

# NM Water Resources Research Institute

LEGISLATIVE FINANCE COMMITTEE

SAM FERNALD

NEW MEXICO WATER RESOURCES RESEARCH INSTITUTE (WRRI)

JUNE 27, 2023

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The logo for New Mexico State University, featuring the letters "NM" stacked above "STATE" in a white serif font, enclosed within a white square that is itself centered within a larger dark red square.

NM  
STATE

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# OUTLINE

1. Background situation
2. Research tools and information
3. Coordinated management flexibility
4. Strategic Community Water Management Program

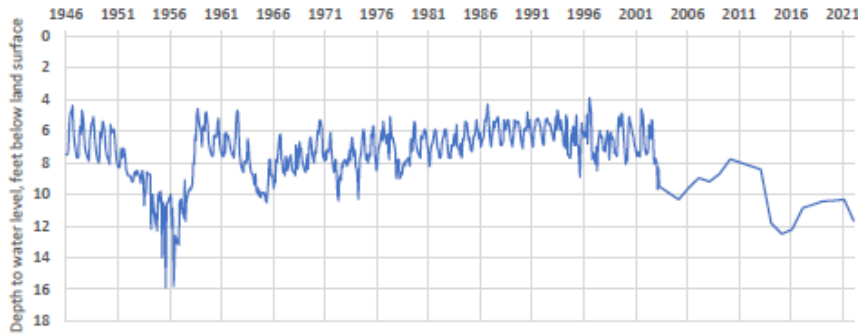


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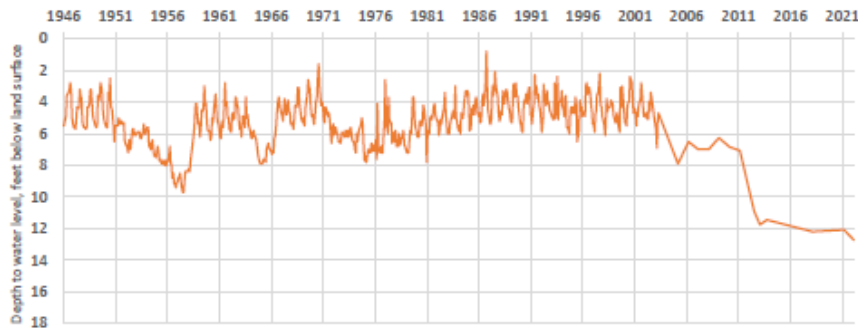
# Mesilla Aquifer Water Levels

Prepared by Julia Klejmont, MS Graduate Research Assistant, NMWRI  
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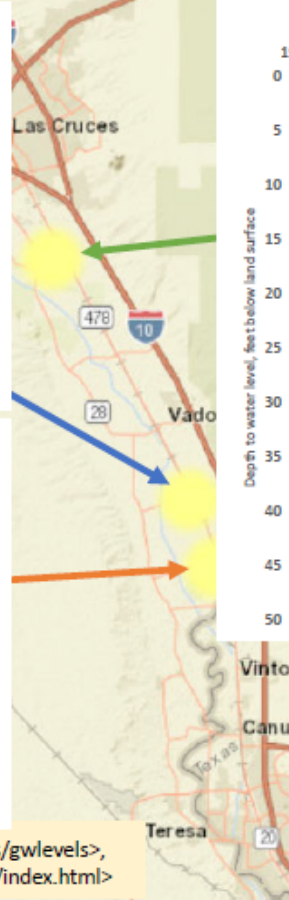
### USGS MBOWN-131



