



COLLEGE OF
AGRICULTURE
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Groundwater, Climate and Stakeholder Engagement (GCASE)

UPDATE

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IBWC Southeast Arizona Citizens Forum

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Project Team

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Advisory Committee: Representatives from Arizona Dept. of Water Resources, US Geological Survey, Salt River Project, and City of Nogales, AZ

Stakeholders

GCASE Project Approach

STAKEHOLDER ENGAGEMENT



MODELING FRAMEWORK

Hourly Rainfall Generator



Daily Streamflow Model



Groundwater Storage Changes



Assessment of Management Scenarios

PROJECTIONS OF FUTURE CLIMATE

Future climate scenarios
from output of
dynamically downscaled
climate models

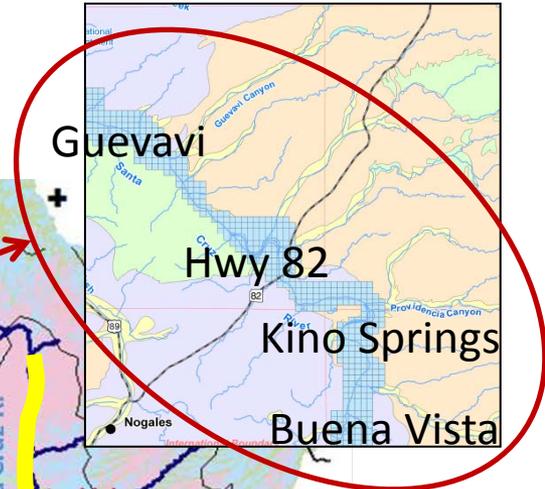
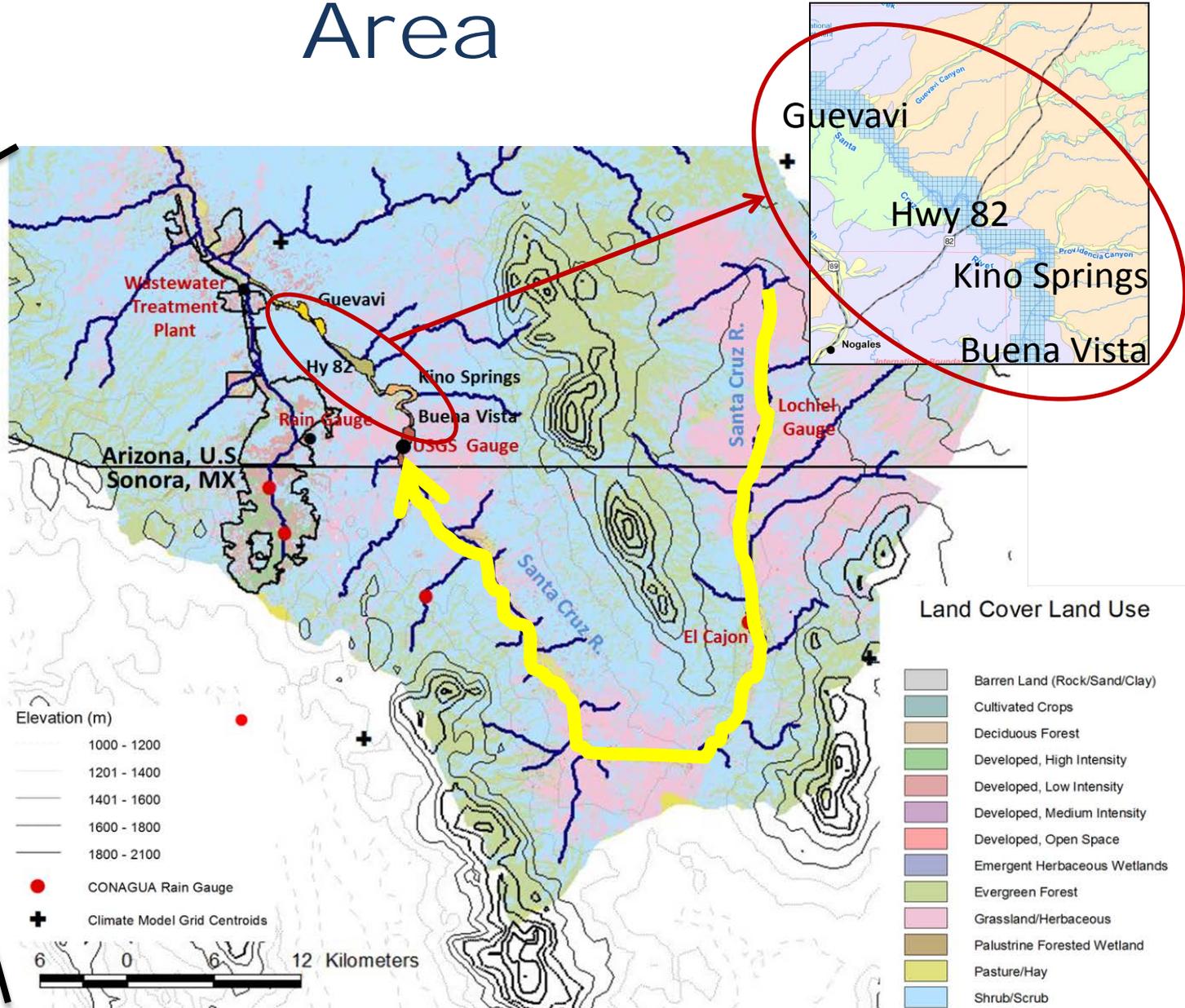


