resources
Brainstorming workshop	Terri Sue Rossi, Arizona Water Company
Groundwater modeling	Valerie Swick, Bureau of Reclamation
Trade Off analysis	Valerie Swick, Bureau of Reclamation
Questions/Discussion	All
Timeline and Budget Update	Valerie Swick, Bureau of Reclamation
Future Upcoming Meeting(s)	
Project Meetings (2nd Tuesday of the month),	May 11, 2021, 9 – 10:30 am
Adaptation and Mitigation Brainstorming Workshop,	May 17 & 18, 2021, 1 – 4 pm
Closing Remarks	Ron Fleming

Eloy and Maricopa-Stanfield Basin Study

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Basin Study Summary

- Overview

- Tasks

Eloy and Maricopa-Stanfield (EMS) Basin Study

- Main Goal:
  - Help water managers plan for uncertain future in water resources

Central Arizona Project Canal near Florence

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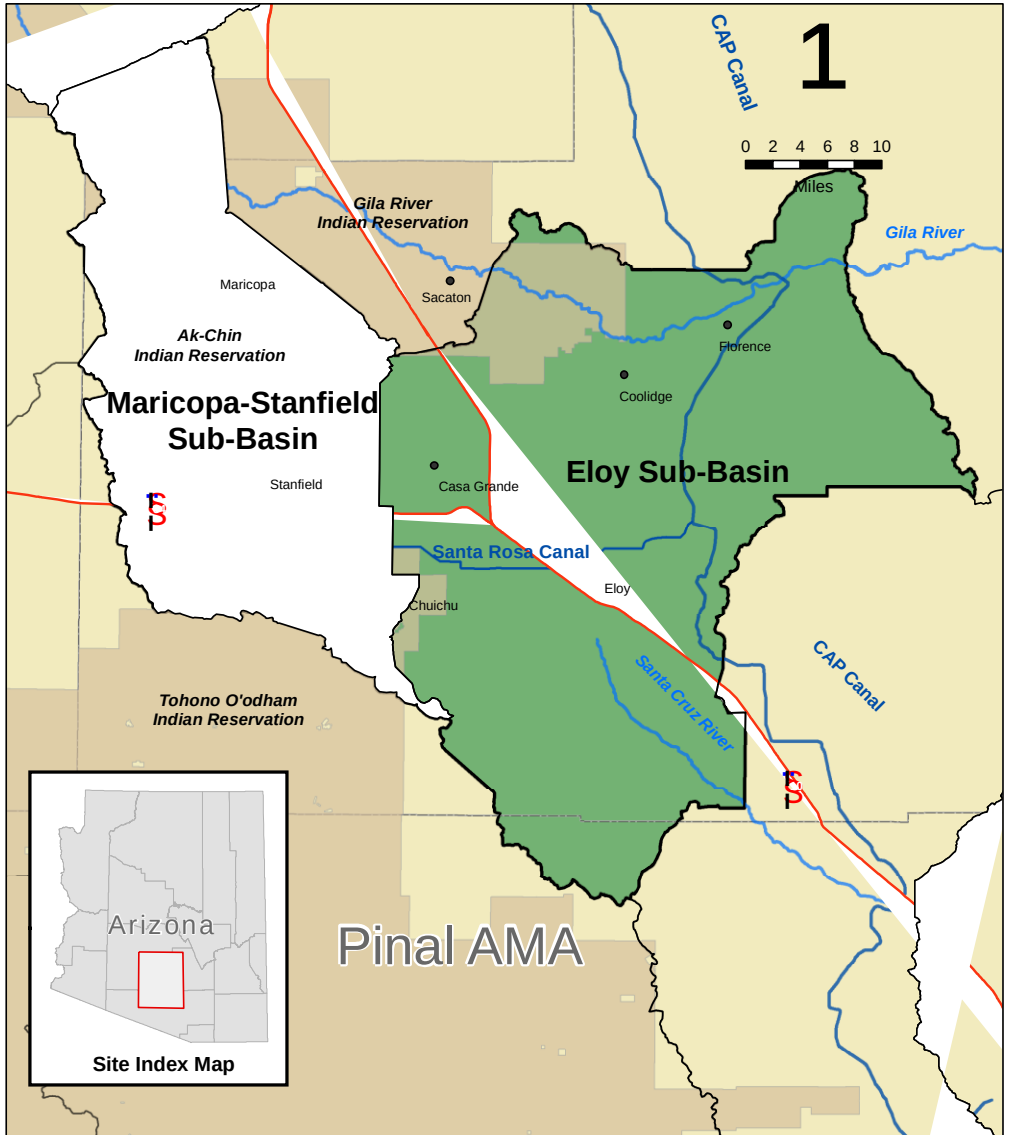
EMS Basin Study – Study Area



- Located south of Phoenix metropolitan area in Pinal County
- Study area: 1575 sq. mi.
- Pinal Active Management Area (AMA) as defined by Arizona Department of Water Resources (ADWR)
- Water demand has historically been dominated by agriculture sector
- Agriculture and agribusiness contributes $1.1 billion to local economy

EMS Basin Study

- Study began in November 2019
- 3½ year study
- Budget of $1,860,000
- Planning period though 2060

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Pinal County
Major Attributes

- Agriculture sector
- Rapid growth

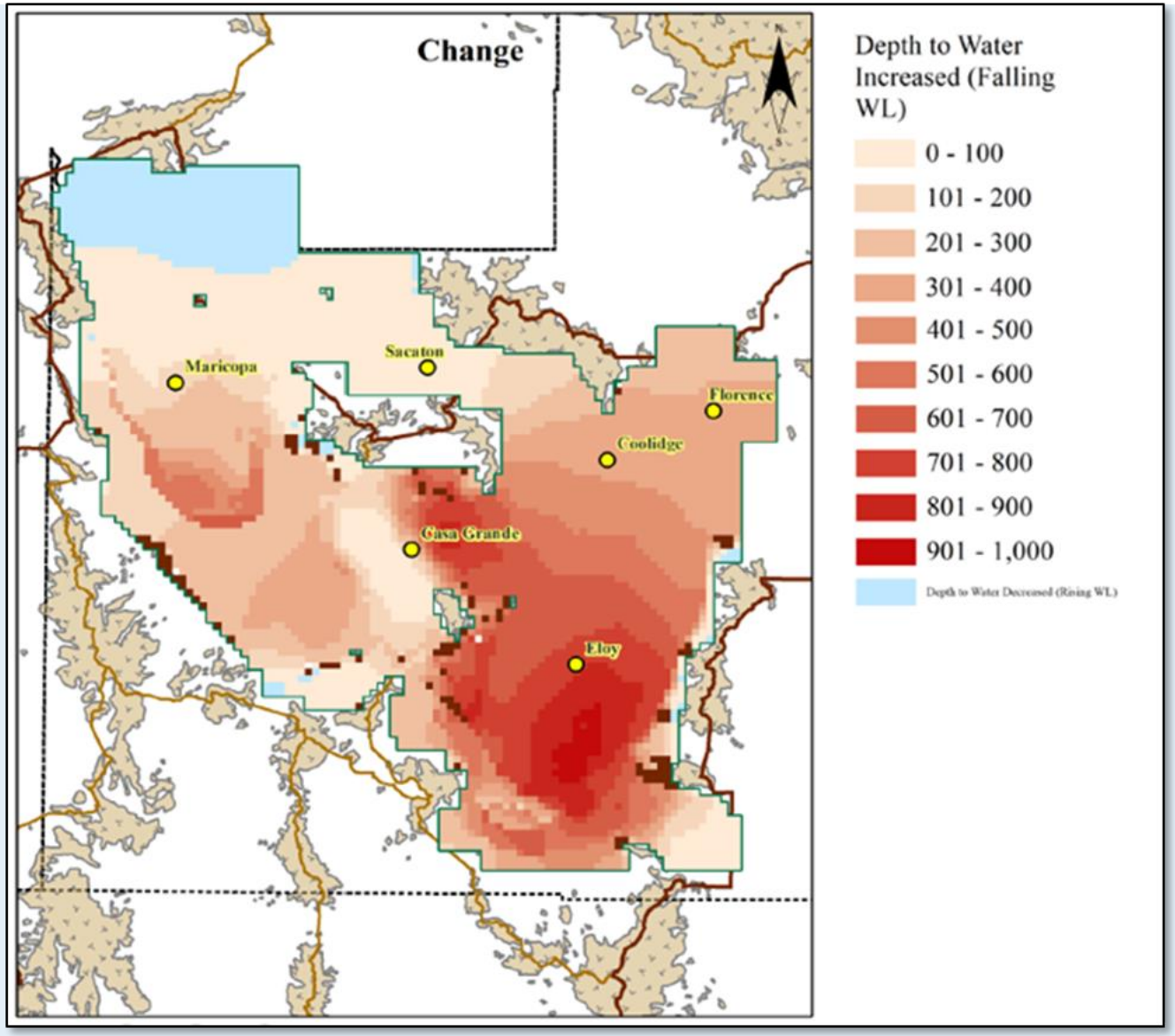
Projected Long-Term Problem

Projected Deficit:

8.1 million acre feet

"Looking out 100 years, there is insufficient groundwater in the Pinal Active Management Area to support all existing uses and issued assured water supply determinations."

ADWR Presentation to the House Ad Hoc Committee on Groundwater Supply in Pinal County, October 11, 2019



Projected aquifer change over 100-years adapted from ADWR

Basin Study Tasks

1
Develop Climate Projections

2
Conduct Supply and Demand Assessment

3 & 4
Update and Run Groundwater Model

5
Conduct Infrastructure Analysis

6
Adaptation and Mitigation Strategies

7
Conduct Economic Analysis

8
Prepare Basin Study Report

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Basin Study Tasks

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Technical Memorandum No. ENV-2020-064

Eloy-Maricopa Stanfield Basin Study: Development of Future Climate and Recharge Scenarios

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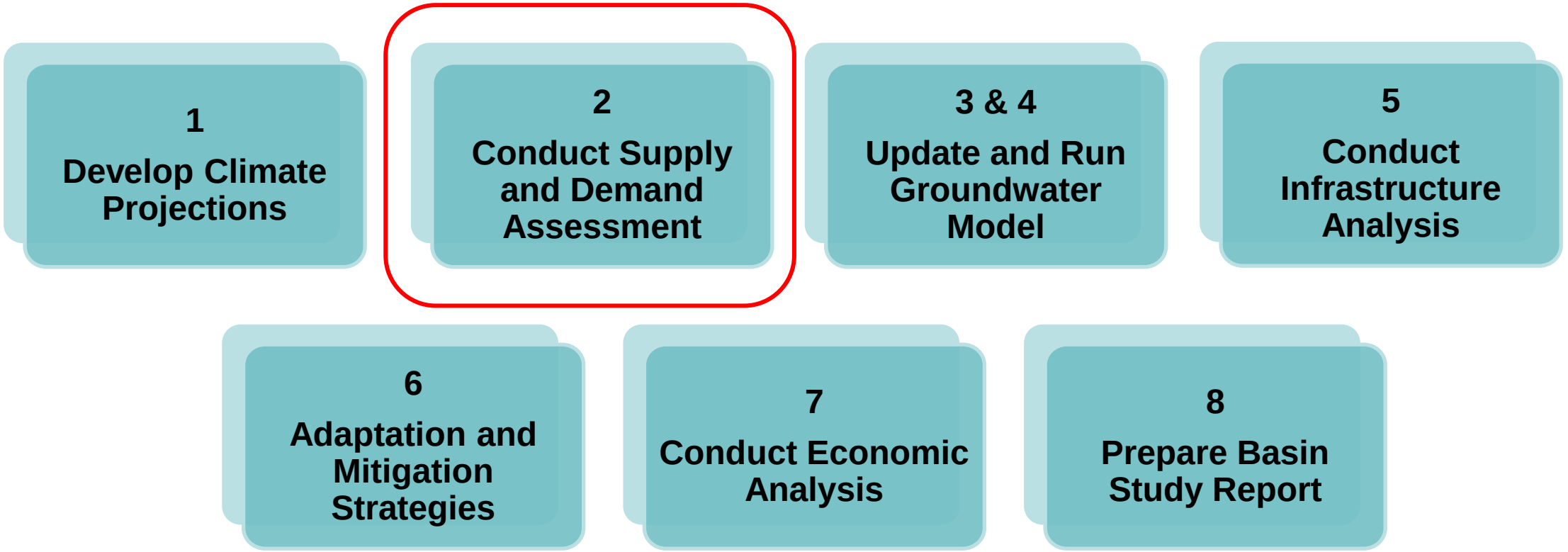
Basin Study Tasks



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Supply and Demand Assessment (Review)

Annual Stakeholder Meeting

4/21/21

Eloy and Maricopa-Stanfield Basin Study

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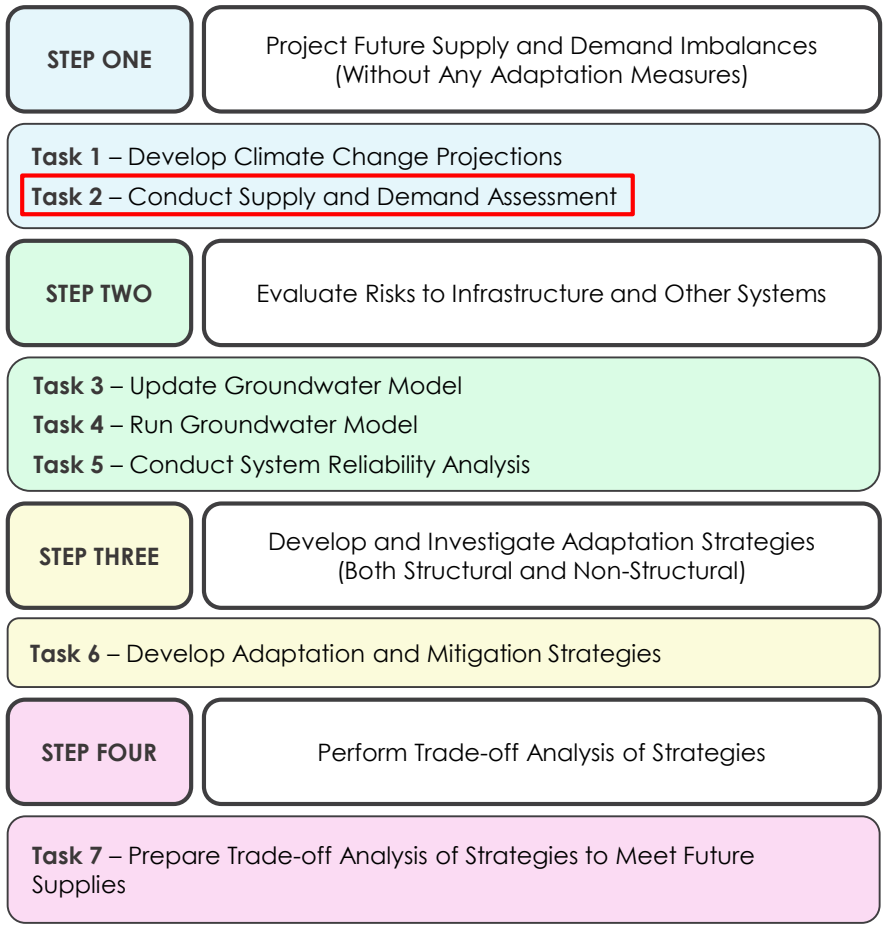
Supply and Demand Assessment



**General Framework for Reclamation Basin Study*

Purpose:

- Assess current water resource supply and demand
- Generate projections of future supply and demand
- Projections serve as inputs into the groundwater model to evaluate potential imbalances

Future Supply and Demand Projections

- Are…
  - Challenging
  - Uncertain
  - Full of assumptions
  - Require technical capability and capacity

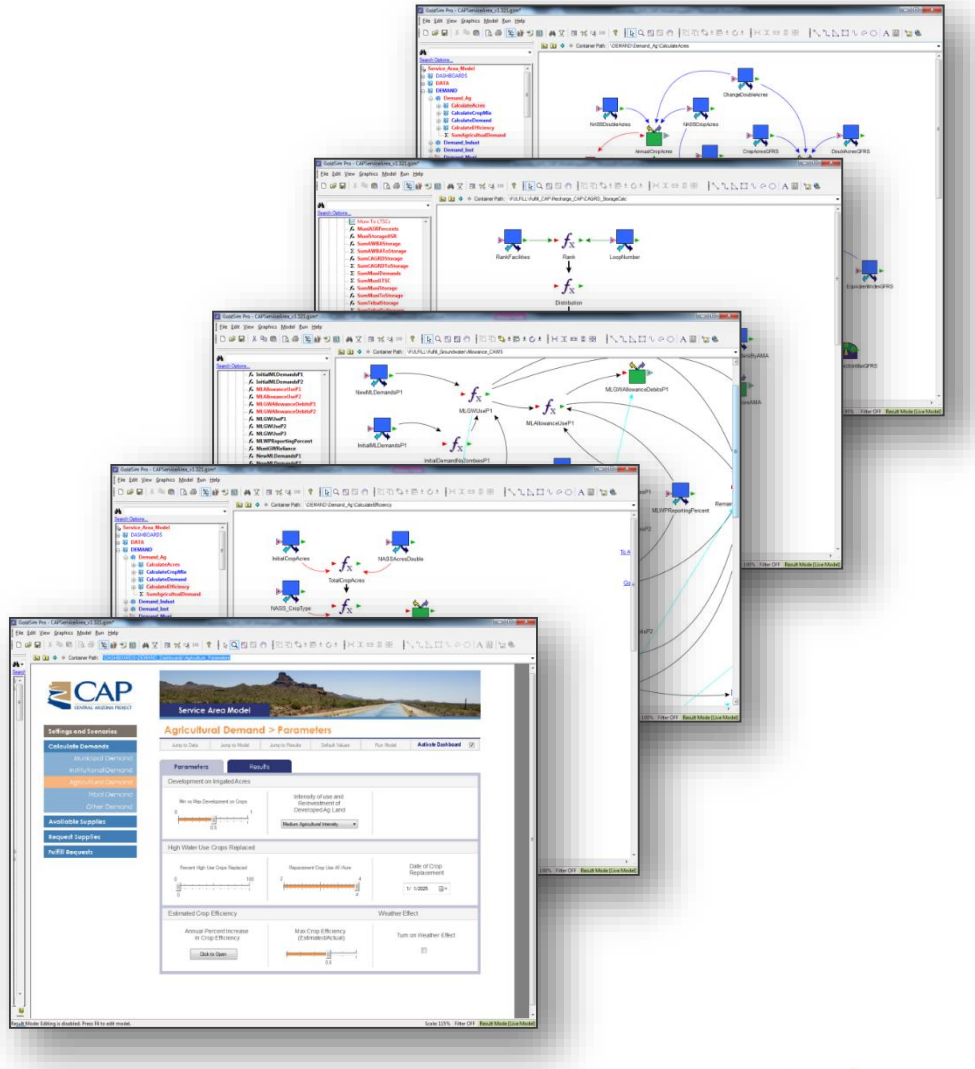
Future Supply and Demand Projections

- And a function of…
  - Growth characteristics
  - Climate variability
  - Shortages
  - Trends in agriculture
  - Water storage preferences
  - Policy changes
  - Socio-economic changes
  - Behavioral shifts
  - …

NEED A MODEL !

CAP Service Area Model (CAP:SAM)

- Tool for projecting supply & demand in CAP's three county service area
  - Over 135 entities modeled
  - 16 water supply types
- Not a hydrological model
- Designed to easily generate "what-if" scenarios
- Many capabilities but among the most relevant for this study are the ability to:
  - Model rate and spatial pattern of growth
  - Evaluate effects of changing climate
  - Project changes in agricultural water use



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Scenario Planning

1 Factors

Driving forces of water supply, demand and reliability (e.g. growth, climate variability, agricultural trends, etc.)

2 Scenarios

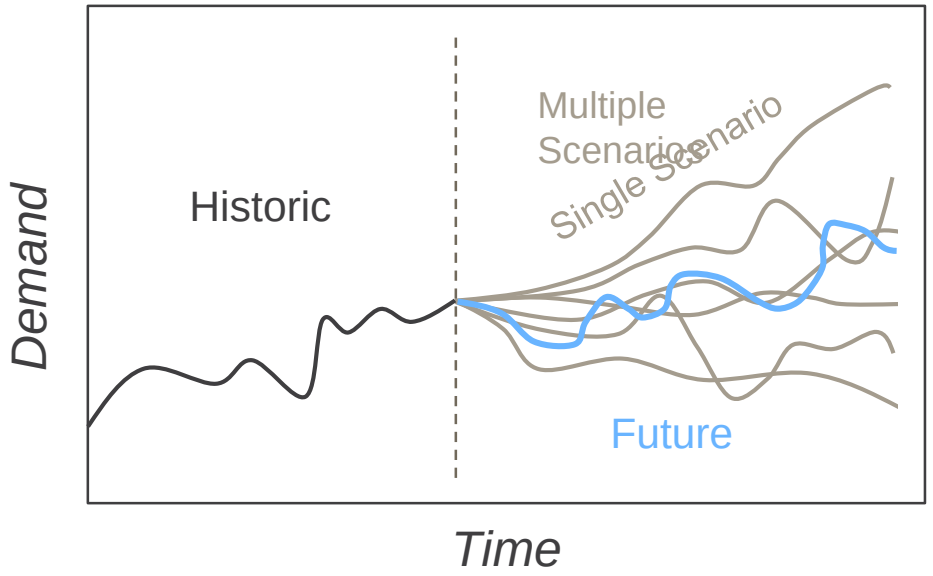
- Combinations of multiple, internally consistent factors
- Represents a plausible narrative about how the future may unfold

3 Projections

- Magnitude and spatial distribution of water demand through time
- Supply availability

Scenario Planning

- **Goal**: Create an envelope of plausible futures with sufficient variability to capture the future



Eloy and Maricopa-Stanfield Basin Study

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EMSBS Modeling Scenarios

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% [1]
B	Hotter and Drier (Higher Emission Future)	Official	Local	Increased – 150% [1]
C	Hot and Dry (Lower Emission Future)	Official	Official	Increased – 150% [1]
D	Hot and Dry (Lower Emission Future)	Official	Official	Increased - 125% [2]
E	Hotter and Drier (Higher Emission Future)	Slow	Dense Urbanization	Current [3]
F	Historic (Current Climate)	Slow	Dense Urbanization	Current [3]

[1] Pumping capacity set to 150% of the maximum historical use (2010 – 2015)
[2] Pumping capacity set to 125% of the maximum historical use (2010 – 2015)
[3] Maximum historical pumping (2010 – 2015) plus DCP pumping capacity

EMSBS Modeling Scenarios

Eloy and Maricopa-Stanfield

Scenario ID	Climate			
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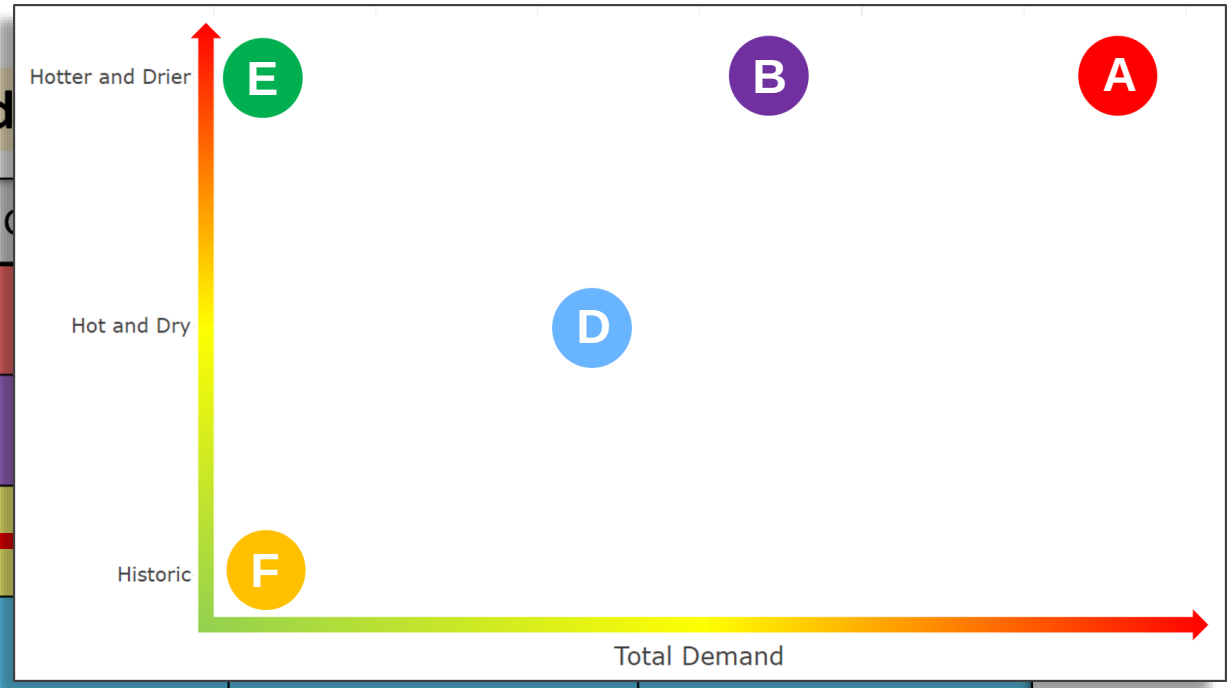

