

Models & Data to Support Sustainable Urban Water

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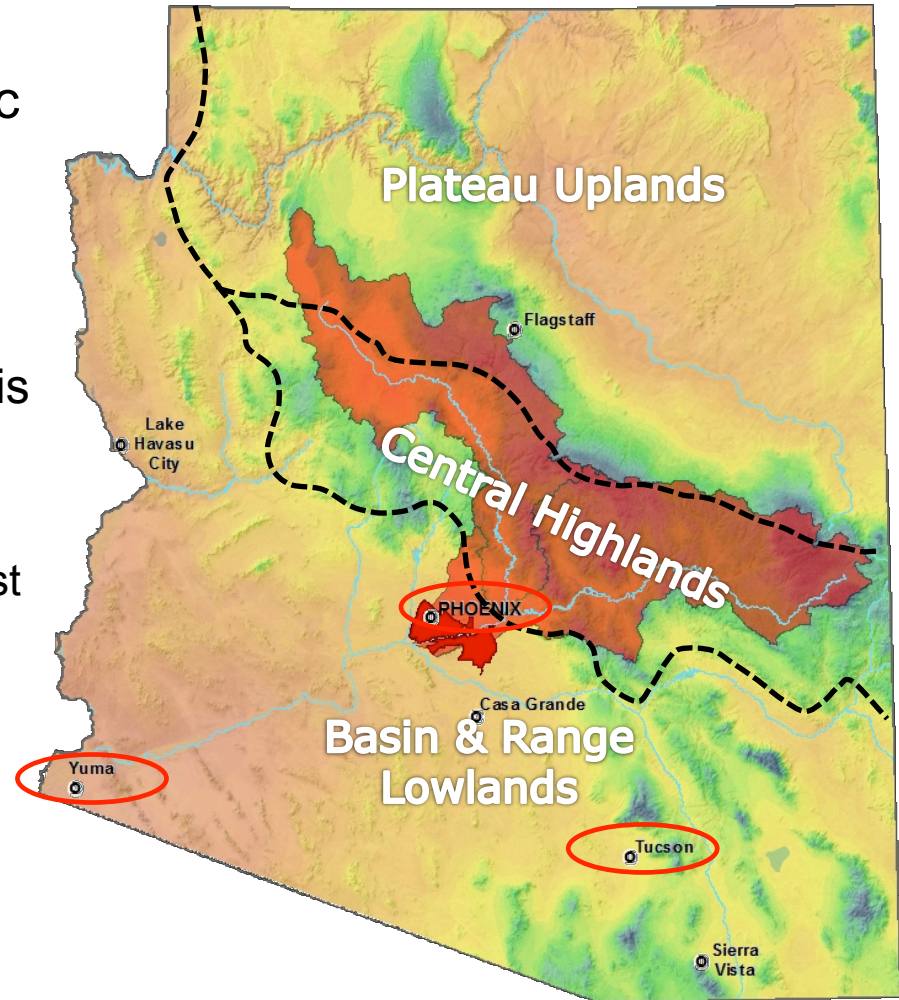
YOUR WATER. YOUR FUTURE.



Water Resources

Physical Setting

- Three major physiographic regions
 - Most of the population is in the Basin & Range
 - Most of the precipitation is in the Central Highlands
 - The Salt River Project has senior rights to most of that surface water



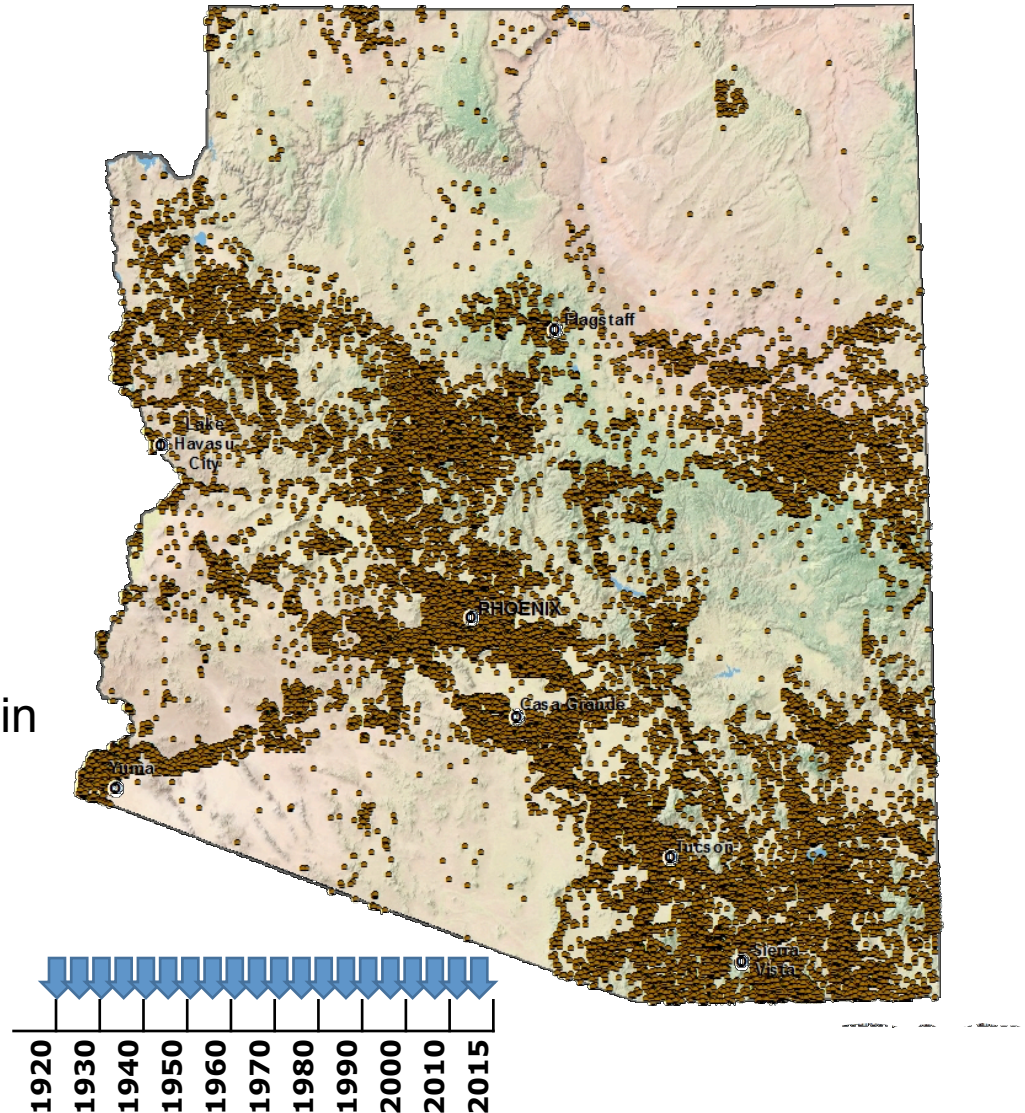
Groundwater

- Plateau Uplands
 - Sandstone and other hardrock formations
- Central Highlands
 - Limited groundwater
- Basin & Range
 - Deep and extensive alluvial basins
 - Little natural recharge
 - Large volume of water in storage

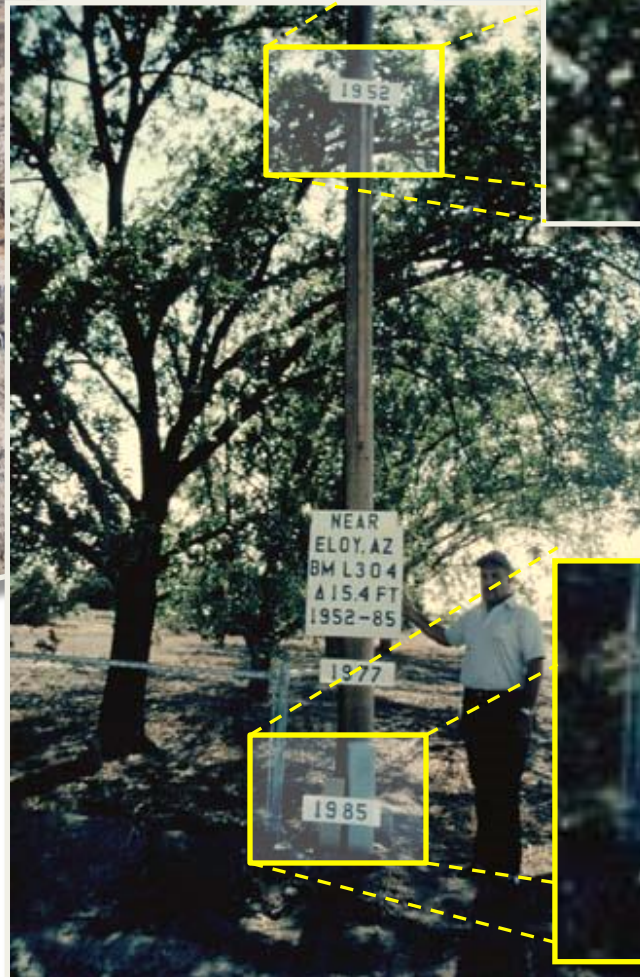


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Groundwater Overdraft



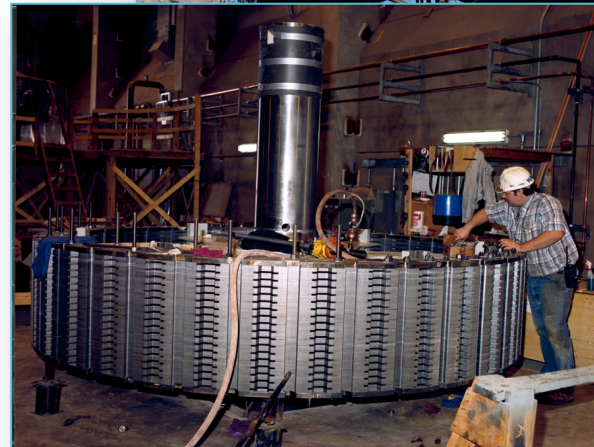
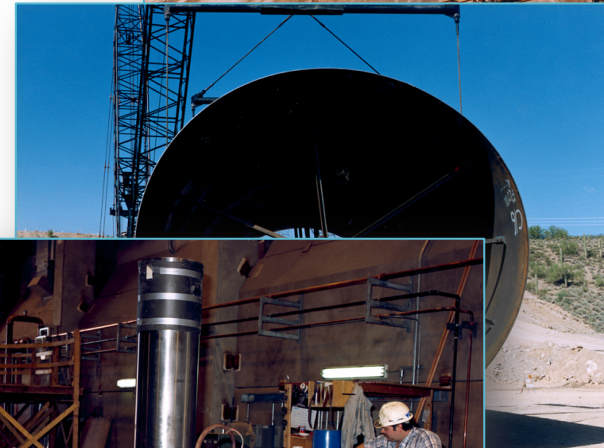
Comprehensive Management

