

II. GCASE: Upper Santa Cruz River Case Study

Eylon Shamir (presenter)

Eshamir@hrcwater.org

Hydrologic Research Center, San Diego www.hrcwater.org

coauthors:

Sharon B. Megdal and, Susanna Eden Water Resources Research ,
University of Arizona (UA)

&

Karletta Chief, Soil Water & Environ. Sciences, UA



Funded by,

*NOAA Climate and Societal Interactions
Sectoral Applications Research Program (SARP)*



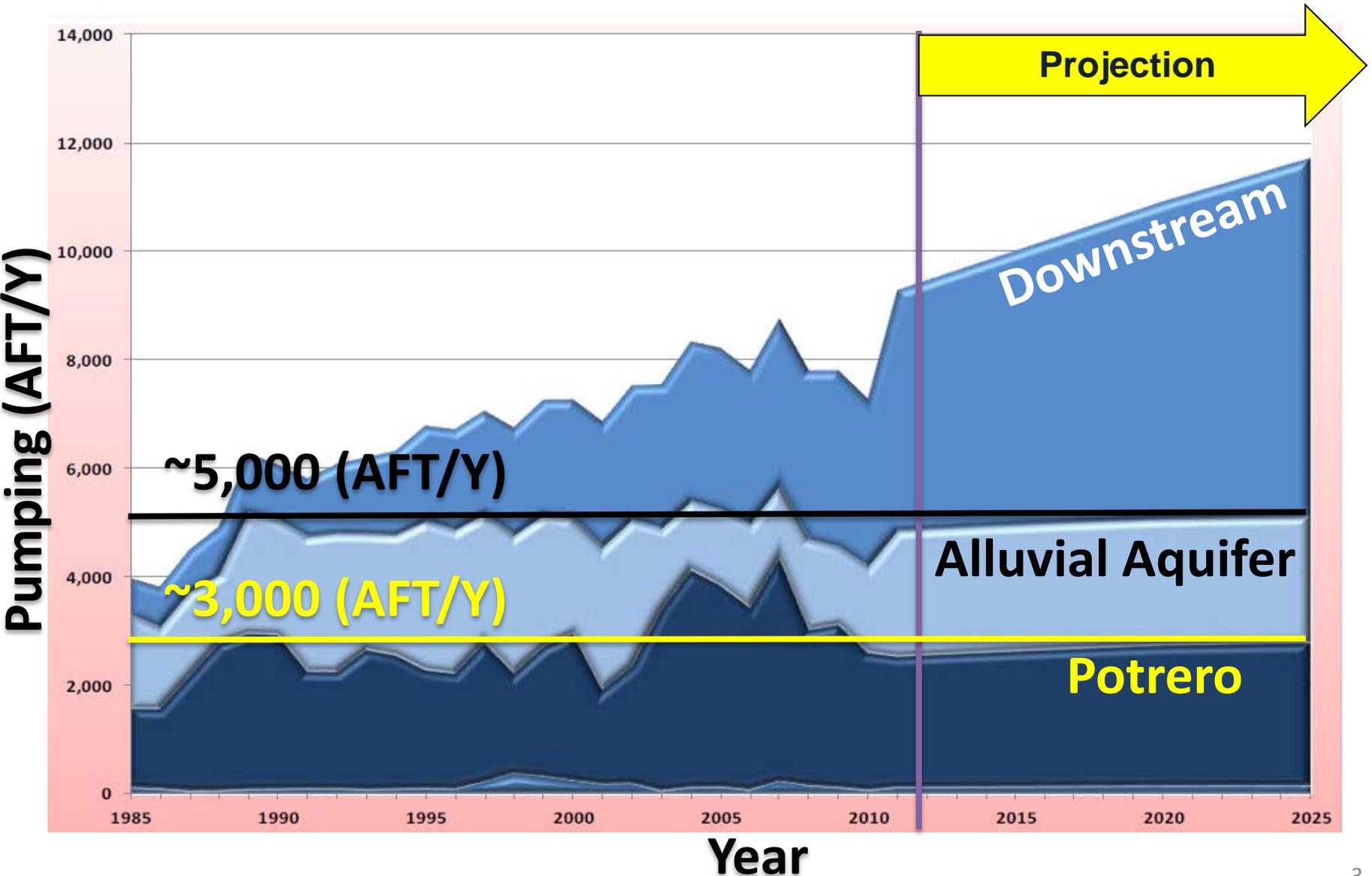
Santa Cruz Active Management Area (SCAMA)