- Case study – Santa Cruz AMA
- Transferability Workshops –
 - Prescott AMA
 - Phoenix Region
 - Tucson Region
 - San Pedro River Basin

Components of GCASE

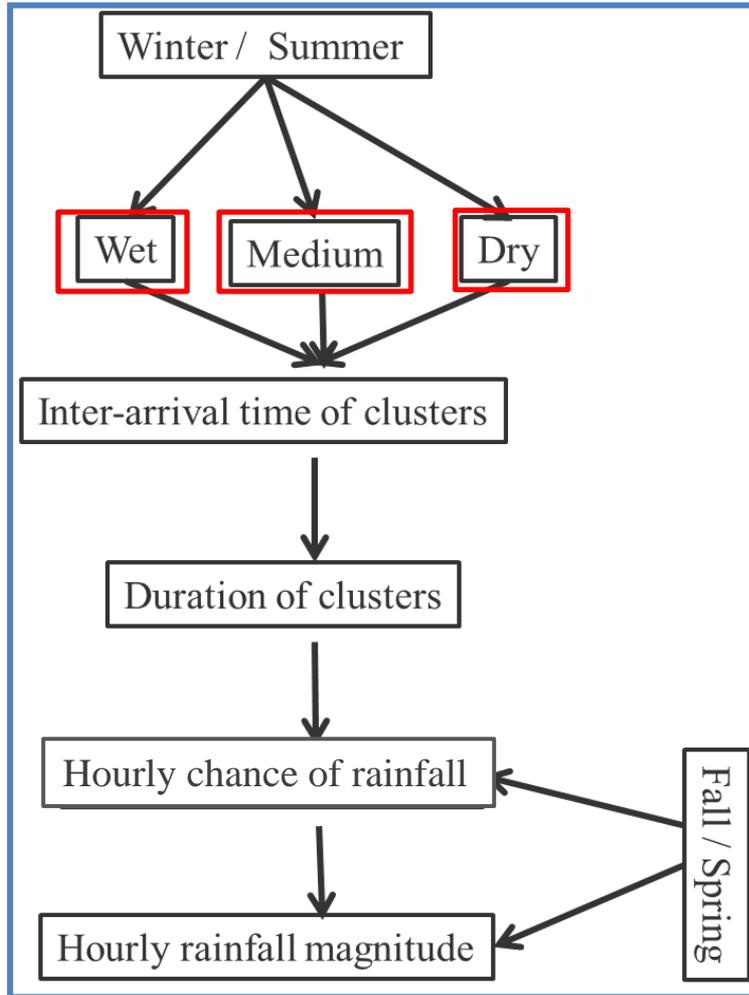
1. Enhance model framework with information from dynamically downscaled climate model projections
2. Analyze the case study of the “microbasins” on the Upper Santa Cruz River
3. Investigate the transferability of the methodology used in the GCASE project