- Created the Arizona Department of Water Resources
- Established Active Management Areas
 - ◆ Hydrologic boundaries
 - ◆ Stringent regulations
 - ◆ Long-range water management goals
- ◆ Ensured completion of the Central Arizona Project (CAP)



Central Arizona Project

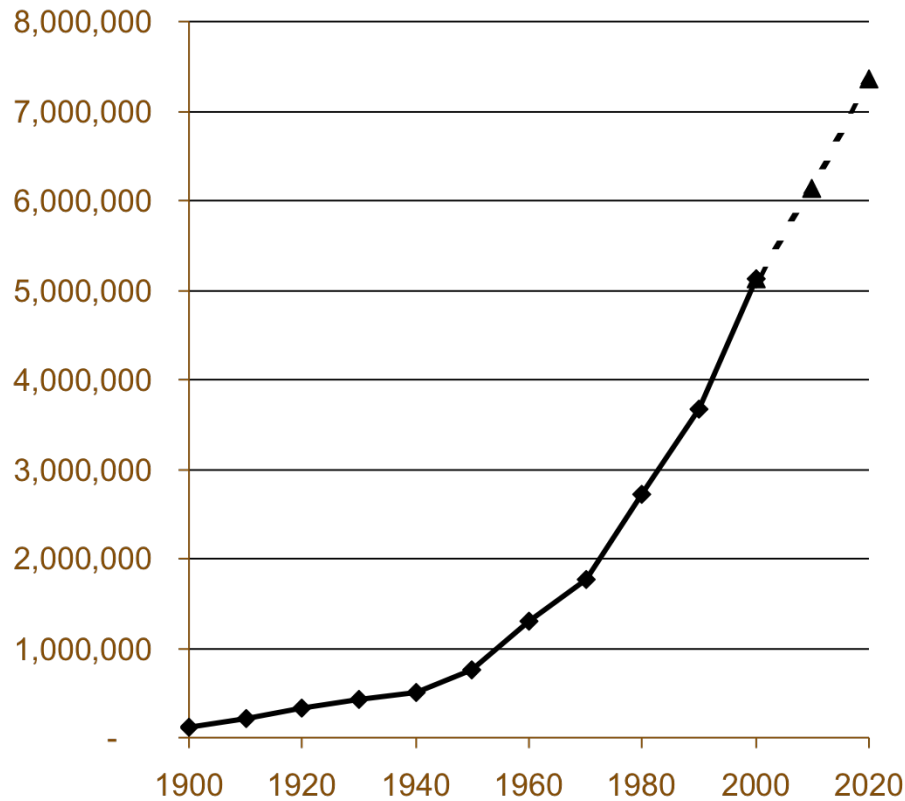
- Diverts ~ 1.6 MAF of Arizona's Colorado River entitlement
 - 336 mile aqueduct system
 - 15 pumping plants
 - 8 siphons, 3 tunnels
 - 2,900 ft. of lift
 - 2.8 million MWH/yr.



A decorative graphic in the top-left corner consisting of two concentric curved lines. The outer line is a dark teal color, and the inner line is a light beige color. They curve from the top-left towards the bottom-left.