“The **management goal** of the Santa Cruz AMA is to maintain a safe-yield condition in the active management area and to prevent local water tables from experiencing long term declines.”

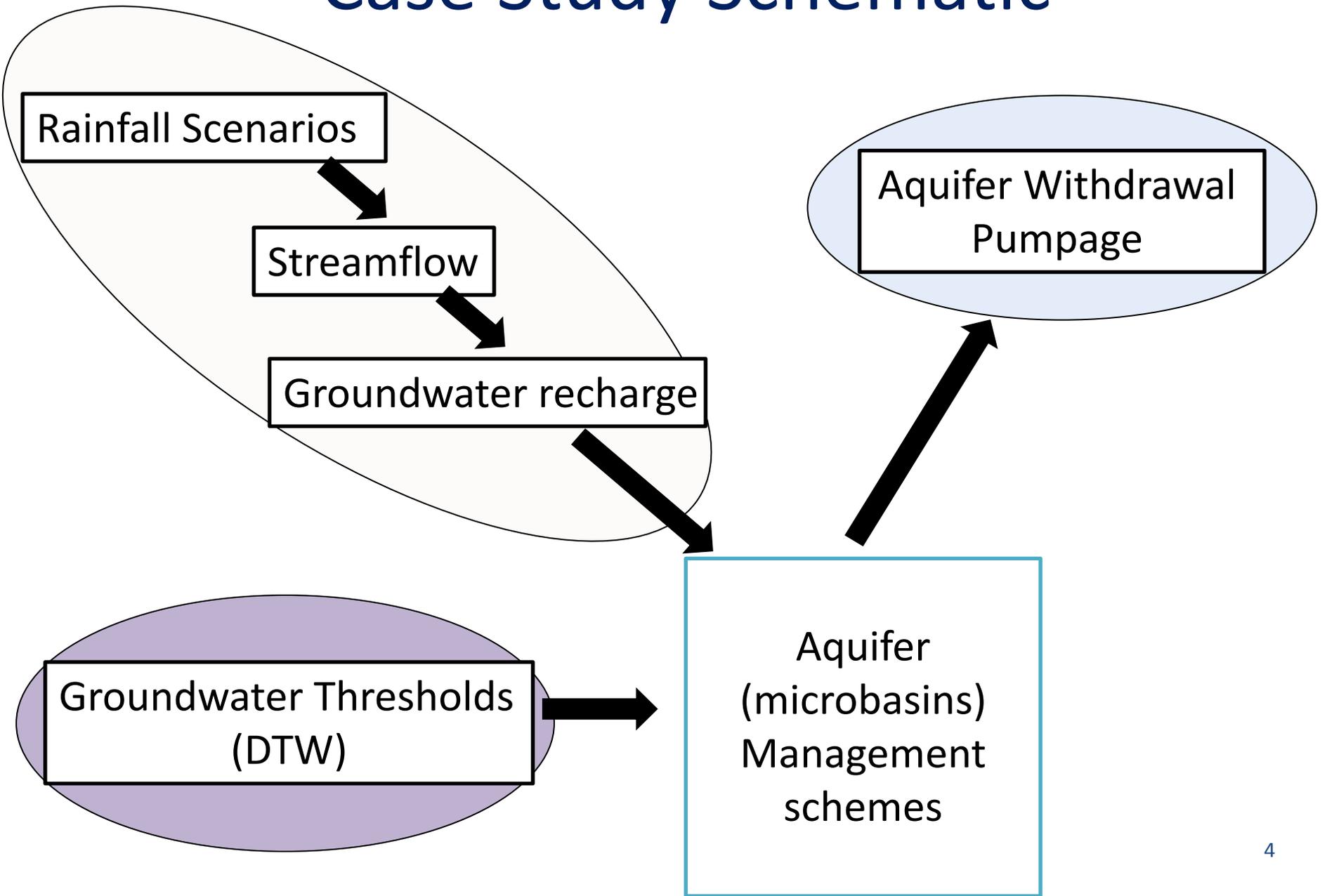
Arizona Revised Statutes



Predicted Pumping to 2025