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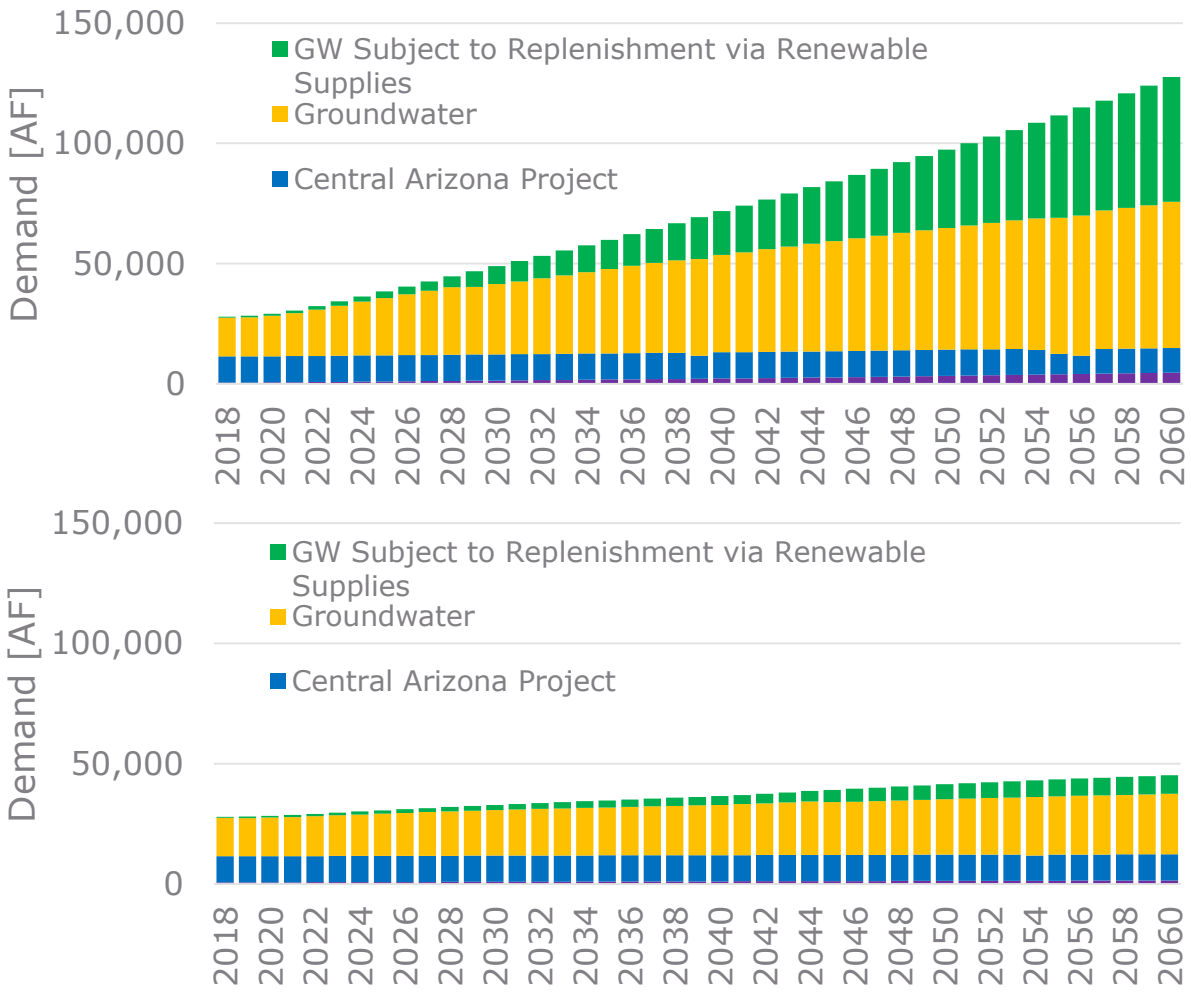
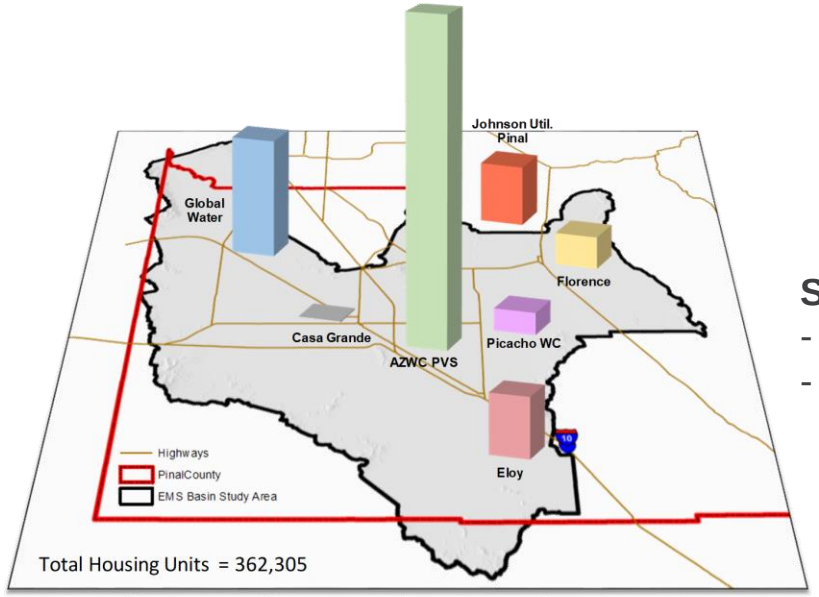
Results – Municipal

DRAFT

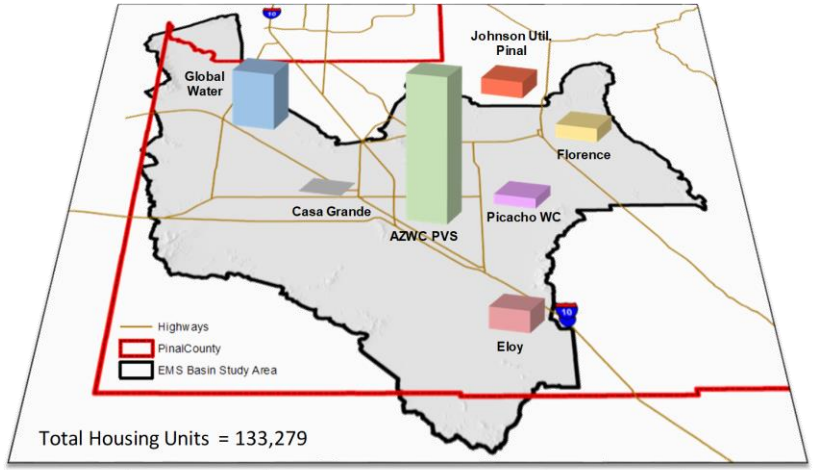
Municipal Demand



Housing Units - 2060



Scenario A
- Fast Growth Rate
- Outward Growth Pattern



Scenario F
- Slow Growth Rate
- Urbanization Growth Pattern

Eloy and Maricopa-Stanfield Basin Study

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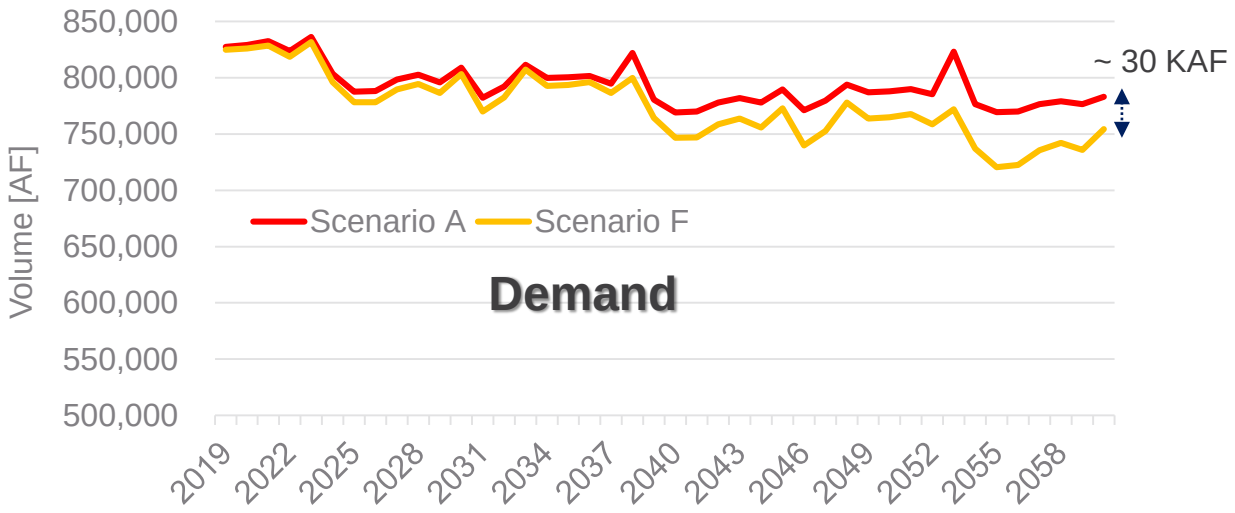
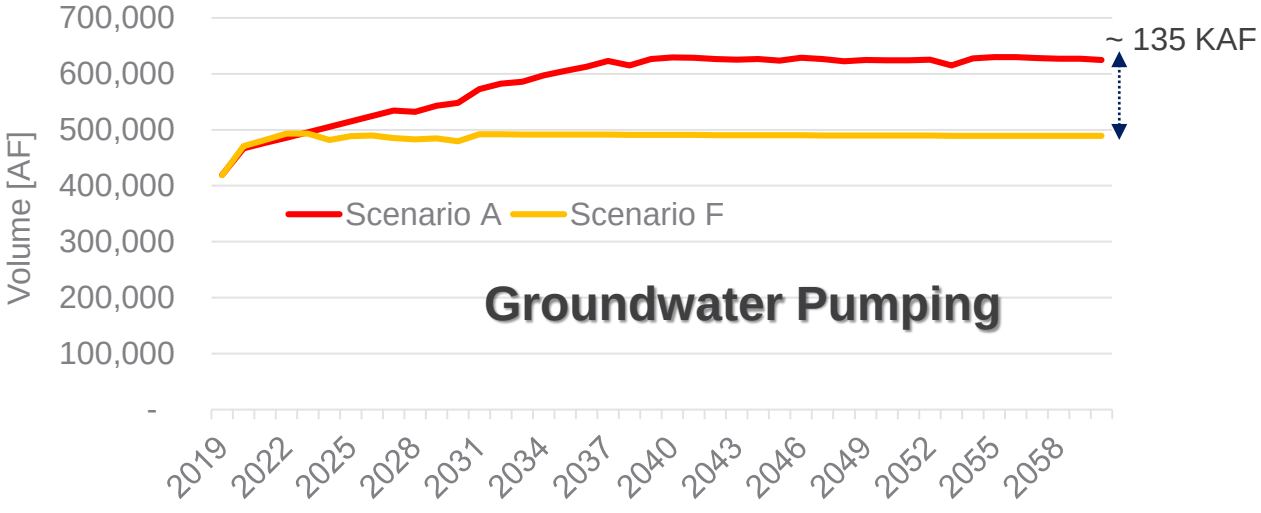
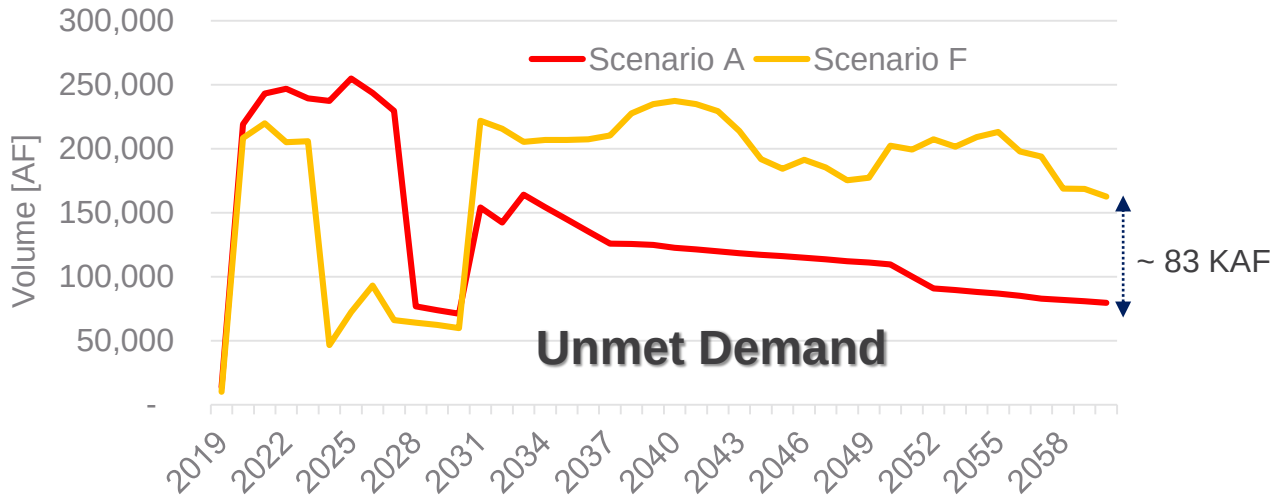
Results - Agricultural

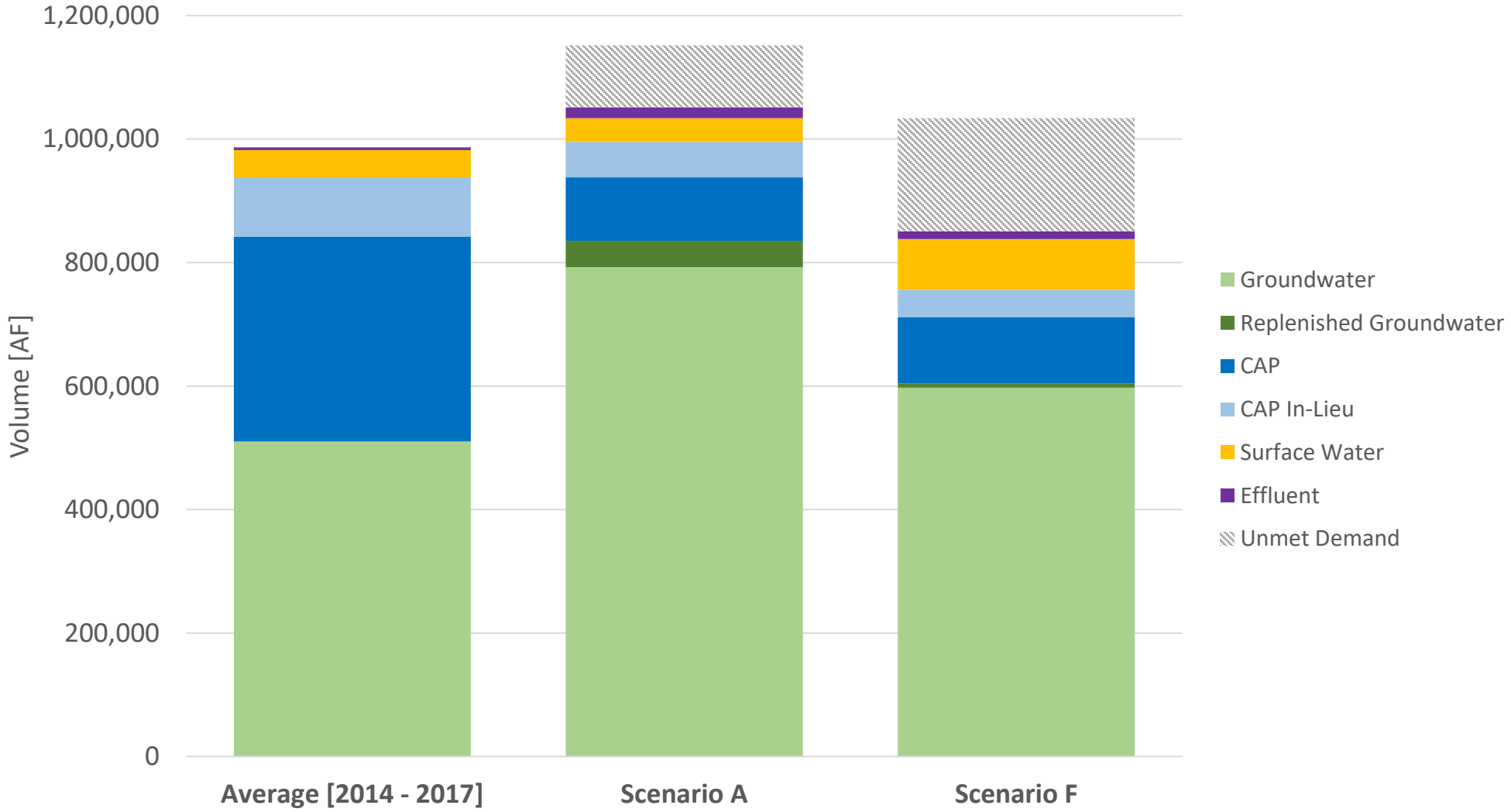






Results – Supply Utilization (2060)

DRAFT



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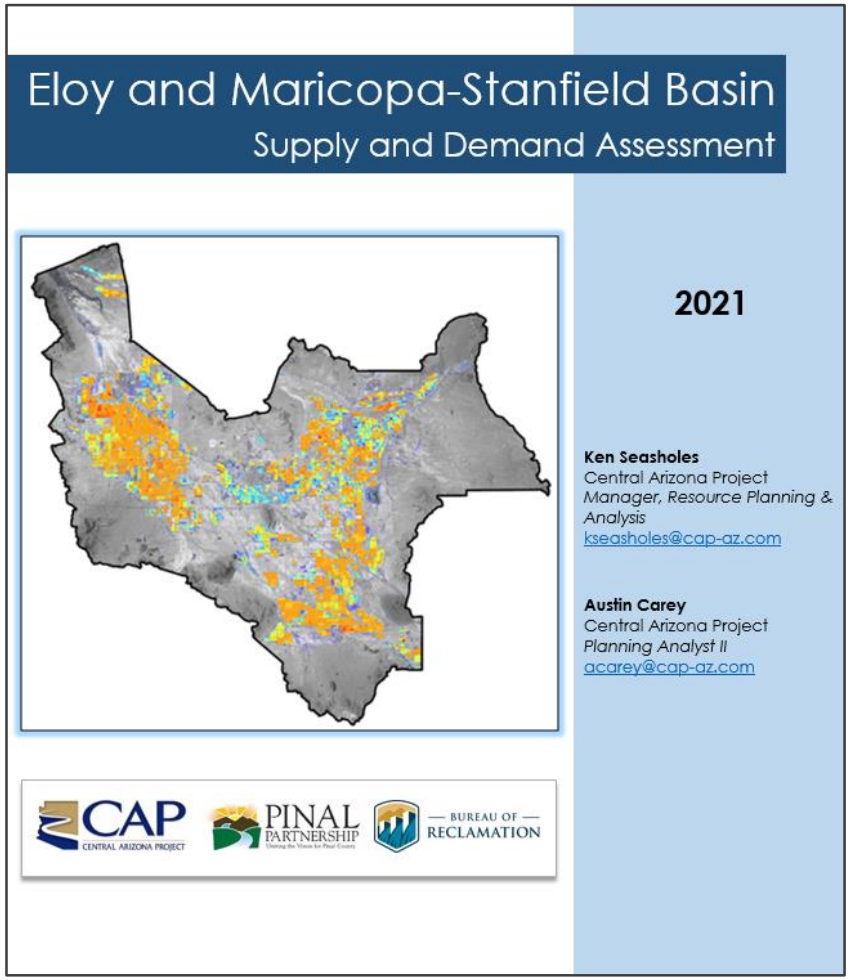
Supply and Demand Report *(In Progress)*



Eloy and Maricopa-Stanfield Basin

Supply and Demand Assessment

2021

Ken Seasholes
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Manager, Resource Planning & Analysis
kseasholes@cap-az.com

Austin Carey
Central Arizona Project
Planning Analyst II
acarey@cap-az.com

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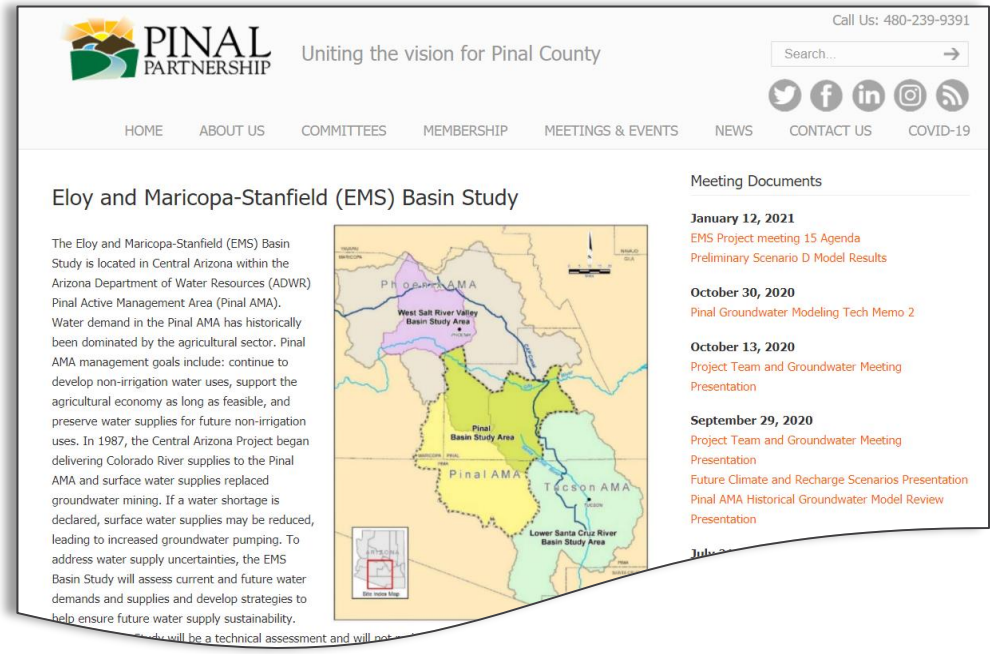
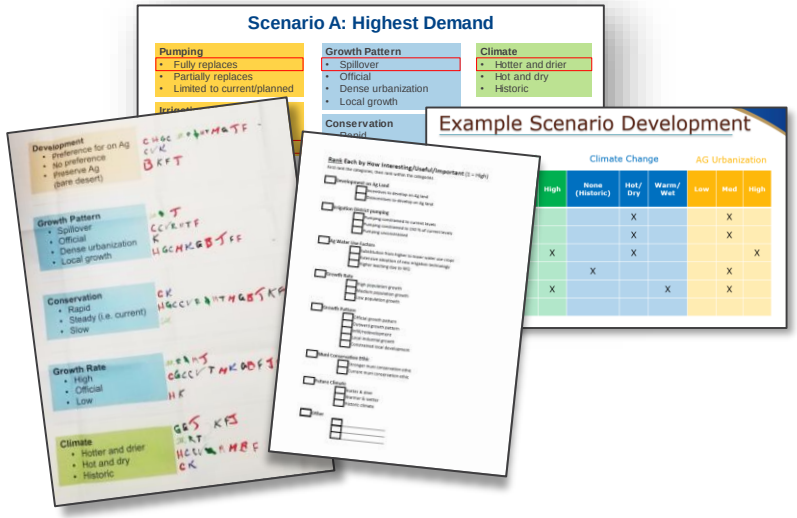
Check Out the Website!