Urbanization

Population Growth



Arizona's Population Rank Among States

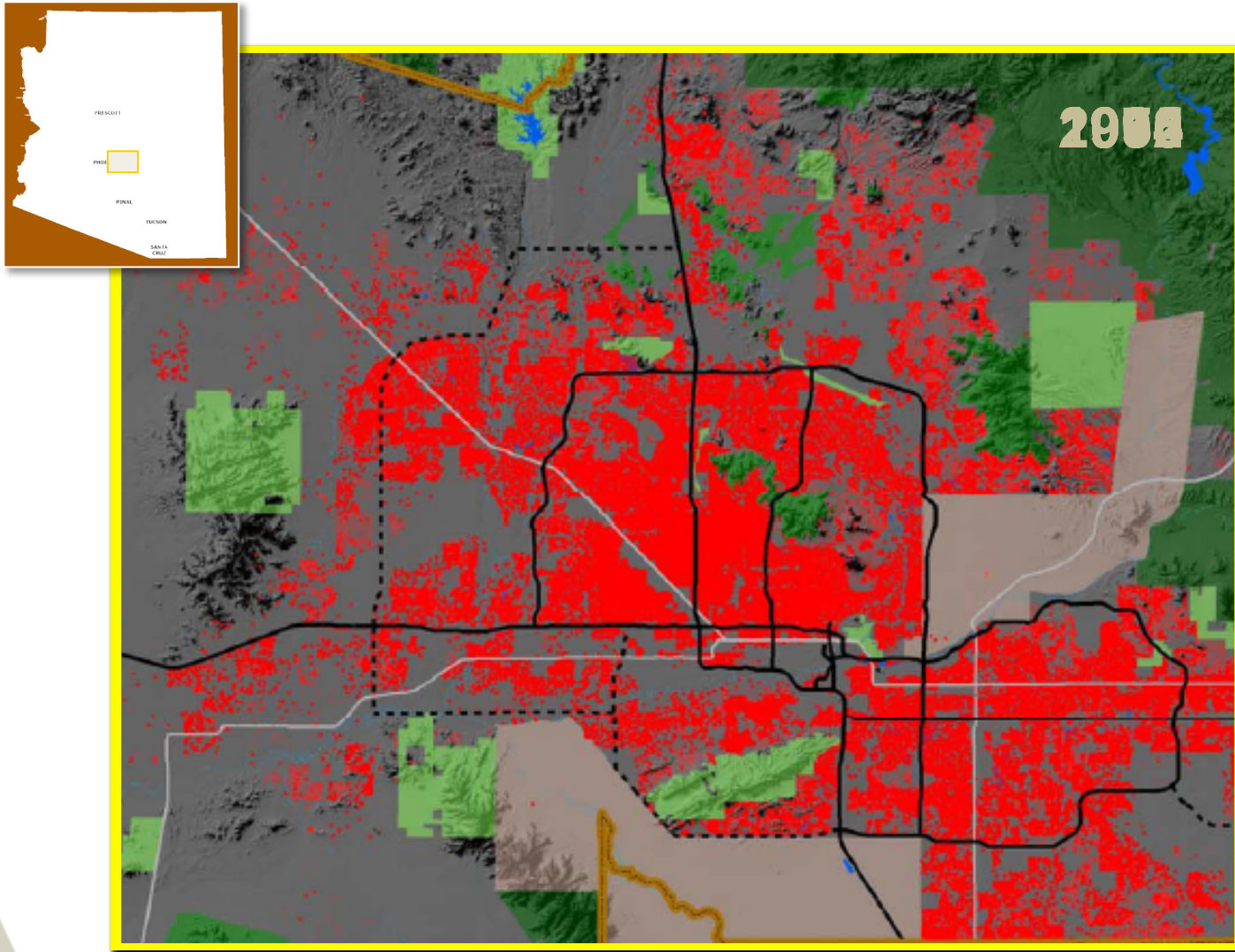
1950 — 38th

2000 — 20th

2010 — 16th

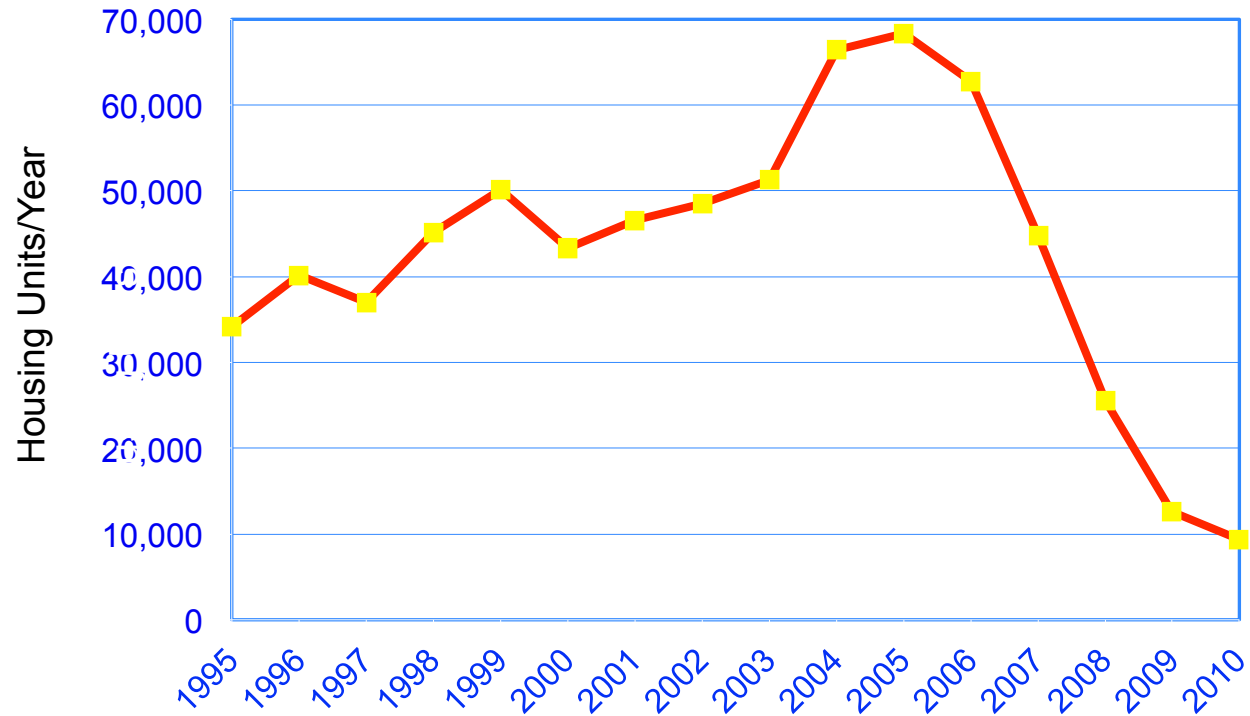
2030 — 10th

Urban Growth

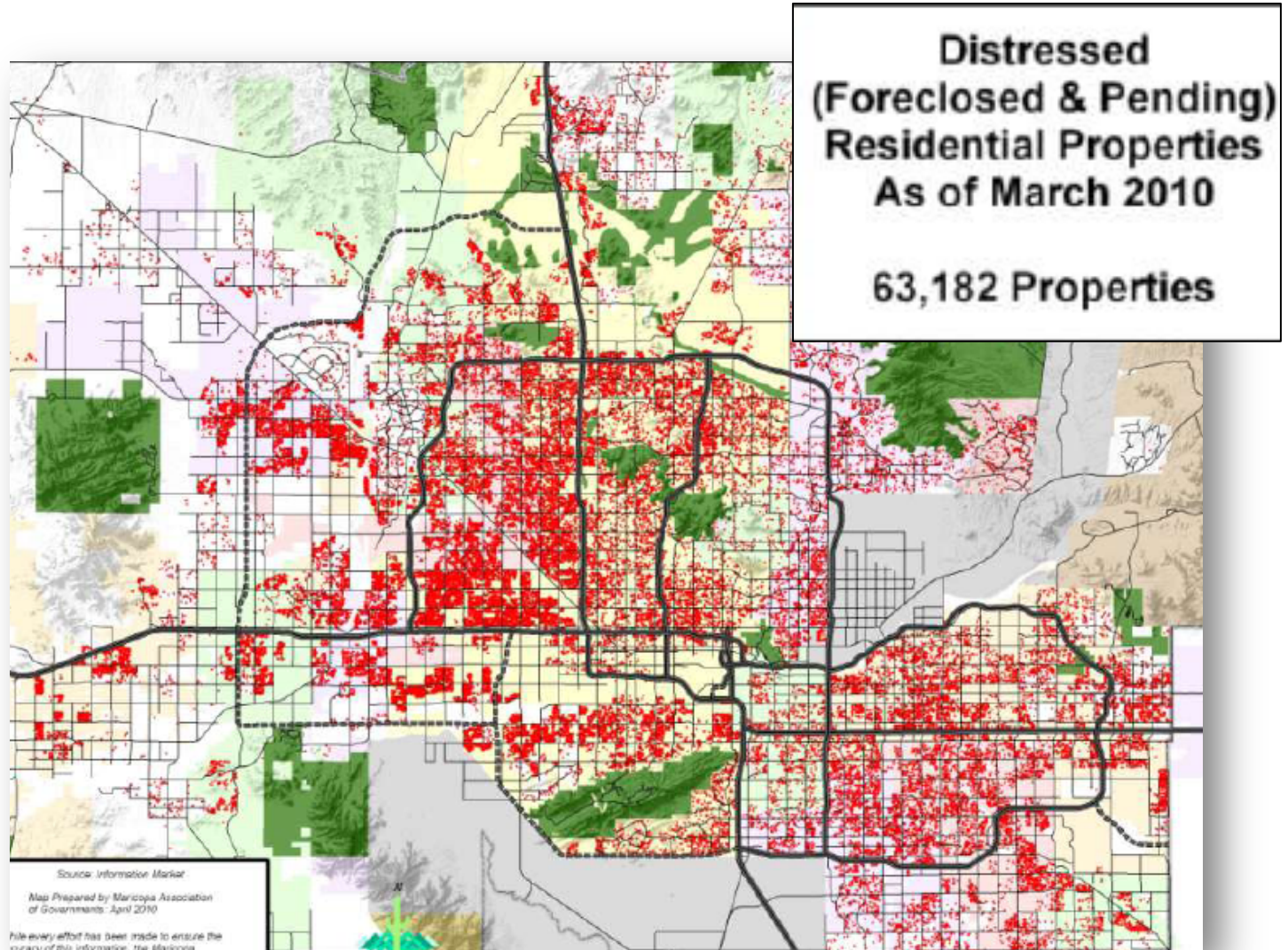


Source: Maricopa Association of Governments

Urban Growth



Urban Bust



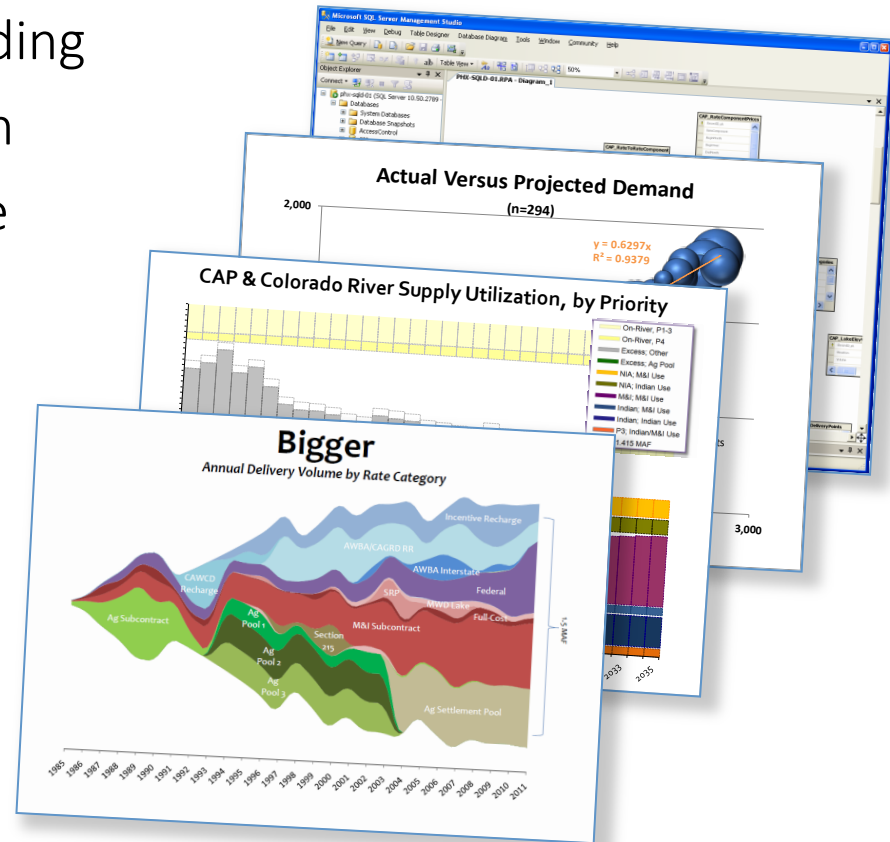
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Modeling

Support for Decisionmaking

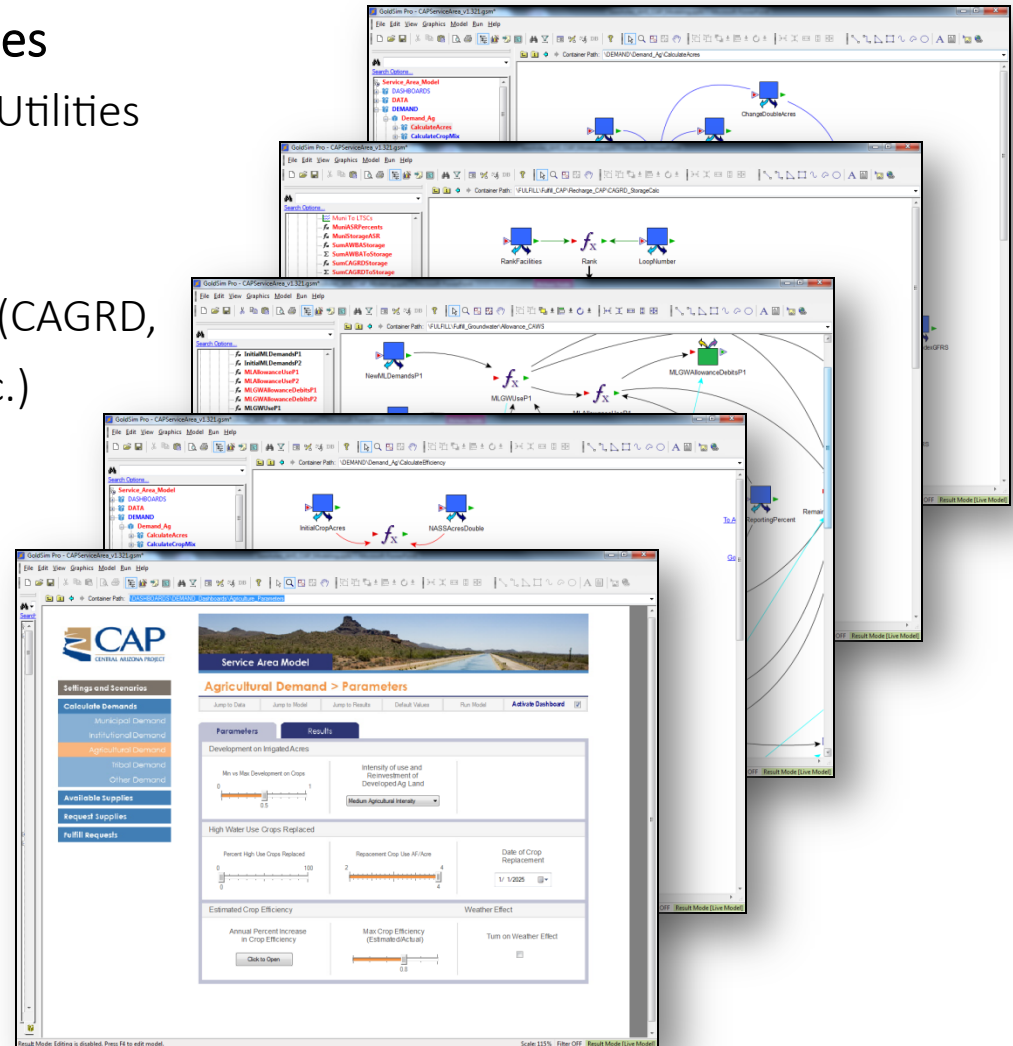
Build flexible planning and analytical capacity that can be used to support a range of policy-relevant questions