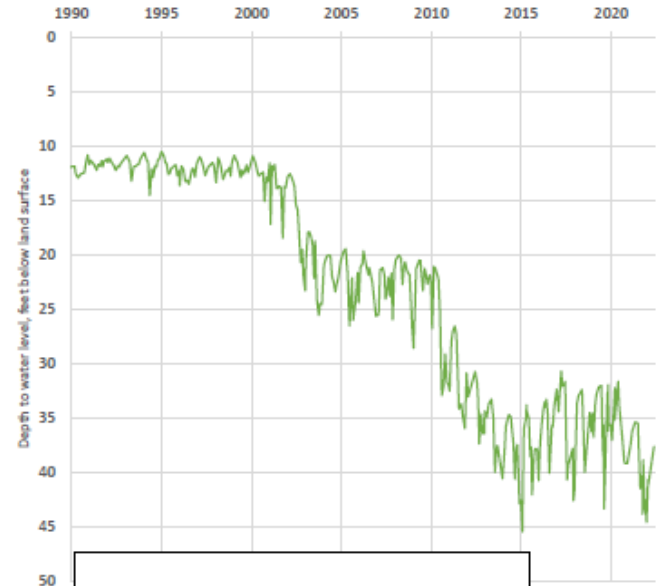
### USGS MBOWN-138



USGS Groundwater for New Mexico: Water Levels, <<https://nwis.waterdata.usgs.gov/nm/nwis/gwlevels>>,  
USGS National Water Information System: Mapper <<https://maps.waterdata.usgs.gov/mapper/index.html>>



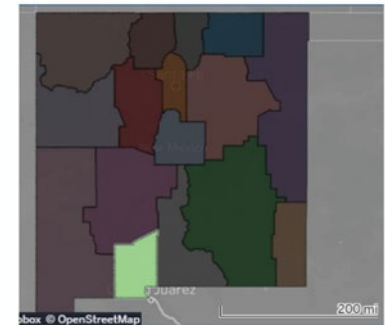
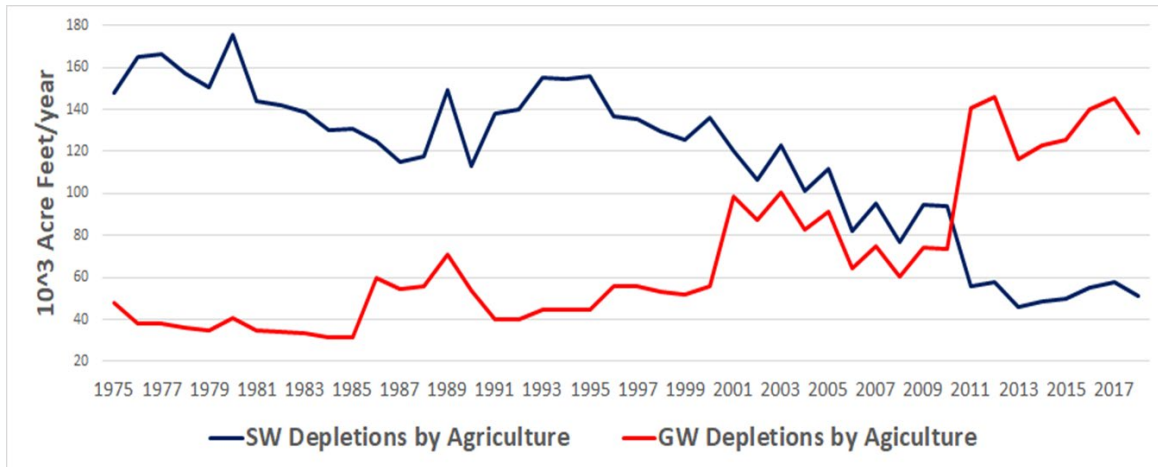
### USGS MBOWN-71



Sites with long term data show groundwater level declines followed by recovery

Declines are apparent since 2002 without full recovery as seen after historic declines

# Lower Rio Grande Region WPR (Doña Ana County)



**Lower Rio Grande  
Water Planning  
Region (WPR)  
(Doña Ana County)**

As Surface Water (SW) Availability Declines, Groundwater (GW) Depletions for Agriculture Increase