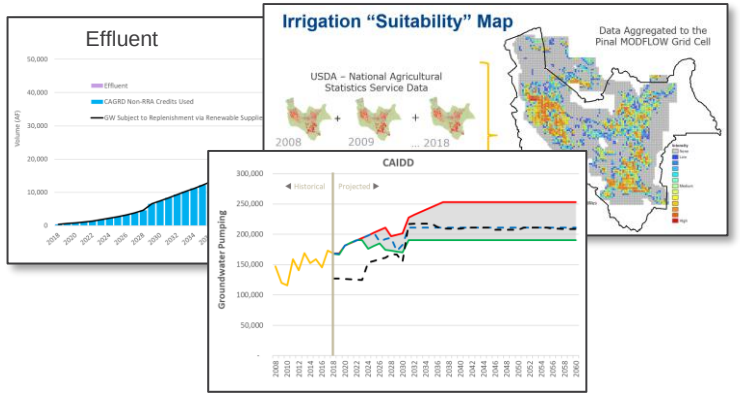


https://pinalpartnership.com/ems-basin-study/

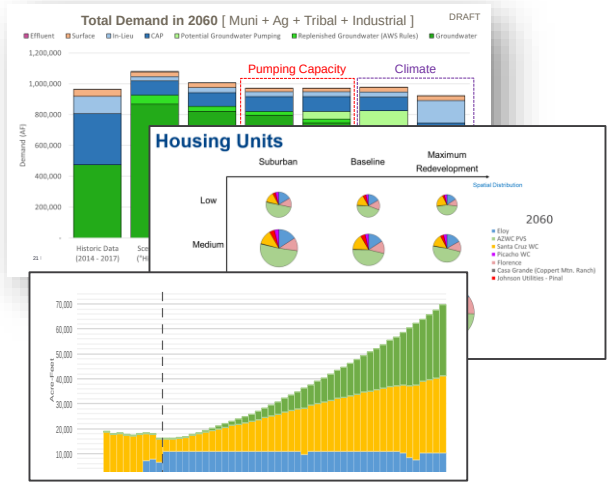
Scenario Development Process



Model Features and Assumptions



Detailed (Draft) Results



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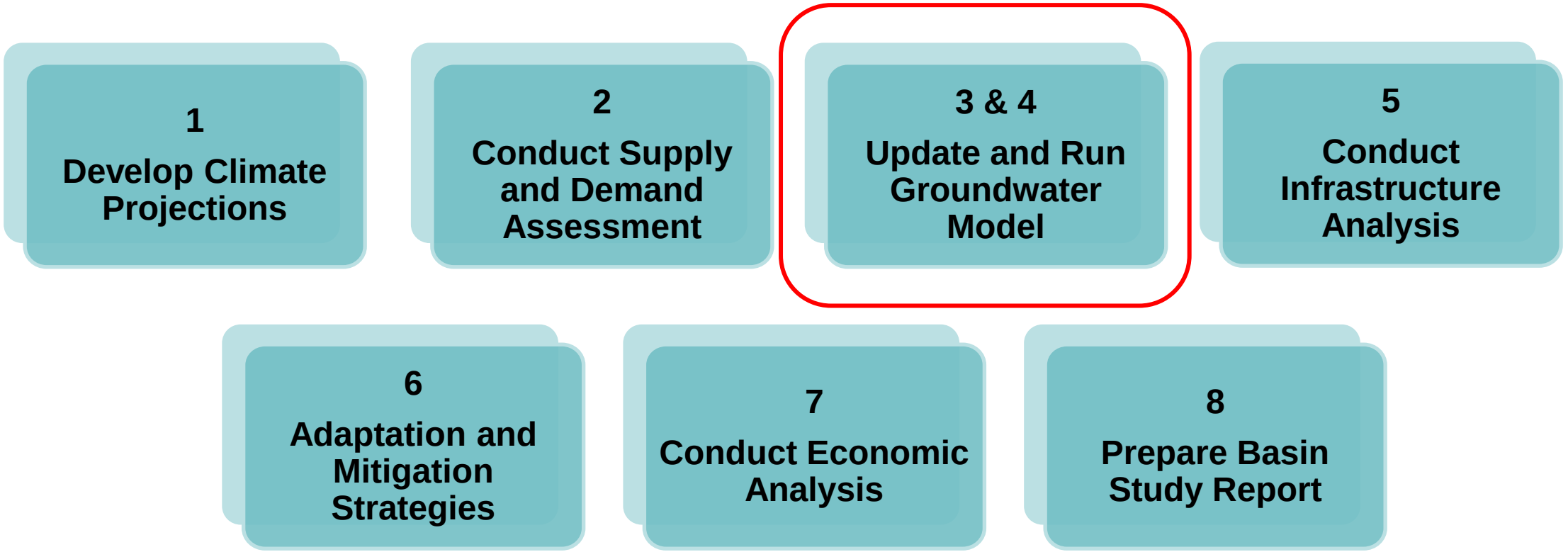
Basin Study Tasks



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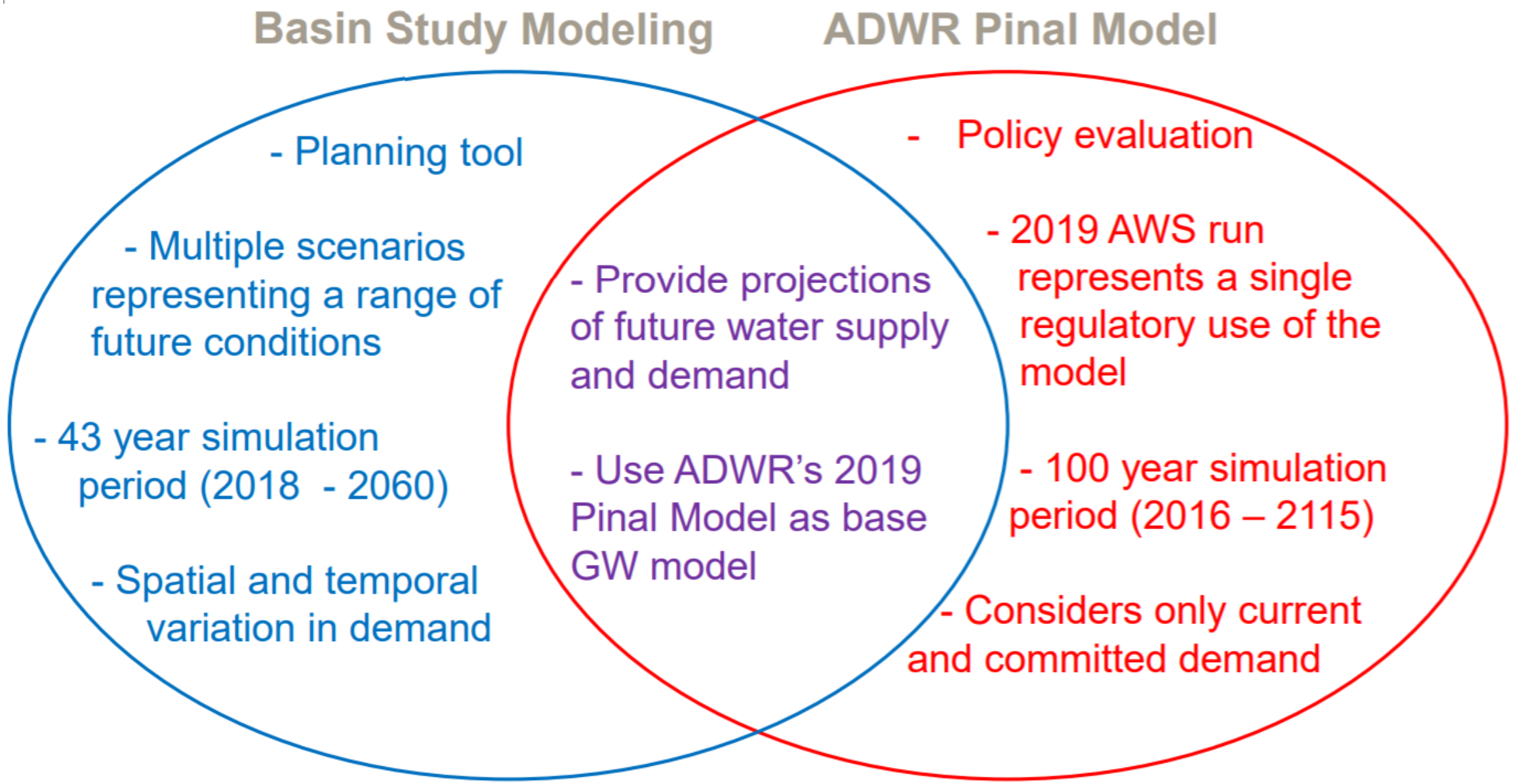

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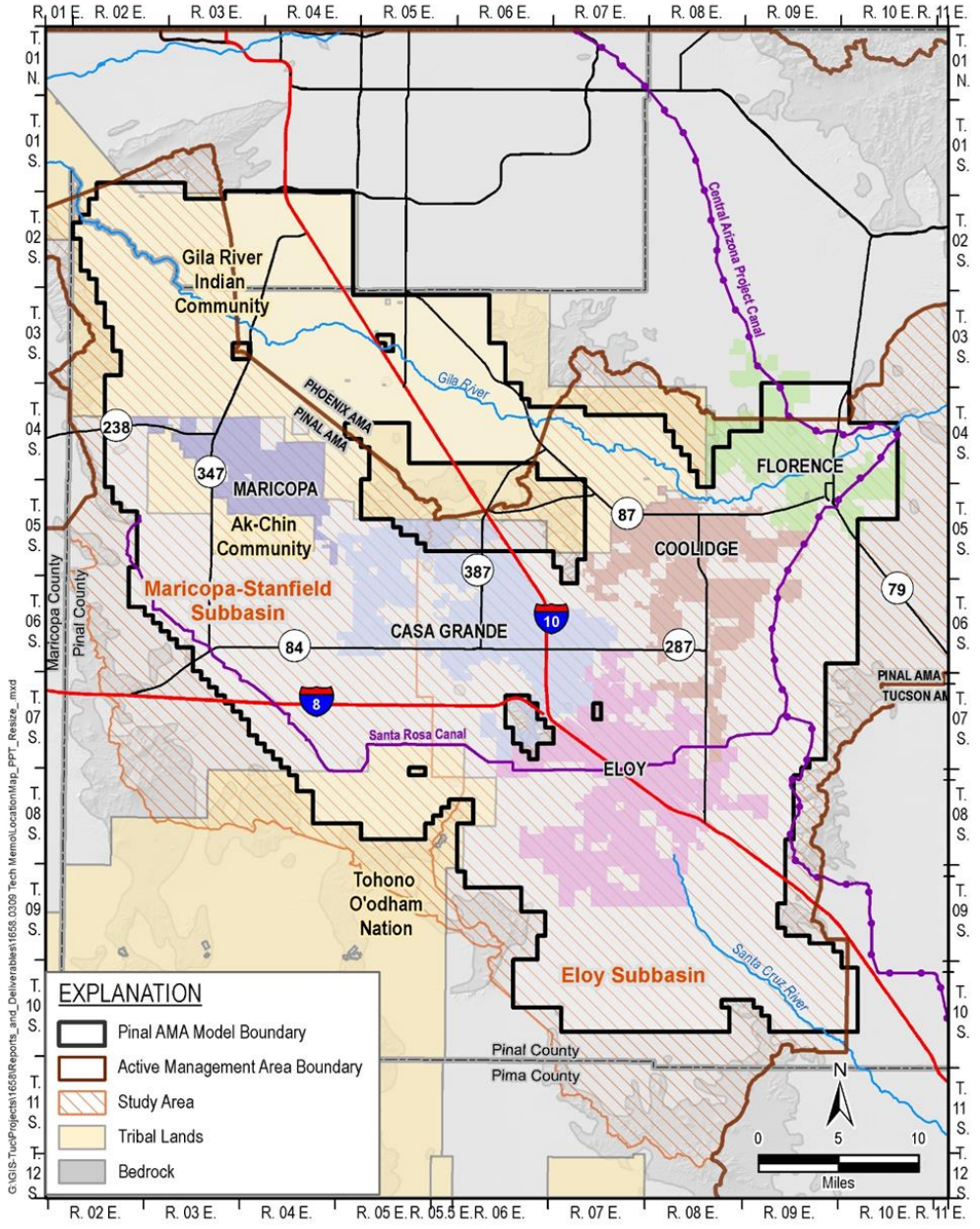
Groundwater Modeling
Eloy and Maricopa-Stanfield Basin Study

MONTGOMERY
& ASSOCIATES
Water Resource Consultants

Stakeholder Meeting
April 21, 2021

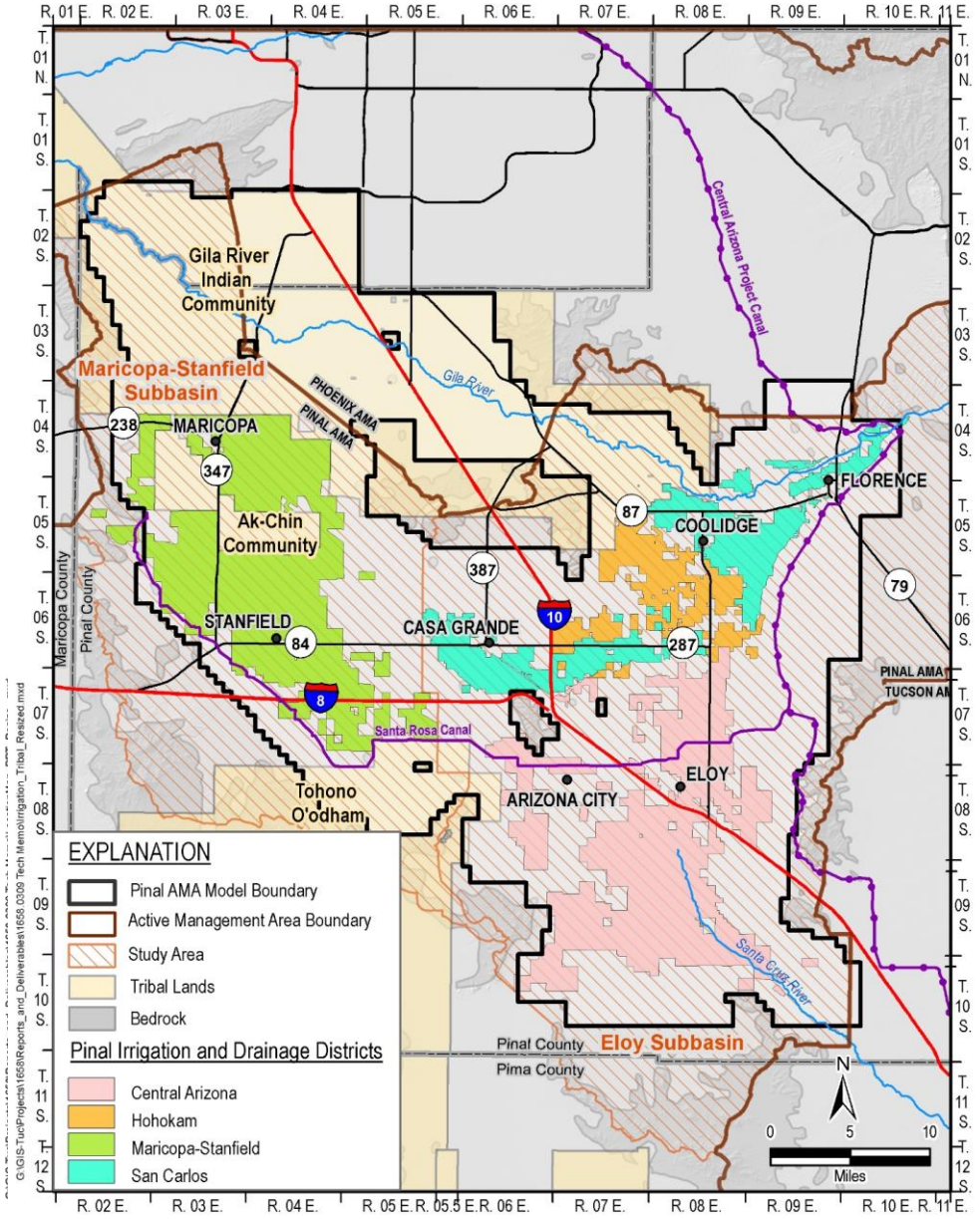
ADWR Model

- Original model released in 2014; historic period 1922 – 2010
- Regulatory use for 100-yr assured water supply projections
- Updated in 2019; some structural adjustments; historic period extended thru 2015



Basin Study Model (2021)

- ADWR Model is starting point
- Updated for years 2016 - 2018
- Thorough review; determined model is acceptable for study objectives; some minor adjustments
- Model runs evaluate future scenarios through 2060
- Model is useful for regional scale evaluation and comparison between alternative future scenarios



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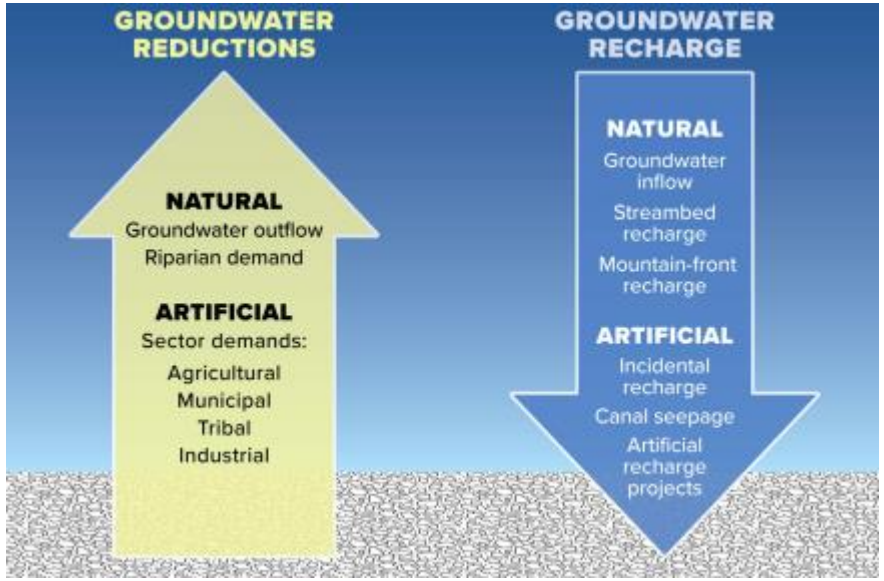
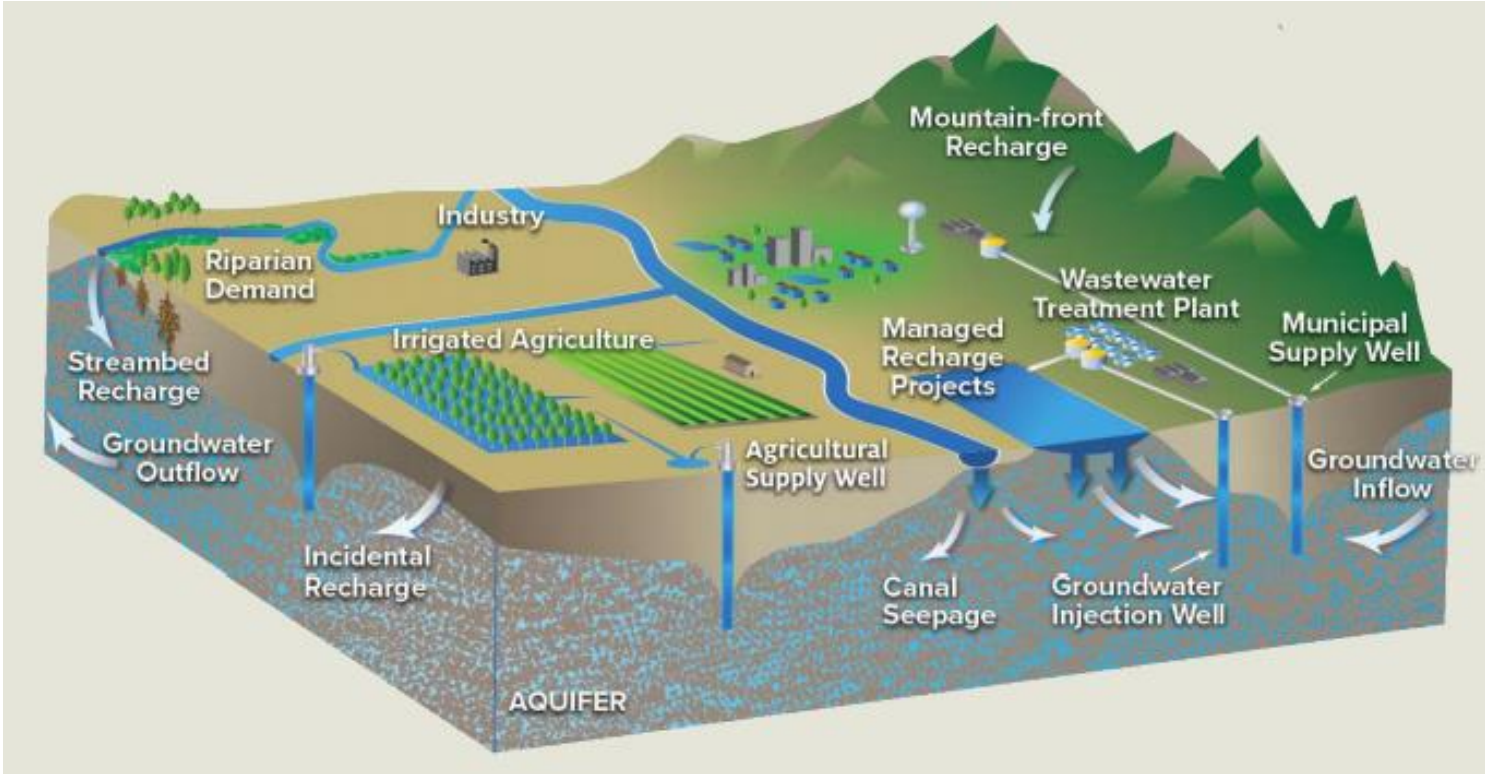
Water Resource Consultants

Pinal AMA Groundwater Model Water Budget



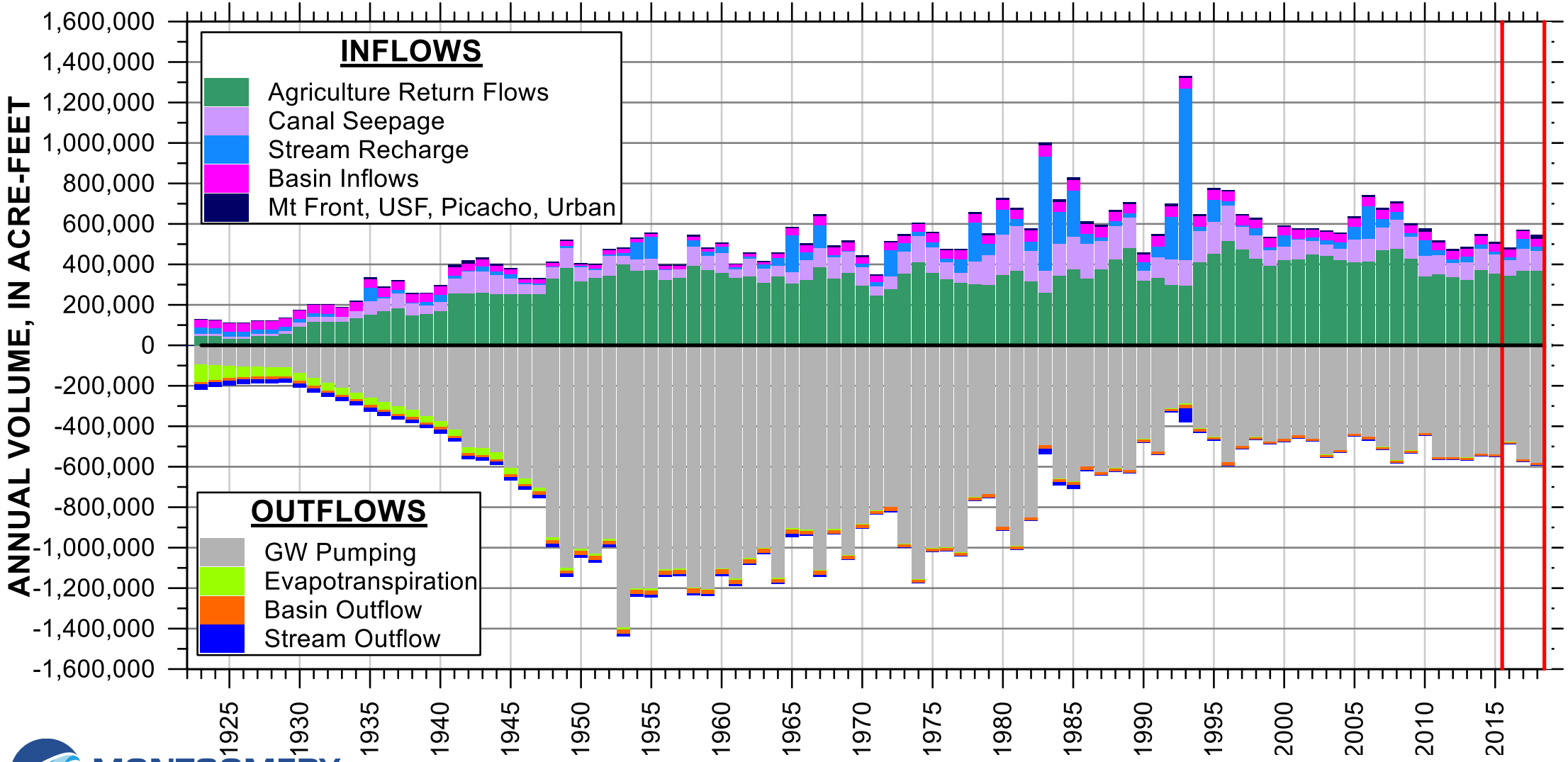


A VISUAL GUIDE TO WATER IN THE PINAL ACTIVE MANAGEMENT AREA
Report prepared by the Univ. of Arizona Water Resources Research Center
JUNE 12, 2020

MONTGOMERY & ASSOCIATES
Water Resource Consultants

Pinal AMA Groundwater Model Water Budget

3-year update



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Groundwater Modeling Results

Annual Stakeholder Meeting

4/21/21

Eloy and Maricopa-Stanfield Basin Study

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EMSBS Modeling Scenarios

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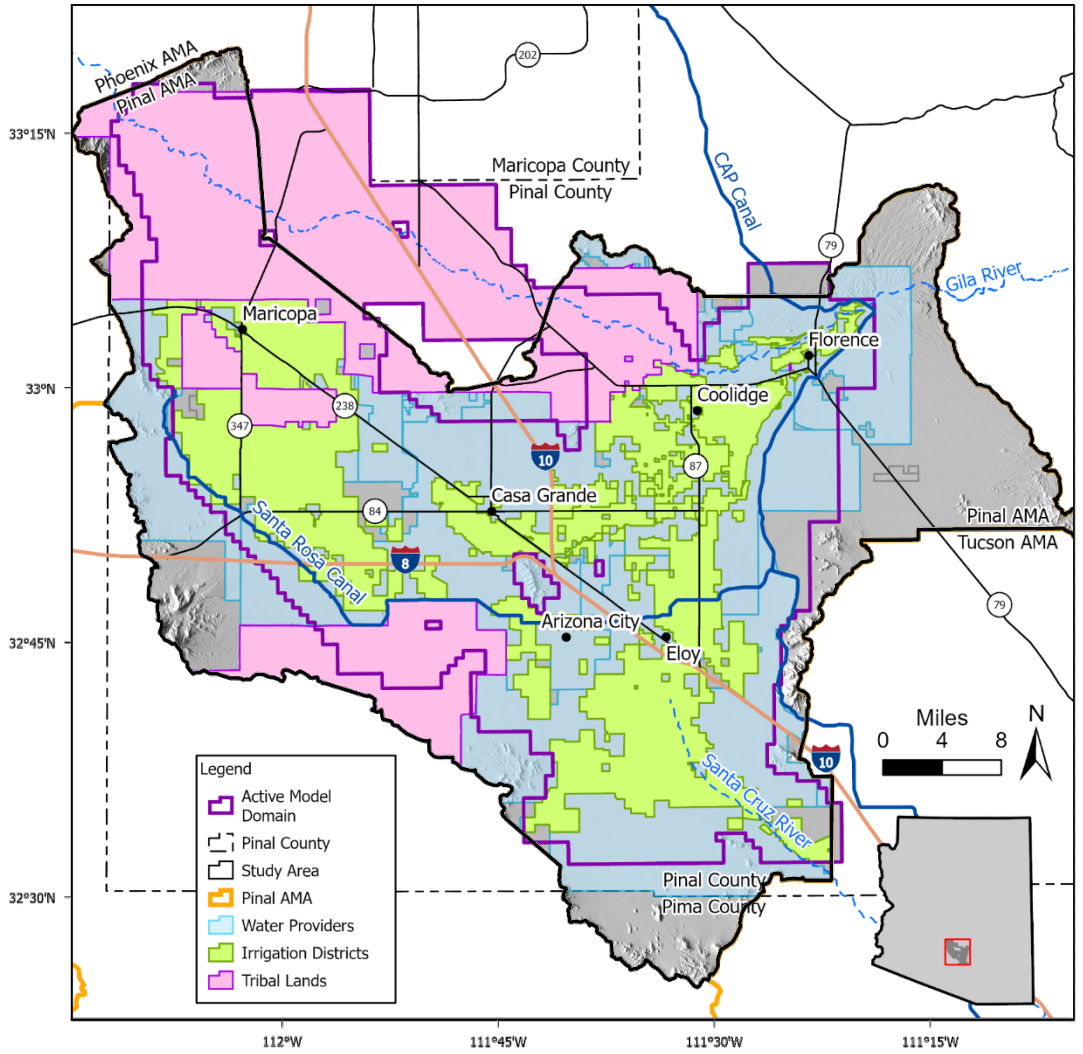
[3] Maximum historical pumping (2010 – 2015) plus DCP pumping capacity