Santa Cruz River Case Study Area

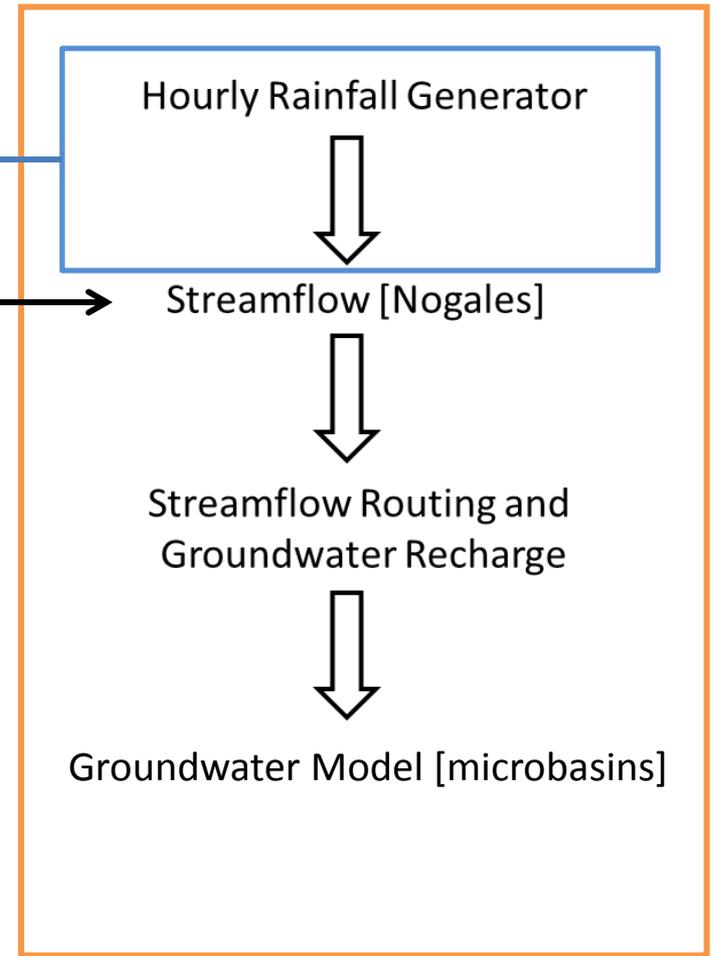


Rainfall Generator

Modeling Framework

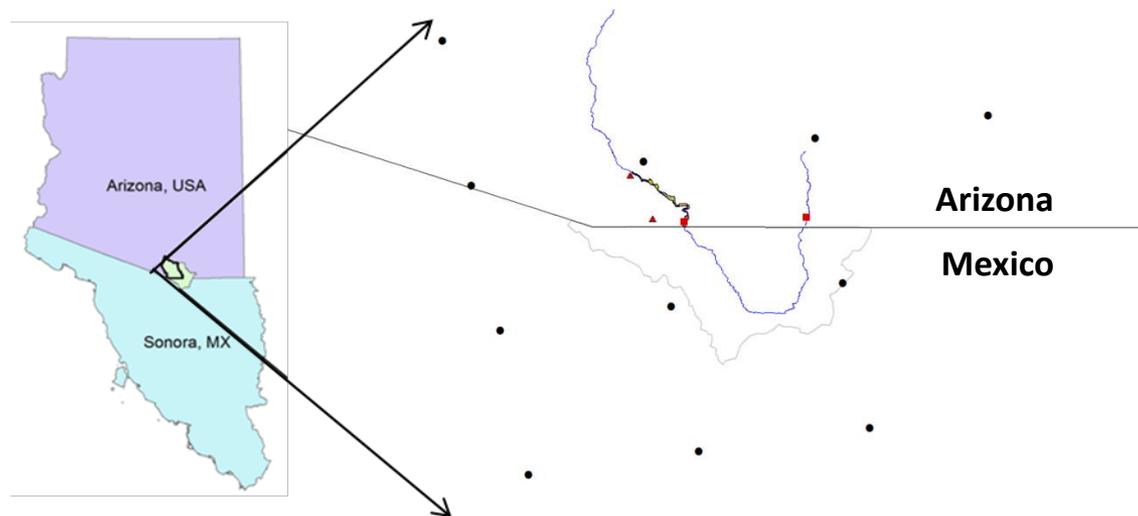


Multiple Likely Rainfall Scenarios



Multiple Likely Groundwater Response Scenarios

