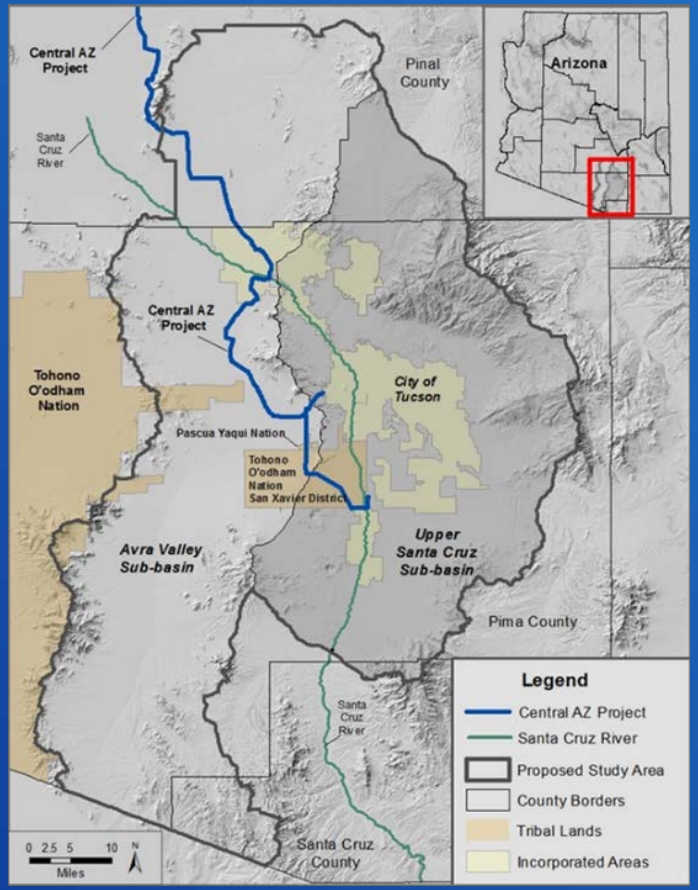
Water Supply/Demand Imbalance in the Face of Climate Change: How will we prepare?

An Overview of the Lower Santa Cruz River Basin Study



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Recent Headlines on Climate Change and Water

**'Climate change is water change' —
why the Colorado River system is headed for major trouble**
(Washington Post, 8/19/16)

Unchecked climate change raising risks of megadrought in the Southwest
USA Today, 10/6/16

Warm weather reducing Colorado River runoff, study finds
(AZ Daily Star, 3/11/16)

Climate Change Poses Existential Water Threats (National Geographic, 2/7/15)

What Happens When the American Southwest Runs Out of Water?
(Esquire, 6/1/16)

As Lake Mead dwindles, can an interstate water war be far behind?
(L.A. Times, 5/23/16)

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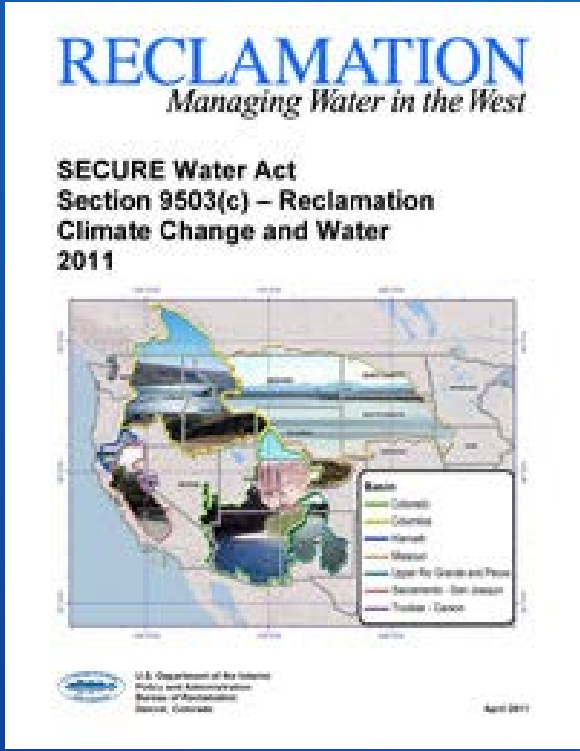
Central Arizona Project and the Tucson Region