Study Area

- Water Providers
  - Seven providers explicitly modeled in CAP:SAM
  - Additional 25+ small providers modeled
- Irrigation Districts
  - CAIDD, MSIDD, SCIDD and HIDD
- Tribal Lands
  - Ak-Chin Indian Community
  - Gila River Indian Community (*portion of demand is the outside model domain*)
  - Tohono O'odham Nation *(all demand is outside the model domain)*



Eloy and Maricopa-Stanfield Basin Study

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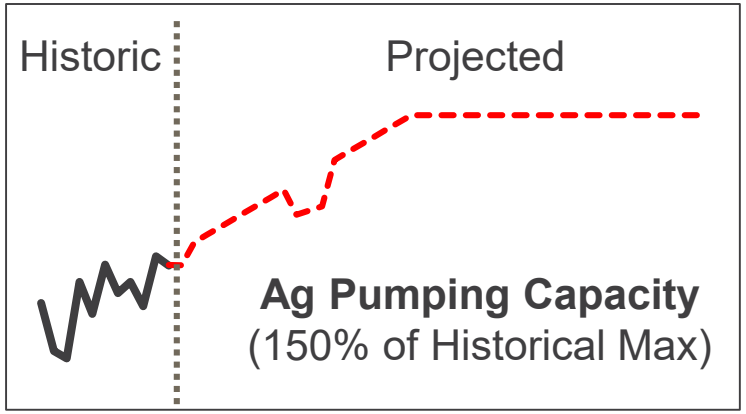
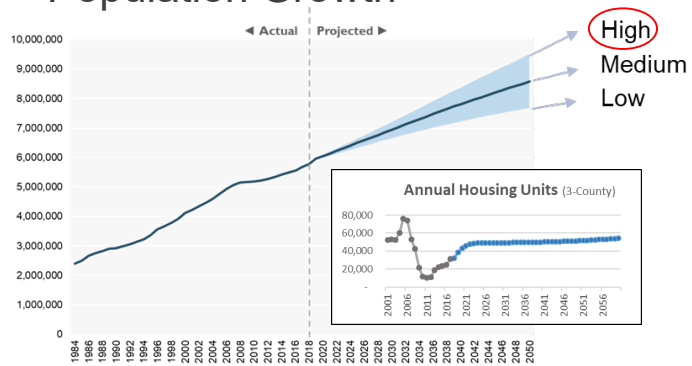
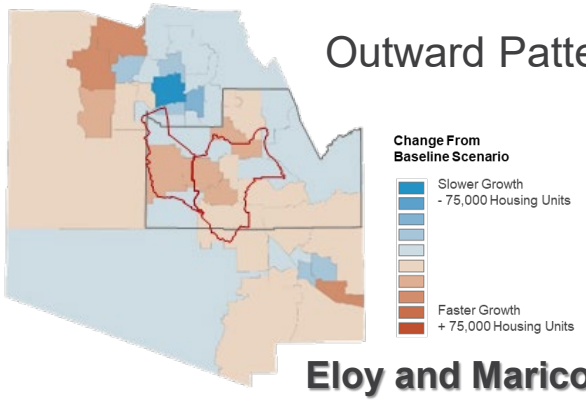
Scenario A - Key Assumptions



- 0.10% per year increase in irrigation efficiency
- 0.15% per year increase in crop consumptive use

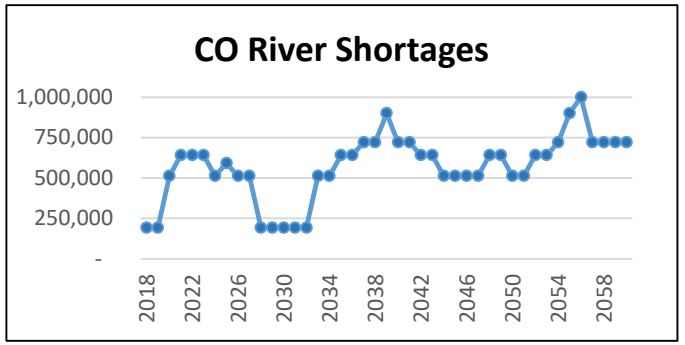
Population Growth

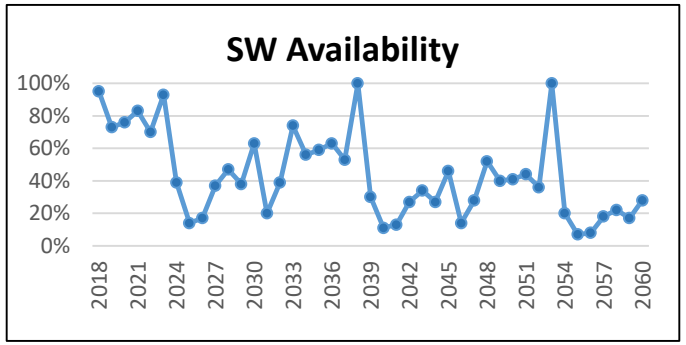




Outward Pattern

"Hotter and Drier"





Eloy and Maricopa-Stanfield Basin Study

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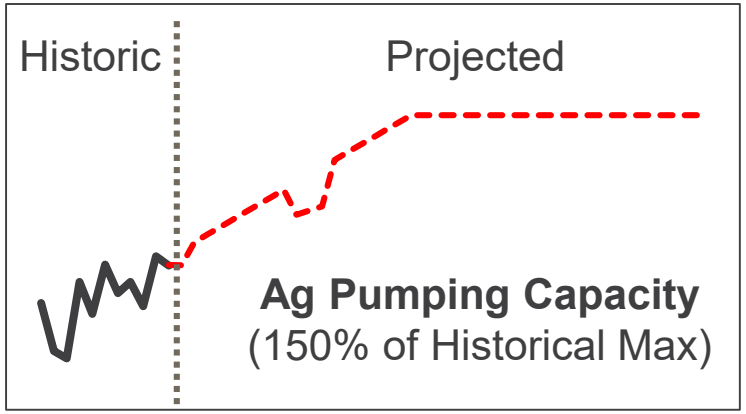
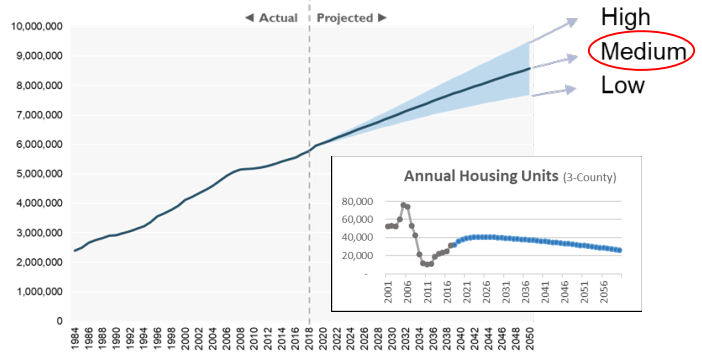
Scenario B - Key Assumptions

Ag Pumping	Municipal Demand	Climate
↑	↑	↑

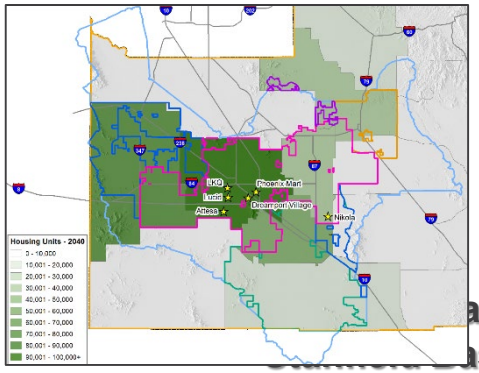


- 0.20% per year increase in irrigation efficiency
- 0.15% per year increase in crop consumptive use

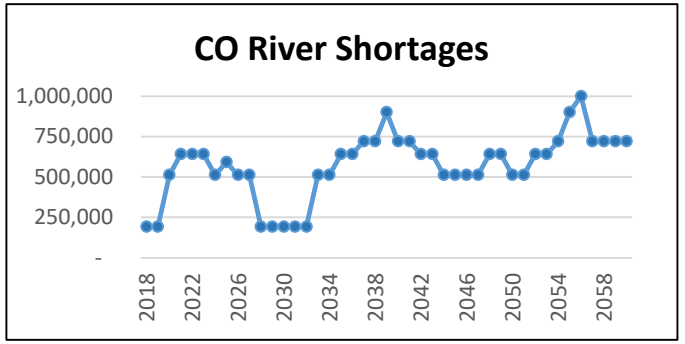
Population Growth

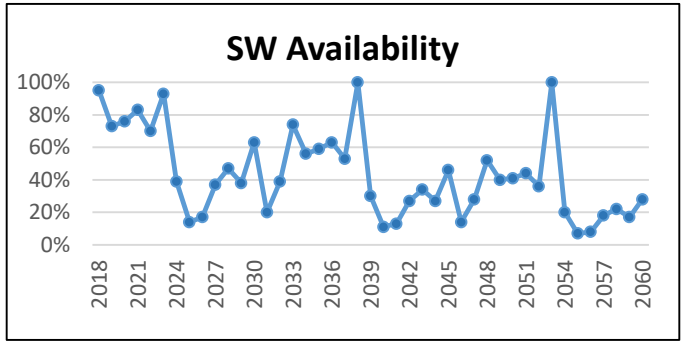


Local Pattern



"Hotter and Drier"





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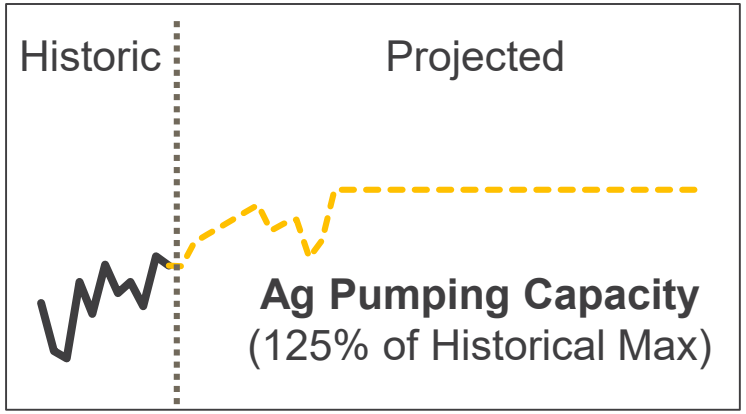
BUREAU OF RECLAMATION

PINAL PARTNERSHIP

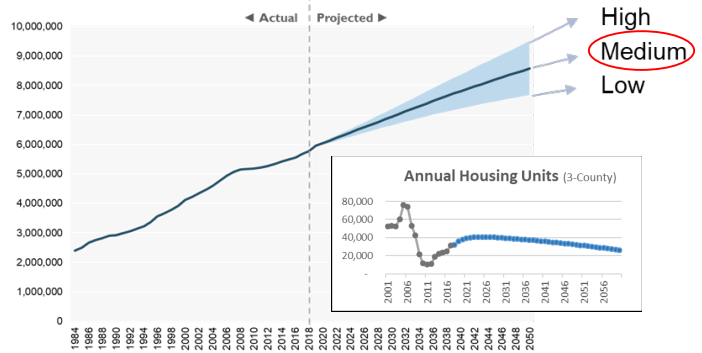
Scenario D - Key Assumptions (Omitted Scenario C)

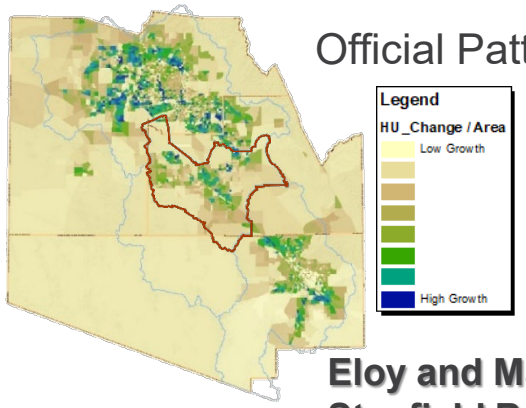
Ag Pumping	Municipal Demand	Climate



- 0.15% per year increase in irrigation efficiency
- 0.10% per year increase in crop consumptive use

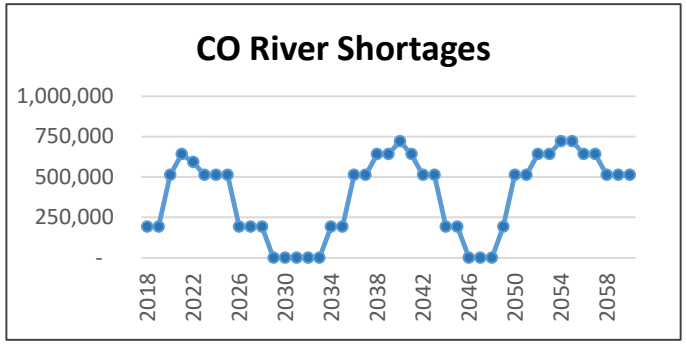
Population Growth

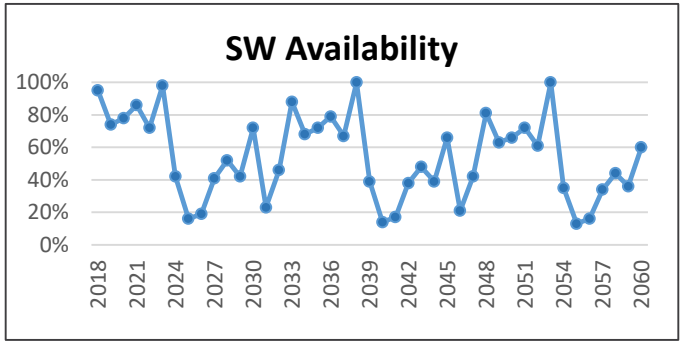




Eloy and Maricopa-Stanfield Basin Study

"Hot and Dry"

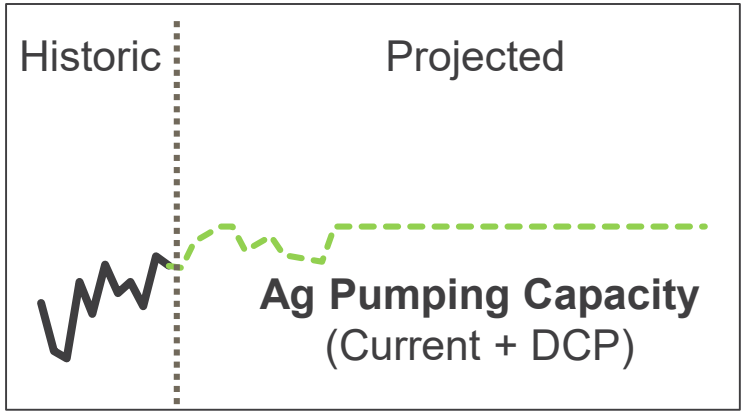




BUREAU OF RECLAMATION

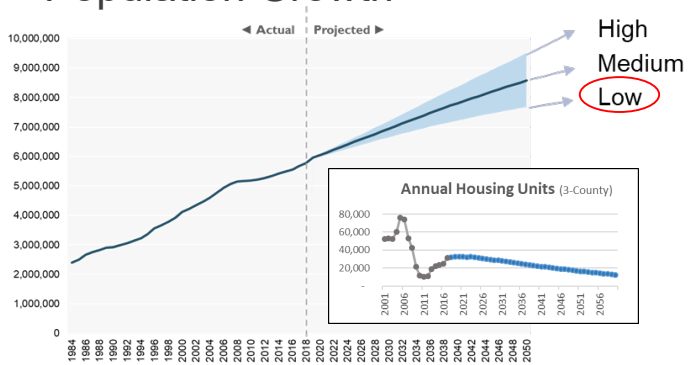
PINAL PARTNERSHIP

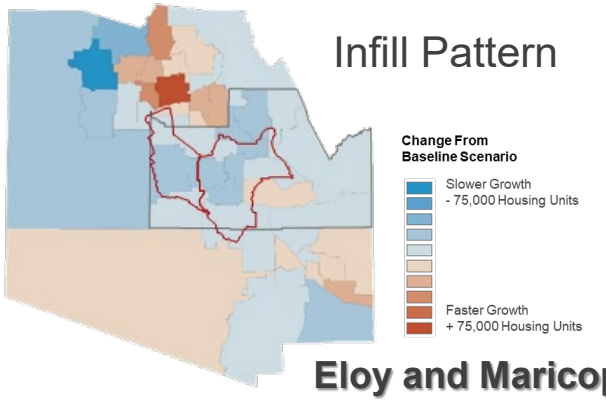
Scenario E - Key Assumptions



- 0.20% per year increase in irrigation efficiency
- 0.15% per year increase in crop consumptive use

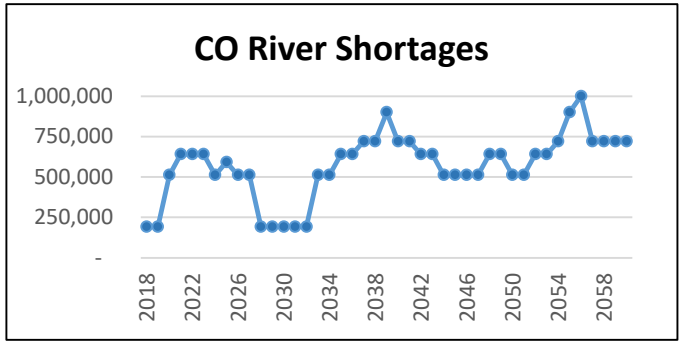
Population Growth

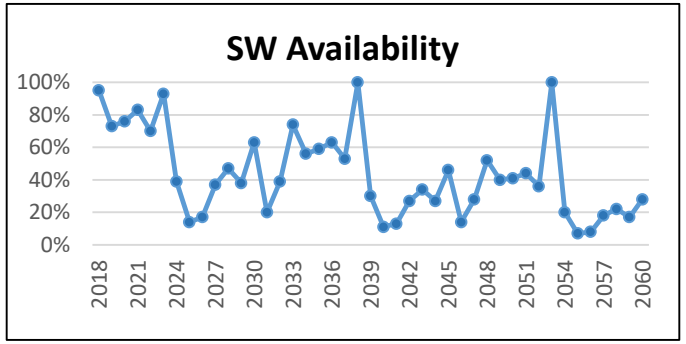




Infill Pattern

"Hotter and Drier"





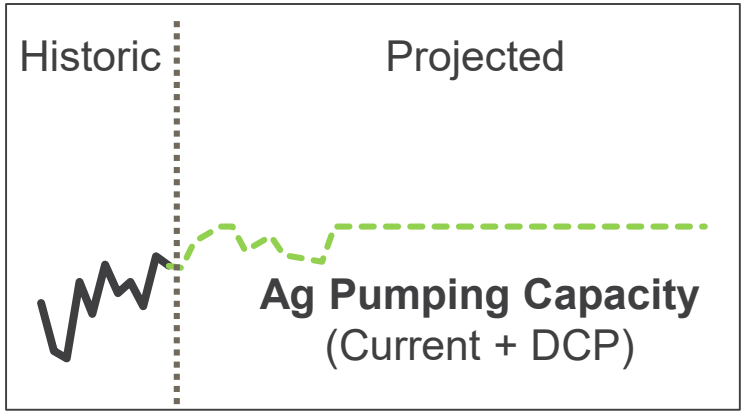
Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

PINAL PARTNERSHIP

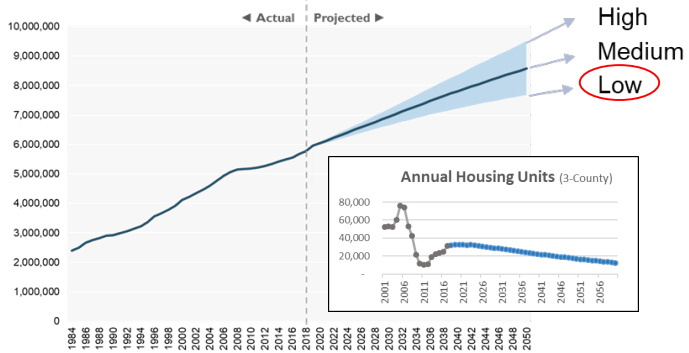
Scenario F - Key Assumptions

Ag Pumping	Municipal Demand	Climate

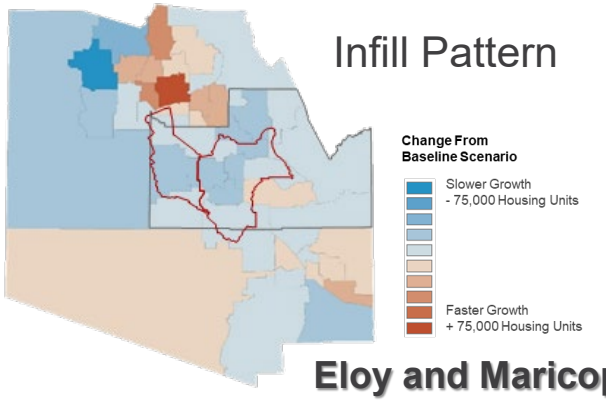


- 0.20% per year increase in irrigation efficiency
- 0.00% per year increase in crop consumptive use

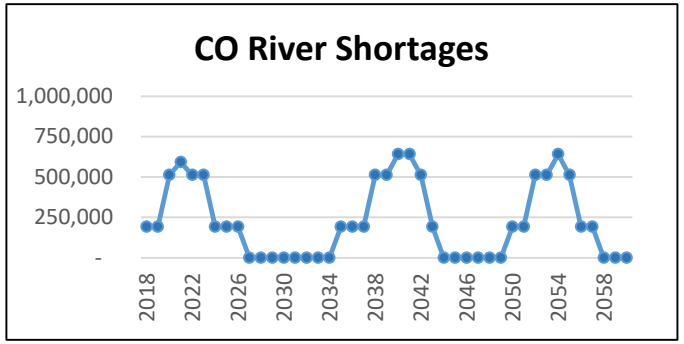
Population Growth

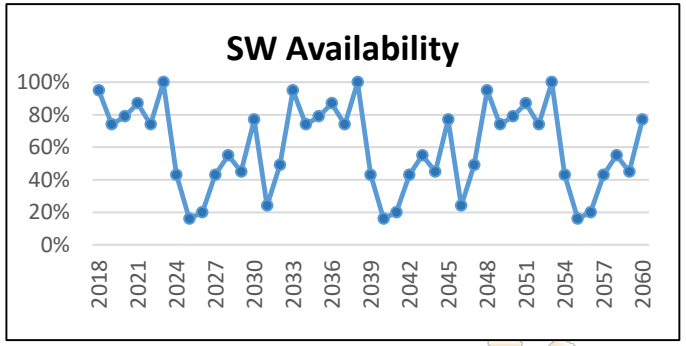


Infill Pattern



"Historic"





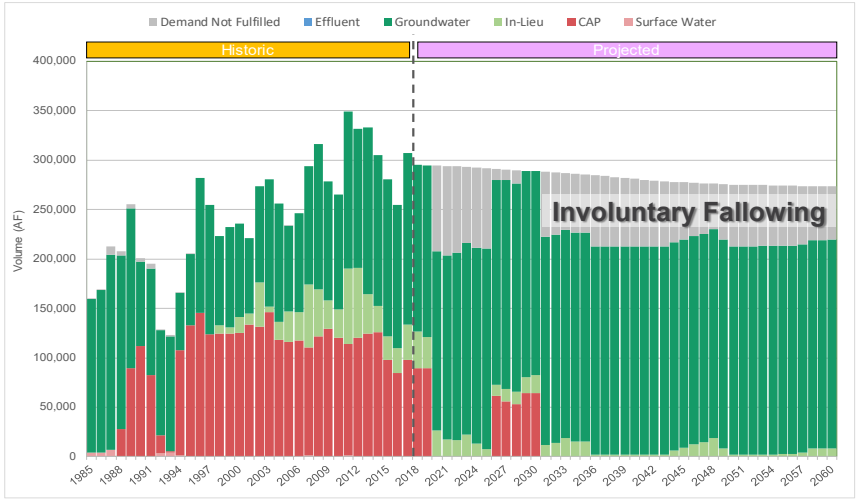
Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