Projections of Wetness Categories from 8 Regional Climate Models



SUMMER

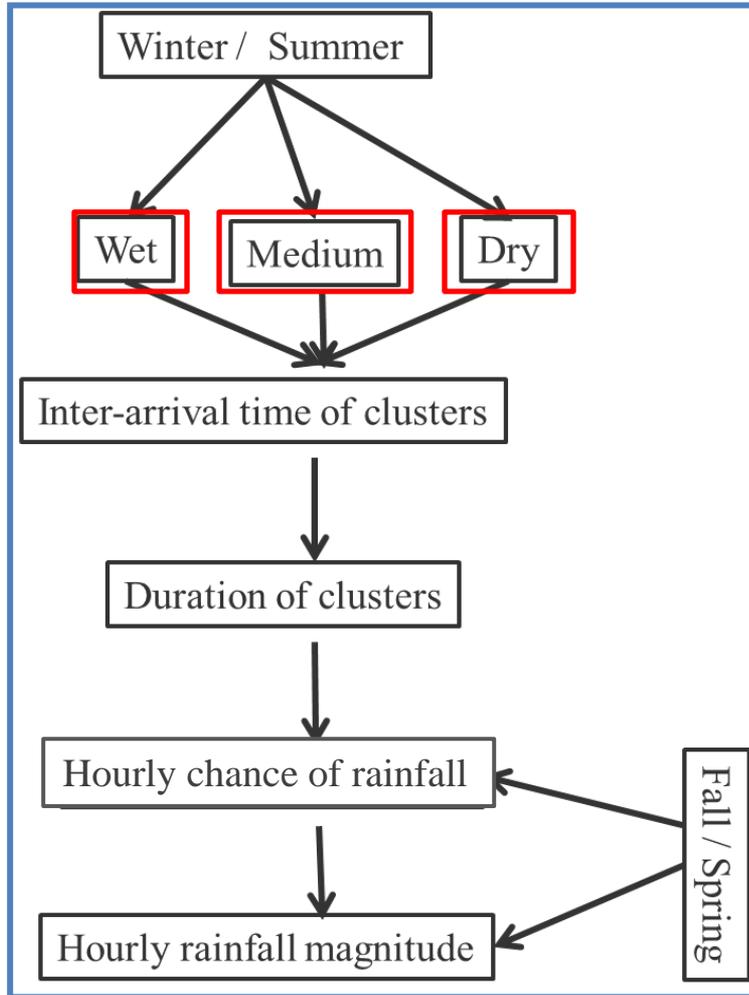
- 7 models indicate higher frequency of dry summer
- 6 models indicate lower frequency of wet summer

