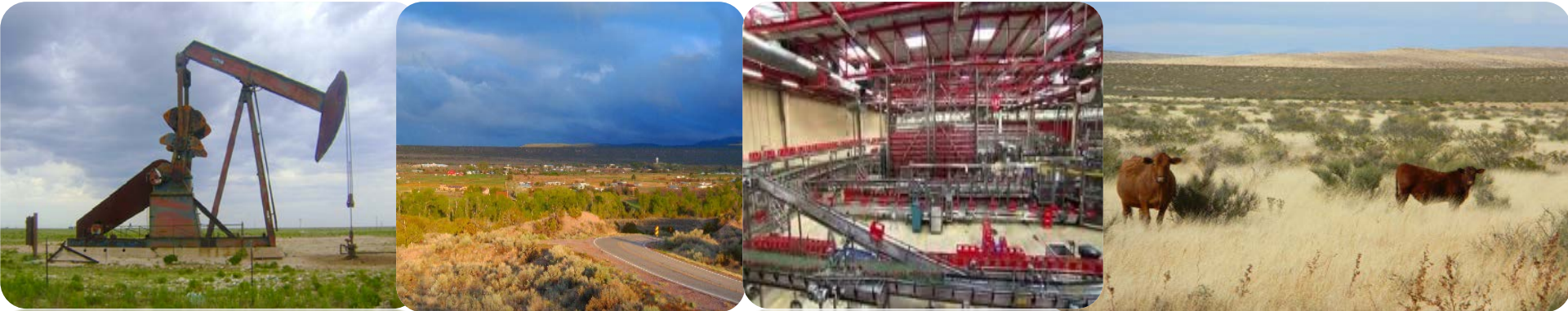


# NM WRRI – Indian Affairs Interim Committee

## 7 September 2017

Sam Fernald  
NM WRRI, NMSU



# Purposes of New Mexico Water Resources Research Institute as defined by New Mexico Statute 21-8-40 of 2005

## The purposes of the Institute are to:

- Provide research and training in water conservation and management
- Transfer water information through publications, newsletters, and conferences
- Provide expertise and technical information to address water problems
- Cooperate with local, state, and federal water agencies.

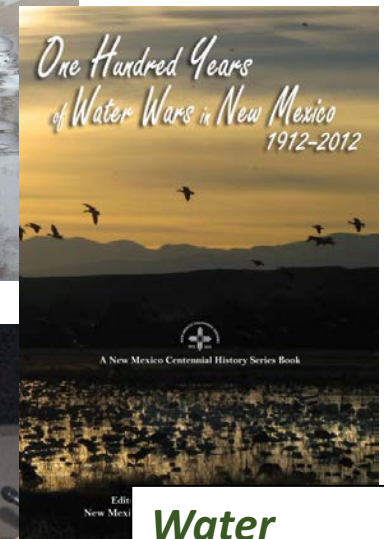
*Research*



*Training*

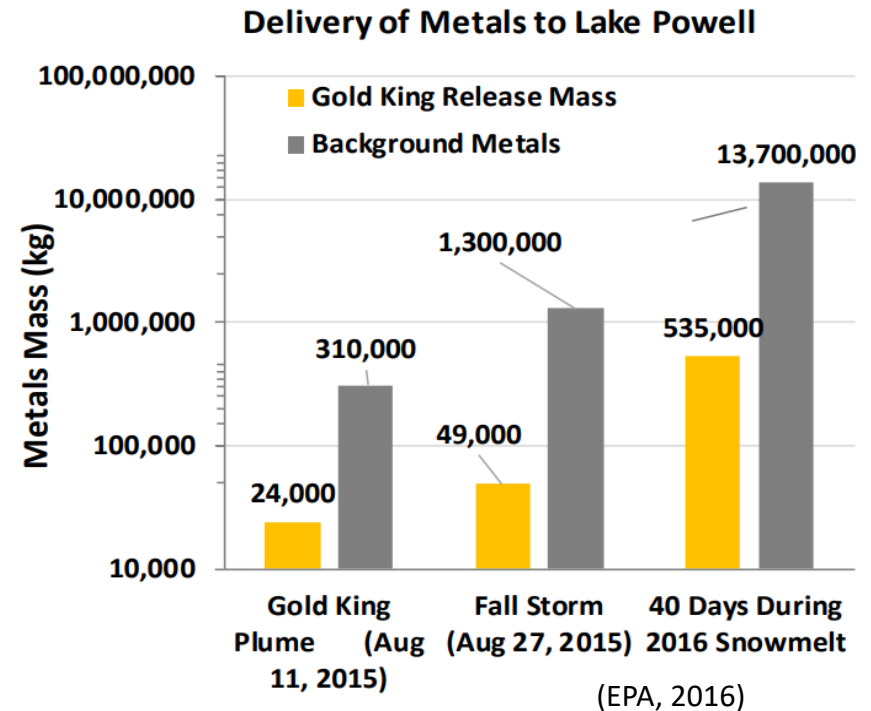


*Statewide Cooperation*



*Water  
Information*

# Environmental Conditions of the Animas and San Juan Watersheds: With a Focus on Gold King Mine and Other Mine Waste Issues (2<sup>nd</sup> Annual Conference put on by NM WRRRI, 2017)