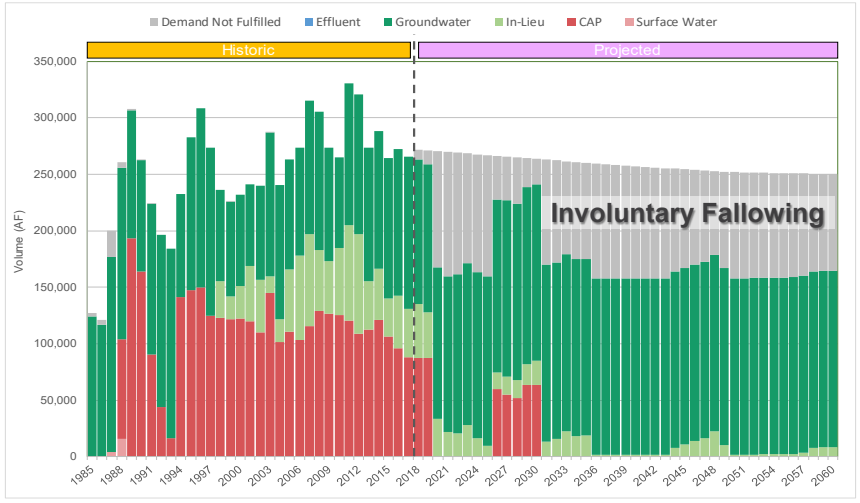
PINAL PARTNERSHIP

Quick Note About Ag…

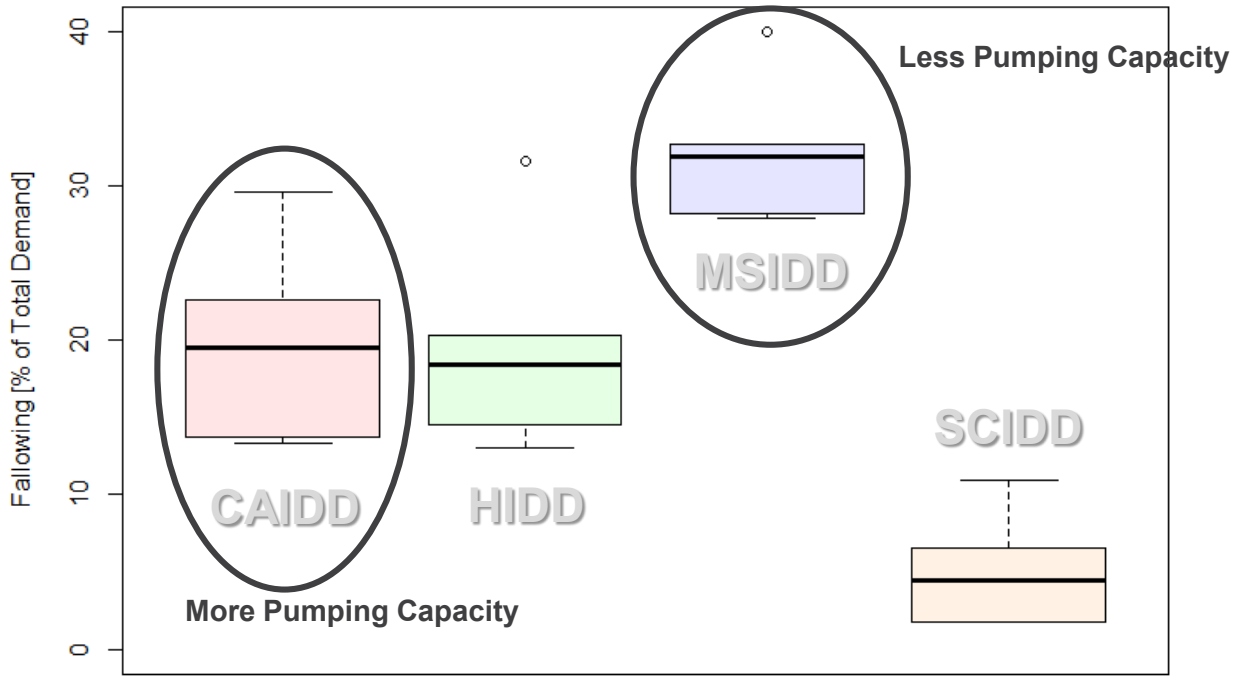
CAIDD



MSIDD



Average Fallowing by District



*Across all scenarios

Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

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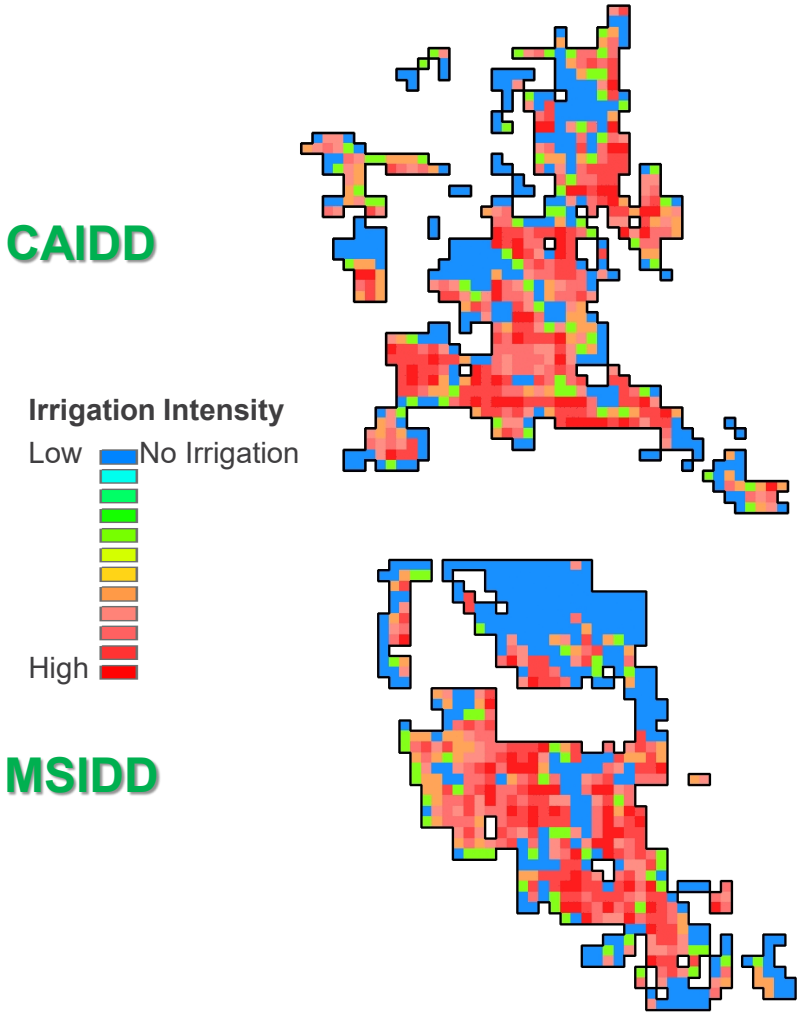
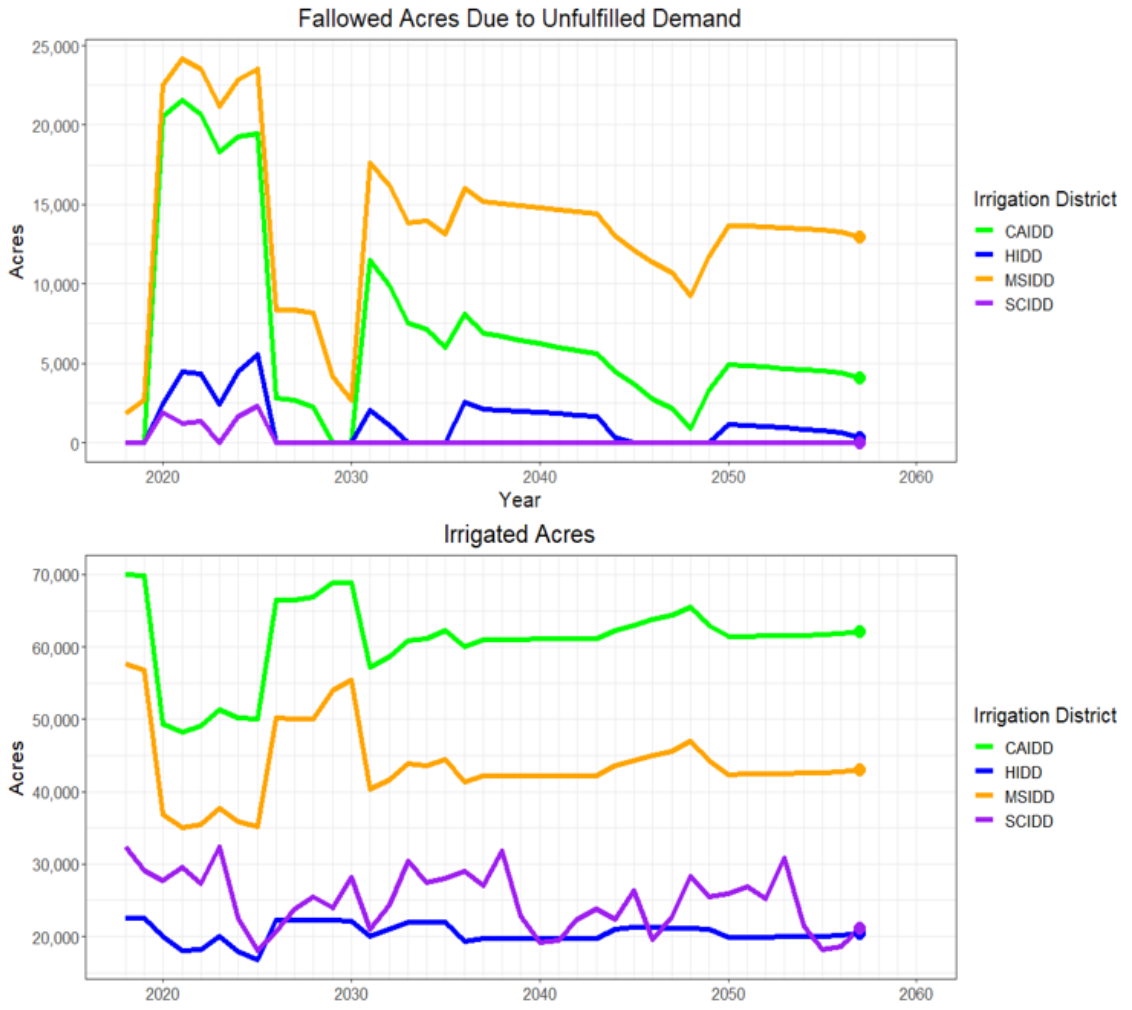
Quick Note About Ag…





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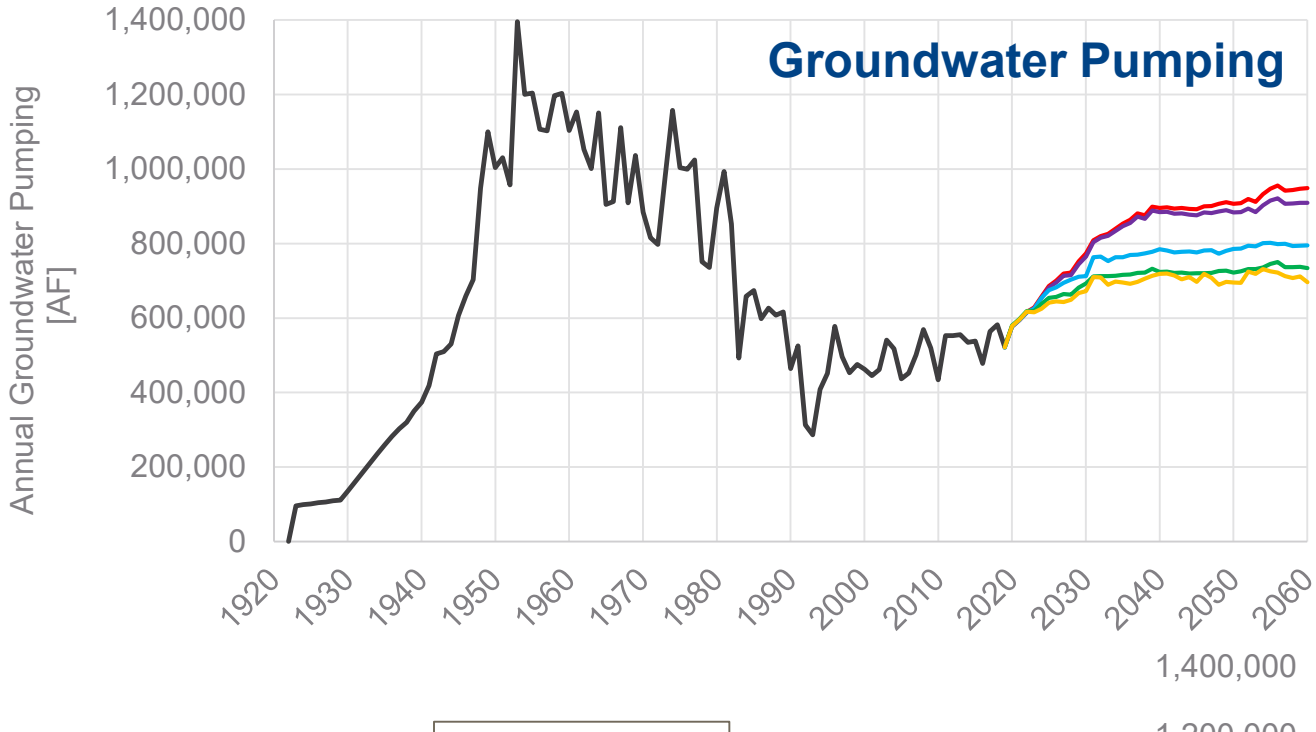
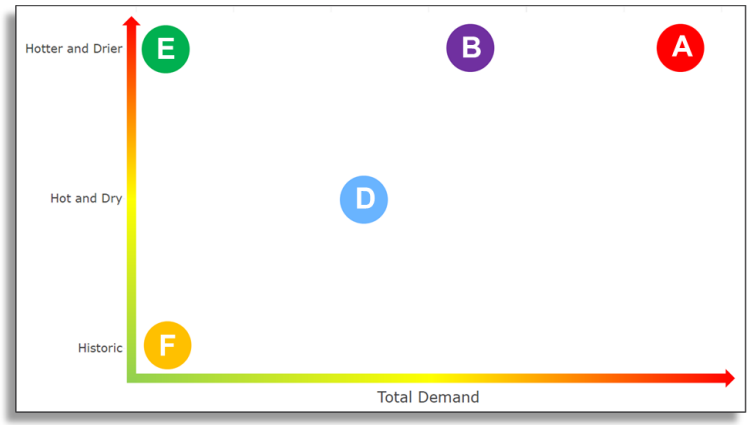
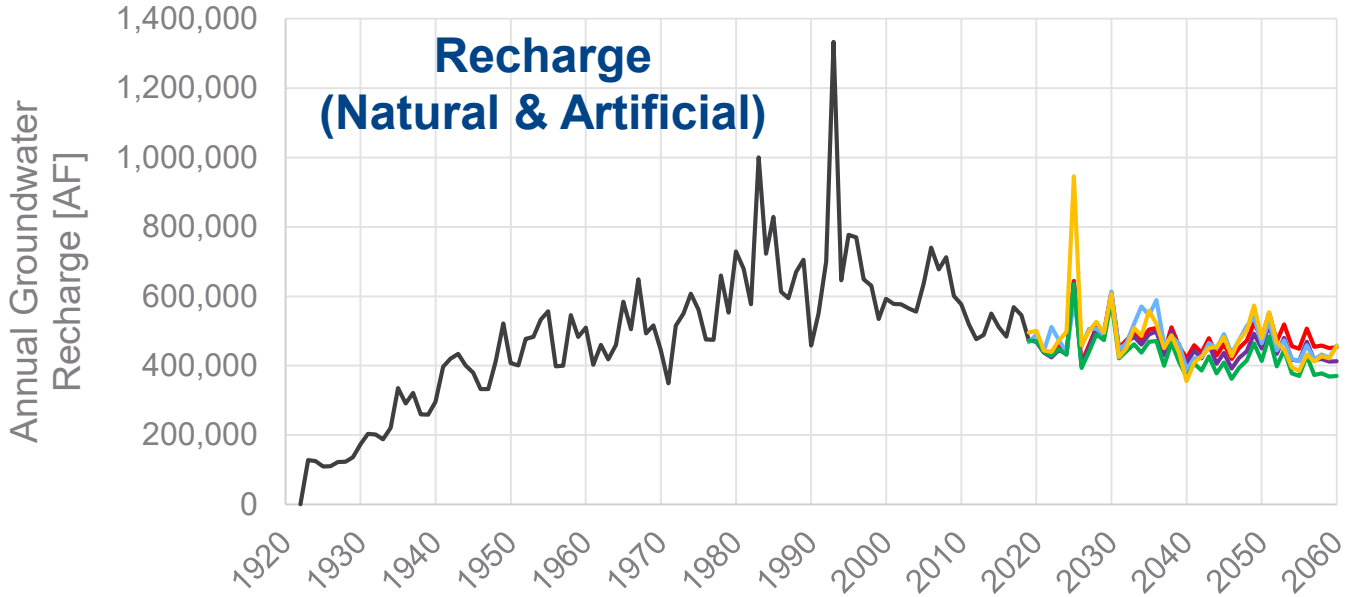
BUREAU OF RECLAMATION

PINAL PARTNERSHIP

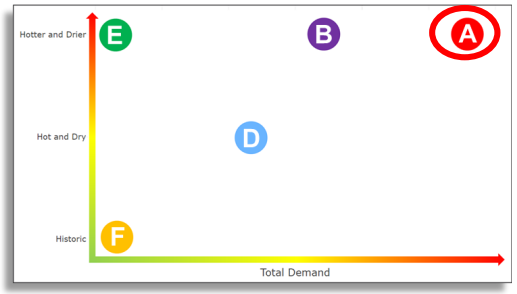

Groundwater Pumping
Annual Groundwater Pumping [AF]
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060


Hotter and Drier
Hot and Dry
Historic
Total Demand
E
B
A
D
F


Historical
Scenario A
Scenario B
Scenario D
Scenario E
Scenario F


Recharge
(Natural & Artificial)
Annual Groundwater Recharge [AF]
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060

GW Modeling Results
Scenario A



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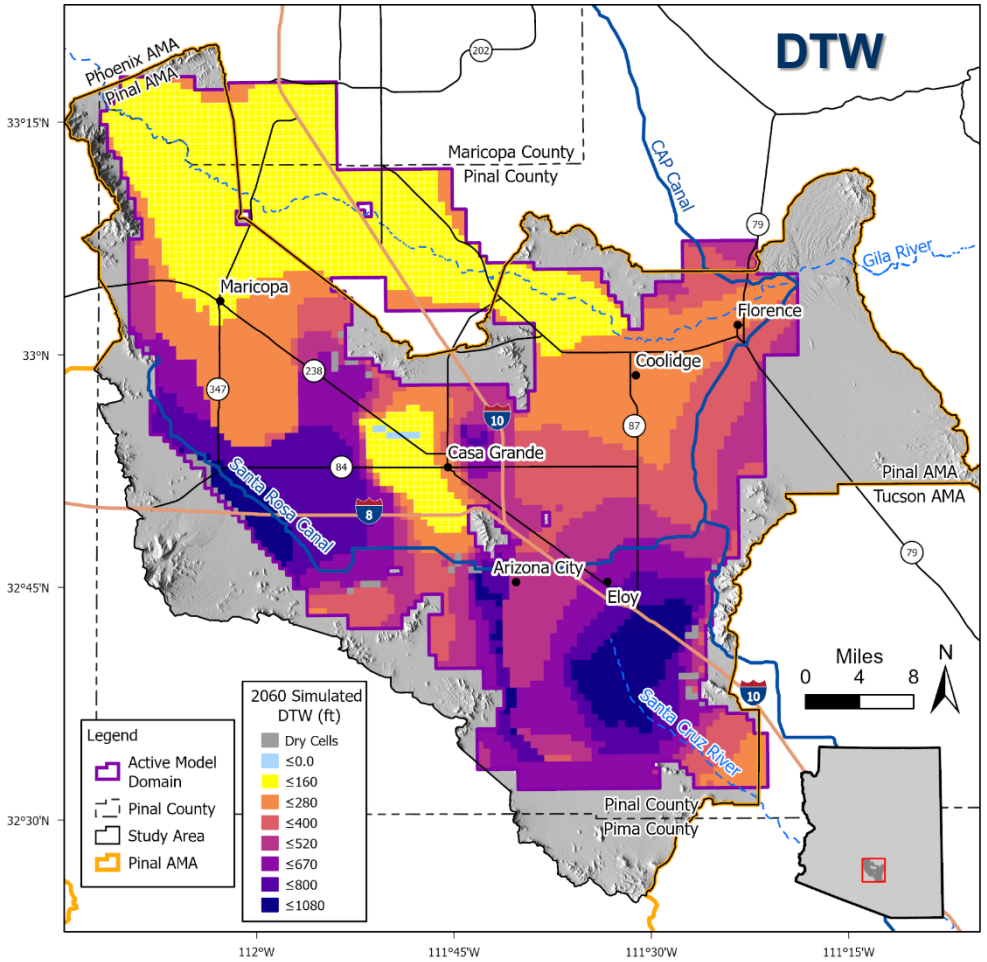
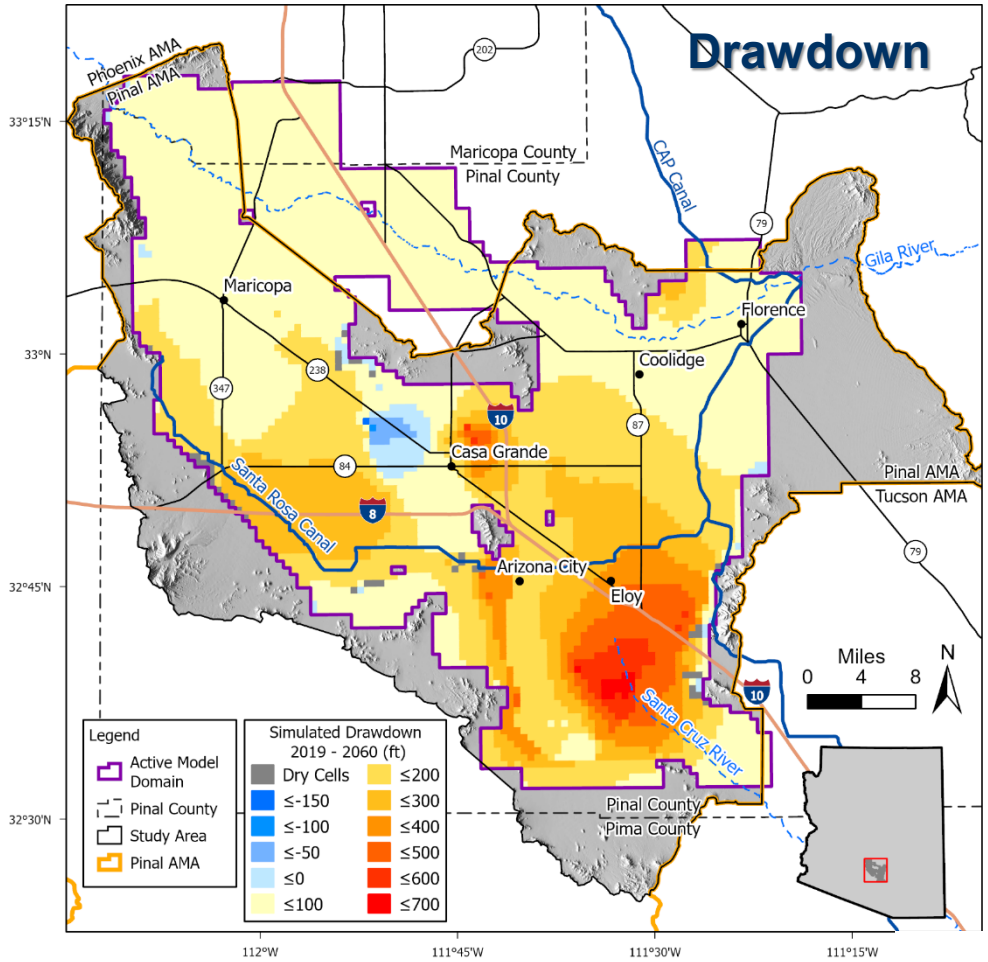




Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

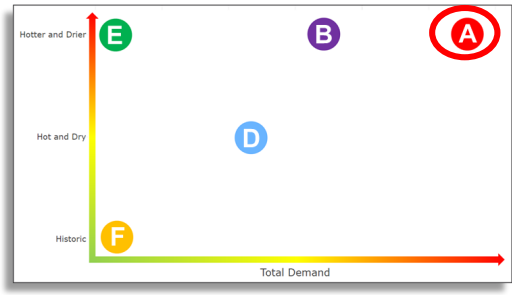
Agriculture
Municipal
Industrial

Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

PINAL PARTNERSHIP

GW Modeling Results
Scenario A



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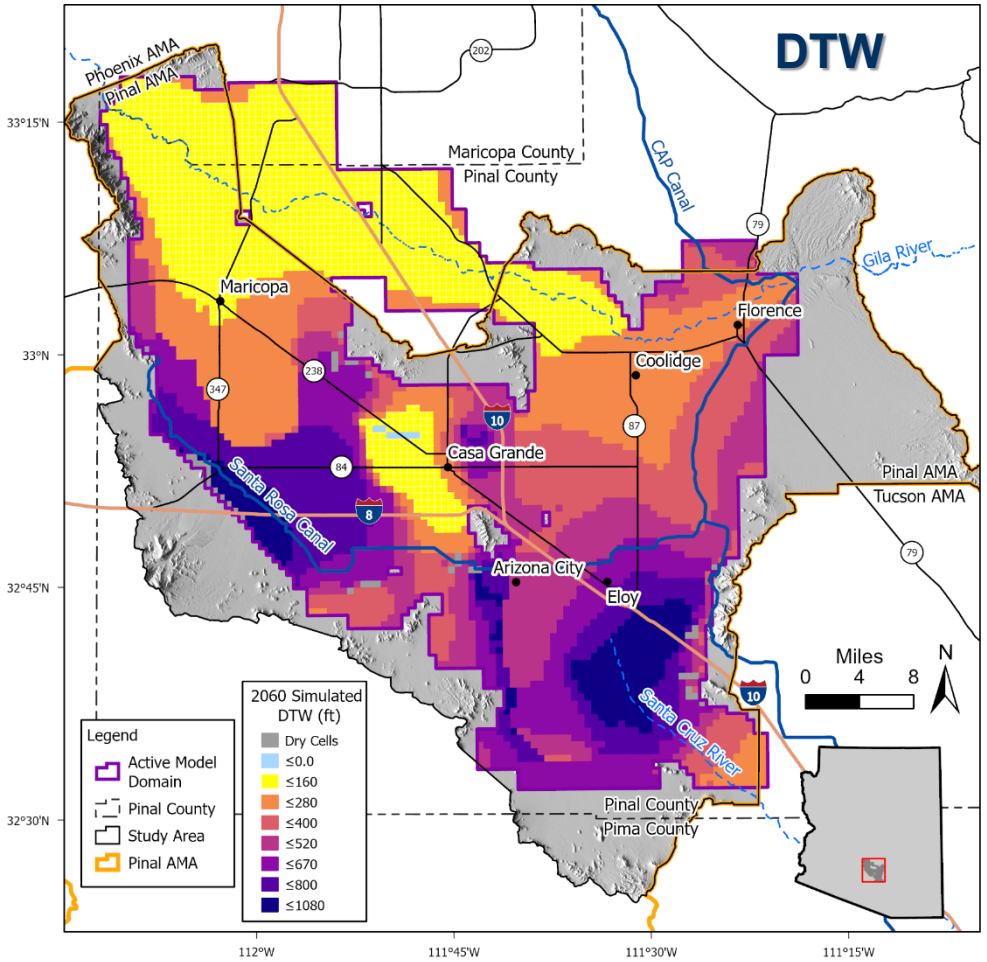