- CAP priority system designates which “pools” will be reduced during Colorado River shortages
- Tucson area’s supplies have high-priority (Municipal & Industrial and Indian pools)
- Region is planning for shortages in the long-term

SECURE Water Act of 2009

- **Directs the Secretary of the Interior to establish a climate change adaptation program to:**
  - *Assess risks* to water supply
  - *Analyze the impacts* of changes in water supply on a variety of demands
  - *Develop adaptation strategies* in consultation with non-Federal participants

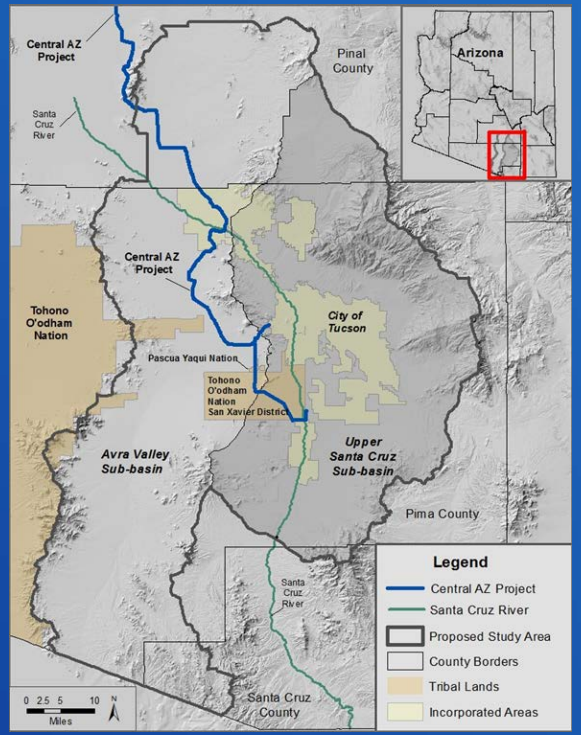


What is the Lower Santa Cruz River Basin Study?

Three year, $785,750 partnership between Reclamation and partners to:

- Project future supply/demand imbalances (due to climate change and other factors)
- Evaluate risks to infrastructure and other systems
- Develop and investigate adaptation strategies (structural and non-structural)
- Perform trade-off analysis of strategies