WINTER

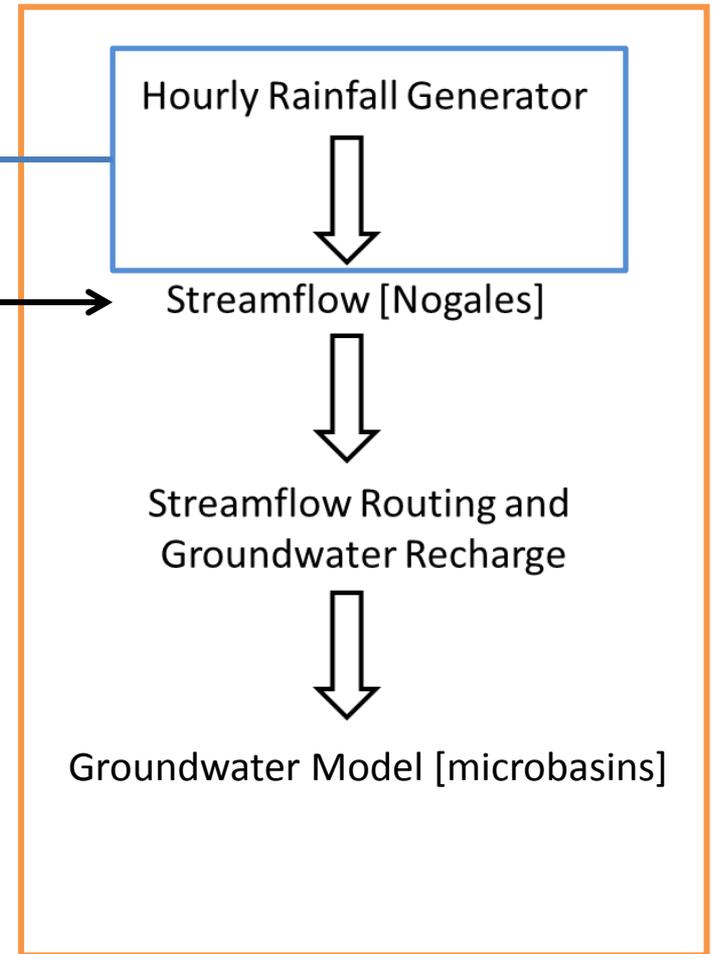
- 8 models indicate higher frequency of dryer winter
- 6 models indicate higher frequency of wet winter