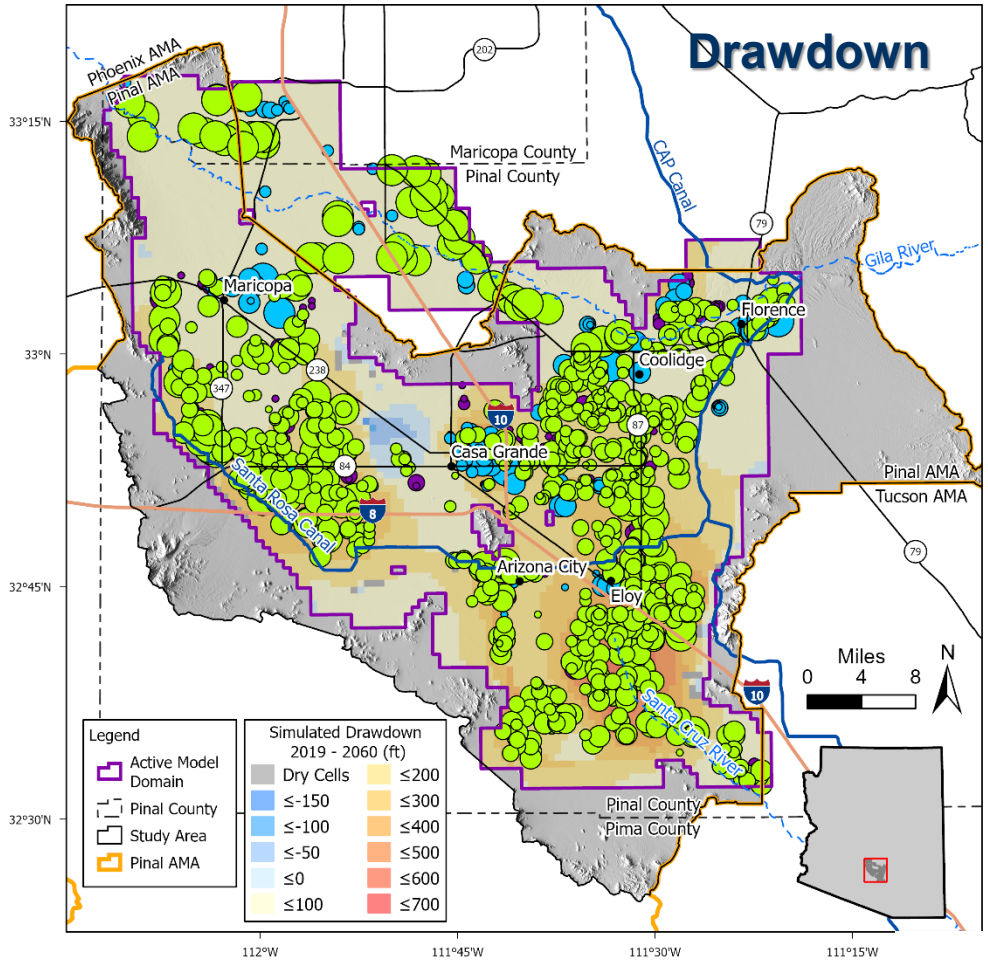

Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

Agriculture
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Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

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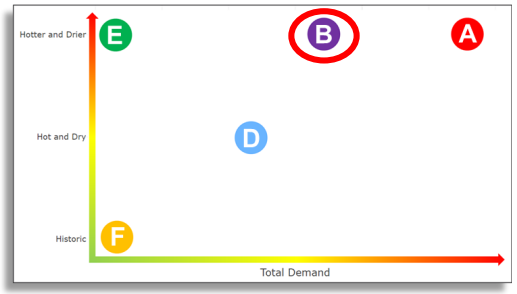
GW Modeling Results
Scenario B



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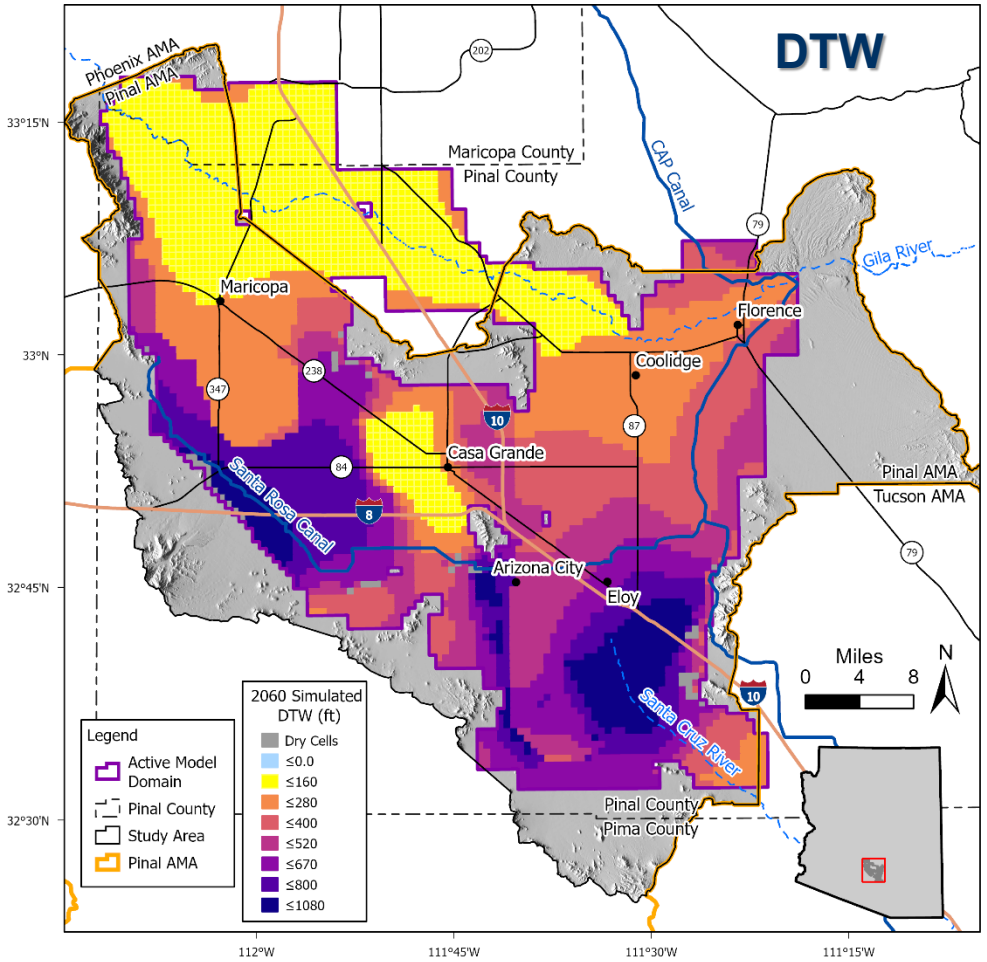

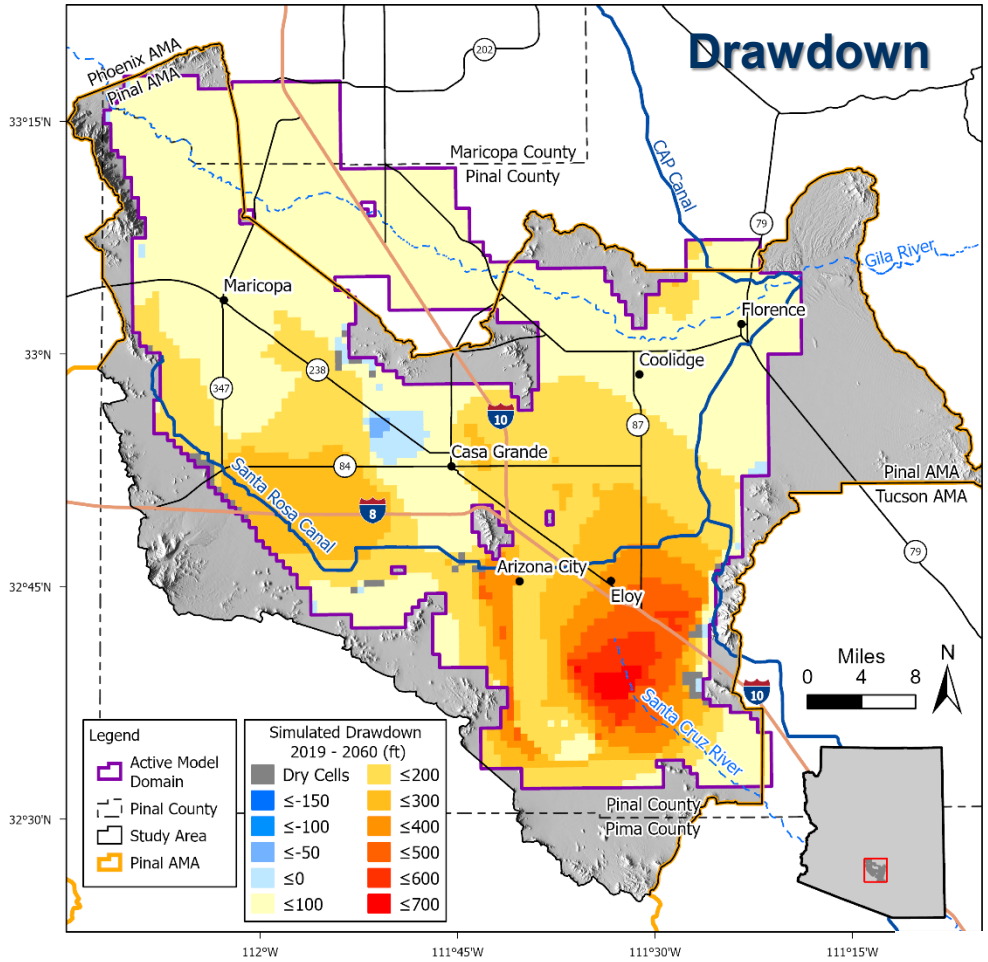

Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

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Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

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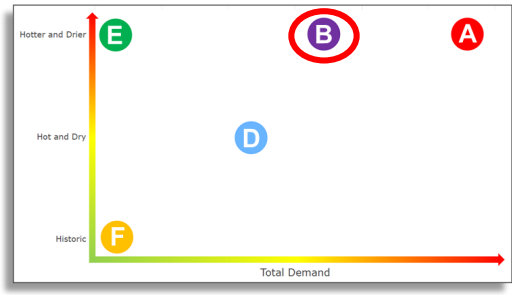
GW Modeling Results
Scenario B



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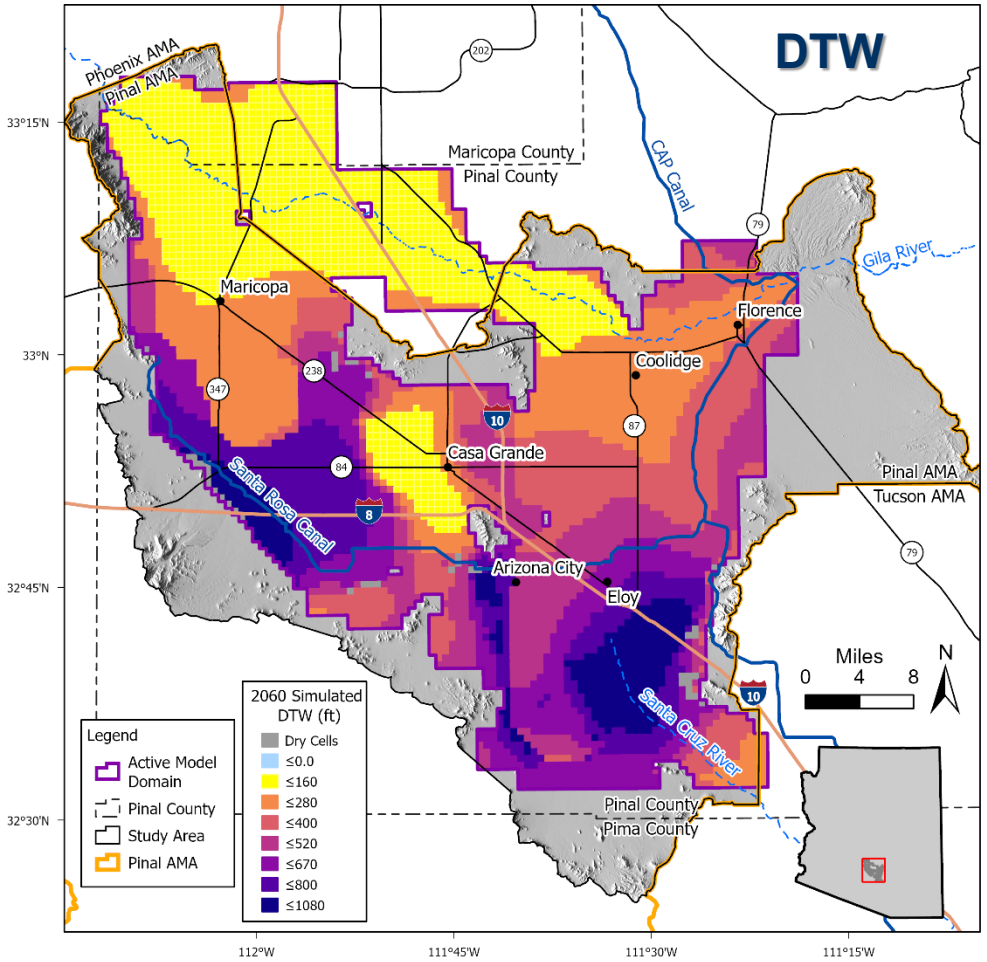

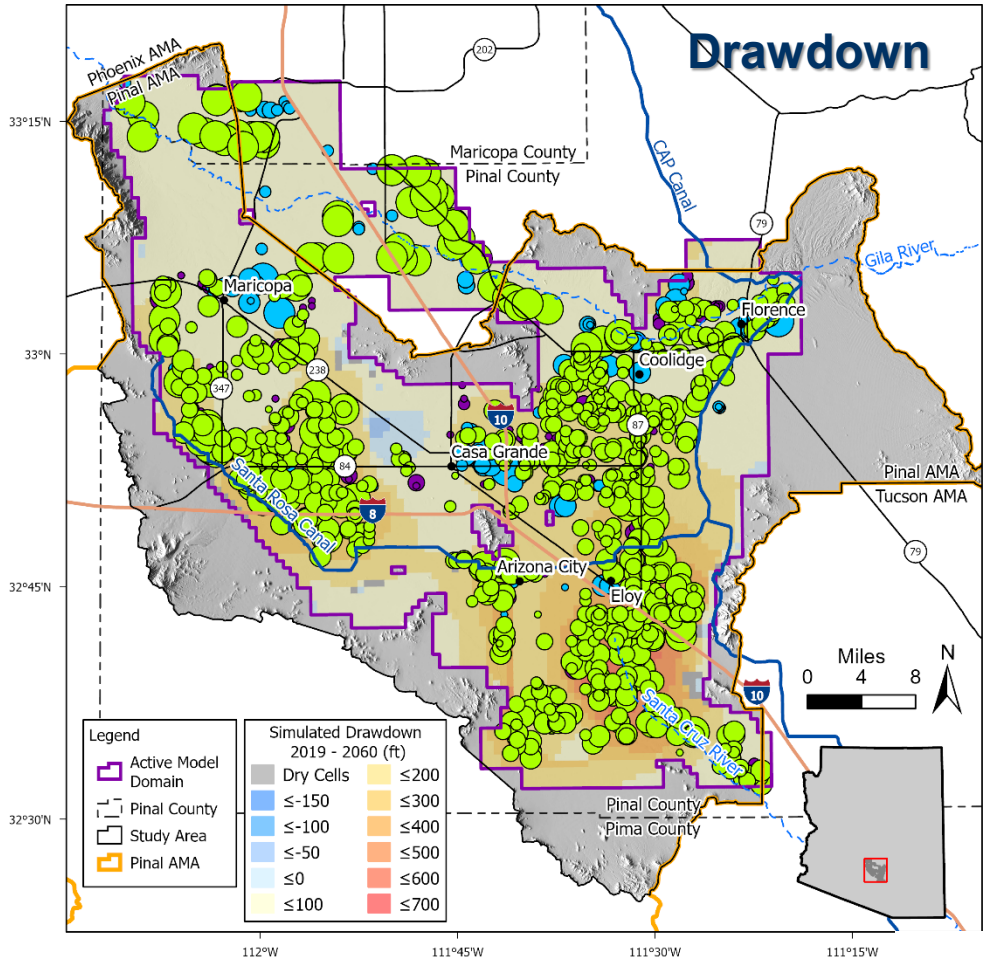

Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

Agriculture
Municipal
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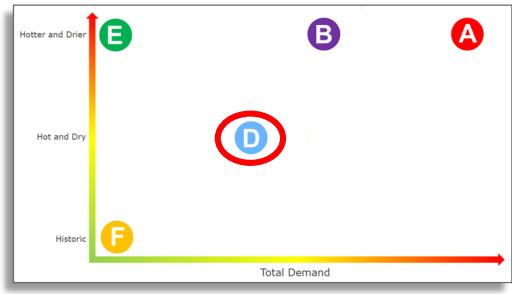
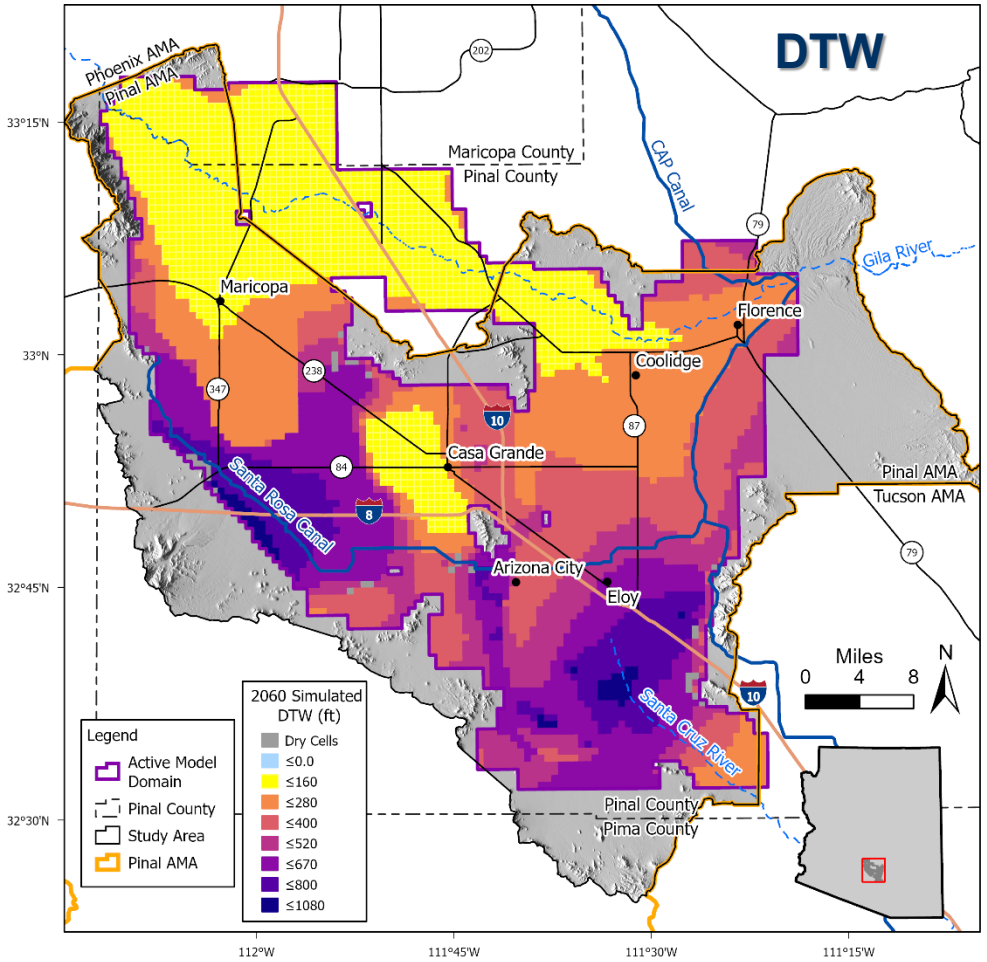
BUREAU OF RECLAMATION

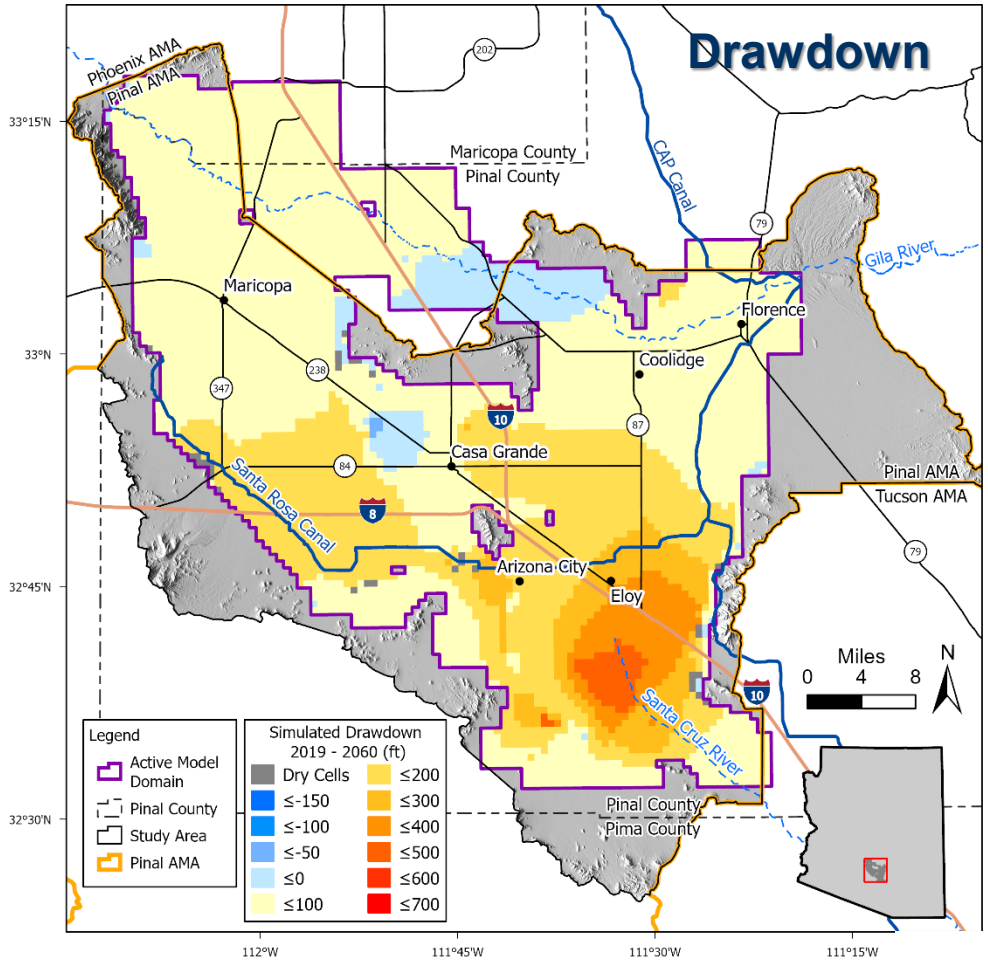
PINAL PARTNERSHIP

GW Modeling Results
Scenario D



DRAFT





Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

Agriculture
Municipal
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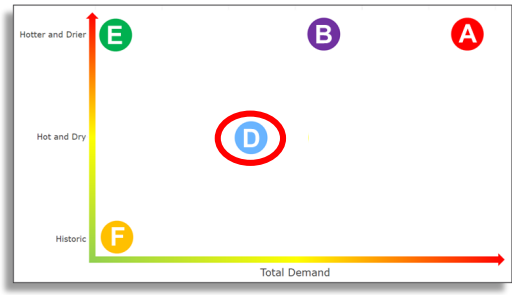
Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