## Summary

- Acid mine waste released by the Gold King Mine spill is equivalent to four days of current acid mine drainage from >5,000 mines
- The affected communities and Navajo Nation are concerned with water quality and agricultural impacts
- Future work should focus on acid mine drainage from all mines in the Animas Watershed

# Proposed Theme for 2018 New Mexico Annual Water Conference – Water Issues of New Mexico Pueblos, Nations, and Tribes

## **TOPICS TO BE BASED ON DISCUSSIONS WITH PUEBLOS, NATIONS, AND TRIBES**

- Major water issues facing Pueblos, Nations, and Tribes (e.g. infrastructure, irrigation, windmills, riparian, endangered species, instream flow, water quality, water rights)
- Updates on water projects (e.g. Navajo-Gallup Water Supply Project)
- Updates on relevant research (e.g. Statewide Water Budget, crop water efficiency)
- Community needs to improve water management (research, outreach, coordination)

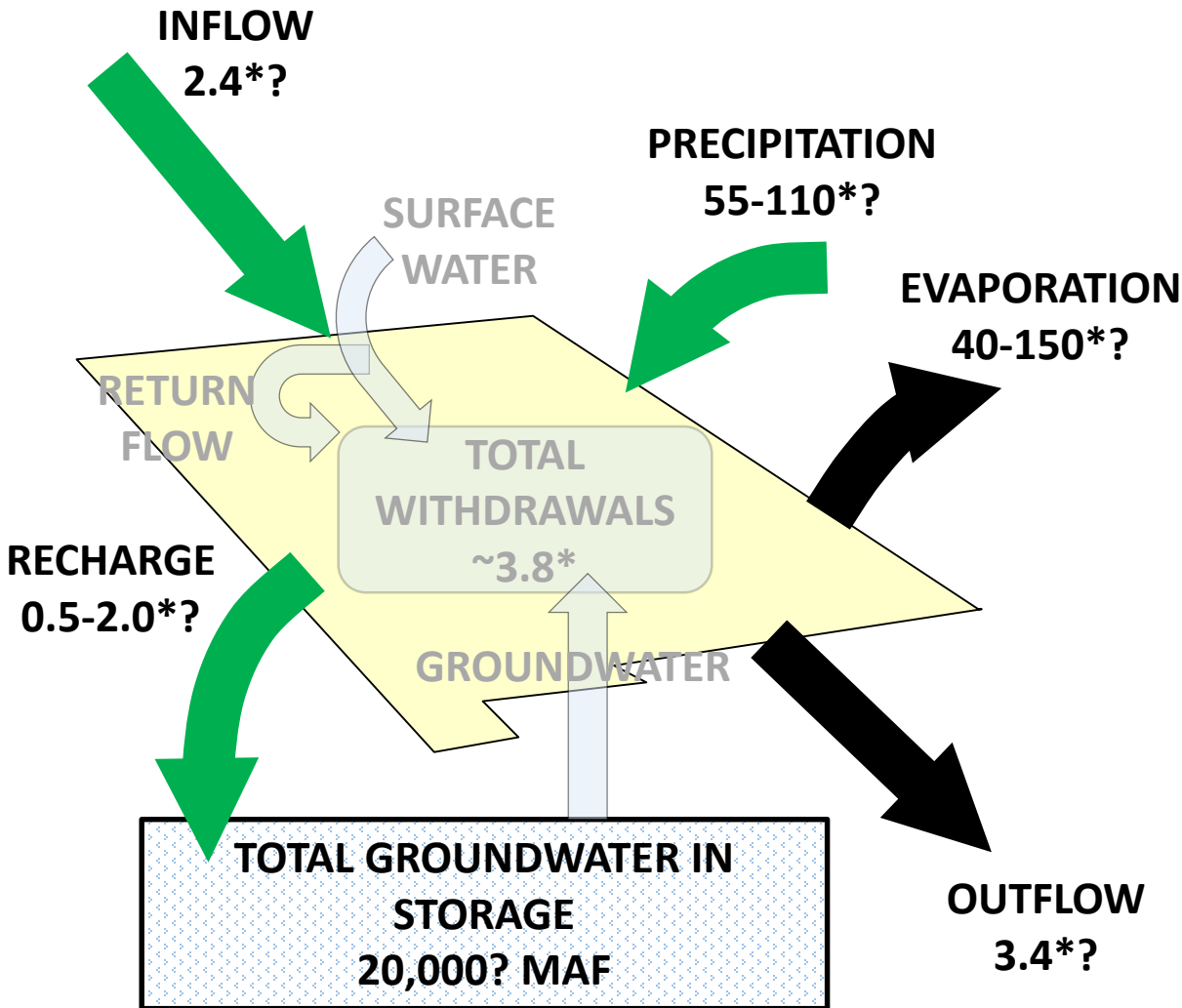
Note: Indian water rights legal issues will NOT be the major focus of the conference