Rainfall Generator

Modeling Framework

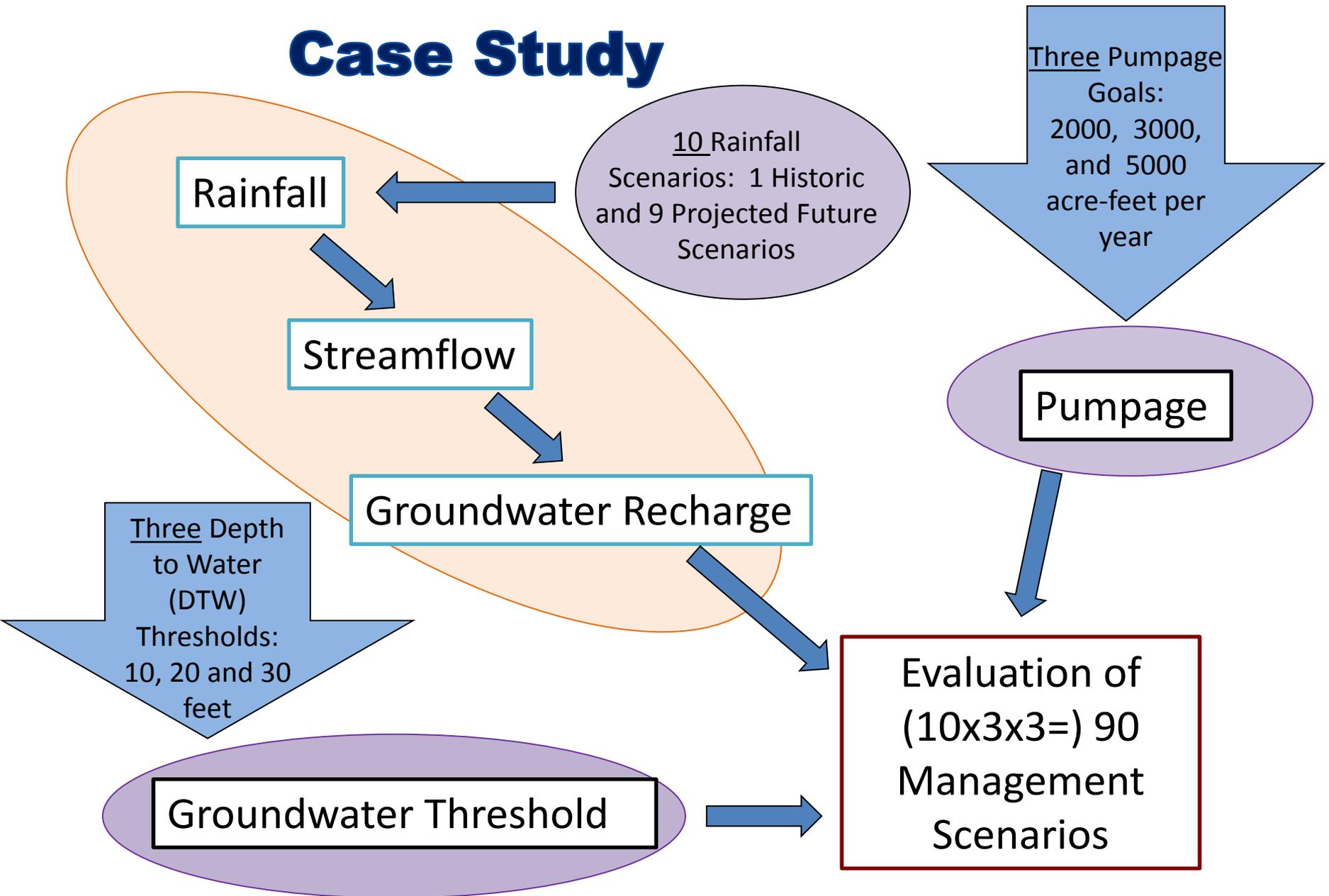


Multiple Likely Future Rainfall Scenarios

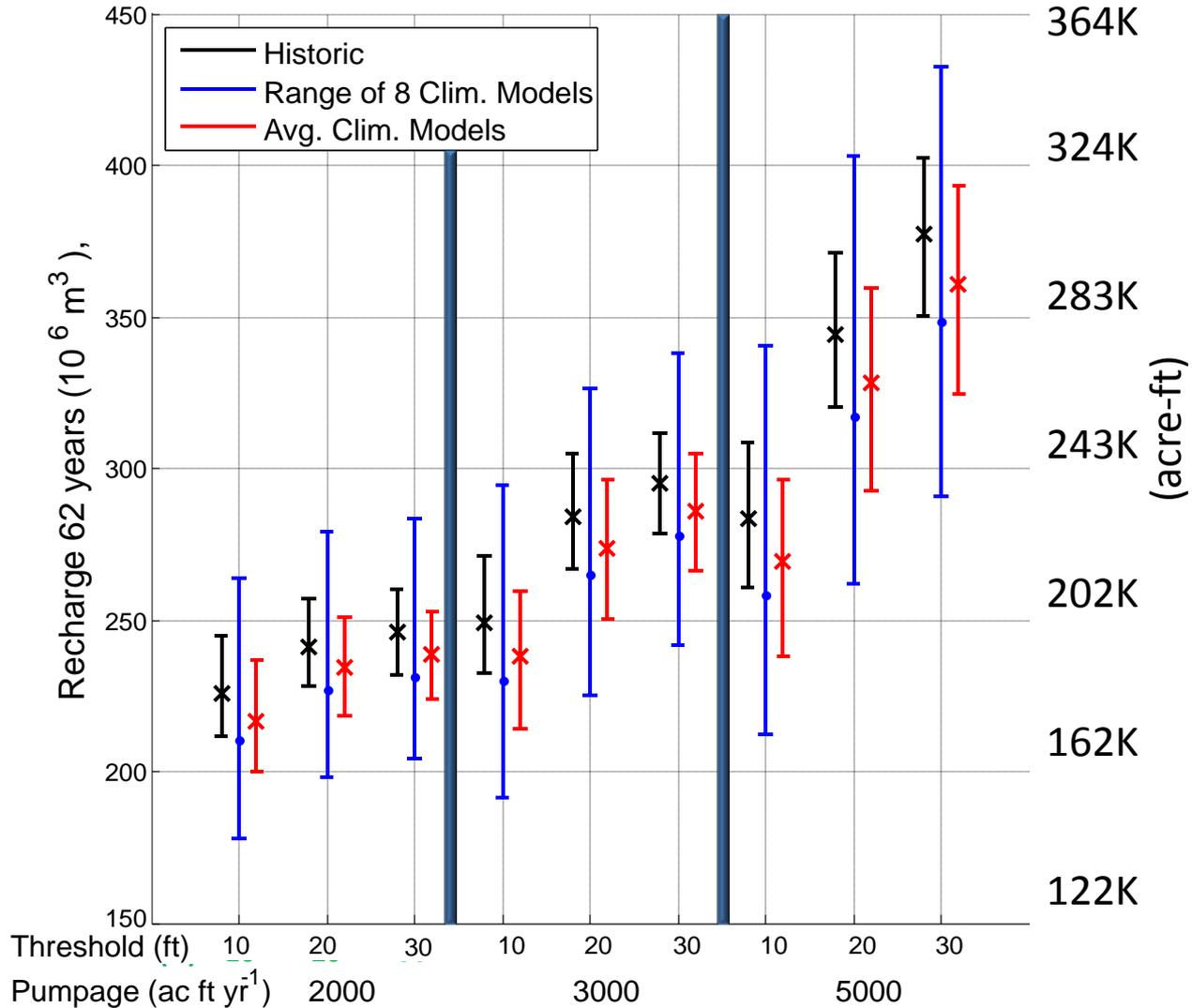


Multiple Likely Future Groundwater Scenarios

Case Study

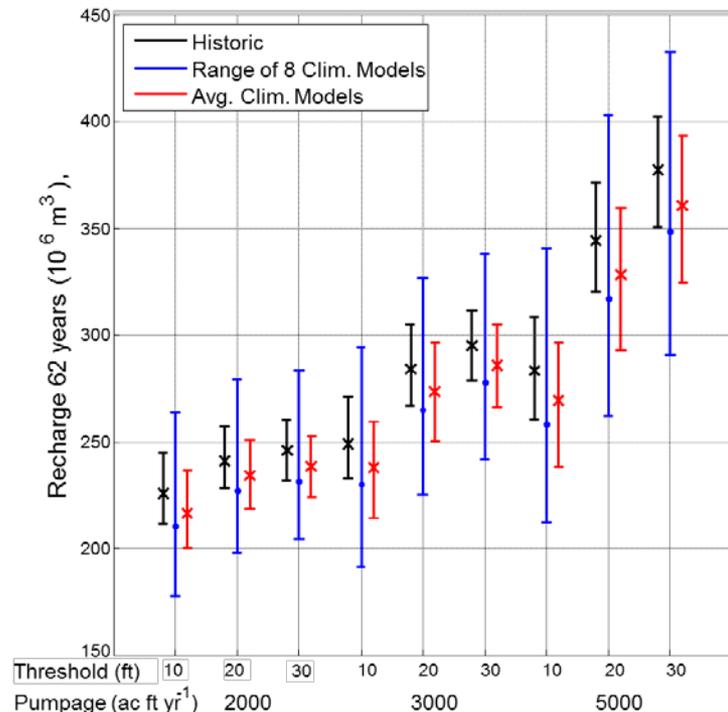


Cumulative Recharge to Microbasins



Case Study Conclusions

- Climate projections indicate greater uncertainty and spread of recharge
- Future recharge is likely to be less than under historic conditions
- The recharge is highly dependent on the water management scheme that is applied