- Exemplifies dynamics of increasing reliance on GW globally



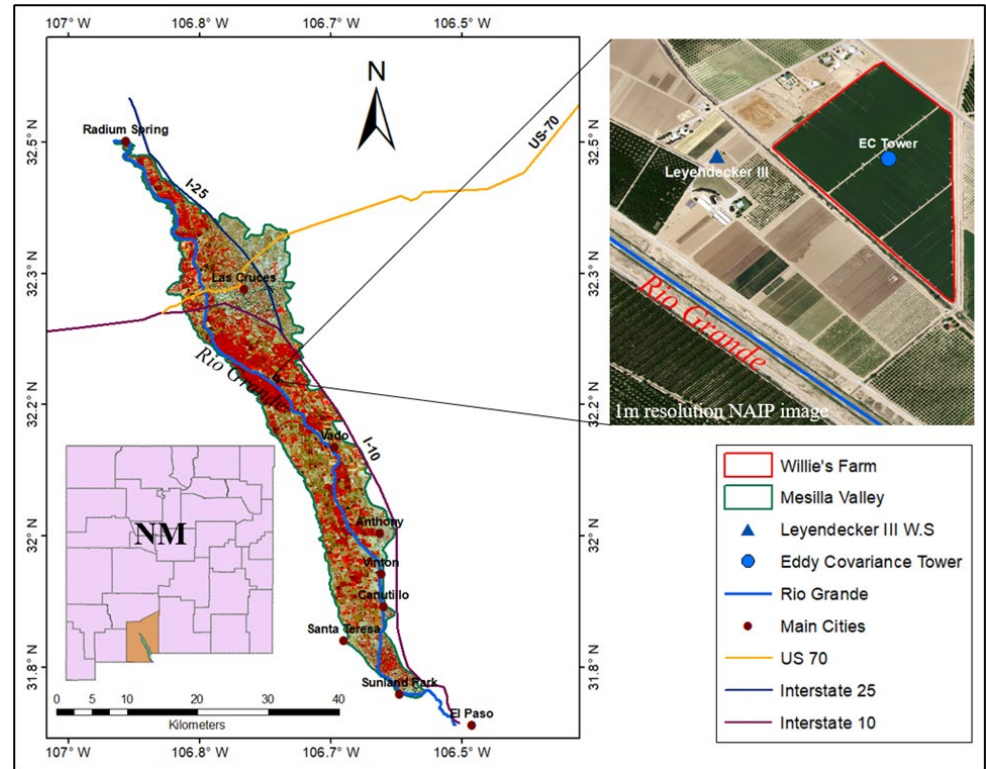
# Research & Development

Remote Sensing Coupled with Ground Level Measurements (Satellite-Based ET, Flux Measurements, Climate)

Spatiotemporal Variability of Consumptive Use or ET – Field Scale and Regional Scale

Fallow Farm Field – Hydrology (Infiltration, Evaporation Losses)