- Rates, reserves & bonding
- New supply acquisition
- Regulatory compliance
- Shortage impacts
- System capacity
- Water banking
- Board policy
- Legislation
- ...



CAP Service Area Model (CAP:SAM)

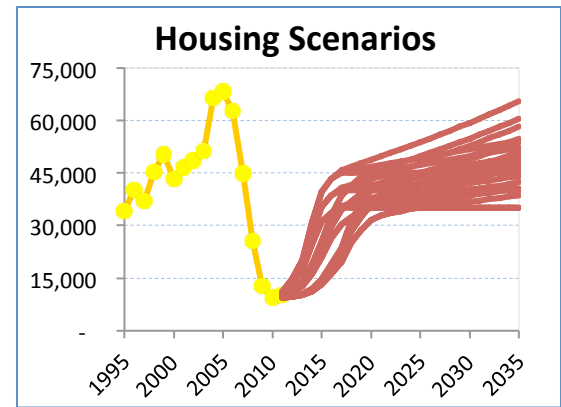
- All Major Water Using Entities
 - 80 Public & Private Water Utilities
 - 23 Irrigation Districts
 - 12 Tribes and Districts
 - 20+ other user categories (CAGRD, AWBA, Industrial users, etc.)
- 16 Water Supply Types
 - Includes Surface Water, Effluent, CAP, LTSC, Groundwater, Recovered Water, etc.
 - Incorporates shortage scenarios from Colorado River Simulation model (CRSS)



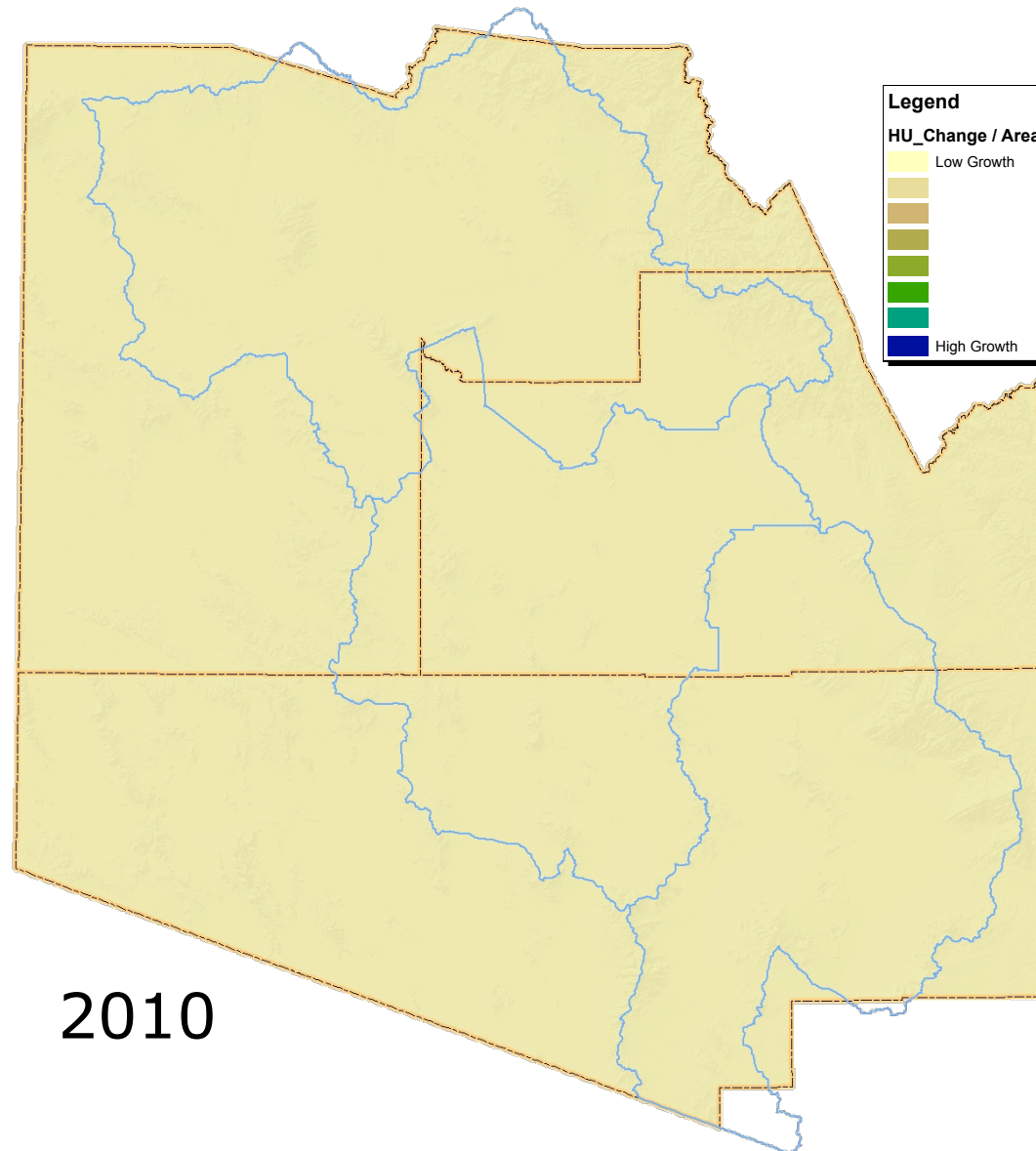
Growth

Both the rate of growth and the location of growth are critical driving forces

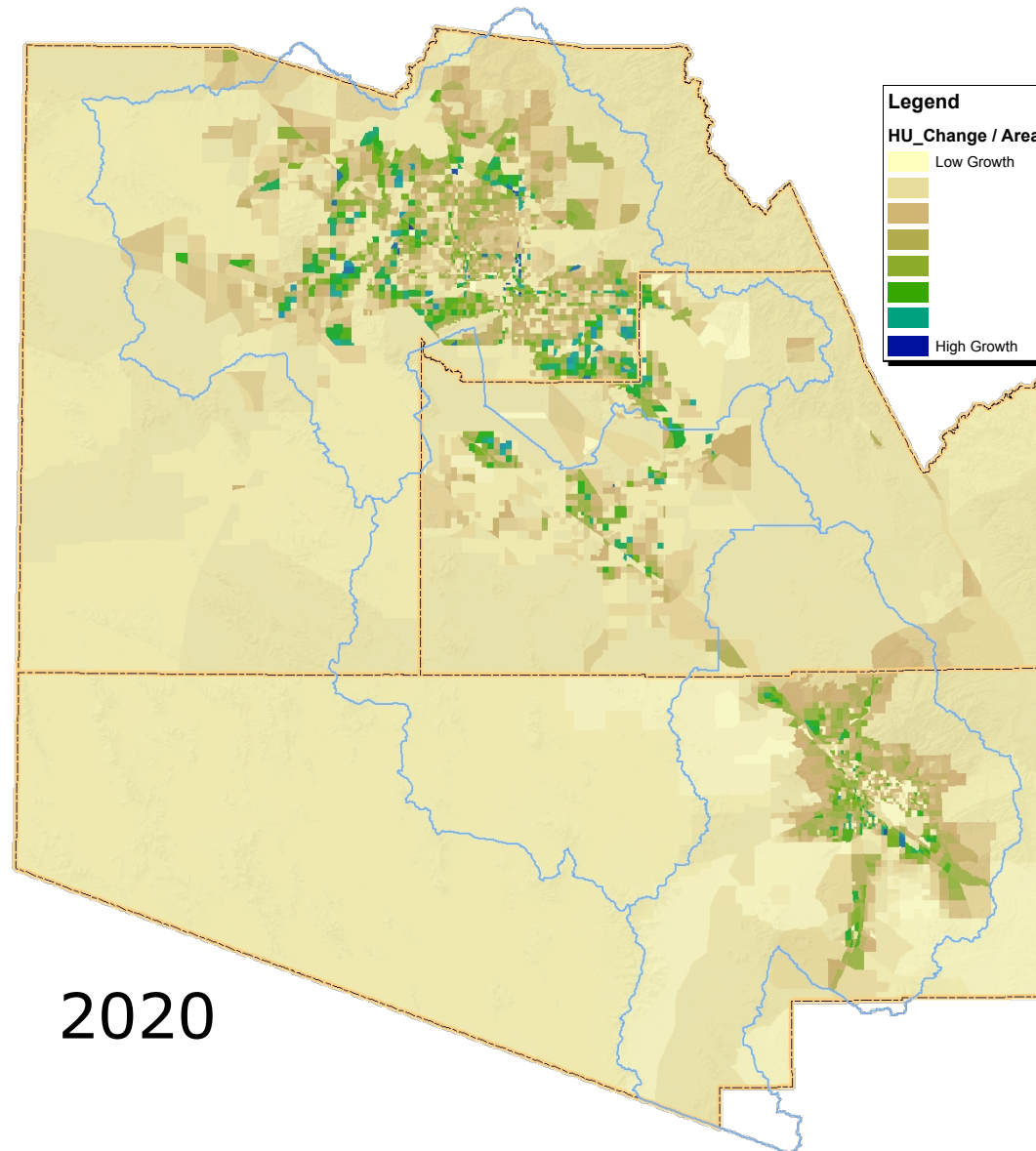
- Rate
 - Affects total use of supplies
- Location
 - Different water use characteristics for each utility
 - Different water supply portfolios
 - Different regulatory and institutional requirements