Planning horizon: today through 2060



LSCR Basin Study Area is identical to Tucson Active Management Area

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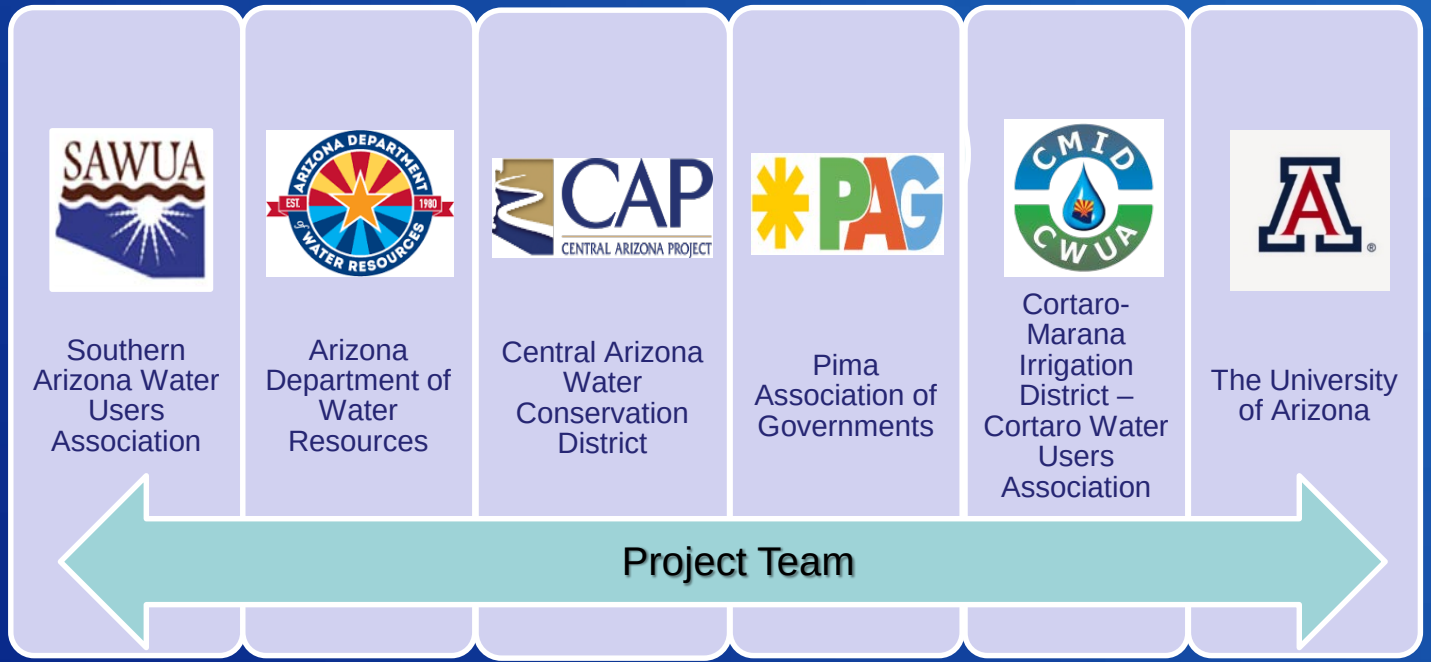
Cost-Share Partners



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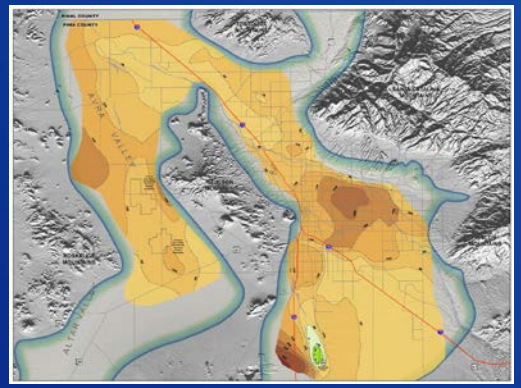
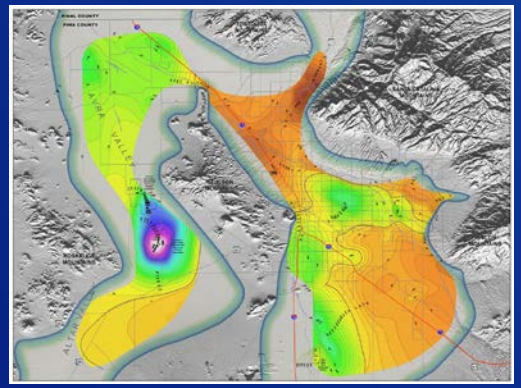
LSCR Basin Study Objectives

Tucson Basin Water Level Changes



1950 - 2000



2000 - 2014

1) Identify Where Physical Water Resources are Needed to Mitigate Supply-Demand Imbalances

2) Develop Strategies to Improve Water Reliability for Municipal, Industrial, Tribal, Agricultural and Environmental Sectors

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Water for the Environment

- Includes analyses of riparian areas
- Local subject matter experts will select areas of interest and type of analysis
- Adaptation alternatives include ways to meet environmental needs