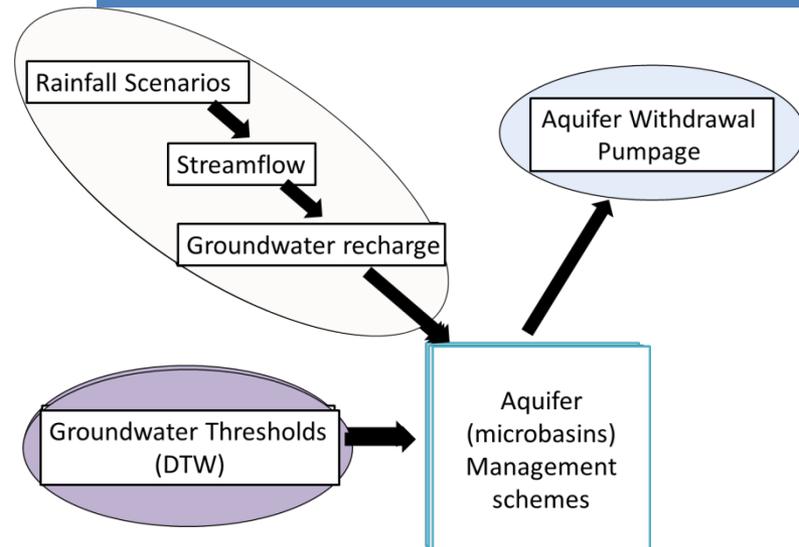


Case Study Schematic

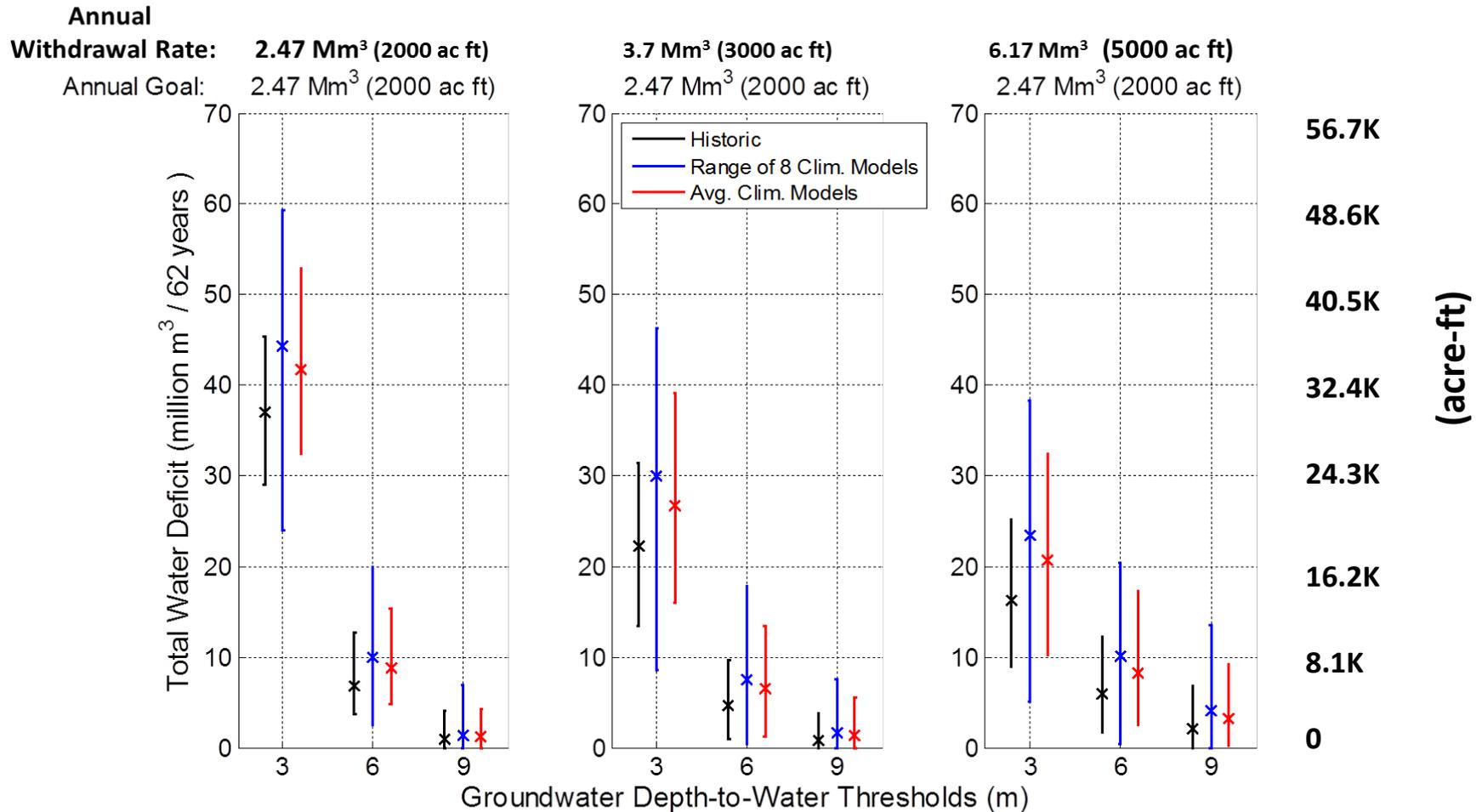


90 Scenarios

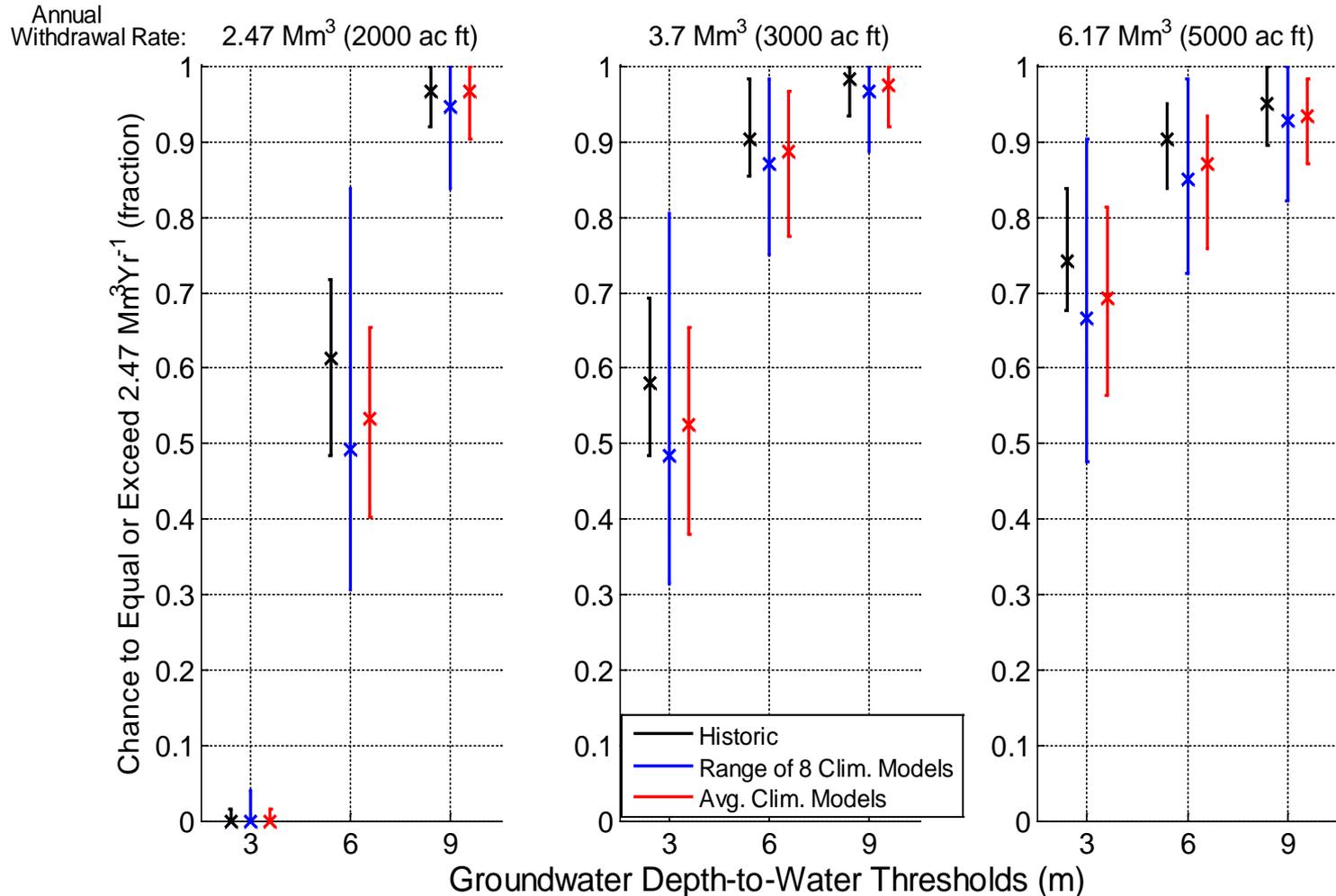
Rainfall:	Observation	8 Regional Climate Models	Avg of Regional Climate Models
Depth To Water:	10 ft	20 ft	30 ft
Pumpage Goal:	2,000 AFY	3,000 AFY	5,000AFY