## **CALENDAR**

- September 2017: Meet with respective tribes/group councils
- October 2017: Form a tribal representatives group to discuss conference options
- February 2018: Report to Conference Advisory Committee by tribal representatives group
- Fall 2018: NM Annual Water Conference



# Why we need a Statewide Water Budget

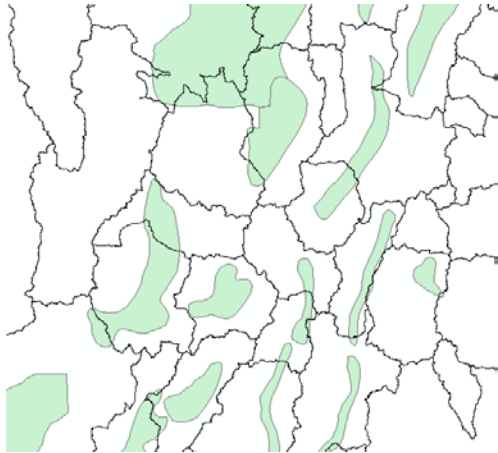


- Physical supply is not well known
- Need for a comprehensive assessment of NM's water resources
- Aim is to complement OSE and other agencies' water programs while providing new information through research

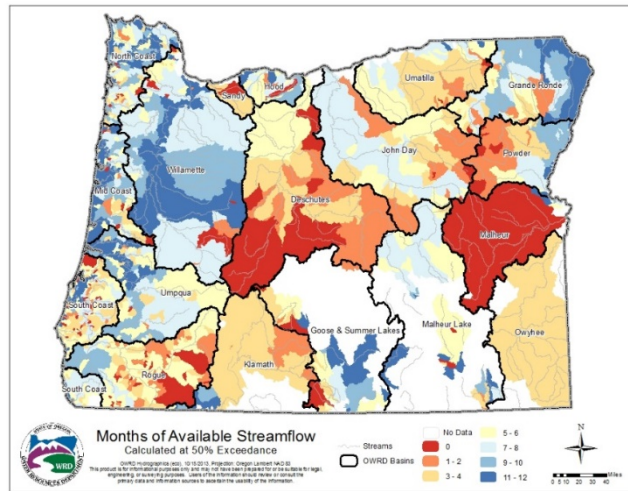
\*Fluxes in millions of acre-feet per year

# Other western states' water assessments to enhance water administration and planning; NM should invest likewise

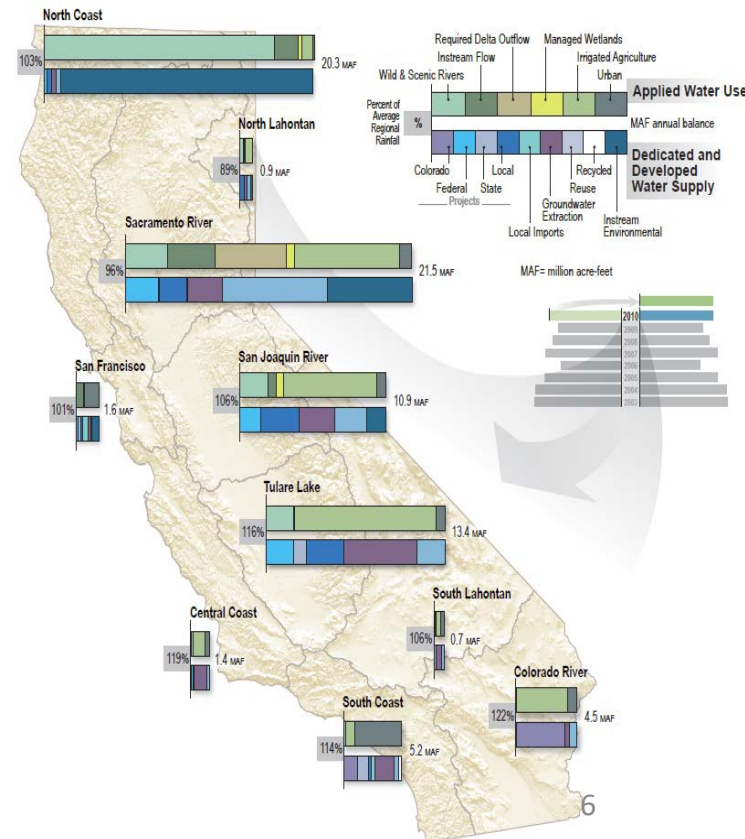
Utah: Combined state water use and USGS water resource areas