Source: Pima Association of Governments

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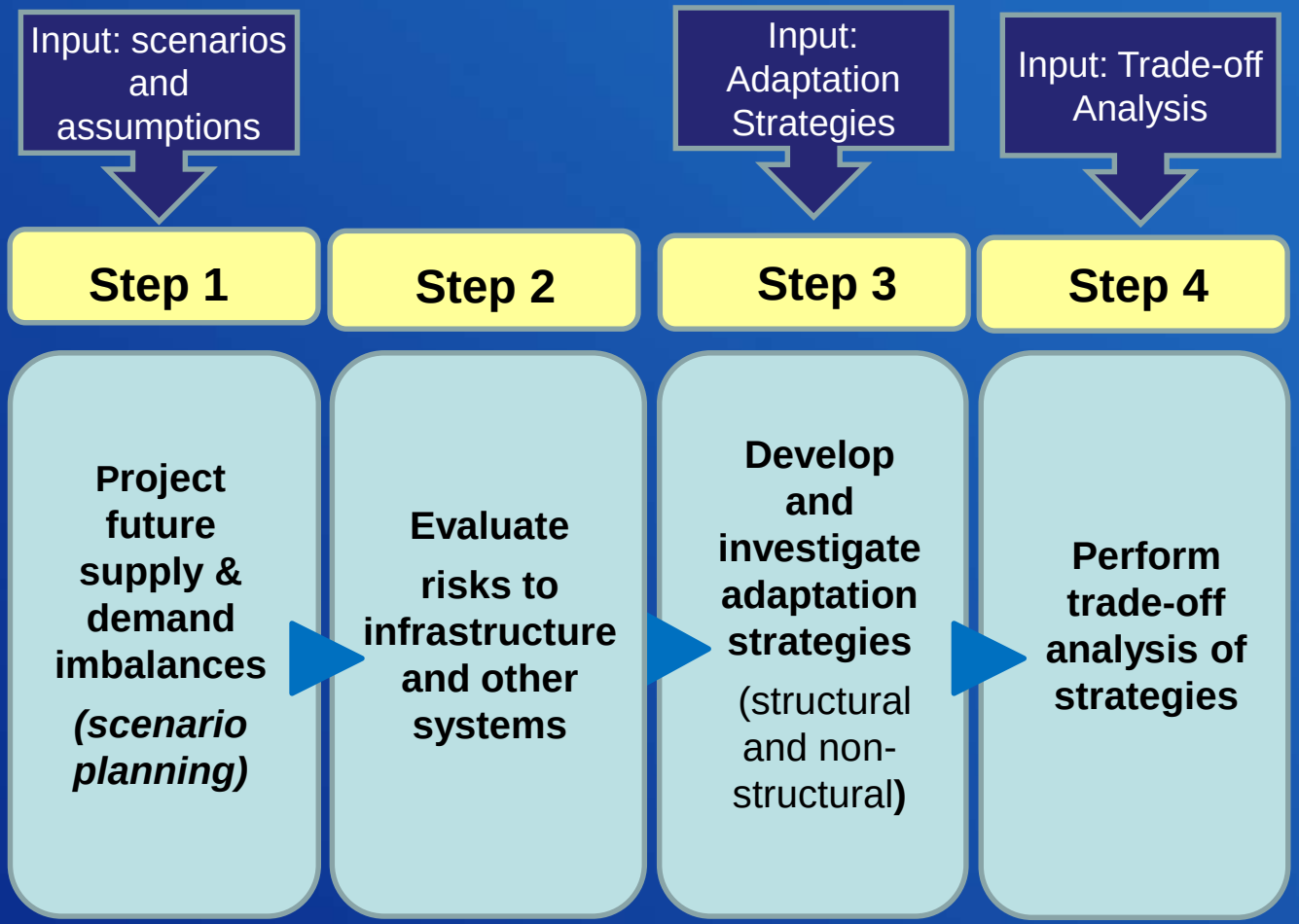
Public Involvement: Key Part of Process