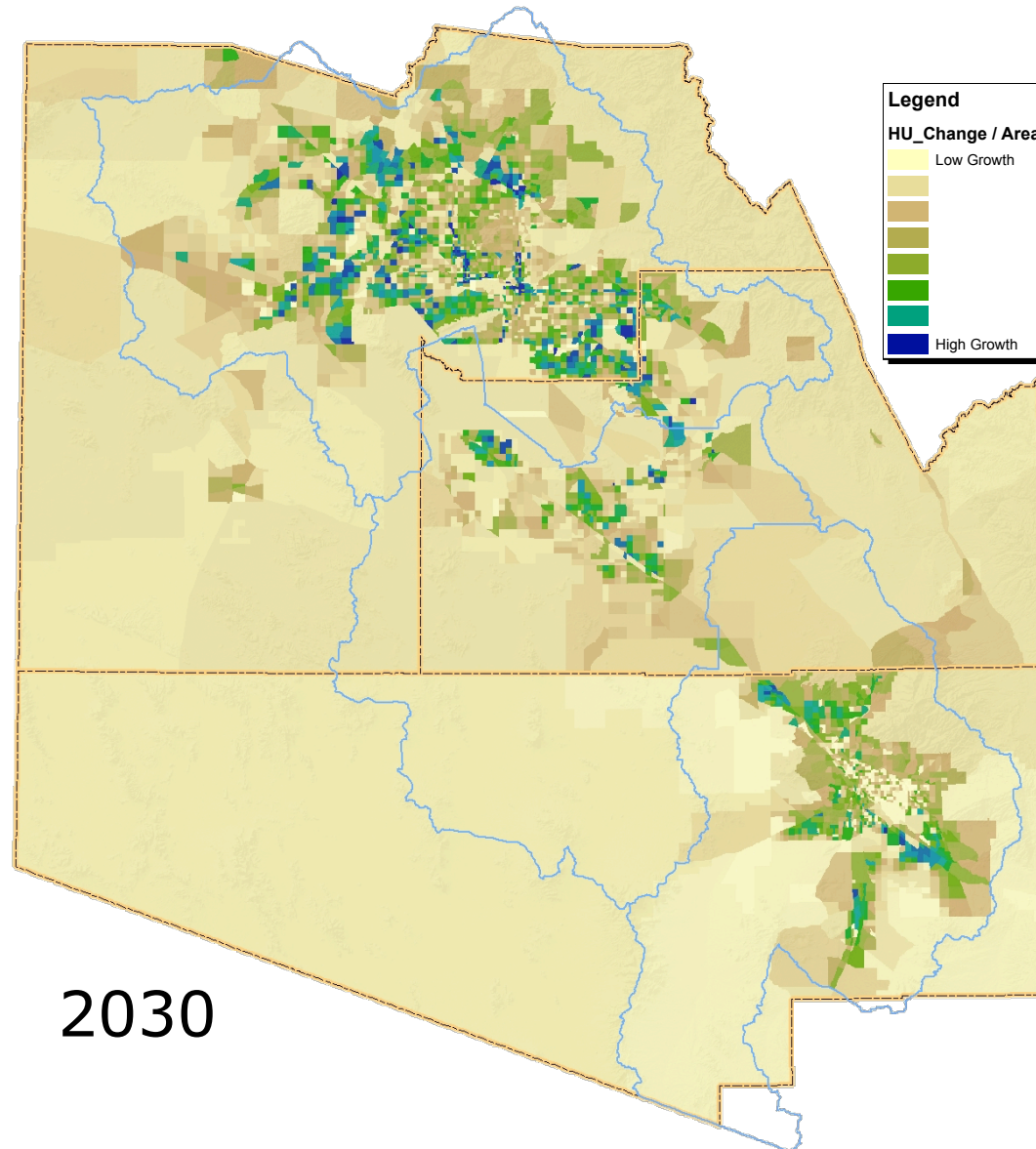
Growth & Location



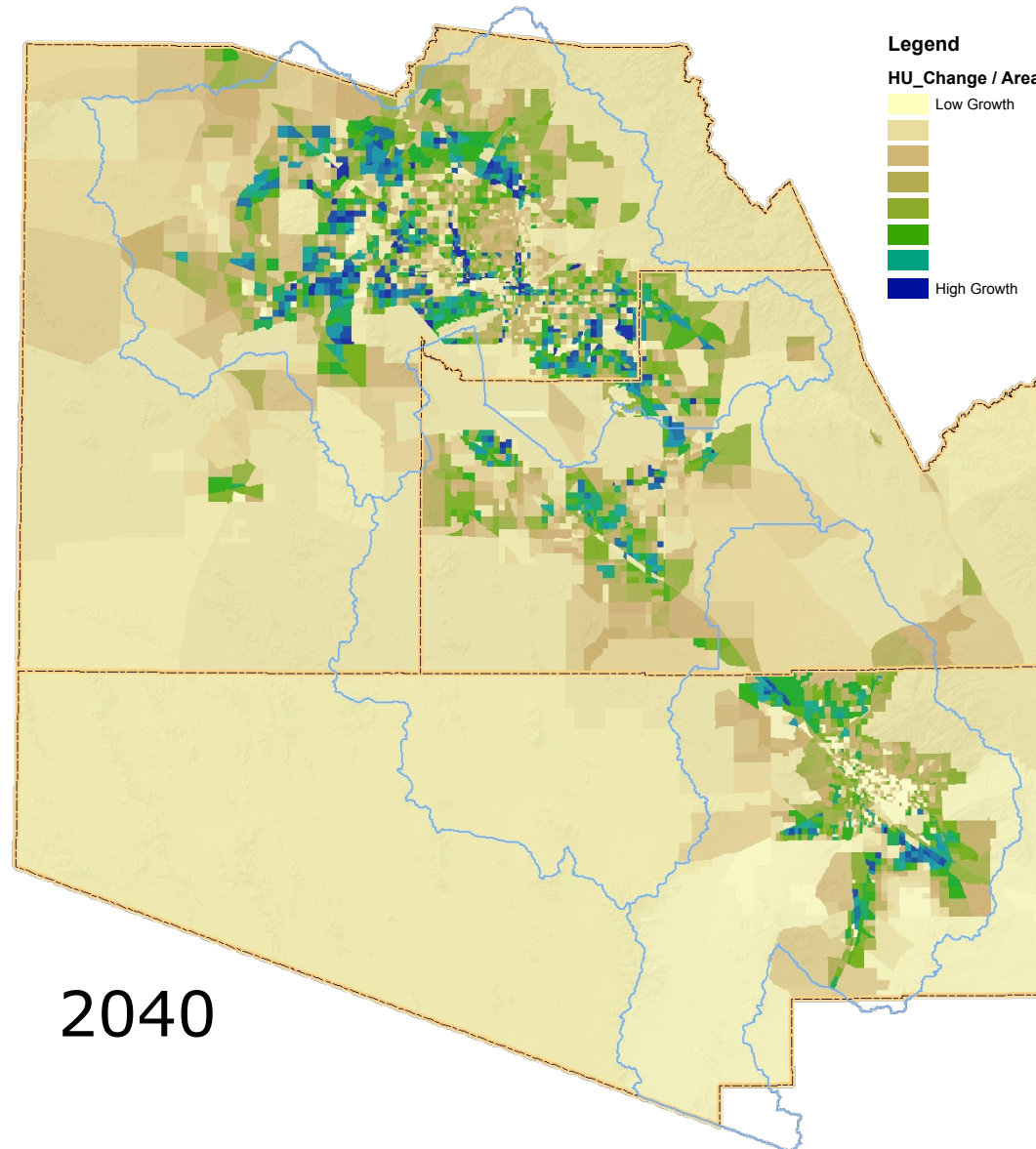
Growth & Location



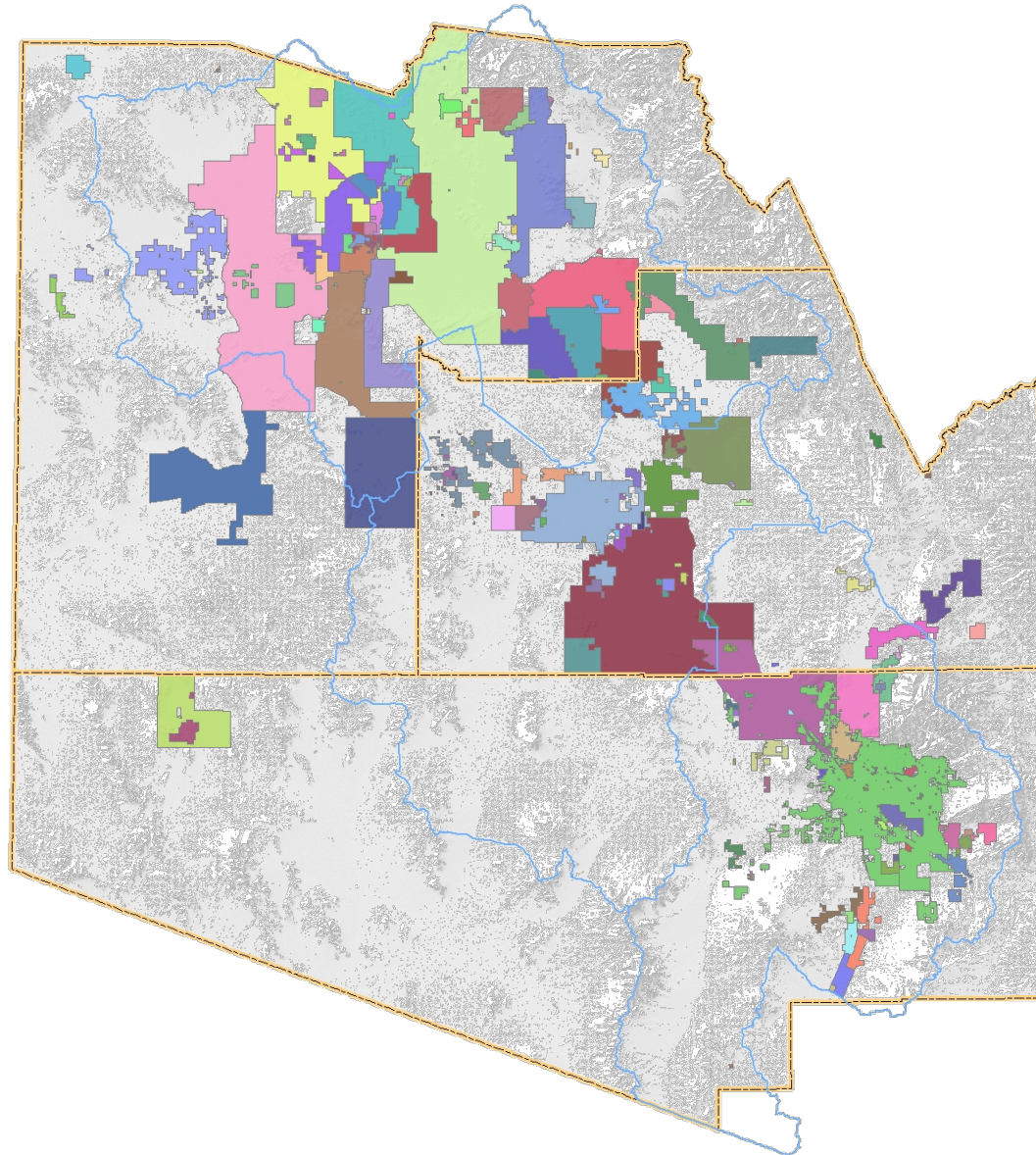
Growth & Location



Growth & Location



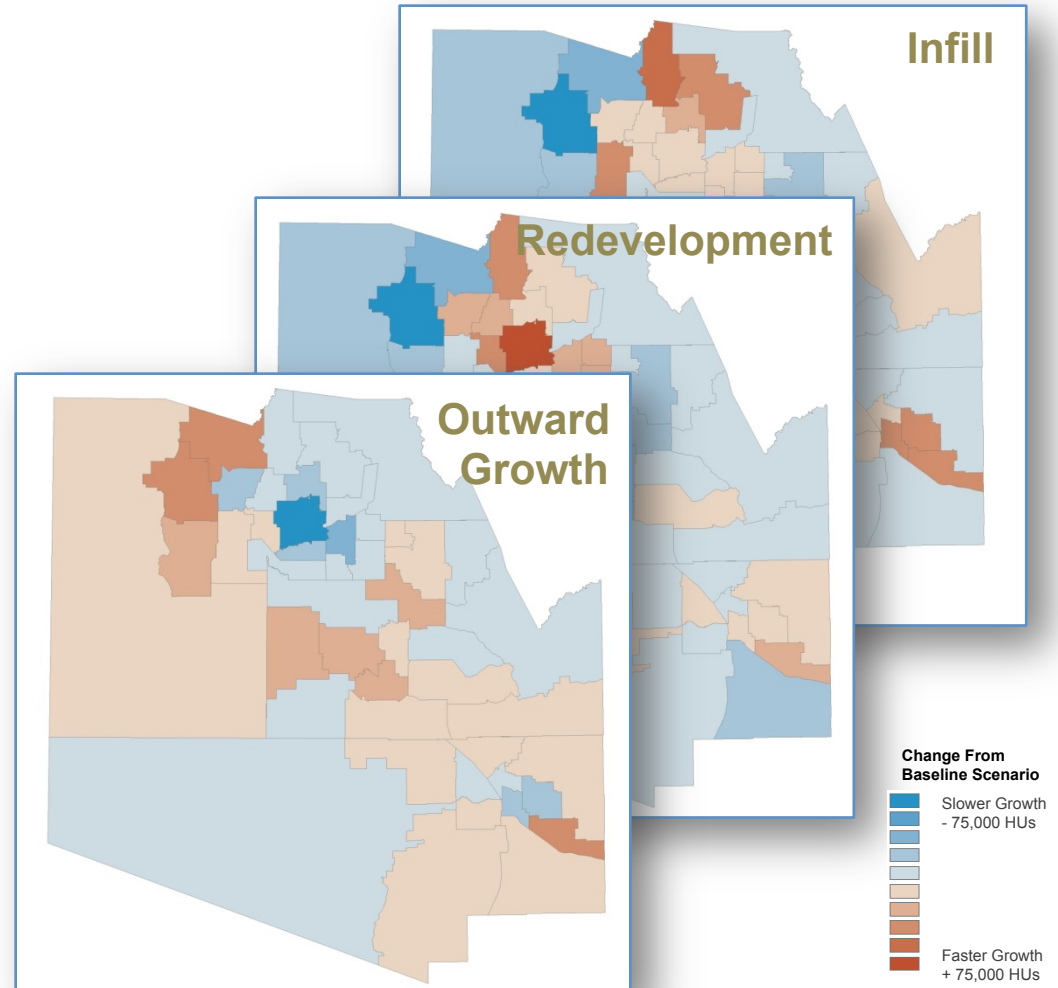