PINAL PARTNERSHIP

GW Modeling Results
Scenario D



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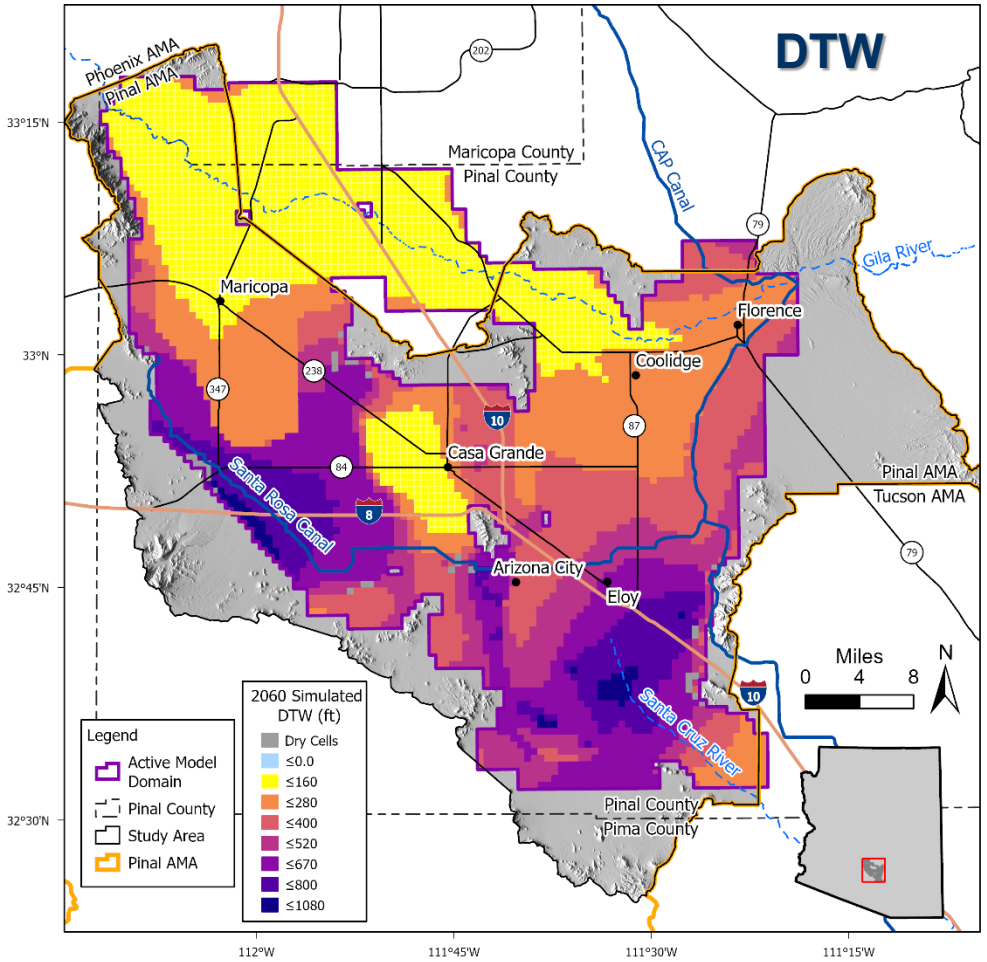
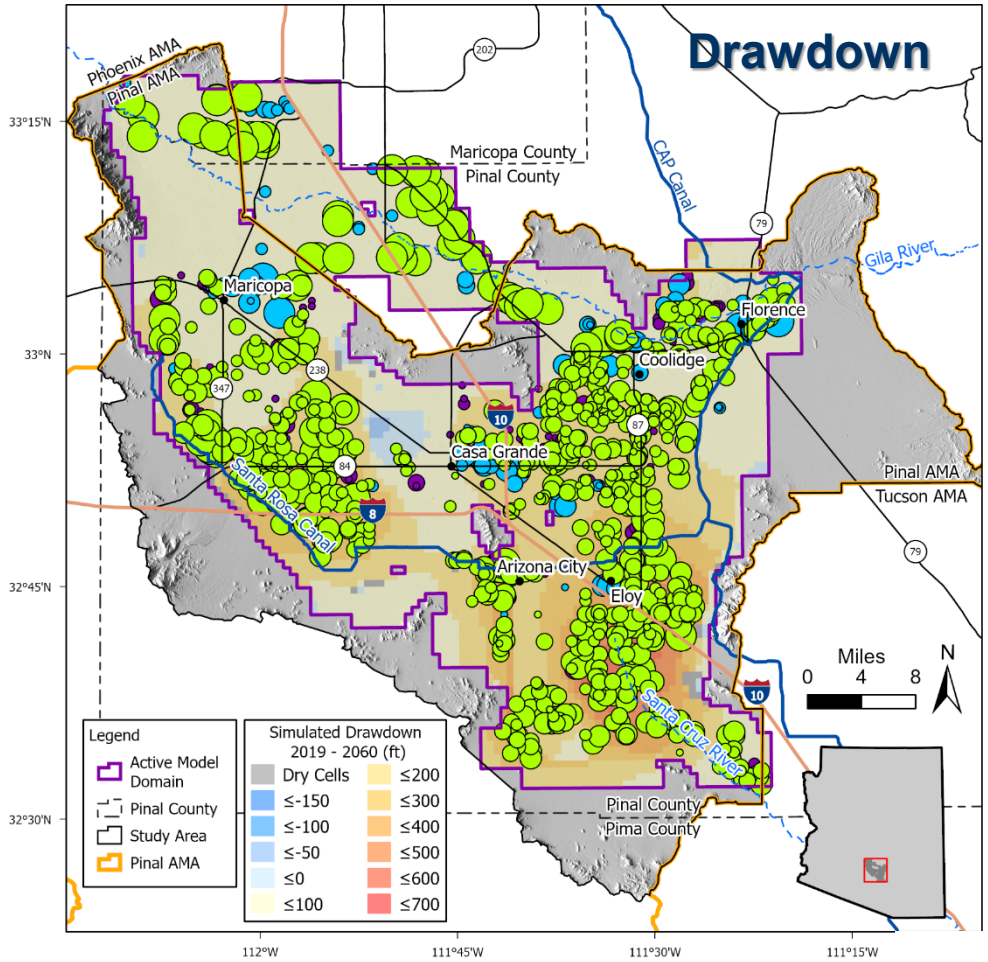




Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

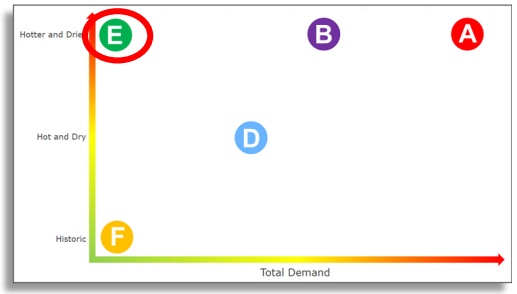
Agriculture
Municipal
Industrial

Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

PINAL PARTNERSHIP

GW Modeling Results
Scenario E



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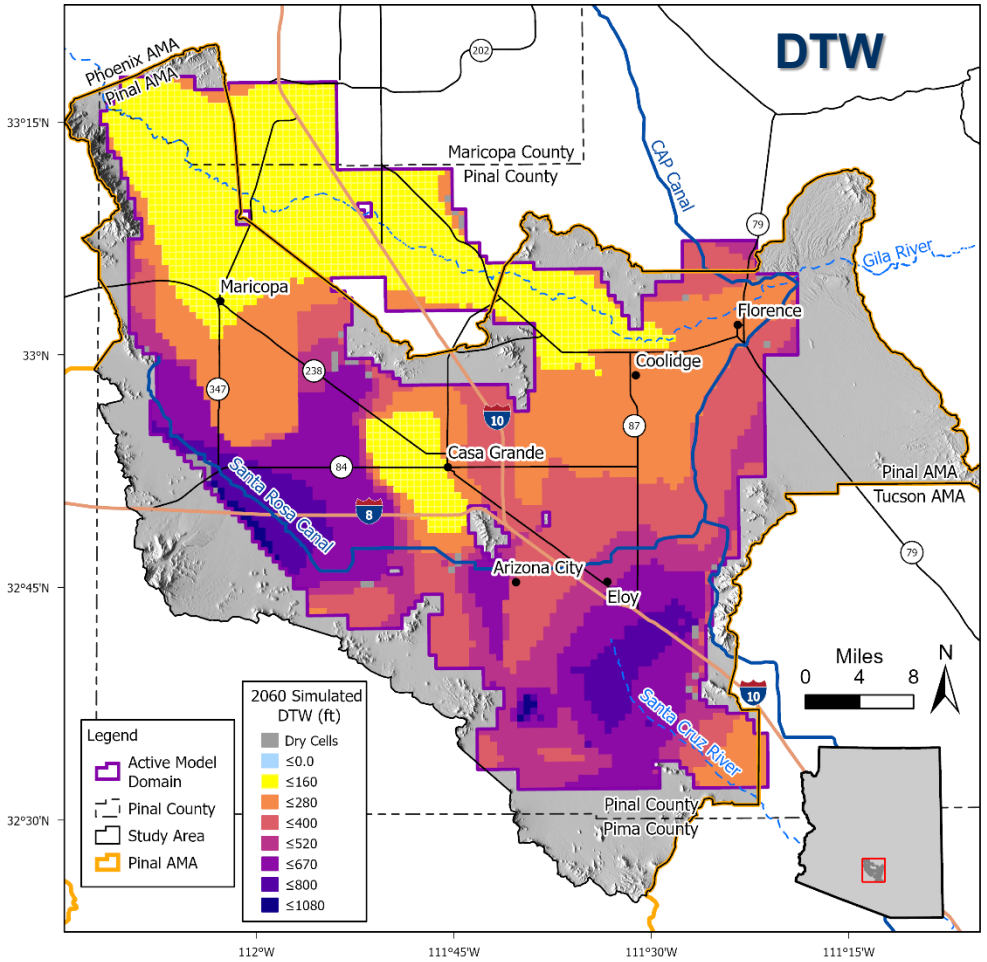

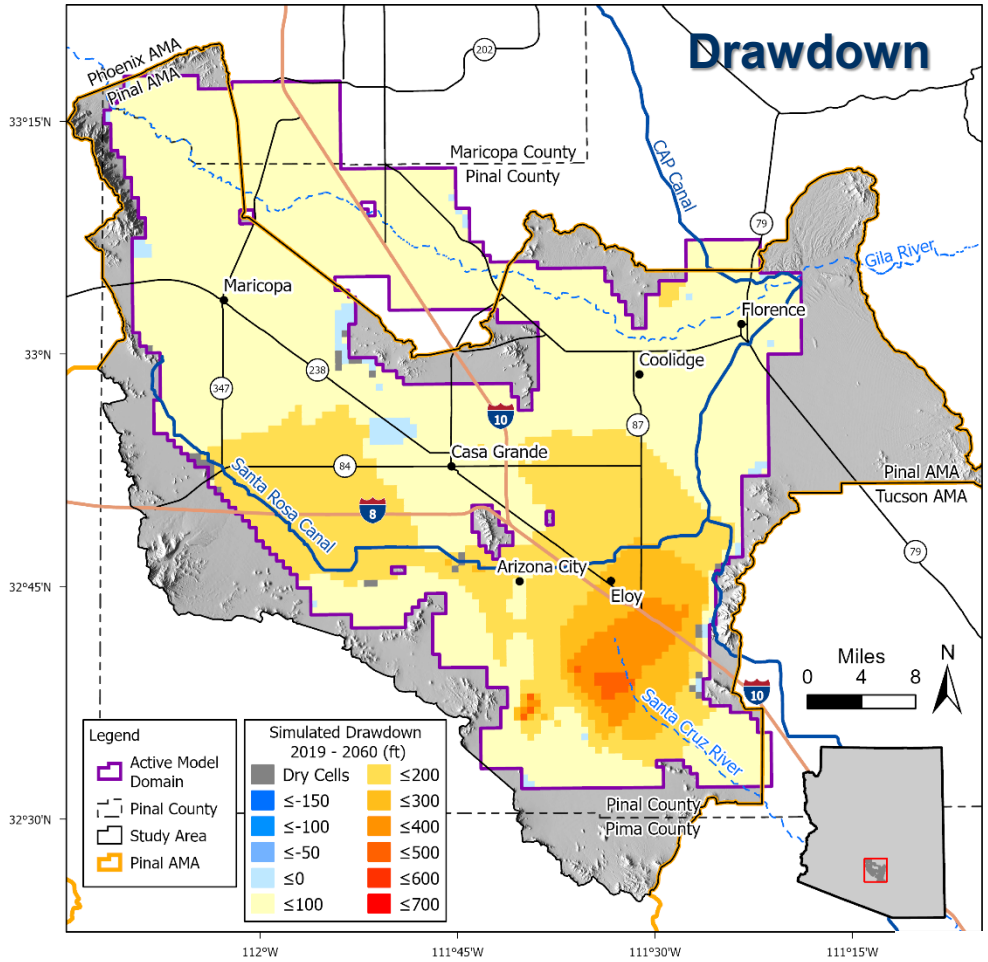

Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

Agriculture
Municipal
Industrial

Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

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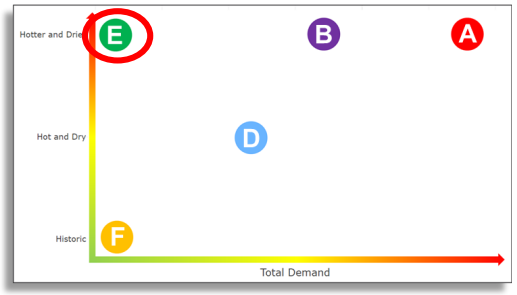
Scenario E



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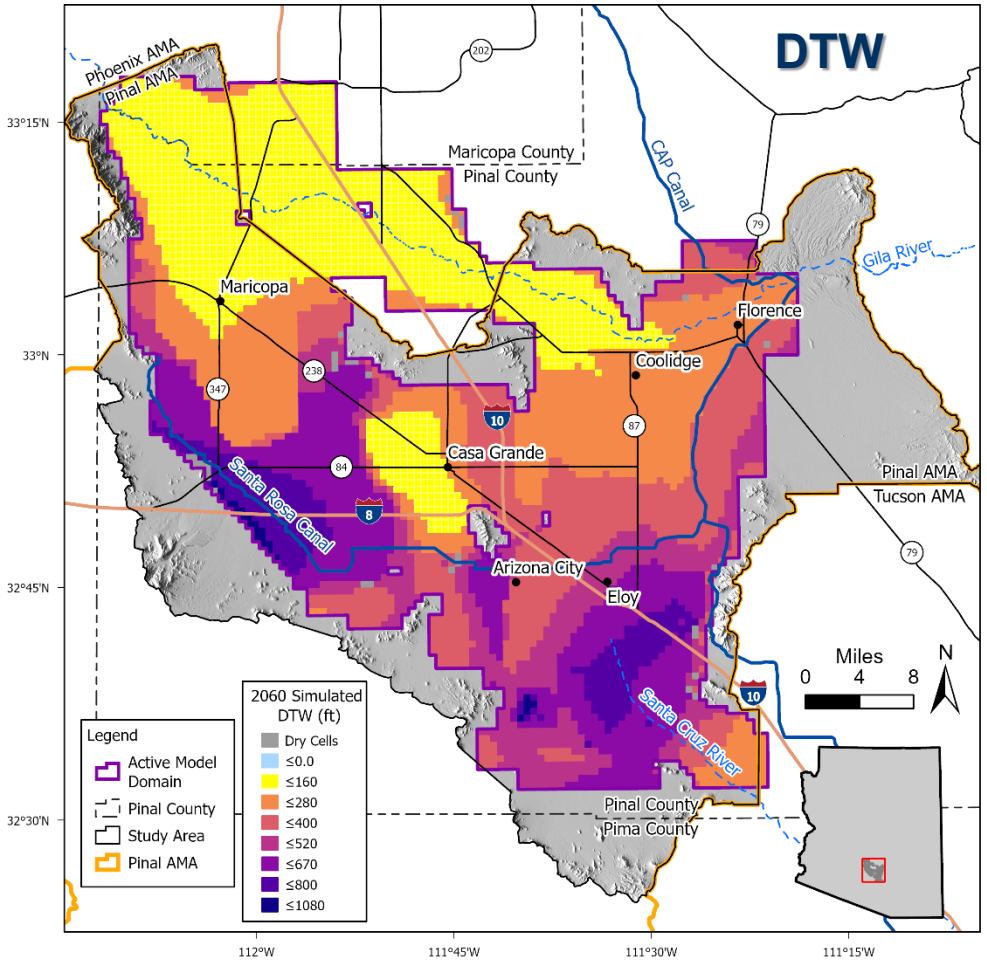
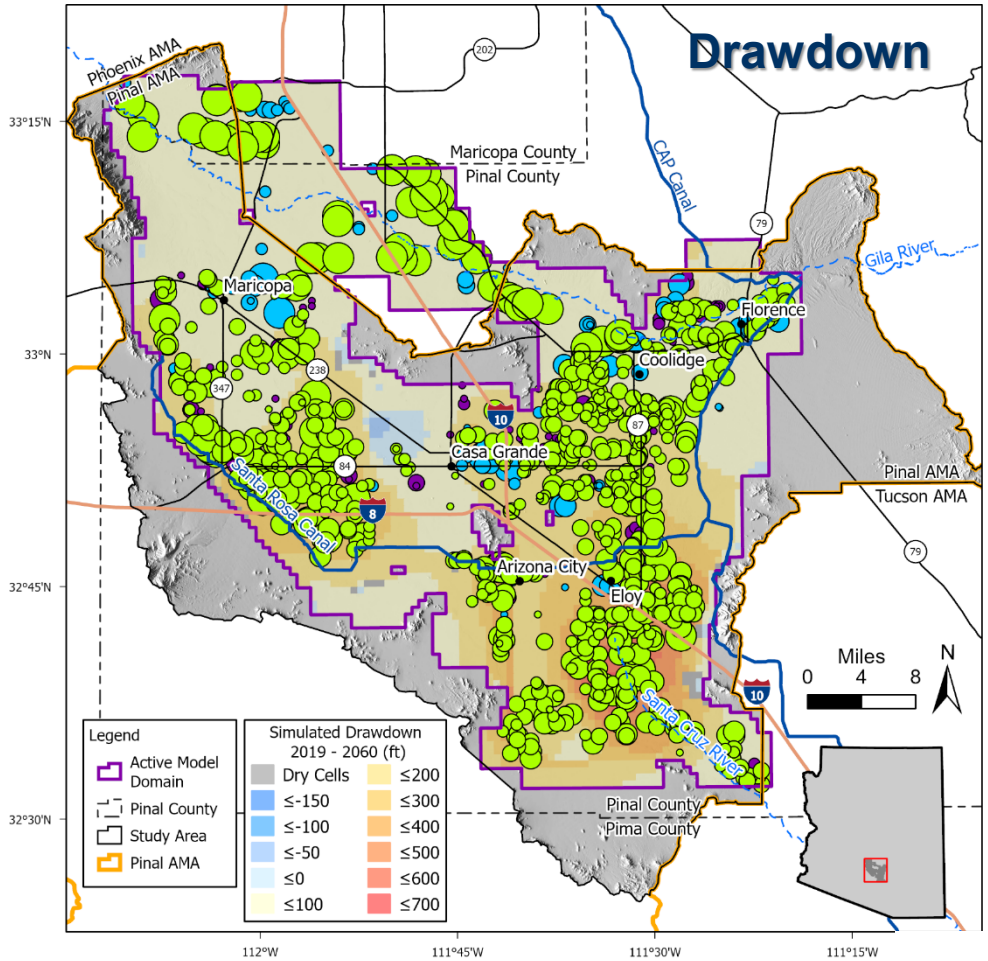




Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

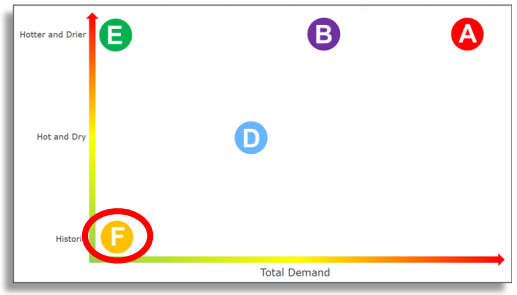
Agriculture
Municipal
Industrial

Eloy and Maricopa-Stanfield Basin Study

BUREAU OF RECLAMATION

PINAL PARTNERSHIP

GW Modeling Results
Scenario F



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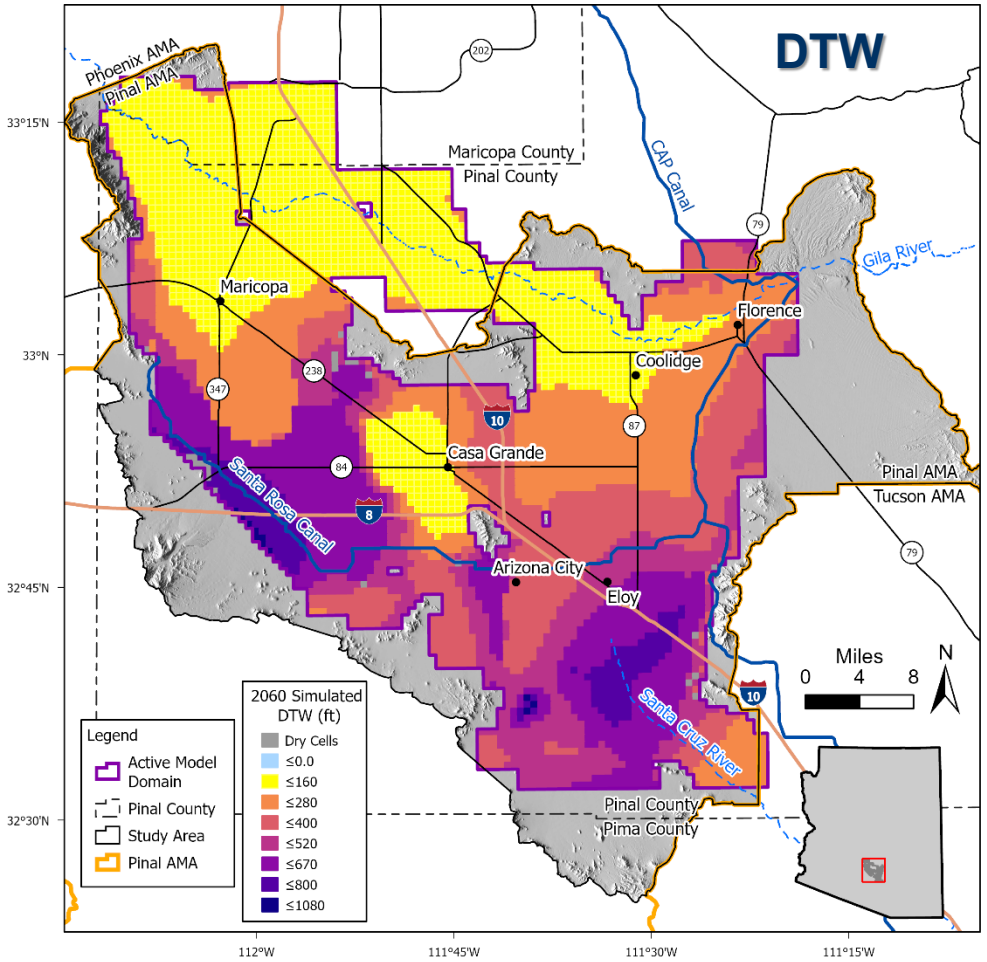

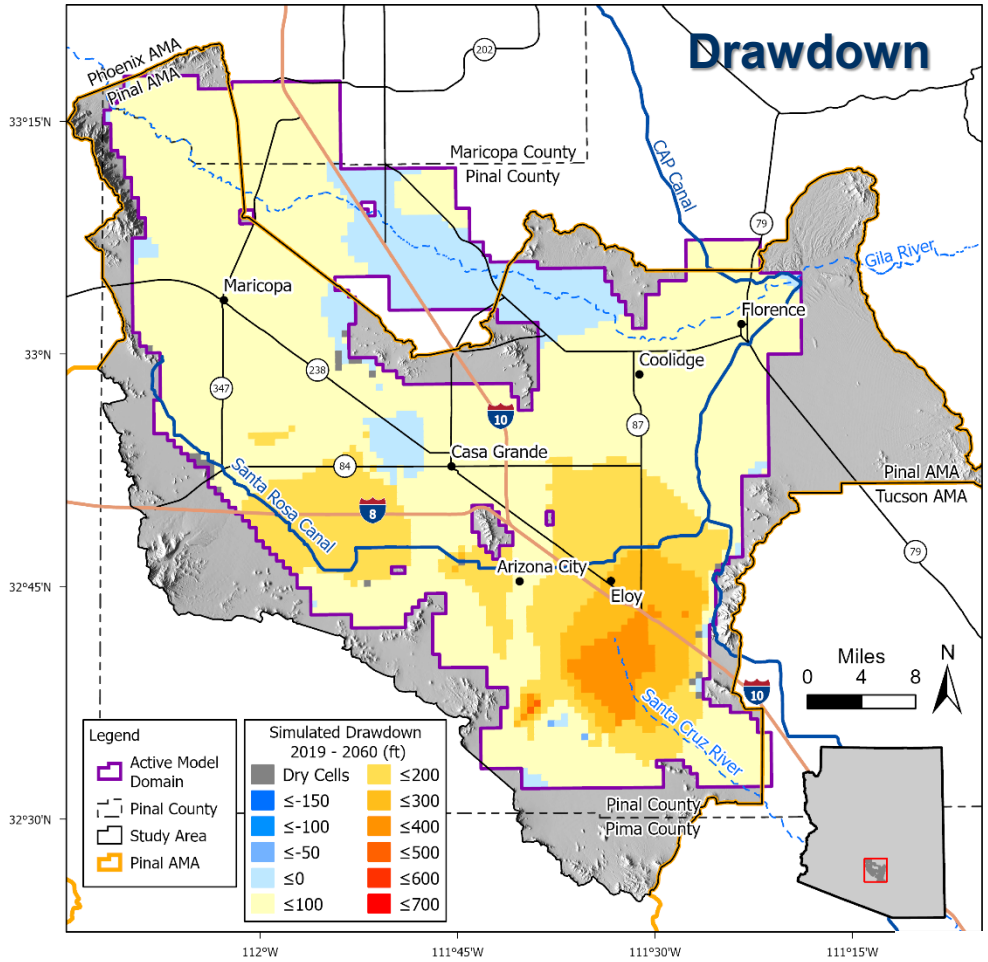

Total Pumping [AF]

- ≤3,670
- ≤14,200
- ≤35,300
- ≤74,800
- ≤173,200

Agriculture
Municipal
Industrial

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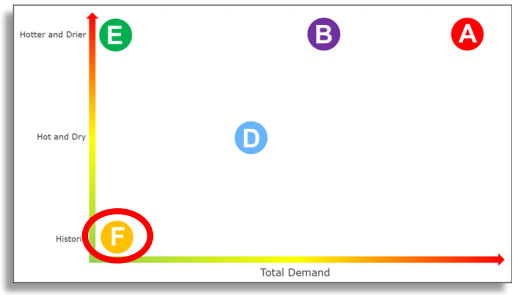
GW Modeling Results
Scenario F



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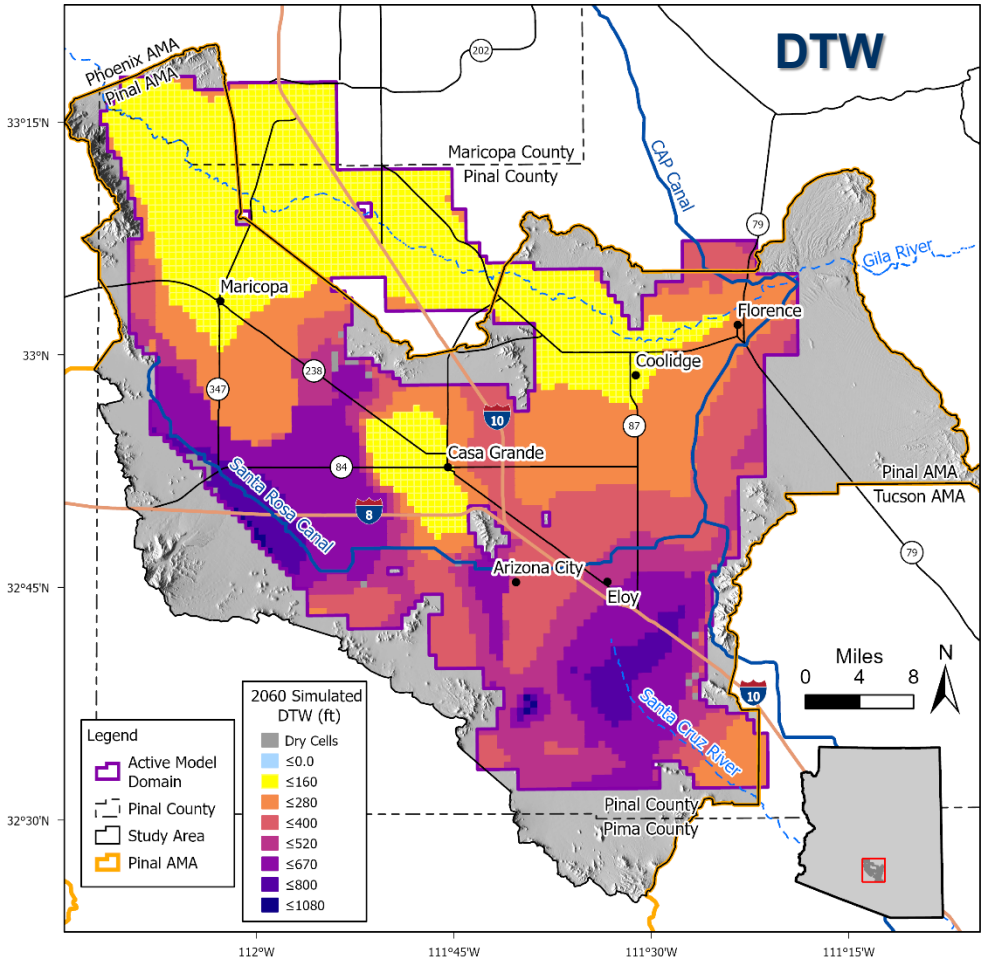