Regional Water Budget – Accounting?  
Collaborative Effort



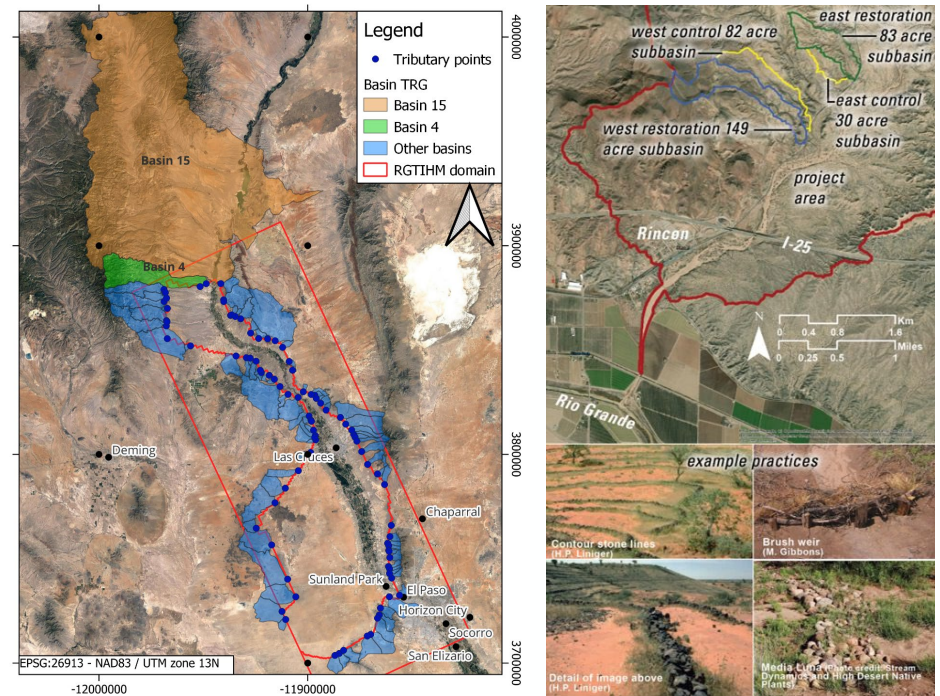
# Coordinated Flexible Management

- Objective: Increase groundwater storage while maintaining agriculture, ecosystems, and communities
- Approach: Use a suite of management techniques to:
  - Increase supply
    - Groundwater recharge
    - Surface water inflows
    - Less groundwater pumping
  - Reduce demand
    - Conservation
    - Efficient use technology
    - Fallowing and land use management