Oregon: Point flow data converted for water unit flow management

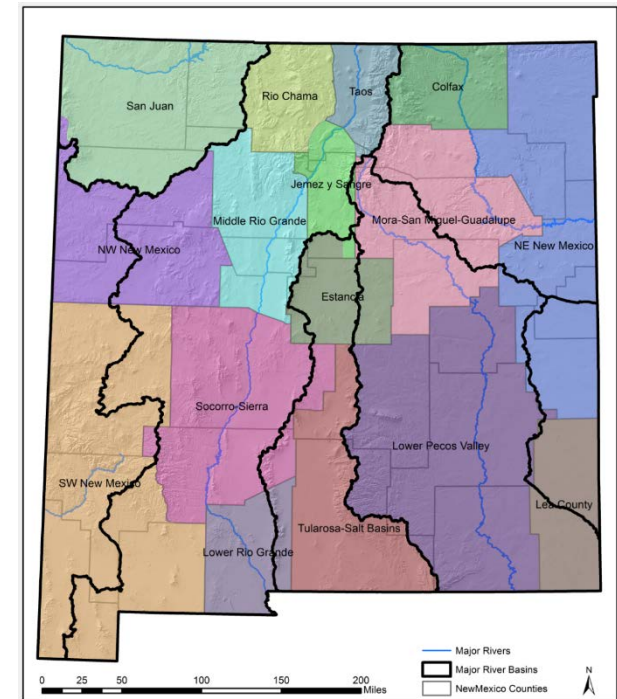


California: Common platform for water uses and supplies by region



# The Statewide Water Assessment: Why It is Critical

- A tool for proper planning of water resources to avoid water shortage crises
- A unique, multi-scale dynamic model that fills in gaps of historic water management in New Mexico
- Work closely with Interstate Stream Commission to complement State Water Plan
- Future scenario estimations to help alleviate uncertainty for state water planners
- Multi-university collaboration on a variety of water topics
- Leading academic researcher in areas of evapotranspiration, hydrology, modeling
- Graduate students and young professionals engaging in applied water research and management (future water managers!)



# Statewide Water Assessment Collaboration



## Remotely Sensed Evapotranspiration and Precipitation Assessment



## Oil and Gas Produced Water Assessment



## Statewide Systems Dynamics Water Budget



## Groundwater Recharge Assessment



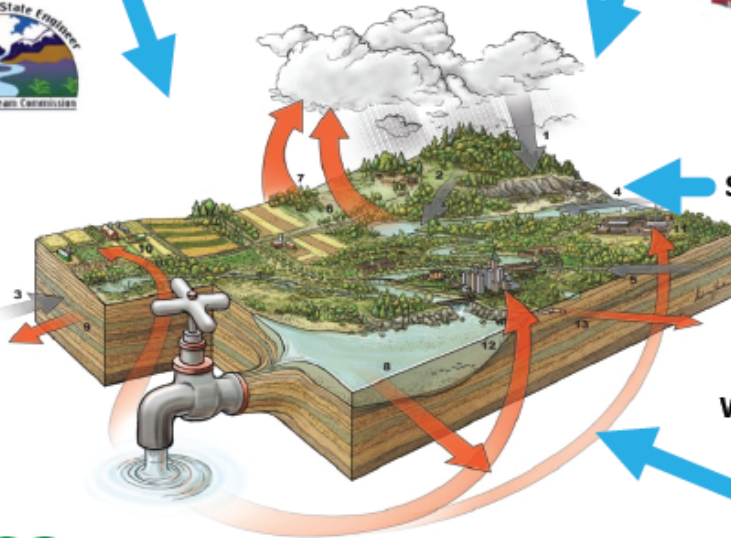
## Groundwater Level and Storage Changes



## Surface Water Flow Statistics



## Water Use Reporting





# The Interactive Visualization Tool

## NMDSWB - County Future Scenarios

Disclaimer | Future Scenario Options | Avg. Monthly Flows for Multiple Scenarios for a Single County | **Compare Multiple Variables and Scenarios for a Single County** | Compare Multiple Scenarios and Counties for a Single Variable