Water Utilities



Alternate Growth Patterns

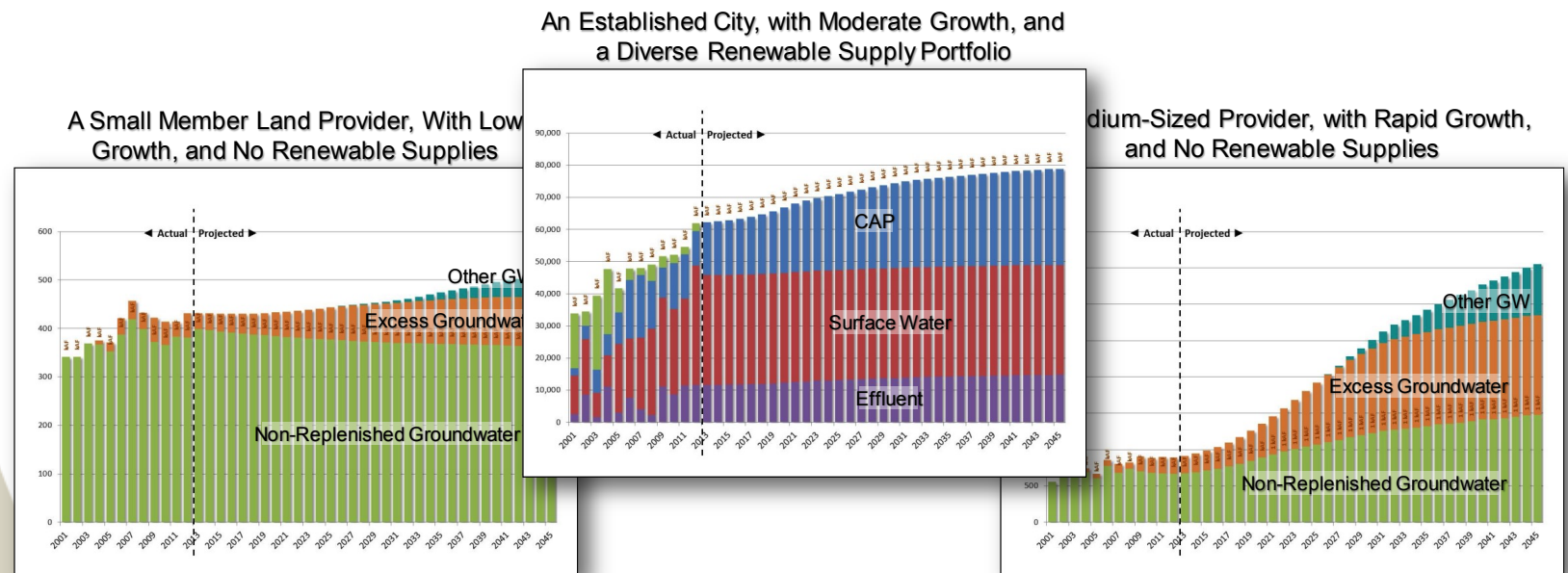
Allocation Factors

- Commute time
- Proposed development projects
- Employment centers
- Transportation infrastructure
- Land value