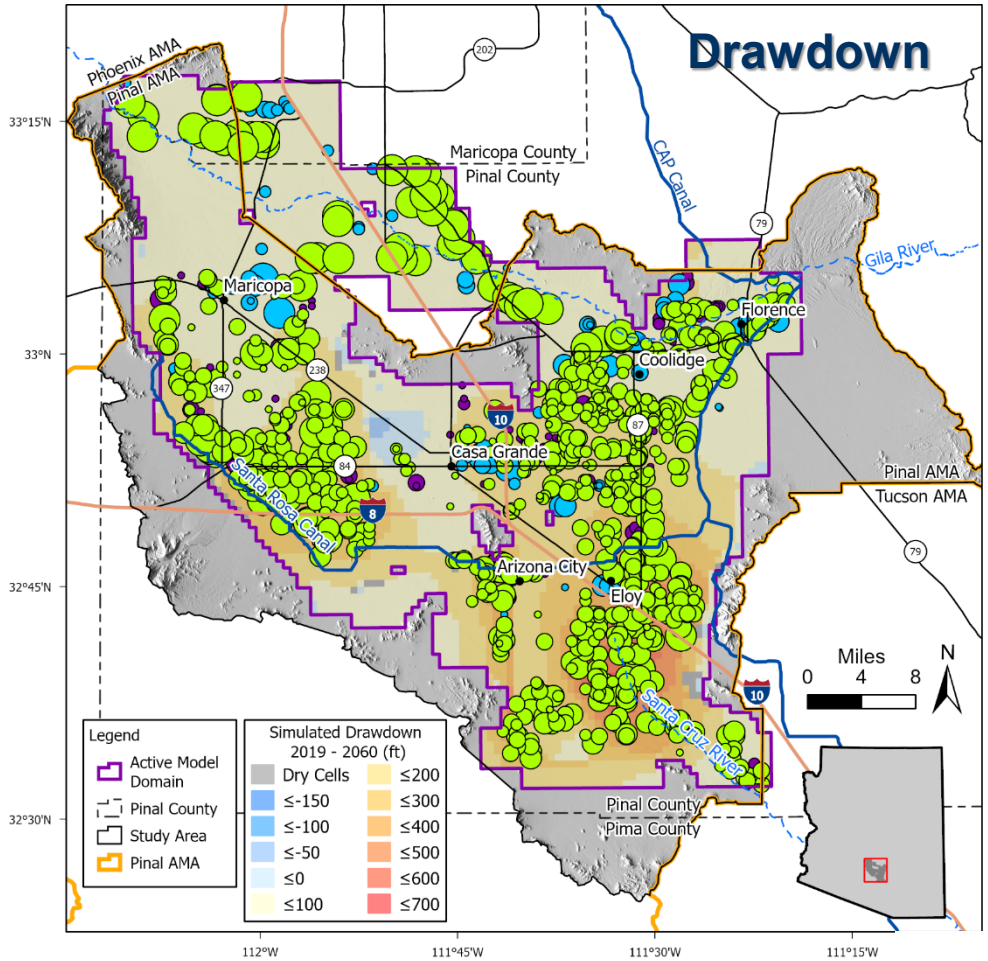

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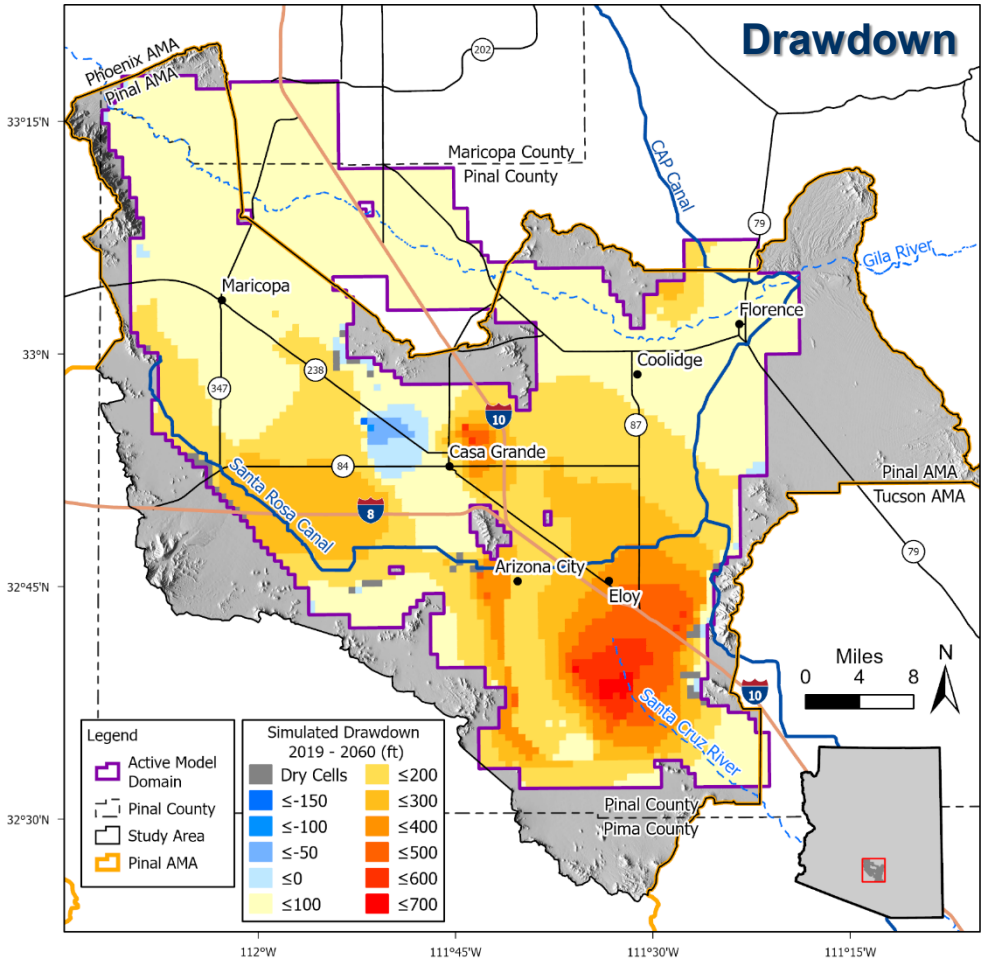
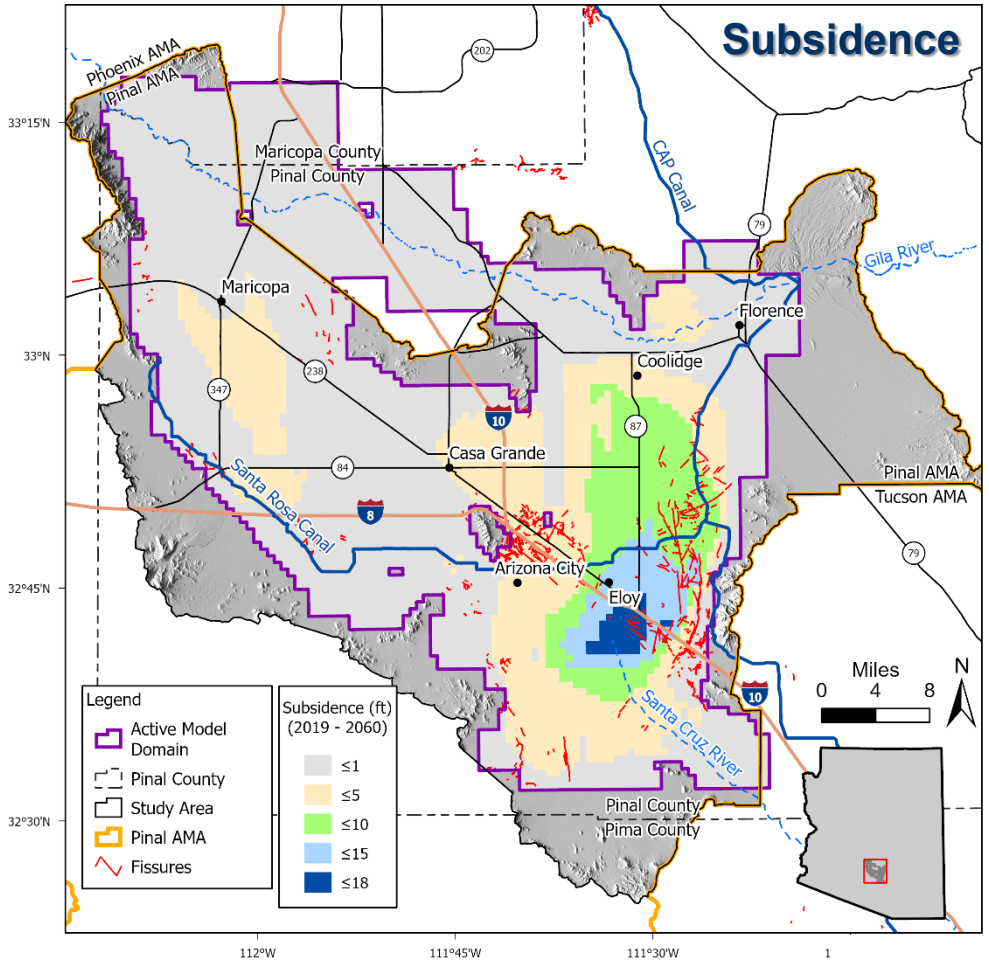
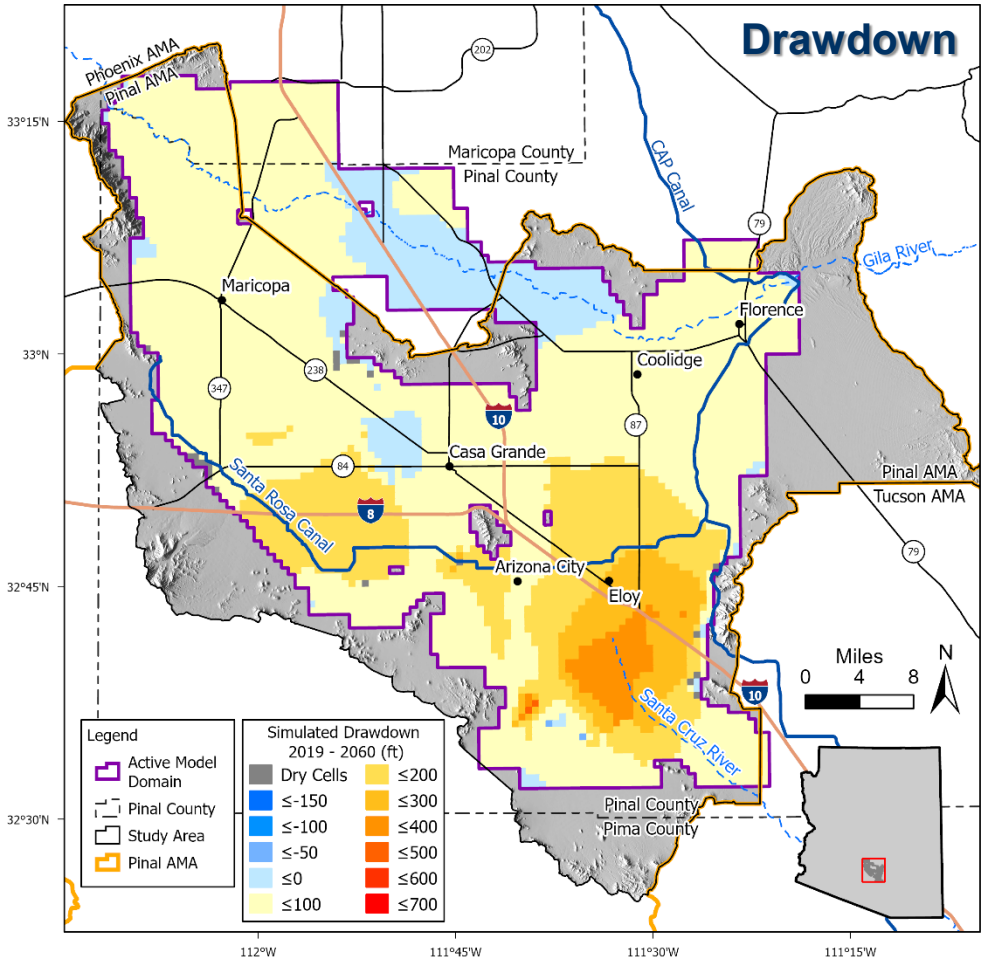
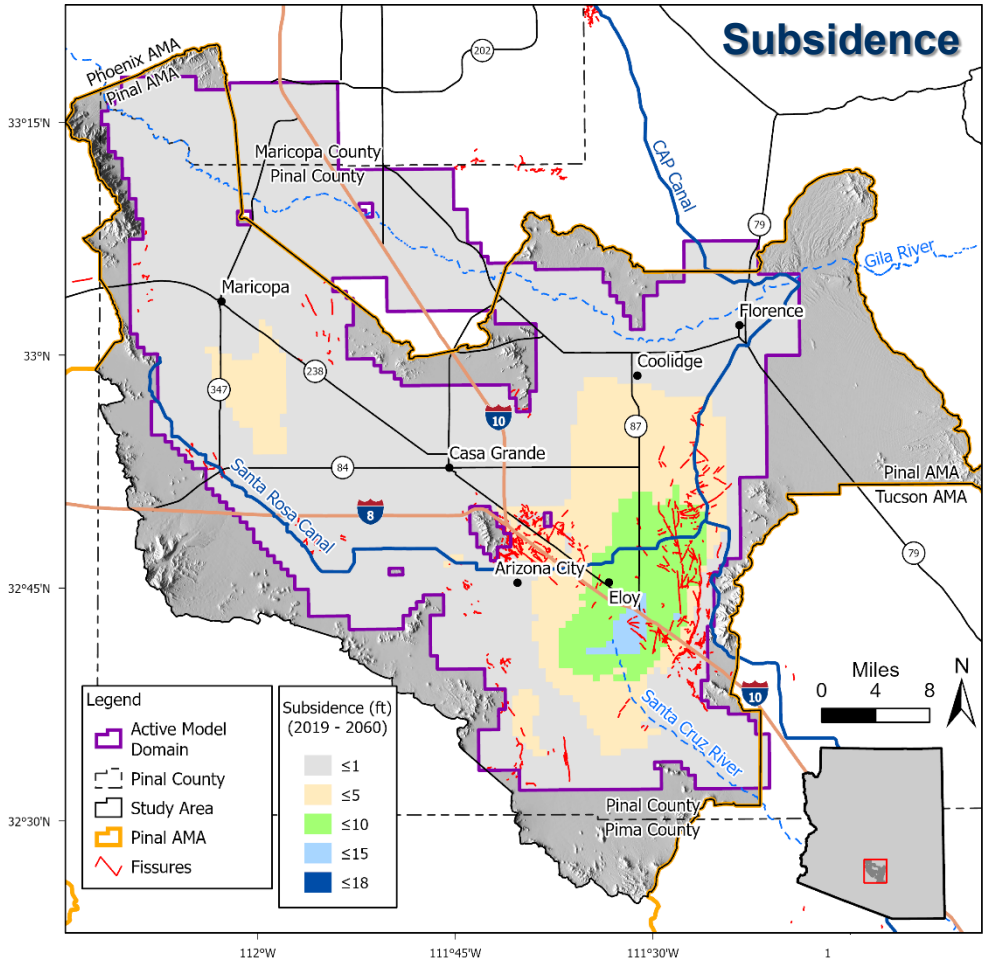
Subsidence (2019 – 2060)
Scenario A





Subsidence (2019 – 2060)
Scenario F

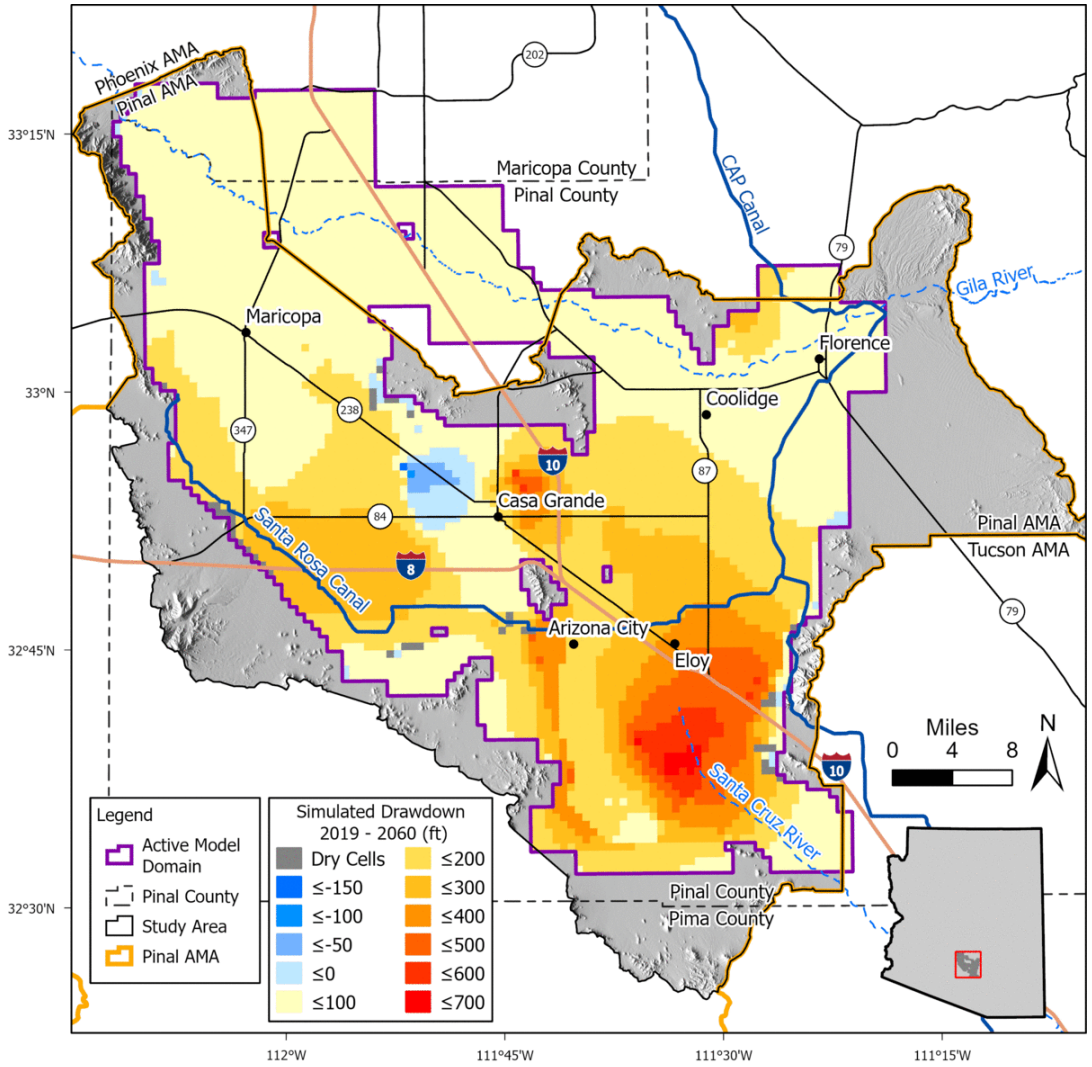




Summary

- Regional water level declines across scenarios
- Key Drawdown Areas:
  - Eloy
  - Southern MSIDD
  - Casa Grande Ridge
- Groundwater Level Increases:
  - Casa Grande Recharge Facility
  - Gila River Recharge
- Potential for subsidence
  - Greatest in Eloy sub-basin

Scenario A



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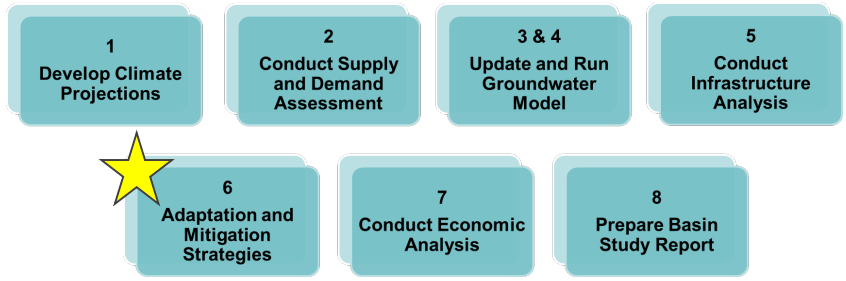
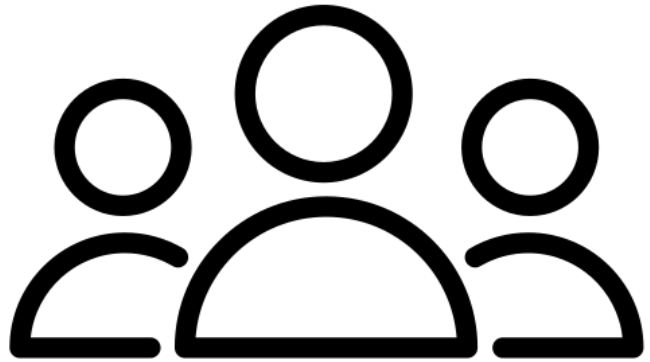
Where Do We Go From Here?

- Adaptation and Mitigation Brainstorming Workshop
  - Two day virtual event, May 17th and 18th
- Adaptation – How might we change water management behavior to adapt to these new futures?
  - De-coupling of the municipal sector from the groundwater system?
  - Targeted recharge and recovery?
- Mitigation – How might we reduce the impact of groundwater level declines?
  - Depth to water pumping rules?
  - Reduced agricultural pumping?





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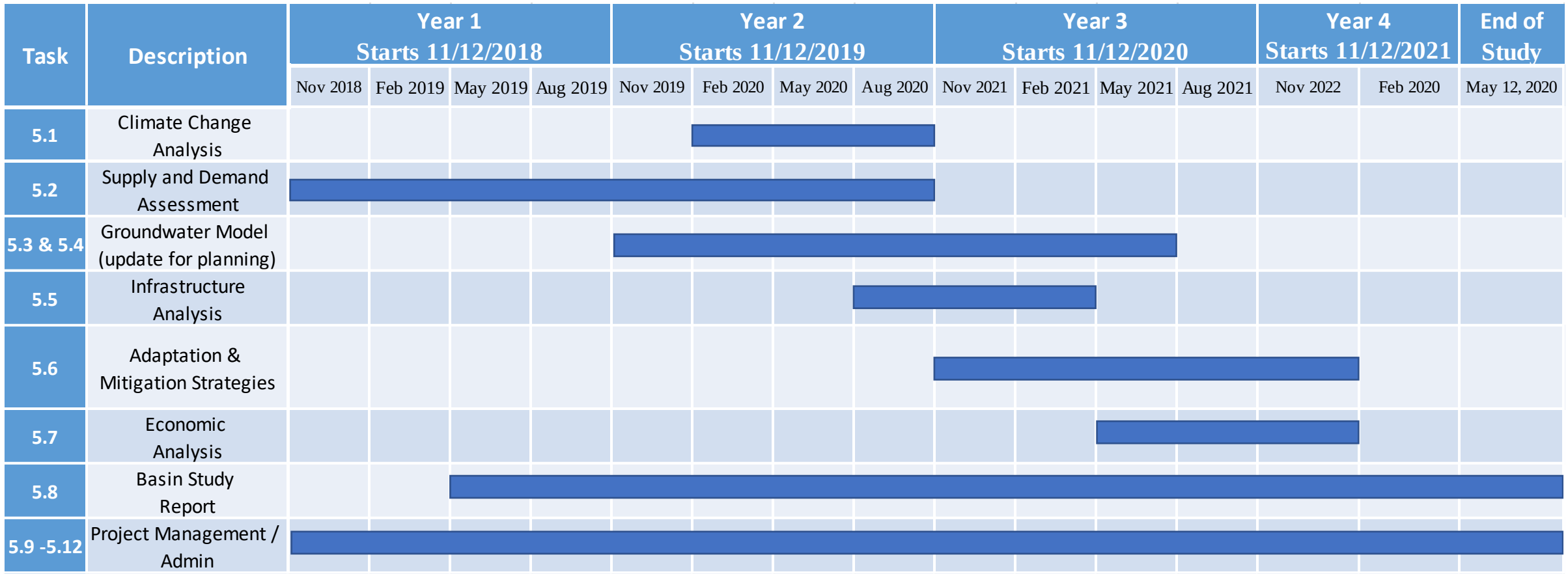
Updated Schedule



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Post Study

- Apply for WaterSMART Grants for additional analyses
- Individual entities completing projects
- Regional entities completing projects

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Upcoming Meetings

Project Meetings
2nd Tuesday of the month
May 11, 2021, 9 – 10:30 am

Adaptation and Mitigation Brainstorming Workshop
May 17 & 18, 2021, 1 – 4 pm

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Thank You

For more information:

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

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AZ Water Association
Professionals Dedicated To Arizona's Water

American Water Works Association Arizona Section

Water Environment Federation