County: Bernalillo

Fluxes and Stocks: Storage Change GW


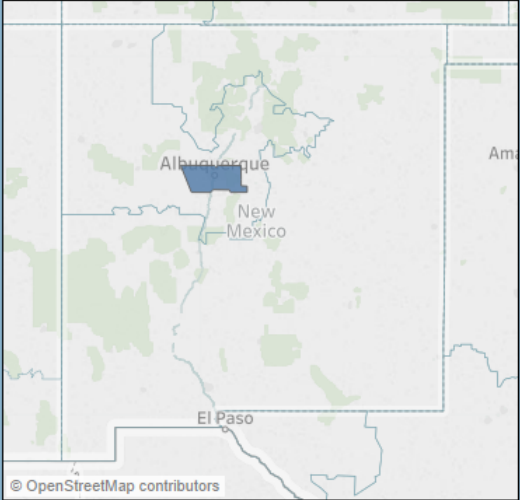
Climate Model: (Multiple values)

Water Use Efficiency: (Multiple values)

Population Growth Rate: (Multiple values)

Year Range: 2000 - 2037

Use the climate model, water use efficiency, and population growth rate filters to compare multiple future water budget scenarios for the county and stocks and fluxes of interest. Exact start and end years can be manually entered on the year range filter by clicking on the year. Note: To see historical values, the historical option must be selected on the climate model, water use efficiency, and population growth rate filters.



**Legend**  
(Climate Model, Fluxes and Stocks, Water Use Efficiency, Population Growth Rate)

- UKMO, Storage Change GW, High, No Change
- UKMO, Storage Change GW, Low, No Change
- Historical, Storage Change GW, Historical, His...

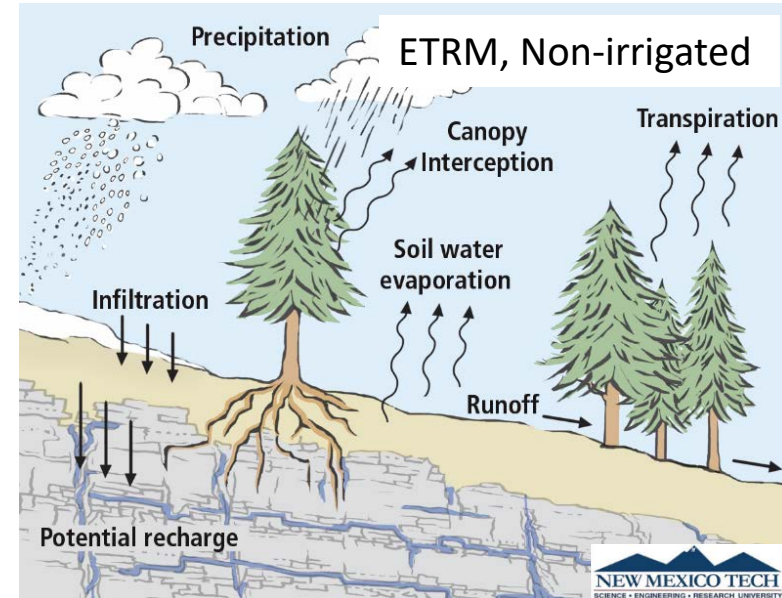
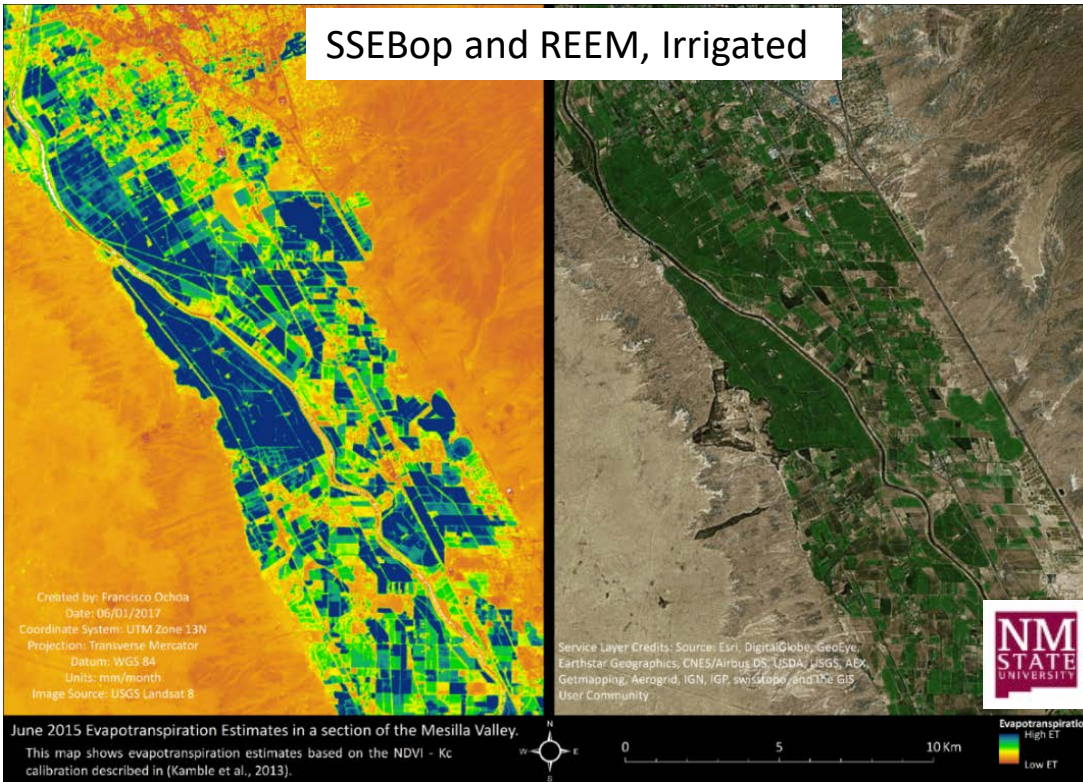