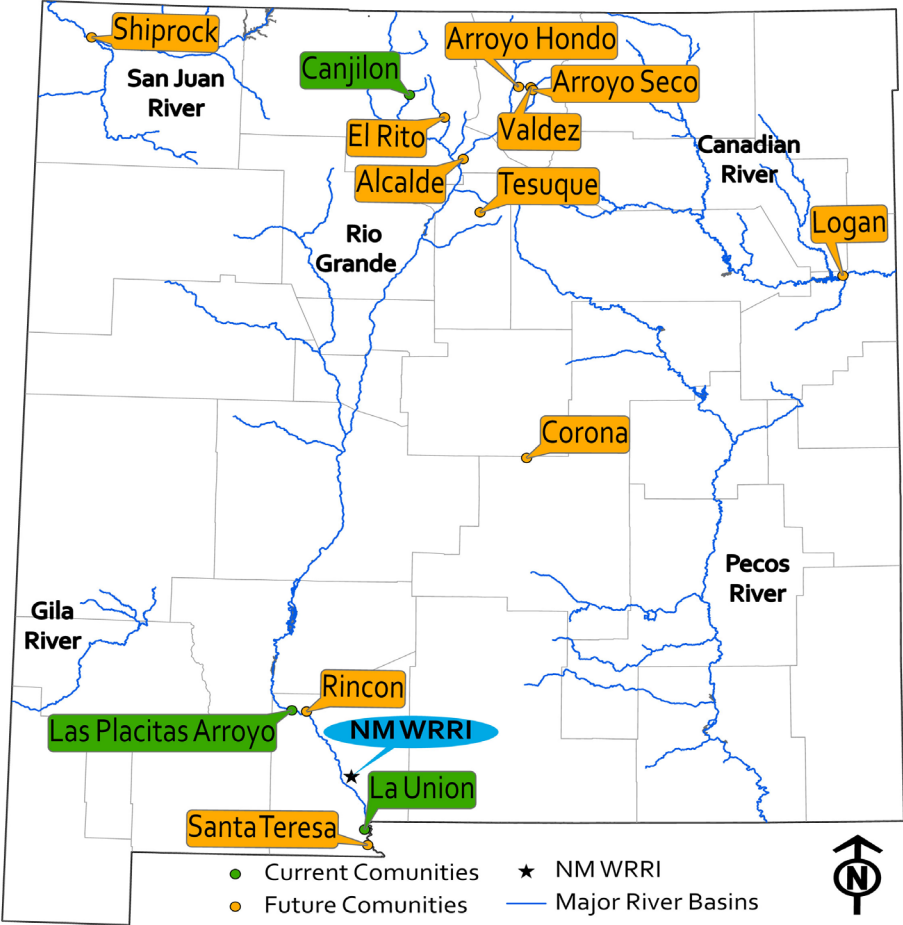


## Improved groundwater recharge through NM WRRRI research

- Recharge in flood irrigated alfalfa, pecans, pistachios.  
12-81% of applied water
- Diffuse recharge from contributing watersheds  
Up to 3000 acre-ft/year
- Watershed restoration  
Reduce flood energy and erosion  
Increase retention and recharge



# Current and Future Strategic Community Water Management Program





# THANK YOU!



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# Focused recharge

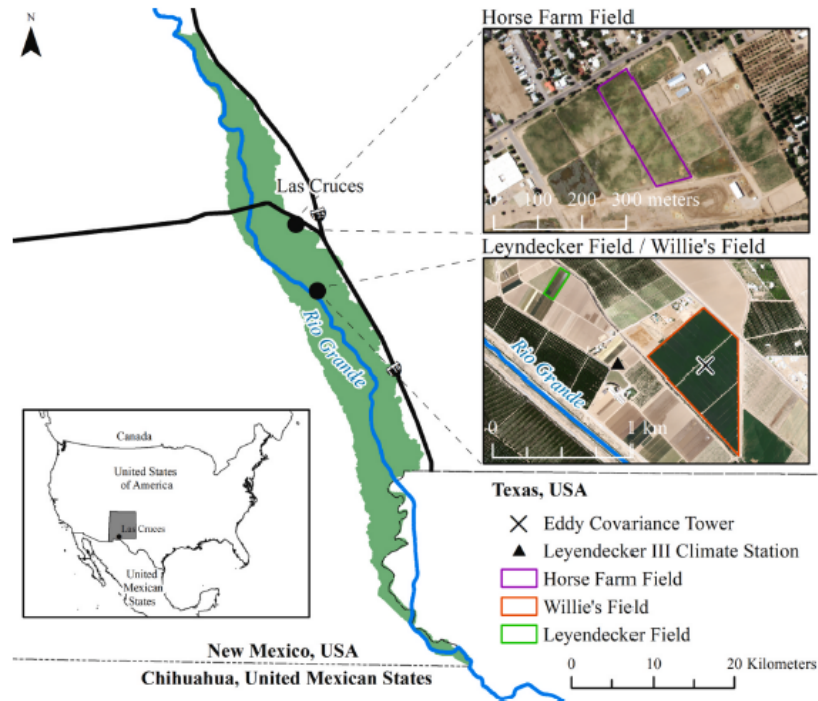
## Focused recharge

Recharge in flood irrigated alfalfa fields in the Mesilla Valley, New Mexico, for 2017 was from 37% to 45%. (Boyko et al., 2018)

In Northern New Mexico, total deep percolation on alfalfa fields ranged from 68% to 81% of irrigation water applied contributed to deep percolation. (Conrad et al. 2021)