Transferability Criteria for GCASE Approach

Transferability

Workshops –

- Prescott AMA
- Phoenix Region
- Tucson Region
- San Pedro River Basin

1. The local climate is a major factor in the state of the local water resources
2. Rainfall - Streamflow are highly variable and difficult to predict
3. Future climate projections indicate increase variability and uncertainty
4. Informative datasets are available for the region
5. Collaboration from local agencies and stakeholders

Areas with Transferability Potential

- **Tucson region** - projecting future natural groundwater recharge;
- **Cienega Creek** - investigating the impact of development on baseflow;
- **Upper San Pedro sub-watershed** - assessing the impact of recharge augmentation;
- **Prescott AMA** - identifying strategies for balancing groundwater recharge and extraction;
- **Verde River** - evaluating the impact of a new well field in the big Chino aquifer on flow;
- **Santa Cruz River** - assessing the impacts on riparian ecosystems under various NIWTP wastewater discharge scenarios

Next Steps

- Evaluating microbasin management strategies for the City of Nogales, AZ (ADWR)
- Seeking funding for transferring the methodology to other regions, including Cienega Creek, and investigating storage needs in the Nogales area (Reclamation)
- Conducting a workshop in Mexico exploring transferability of the methodology south of the U.S.- Mexico border (NOAA)

GCASE Stakeholder Engagement

THE UNIVERSITY OF ARIZONA | College of Agriculture and Life Sciences

Water Resources Research Center
Research, Extension and Education for Real World Issues

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Featured Article: **GCASE Santa Cruz AMA**

NEWS

- WRRRC Conference Featured on Arizona Week**
More than 300 people attended the WRRRC's 2013 Annual Conference, "Water Security: From the Ground Up" on March 5. "Arizona Week" host Michael Chihak covered the conference and spoke with WRRRC Director Sharon B. Megdal and speakers Elma Montana, Carly Jerla and Jim Leenhouts... [more](#)
- The WRRRC is now accepting applications for: The 2013 Montgomery & Associates Summer Writing Internship**
The University of Arizona's Water Resources Research Center is offering a summer internship to a student interested in gaining experience writing about environmental and water issues. The internship is supported by Montgomery & Associates, an Arizona-based consulting firm... [more](#)
- New Arizona Environmental Flows and Water Demand Bulletins**
The Water Resources Research Center (WRRRC) is happy to announce that all four regional

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Groundwater, Climate And Stakeholder Engagement (GCASE)

Project Summary

Planning to meet water demands in semi-arid regions is particularly challenging for groundwater dependent communities where aquifers are being replenished by intermittent streamflow events. Projected and observed climatic changes for the Southwest increase uncertainties. The project, Incorporating Climate Information and Stakeholder Engagement in Groundwater Resources Planning and Management, employs a novel modeling framework and extensive stakeholder interactions to achieve the following three objectives: (1) Address climate uncertainties with a sophisticated modeling framework; (2) Increase stakeholder capacity to adapt water planning and management to future climate uncertainties; and (3) Establish the transferability of the modeling framework and capacity building approach. [More>>](#)

Links:

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- [Discussion](#)

Ultraflight photograph of the Santa Cruz River facing northwest over the northern portion of Rio Rico. (background: Tumacácori Mountains)

WEBSITE

wrrc.arizona.edu/GCASE