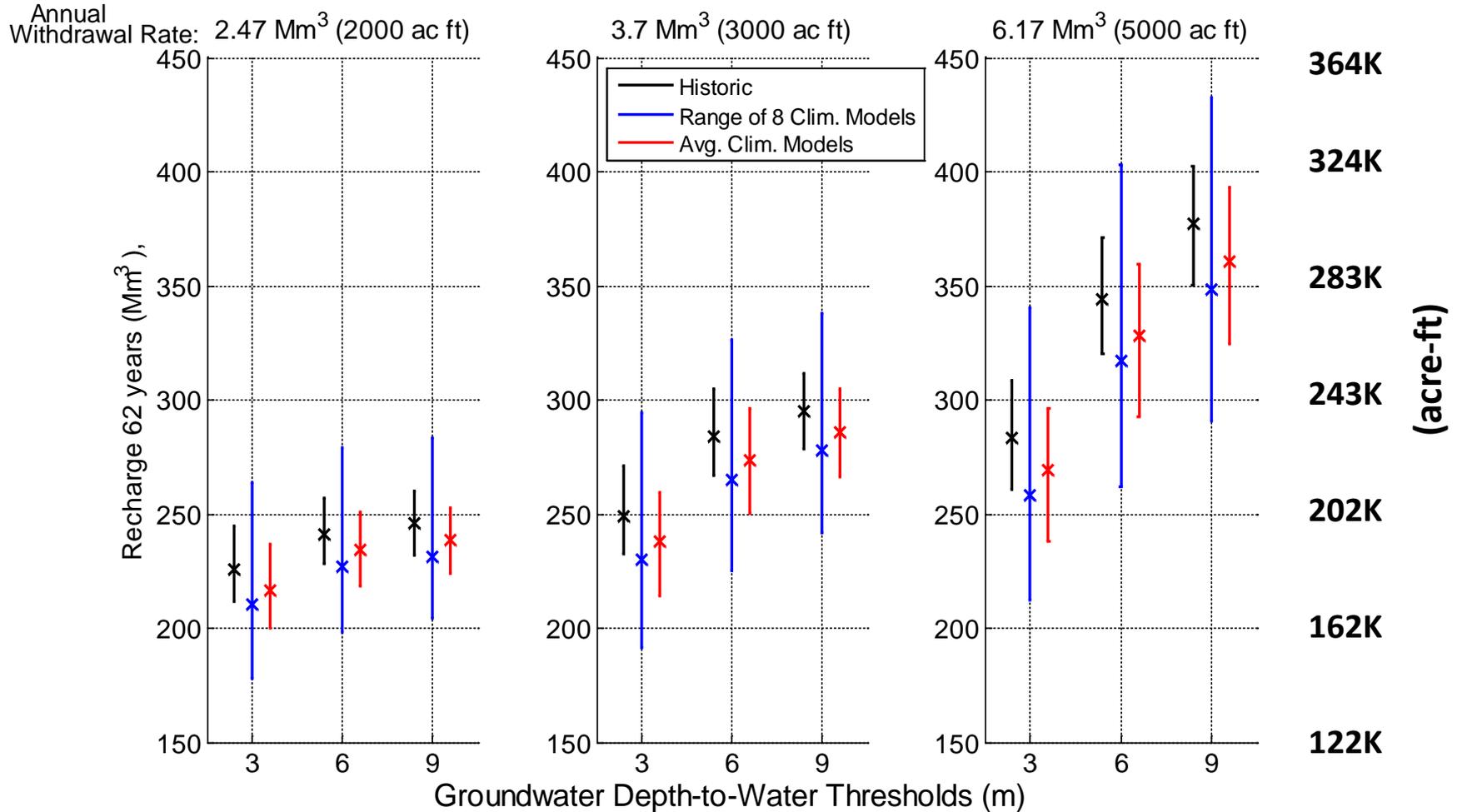
Cumulative 62-Year withdrawal deficit



The reliability to attain or exceed an annual withdrawal goal of 2.47 Mm³ (2,000 ac ft)