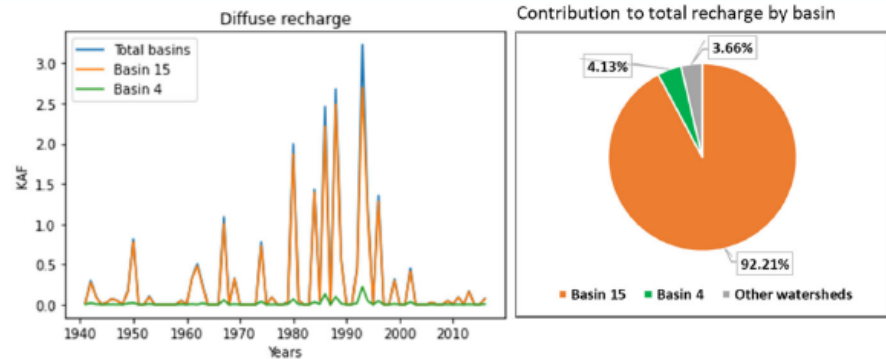
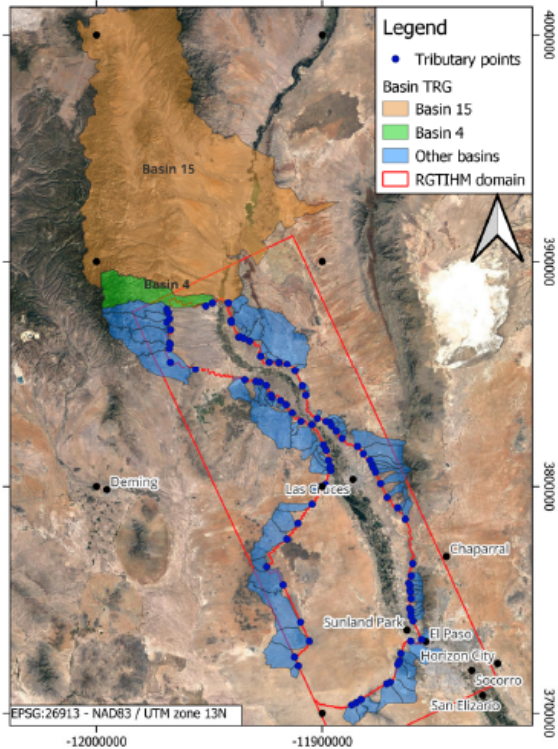
Deep percolation in flood irrigated pecan field in Mesilla Valley for 2020 was 12% of irrigation water applied and recharge in the drip irrigated field was 4% of total water applied.



Location of recharge research in alfalfa fields in Mesilla valley New Mexico (Boyko et al., 2018).



# Diffuse recharge from mountain-front runoff



Rio Grande Transboundary Watershed Model (RGTWM):

- Total recharge from basins between (1940-2015) is **21.73 KAF** and a yearly average of **0.29 KAF**
- Basin 15 and basin 4 are responsible of the 96% of the total recharge

Research needs:

- Approach to increase diffuse recharge: less ET, less runoff
- Field measurement of recharge and runoff
- Better conceptual model to represent surface hydrology in the basins
- Influence of earth dams and potential benefits of MAR
- Ability to project scenarios based on climate change and use of land