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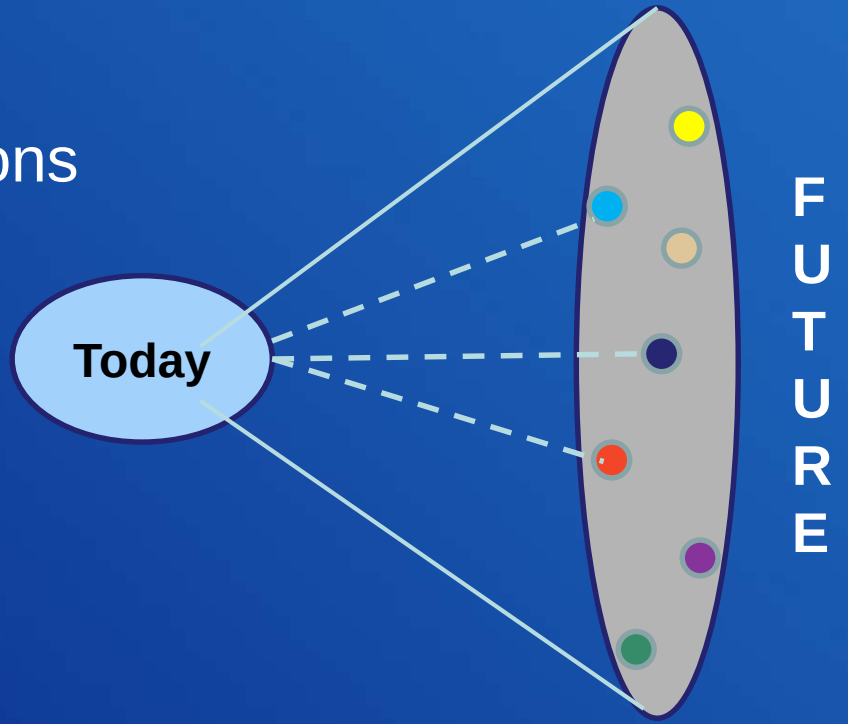
Scenario Planning

Scenarios: plausible futures, based on consistent assumptions

- ***Climate scenarios***: based on amount of greenhouse gases that will be emitted to the atmosphere in the future
- ***Socio-economic scenarios***: include demographic changes, changes in the economy, water conservation rates



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Scenarios will Focus on Risk to Water Providers

"Base Case" (w/o Climate Change)

Supply and Demand

Supply	Demand
CAP Deliveries	Municipal
Local Ground and Surface Water	Industrial
Recycled Water	Tribal
Stormwater	Agricultural
	Environmental

"Best Case"

Supply and Demand

Supply	Demand
CAP Deliveries	Municipal
Local Ground and Surface Water	Industrial
Recycled Water	Tribal
Stormwater	Agricultural
	Environmental

"Worse Case"

Supply and Demand

Supply	Demand
CAP Deliveries	Municipal
Local Ground and Surface Water	Industrial
Recycled Water	Tribal
Stormwater	Agricultural
	Environmental

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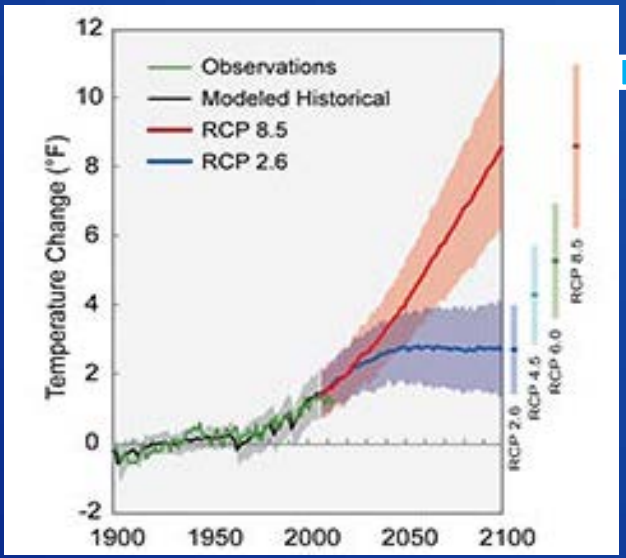
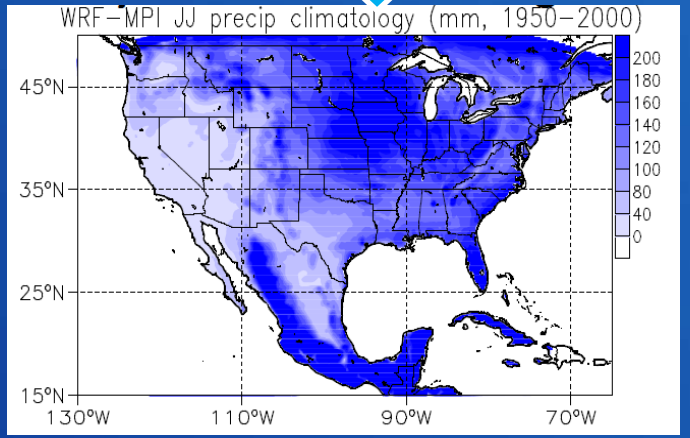
LSCR Basin Study Modeling Diagram