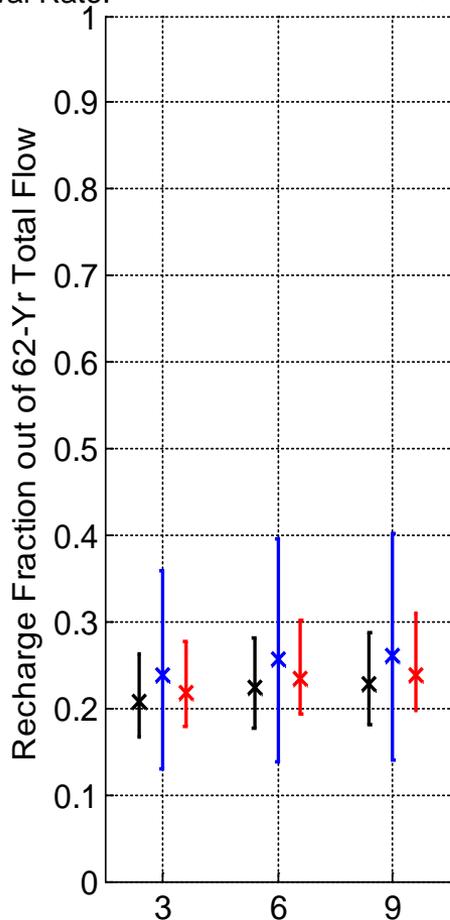


Cumulative groundwater recharge

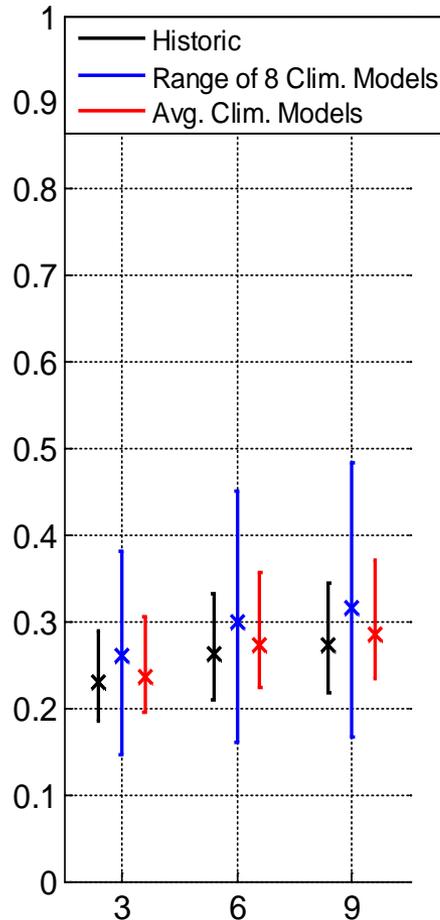


Ratio between streamflow and recharge

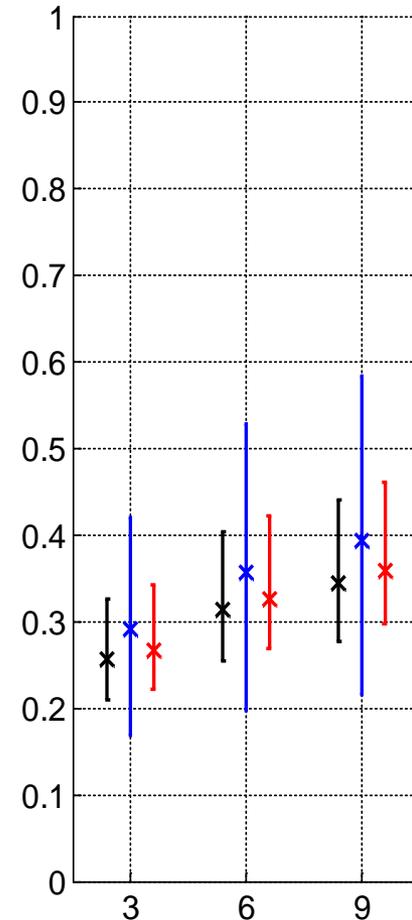
Annual
Withdrawal Rate: 2.47 Mm³ (2000 ac ft)



3.7 Mm³ (3000 ac ft)



6.17 Mm³ (5000 ac ft)



Groundwater Depth-to-Water Thresholds (m)

Conclusions

- Under the same management scheme, future projections indicate decline in reliability, decreased groundwater recharge and increased long term water deficit.
- Climate projections indicate greater uncertainty and spread of groundwater recharge
- The groundwater recharge is highly dependent on the water management scheme that is applied
- Optimal management of water withdrawal can increase water supply reliability, reduce long term water deficit, and increase recharge in the channel.

Project Team

- Eylon Shamir, *Hydrologic Research Center, San Diego*
- Sharon B. Megdal, Susanna Eden, Jacob Prietto, Elia Tapia: *Water Resources Research Center University of Arizona*
- Karletta Chief, *Soil Water and Environmental Sciences, University of Arizona*
- Christopher Castro, Carlos Carrillo, Hsin-I Chang, *Atmospheric Sciences Dept. University of Arizona*

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

Project Report:

Shamir E., S.B. Megdal, C. Carrillo, C.L. Castro, H-I Chang, K. Chief, F.E. Corkhill, S. Eden, K.P. Georgakakos, K.M. Nelson, J. Prietto. Climate change and water resources management in the Upper Santa Cruz River, Arizona. *Journal of Hydrology* (in review)

Web Site wrrc.arizona.edu/GCASE