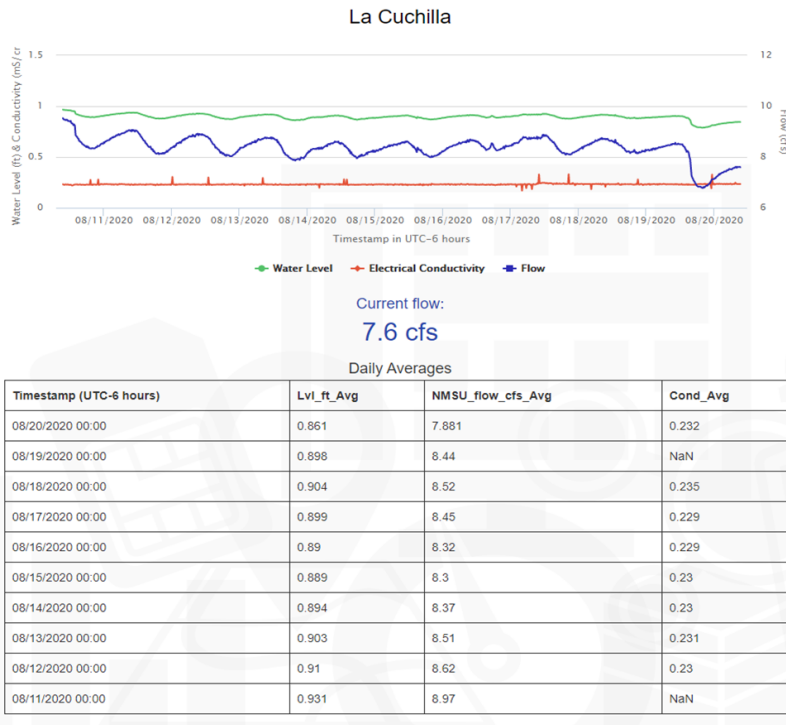


## Rangeland Watershed Restoration: *Goal - Lower Flood Energy and Drop Sediment Out of Flood Flows*

- **Challenge:** Scouring floods are washing large amounts of sediment into dams and the irrigation system. prevents wide-spread aquifer recharge projects and lowers conveyance capacity.
- **Research need:** We will expect to quantify the most effective practices and extent of restoration needed to achieve stakeholder goals within approximately 2 years (3 awarded NMED projects).
  - Additional study on practices closer the valley is needed (e.g. filtering ponds).
- **Paired watershed studies:** Subbasins with restoration are paired with control subbasins and critical indicators measured
  - We use remote sensing for analysis across scales validated by groundtruthing, including:
    - HEC-RAS 2-D modeling and ground measures of surface flow and sediment transport
    - soil moisture
    - Fine-scale vegetation monitoring groundtruthed by extensive transects
- **Funding opportunity to extend projects:** \$3m Reclamation program proposal (due March 28<sup>th</sup>) – 25%-50% match



# Acequia monitoring web interface



An example of the water data displayed for each acequia on the web interface. In this case, La Cuchilla on 20 August 2020.



# Strategic Community Water Management Program

## Future funding

### Rio Hondo – Arroyo Hondo, Valdez, Des Montes

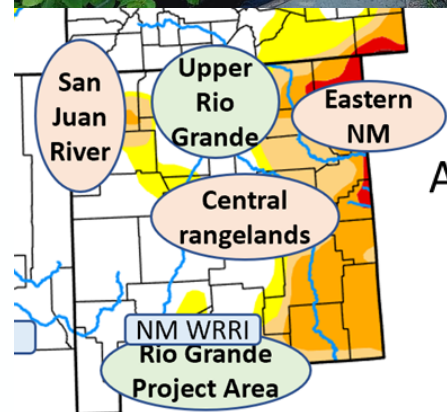
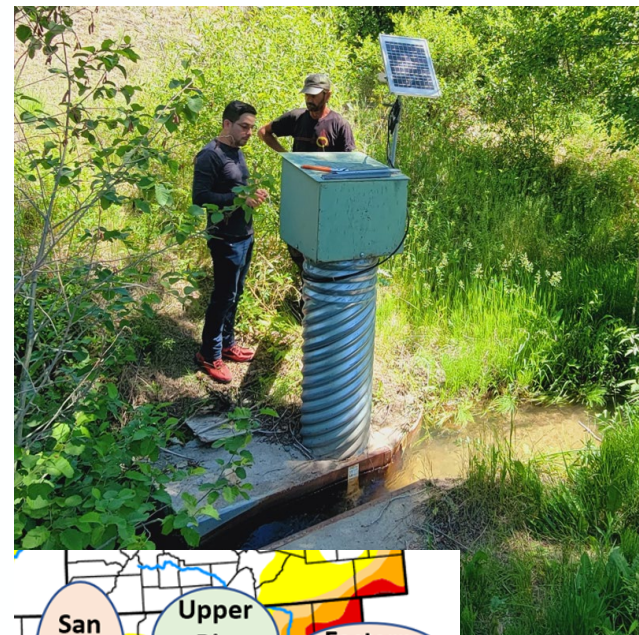
- Request from community to inform water management with sensors, real-time water budget information, technical assistance, data interpretation

### San Juan Irrigation District

- Request from community for information to inform irrigation with sensors, water budget interpretation, vegetation management, water quality

### Tesuque (Upper Rio Grande)

- Request from community to inform infrequent acequia diversion information



Arroyo Hondo



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