Emissions Scenarios

Global Climate Model



Downscaled Climate Model

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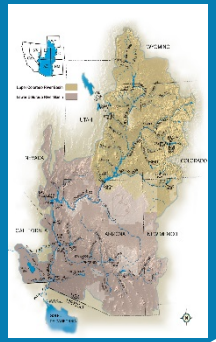
"Chain of Models" Concept

Global Climate Model

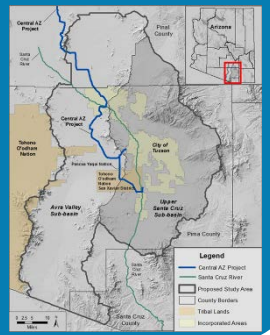
Downscaled Climate Model

Surface Water Flow Model

Colorado River Basin



Tucson Basin



Tucson AMA Ground-water Model

Available water supplies

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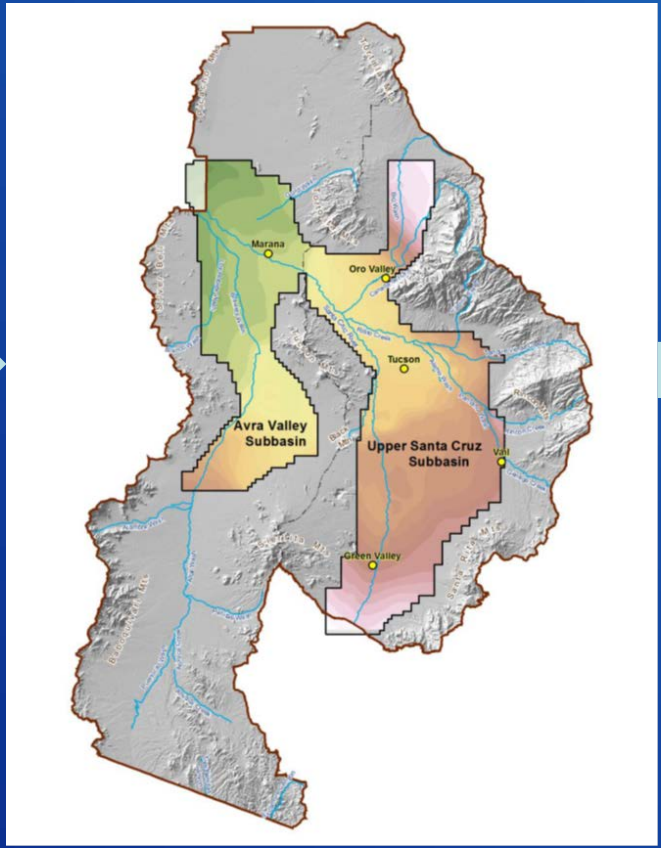
Tucson Active Management Area Groundwater Model

Inflows

- Mountain Front Recharge
- Stream Infiltration
- Underflow from other basins
- Artificial Recharge (CAP and effluent)
- Agricultural Recharge
- Incidental Recharge



Outflows

- Pumping (Municipal, Industrial, Agricultural)
- Evapotranspiration
- Underflow to other basins