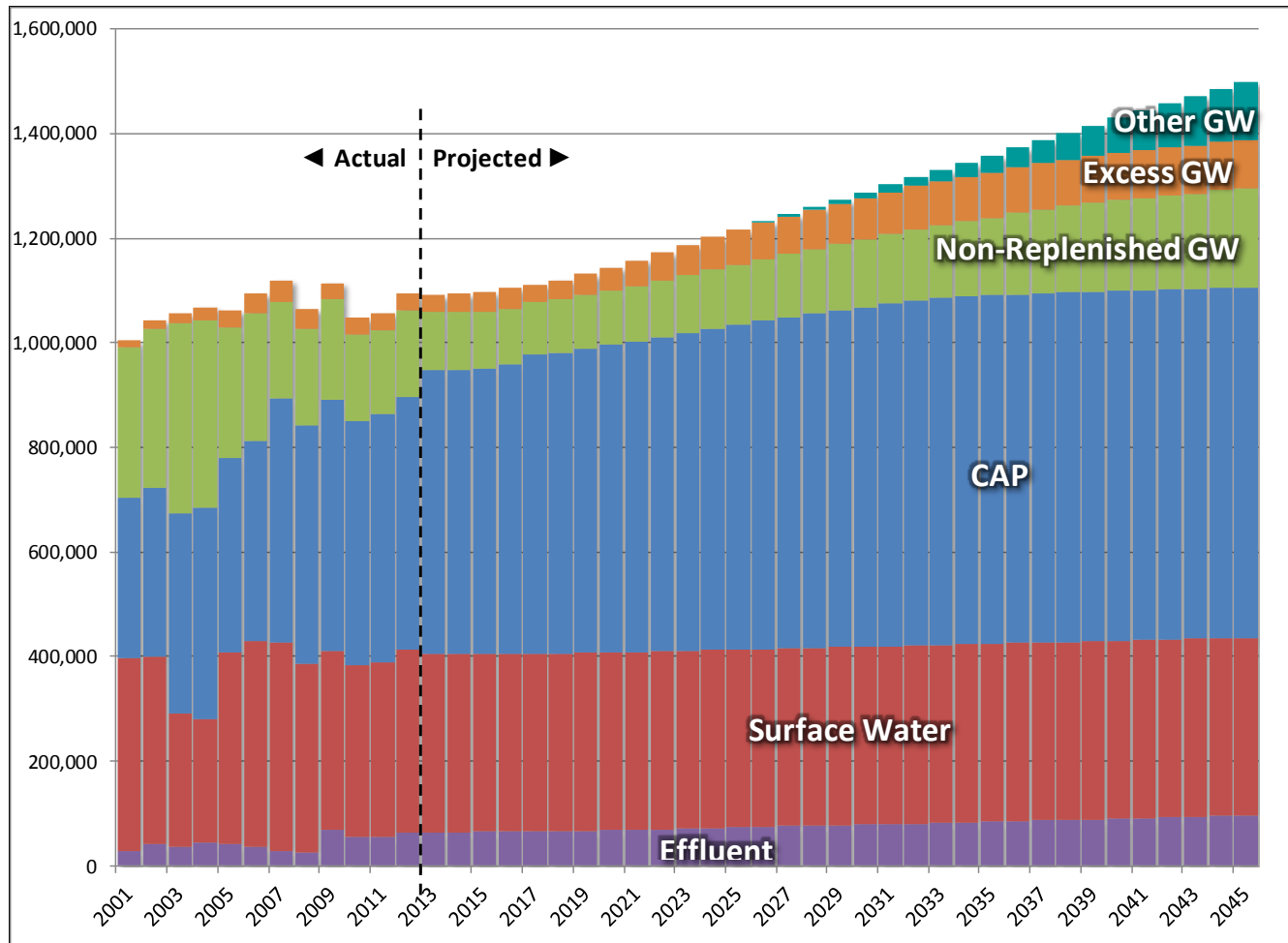


Supply & Demand

- A unique projection is created for each of the 80 utilities based on housing units, custom demand factors and their portfolio of available supplies.