- Creating an easily accessible tool that is useful to water planners, researchers, and water users
- Allows users to compare multiple variables and scenarios
- Example shows two future groundwater storage change projections comparing high and low water-use efficiency

# Ensemble Evapotranspiration Method

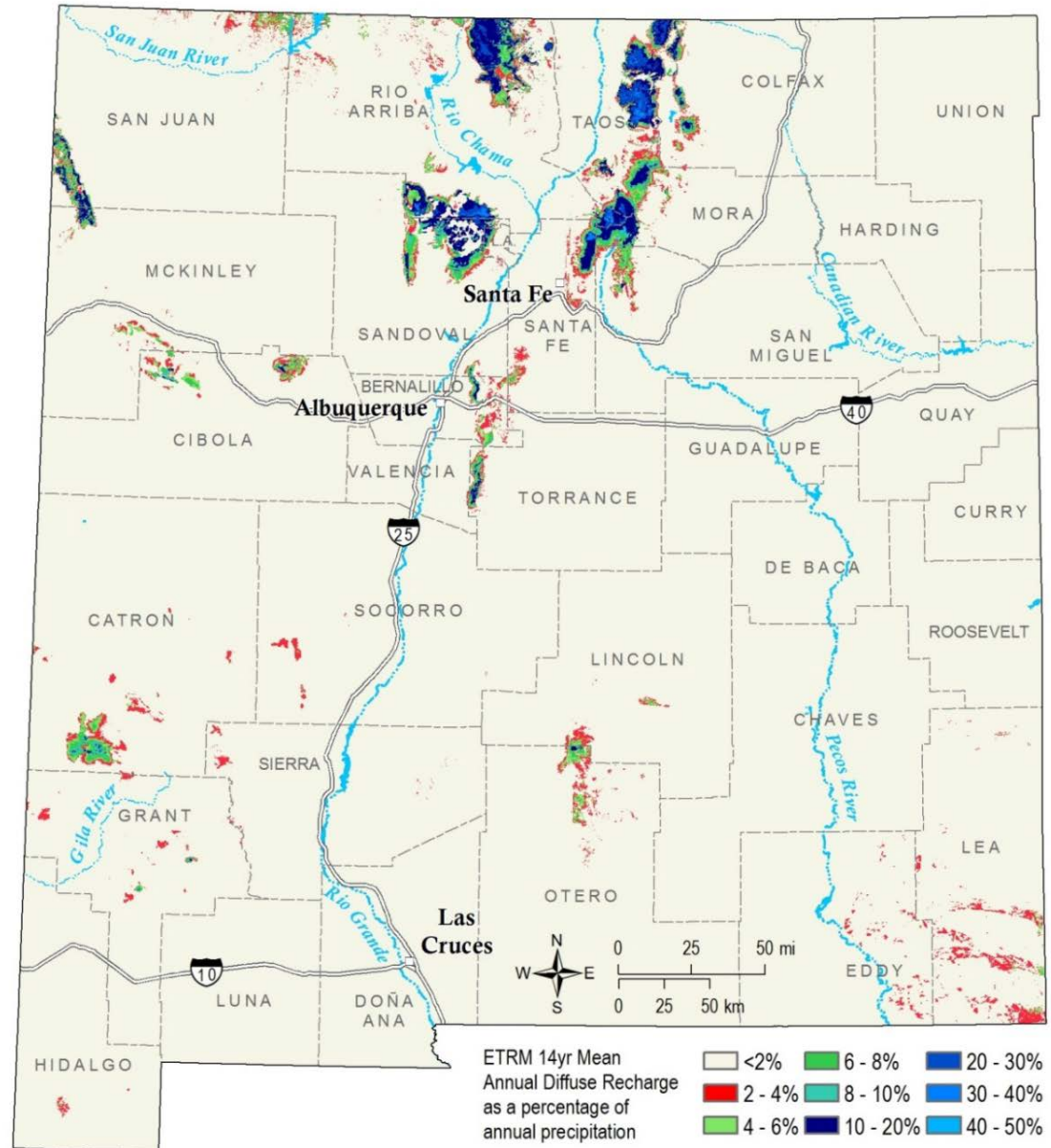
- Cutting edge science to inform the Statewide Water Budget
- Combined ET model research approach from NMSU, NM Tech, and USGS
- Mean ET estimates for irrigated and non-irrigated areas