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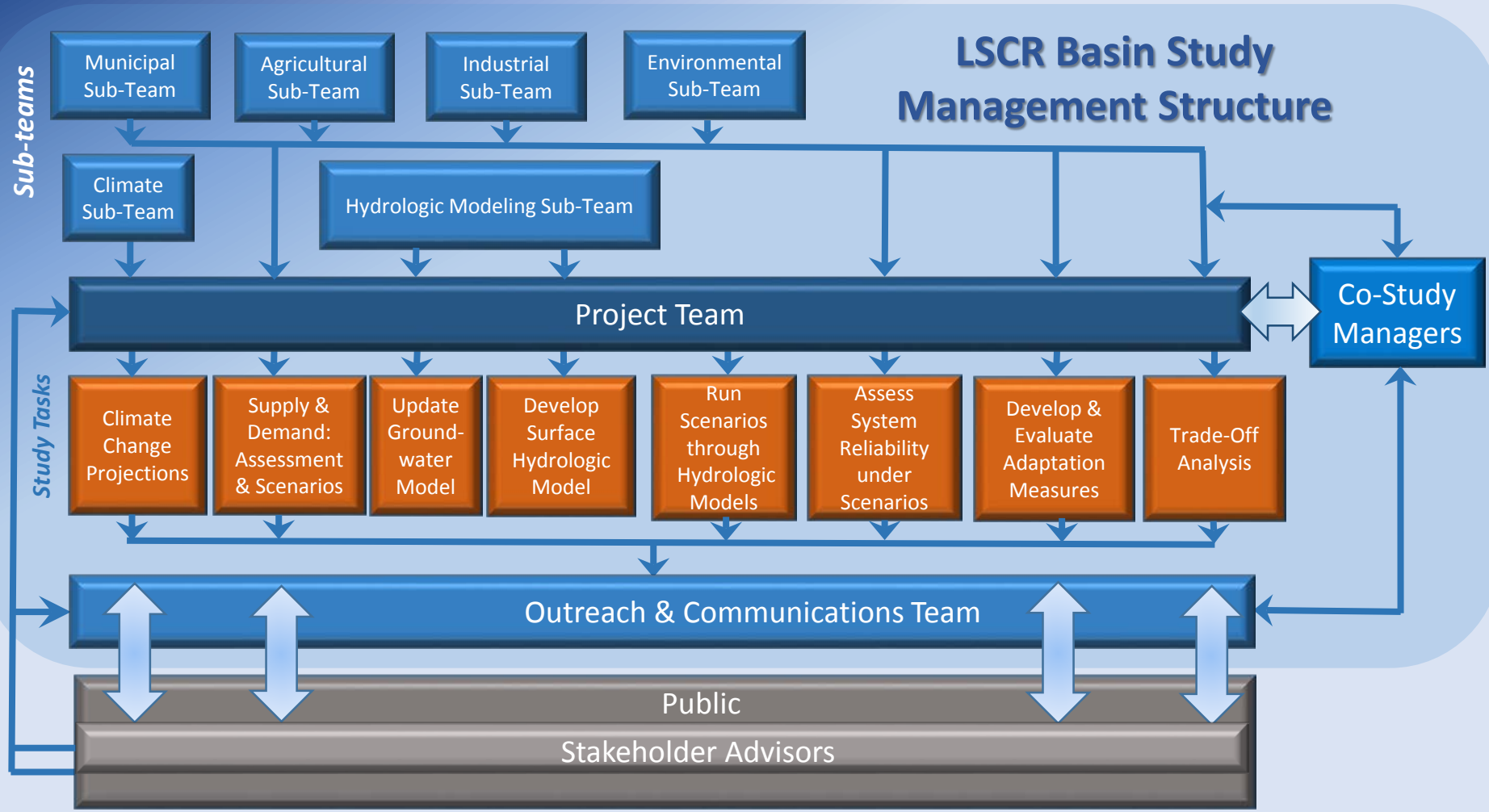
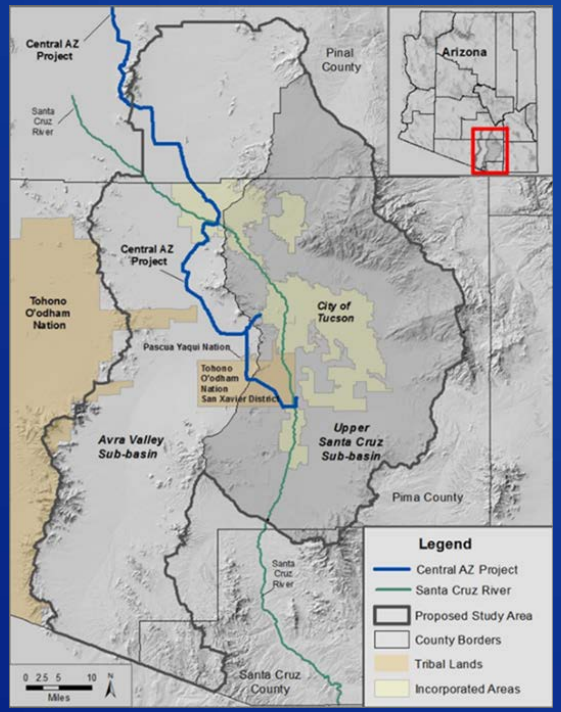