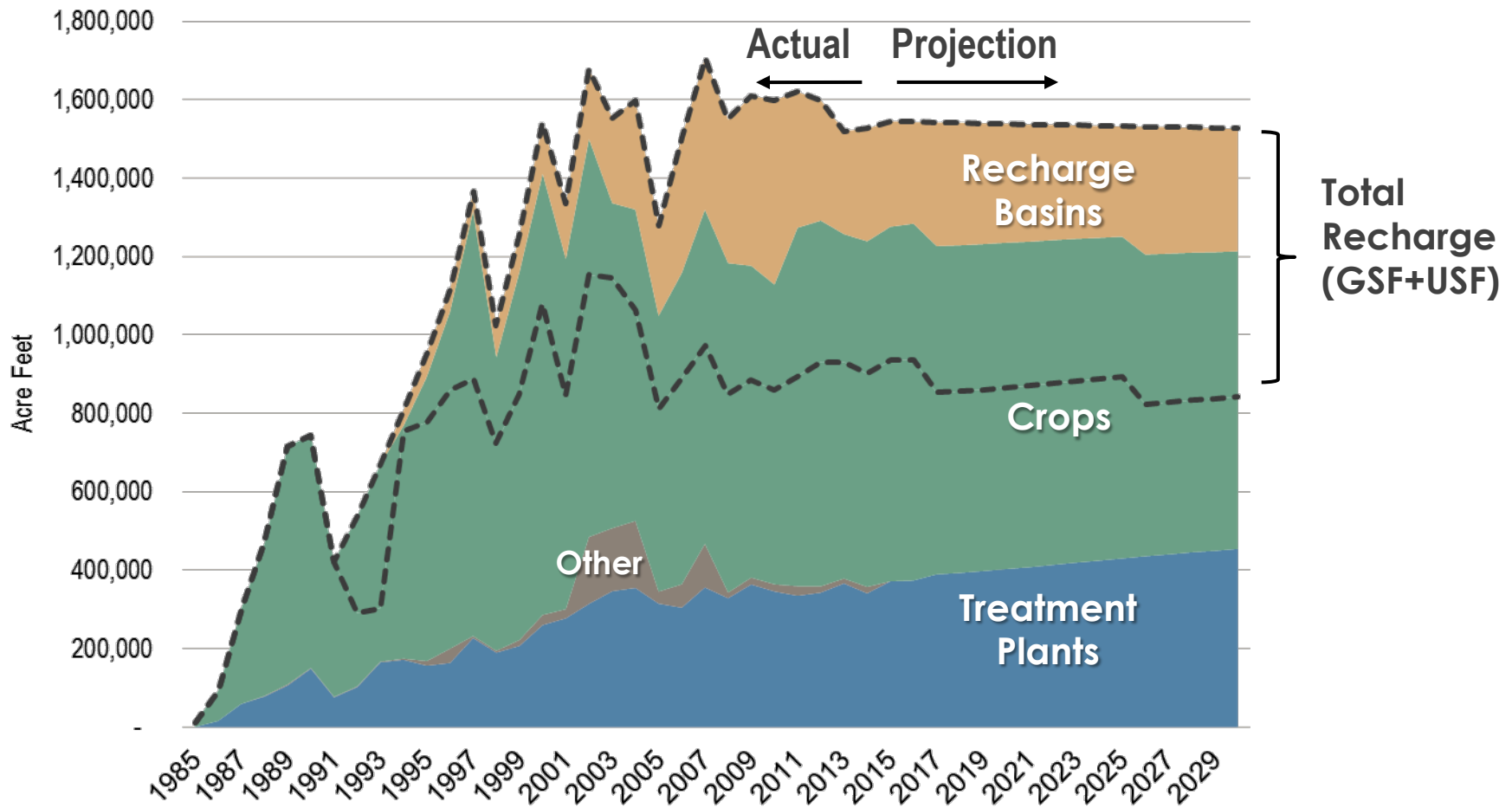


Supply & Demand: Total



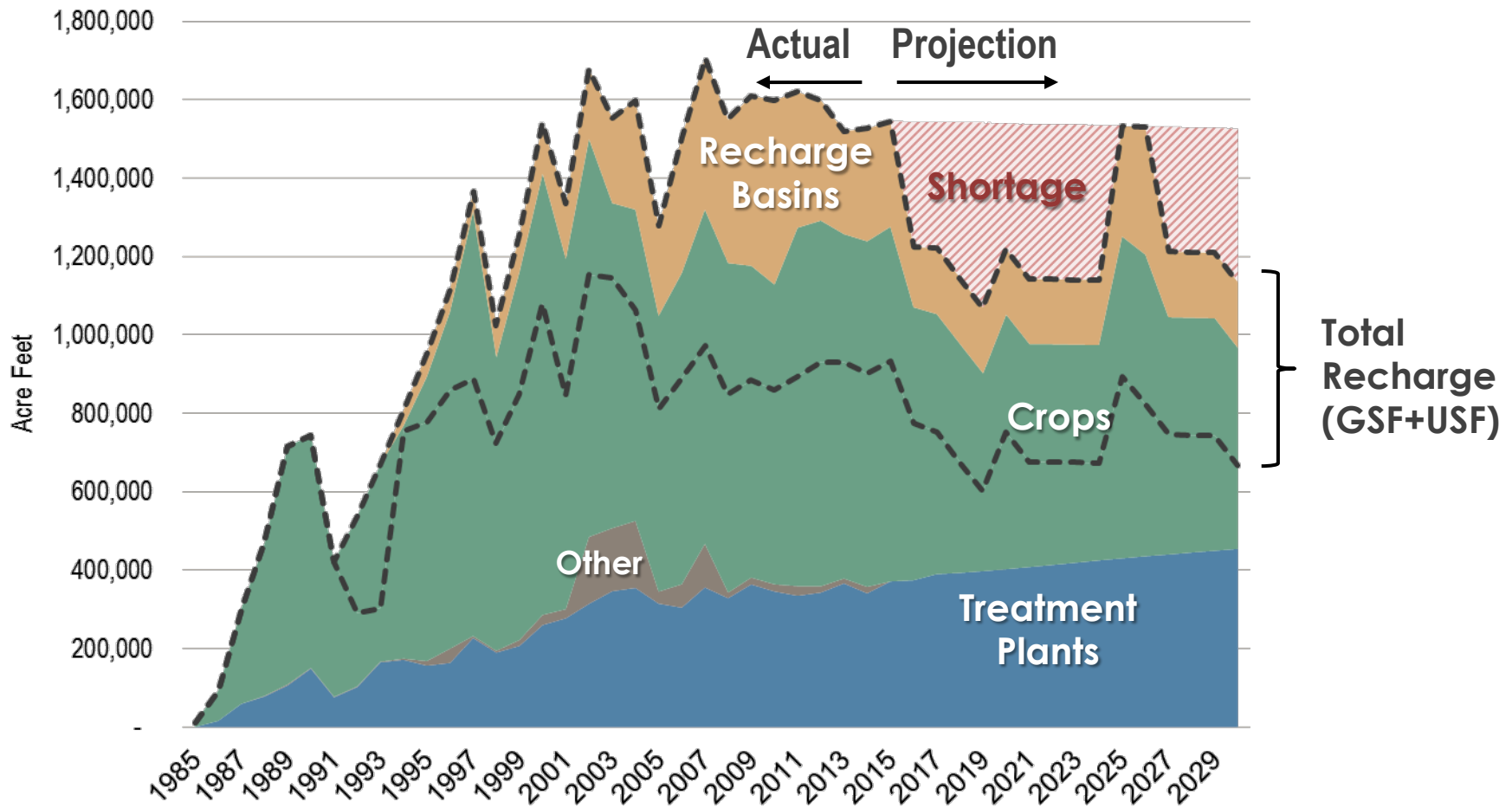
Service Area Analysis Example

CAP Water Use by Destination



Service Area Analysis Example

CAP Water Use by Destination with **Shortage**



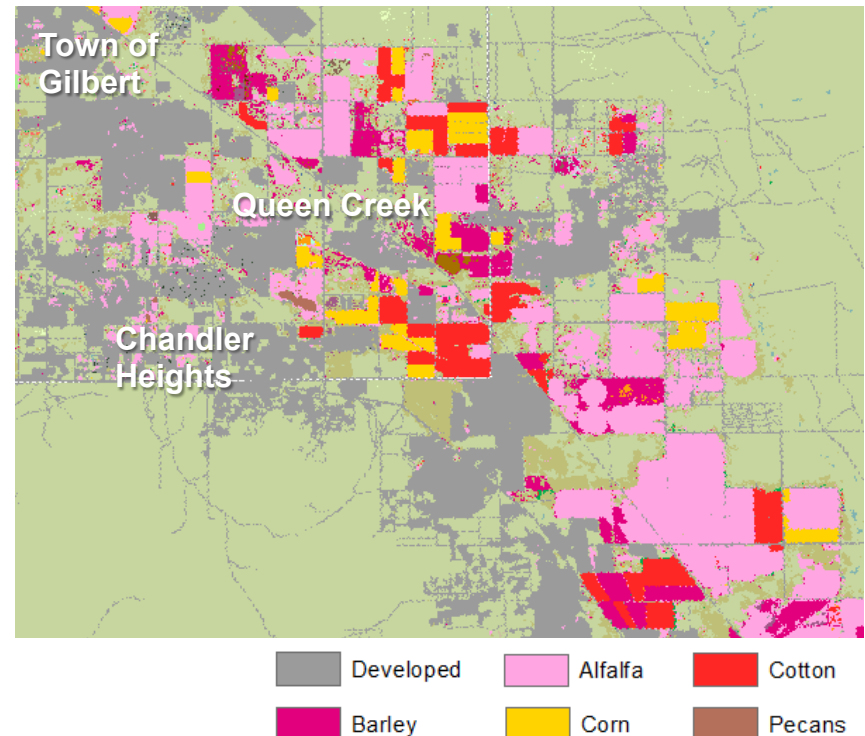
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Remote Sensing

Remote Sensing at CAP

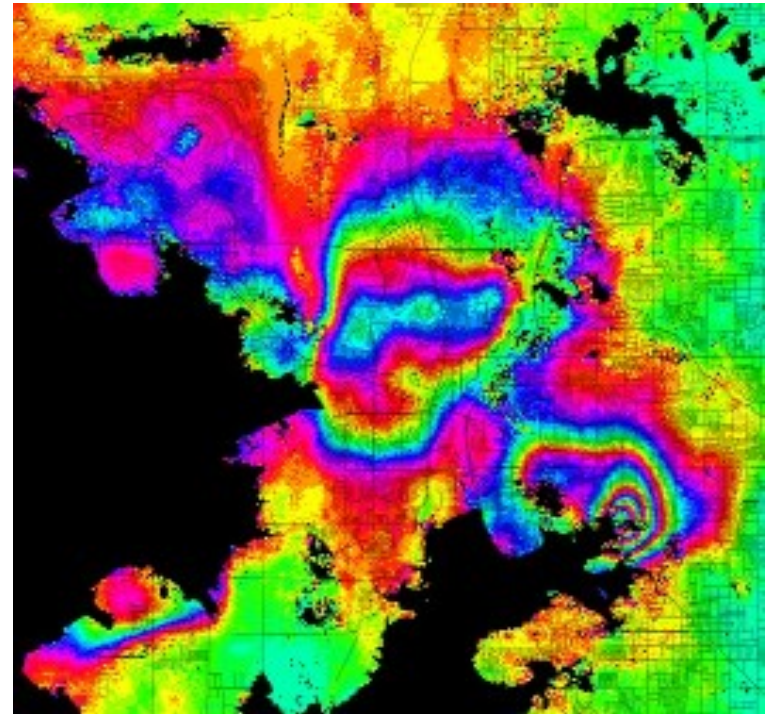
- Landsat/CropScape
(crop water budgets;
Ag urbanization
projections)

National Agricultural Statistics Service
CropScape Data Layer, 2013



Remote Sensing at CAP

- InSAR (subsidence monitoring & mitigation)



West Valley 3030 Day Interferogram, ADWR

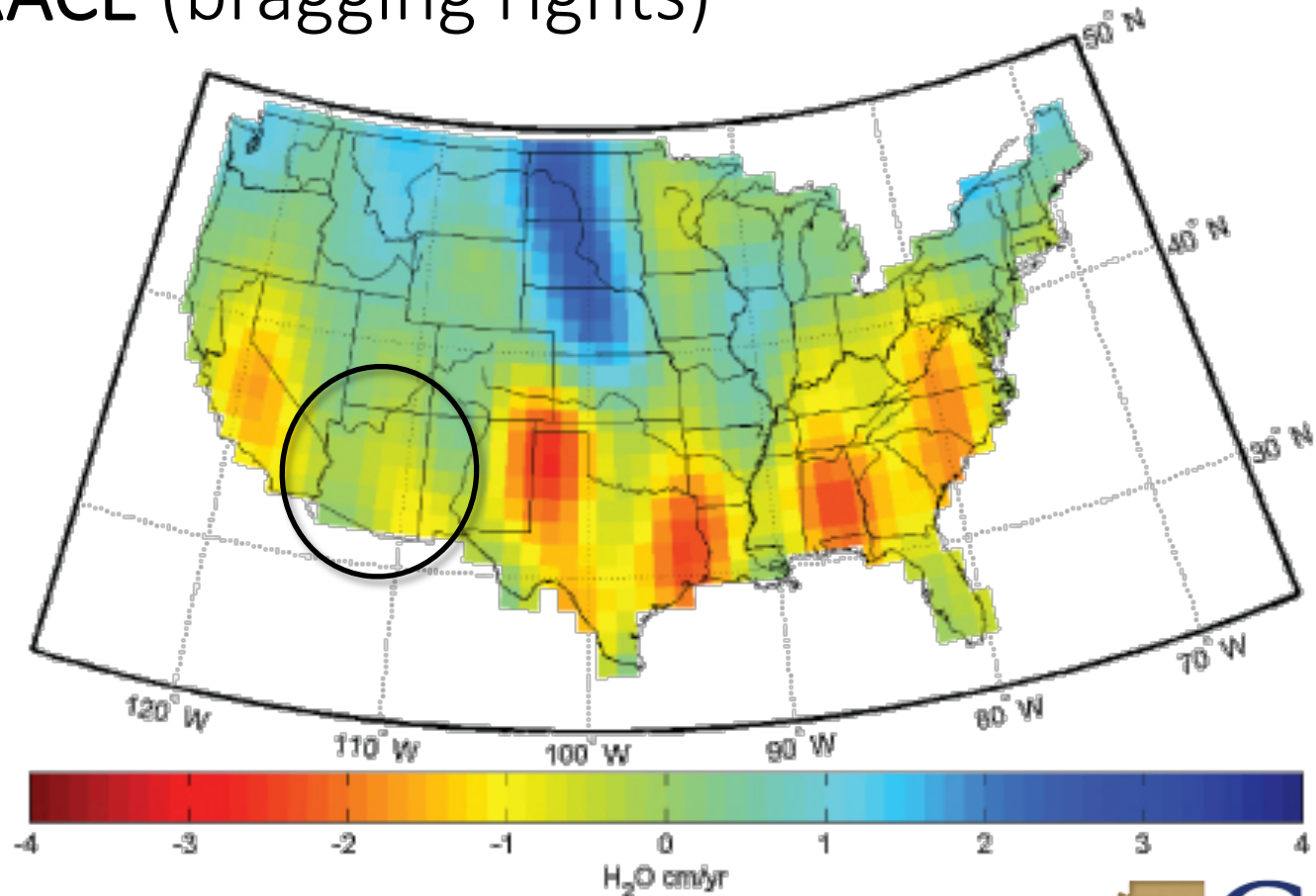
Remote Sensing at CAP

- High-Res Commercial (parcel water use verification; Ag following program)



Remote Sensing at CAP

- GRACE (bragging rights)



Jay Famiglietti and Caroline de Linage, UC Irvine

Questions?

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