SSEBop and REEM, Irrigated



# Evapotranspiration and Recharge Model (ETRM)

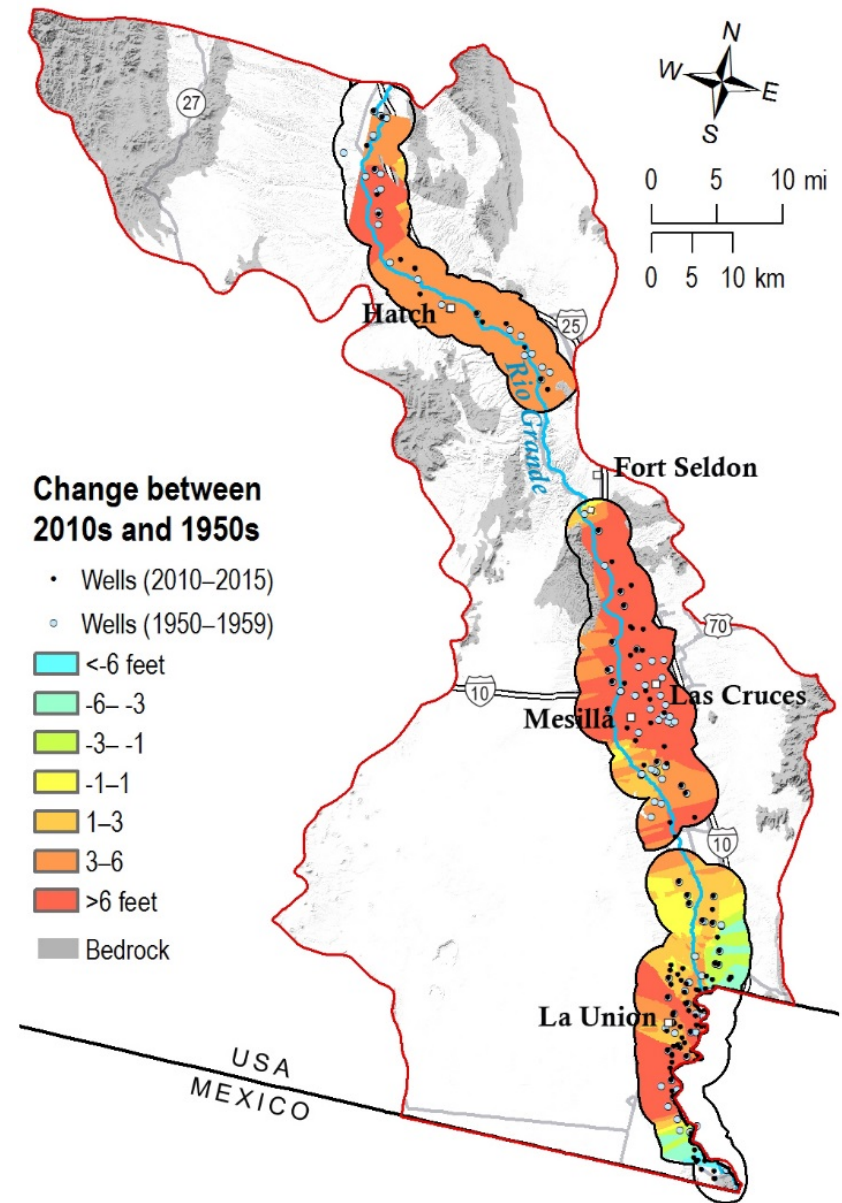
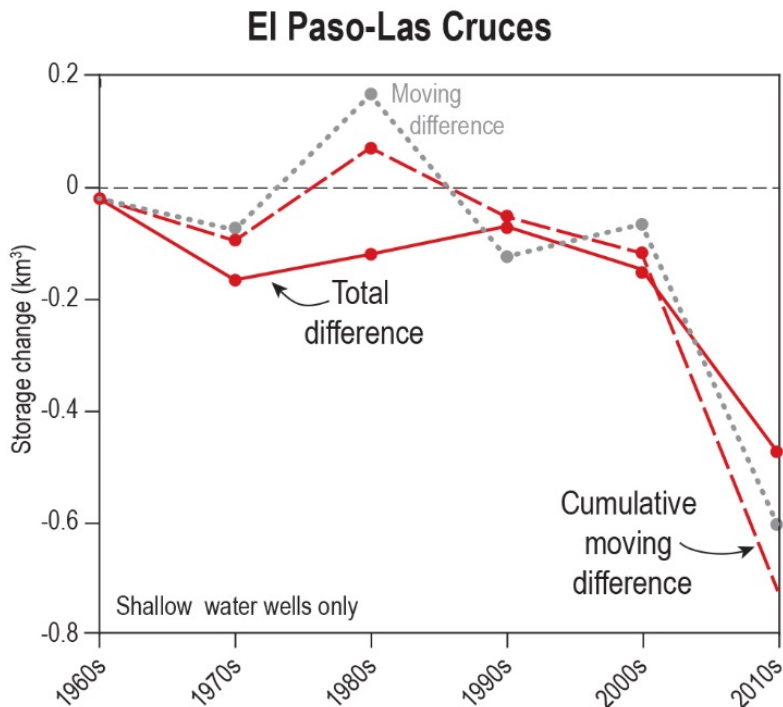
- Entirely new representation of recharge in New Mexico developed for the Statewide Water Assessment project
- Estimates recharge to groundwater for areas that receive only natural precipitation