LSCR Basin Study
Management Structure
Sub-teams
Municipal Sub-Team
Agricultural Sub-Team
Industrial Sub-Team
Environmental Sub-Team
Climate Sub-Team
Hydrologic Modeling Sub-Team
Project Team
Co-Study Managers
Study Tasks
Climate Change Projections
Supply & Demand: Assessment & Scenarios
Update Ground-water Model
Develop Surface Hydrologic Model
Run Scenarios through Hydrologic Models
Assess System Reliability under Scenarios
Develop & Evaluate Adaptation Measures
Trade-Off Analysis
Outreach & Communications Team
Public
Stakeholder Advisors

Summary



- Study addresses impacts of changing climate, population and water use rates through 2060
- Focus on spatial distribution of resources in basin
- Includes water for the environment
- Scenario approach to explore range of futures
- State-of-the-art models and climate projections
- Public invited to become Stakeholder Advisors

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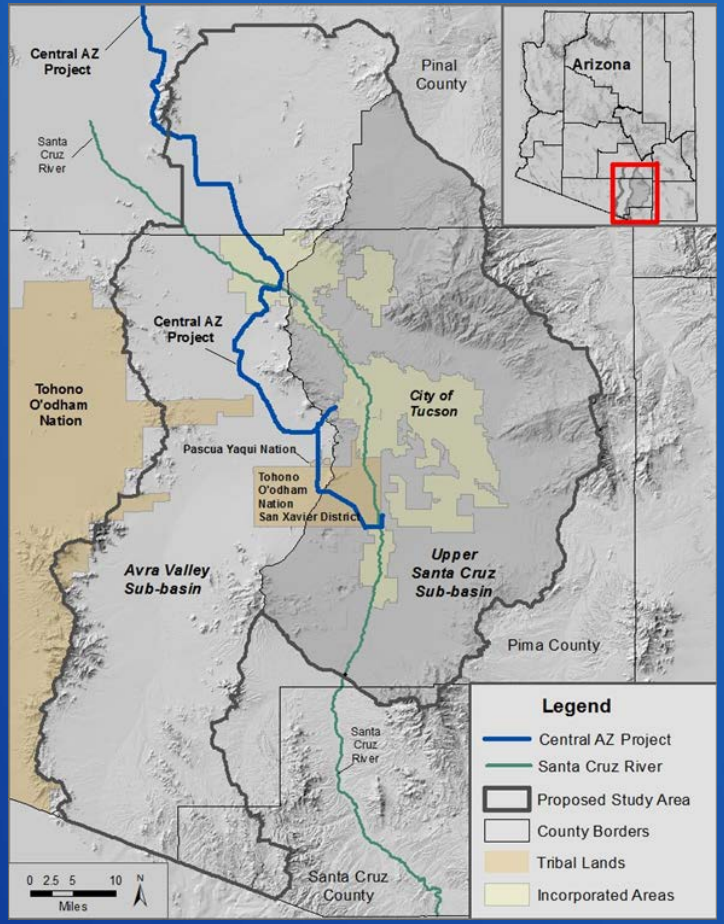
Questions?

Project Website:
http://www.usbr.gov/lc/phoenix/programs/lscrbasin/LSCRBStudy.html or www.sawua.org

Project Email:
bor-pxa-lscrbs@usbr.gov



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