# Mesilla Basin Groundwater Storage Change

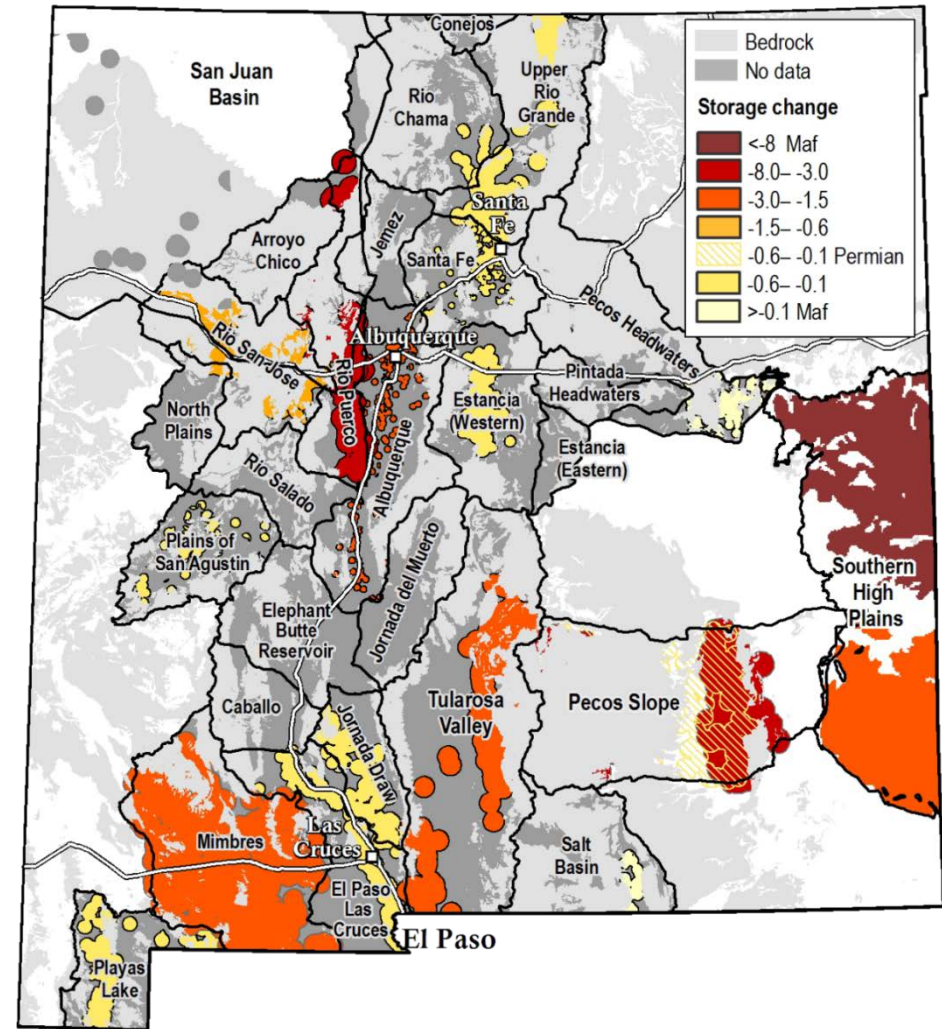
- Detailed characterization of groundwater storage changes
- Informs water managers and improves the Statewide Water Budget
- Example for the lower Rio Grande shows basin-wide changes since the 1950s (1 km<sup>3</sup>=0.82 million acre-feet)





# Groundwater Storage Change

- Analyzed data across the state
- Groundwater storage is decreasing
- Closed basins and areas far from rivers and streams have been most affected
- Funding is required to complete the remaining areas



The storage change project by itself has really changed conversations I have with people about water in New Mexico—we have information, not guesses.

Dr. Alex Rinehart



Thank  
You