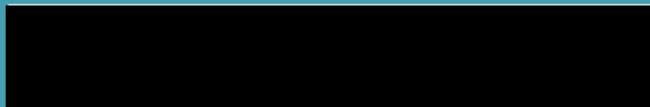


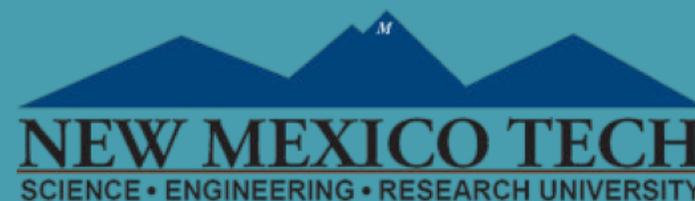
Water Resources and Climate Change in New Mexico

Stacy Timmons

Associate Director for Hydrogeology Programs
New Mexico Bureau of Geology and Mineral Resources



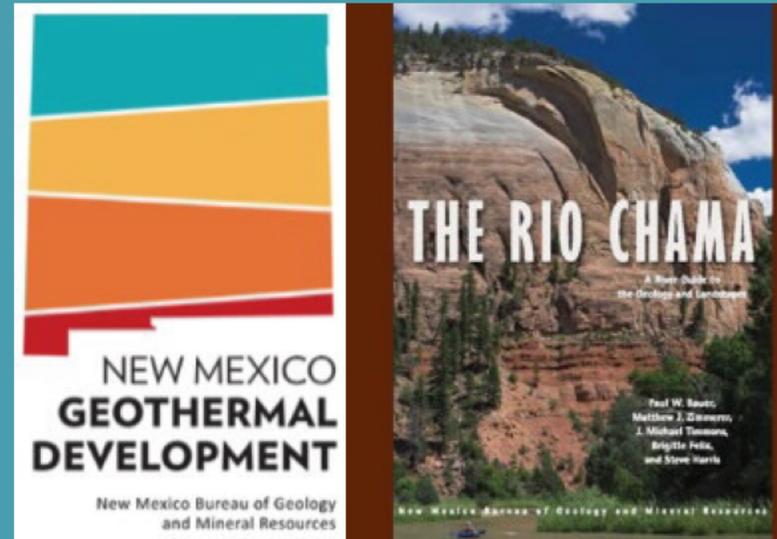
June 2025
NM Judicial Conclave



NM Bureau of Geology – a Resource for New Mexico

Non-regulatory, state geologic survey, providing science and service to NM since 1927

- Geologic Mapping and Hazards
- Hydrogeology / Water Programs
- Energy
 - Oil/gas and geothermal
- Mineral Resources
- Laboratories
- Outreach and Education



WATER PROGRAMS AT NM BUREAU OF GEOLOGY



Aquifer Mapping and Monitoring Program

Regional short and long-term hydrogeology studies and mapping water quantity and quality

Groundwater level monitoring (currently funded by philanthropic funds from Healy Foundation)



Water Data Initiative

Began in 2019, following the Water Data Act

Convening the work with multiple state agencies

Working to make NM water data more accessible and usable



Water Education Program

For legislators, staff and state water leaders

Developed following the model of previous Decision Makers Conferences

Focusing on increasing awareness and education on critical water issues in NM

Climate Change in New Mexico Over the Next 50 Years: Impacts on Water Resources

Editors and Contributing Authors: Nelia W. Dunbar, David S. Gutzler, Kristin S. Pearthree, Fred M. Phillips, Paul W. Bauer

Contributing Authors: Craig D. Allen, David DuBois, Michael D. Harvey, J. Phillip King, Leslie D. McFadden, Bruce M. Thomson, Anne C. Tillery



WATER RESOURCES

NM Bureau of Geology – Bulletin 164

- A review of climate change impacts on water resources in New Mexico over the next 50 years
- Funding from and collaboration with NM Interstate Stream Commission to prepare for 50-Year water planning process
- Experienced team of scientists
- Compilation and integration of existing data

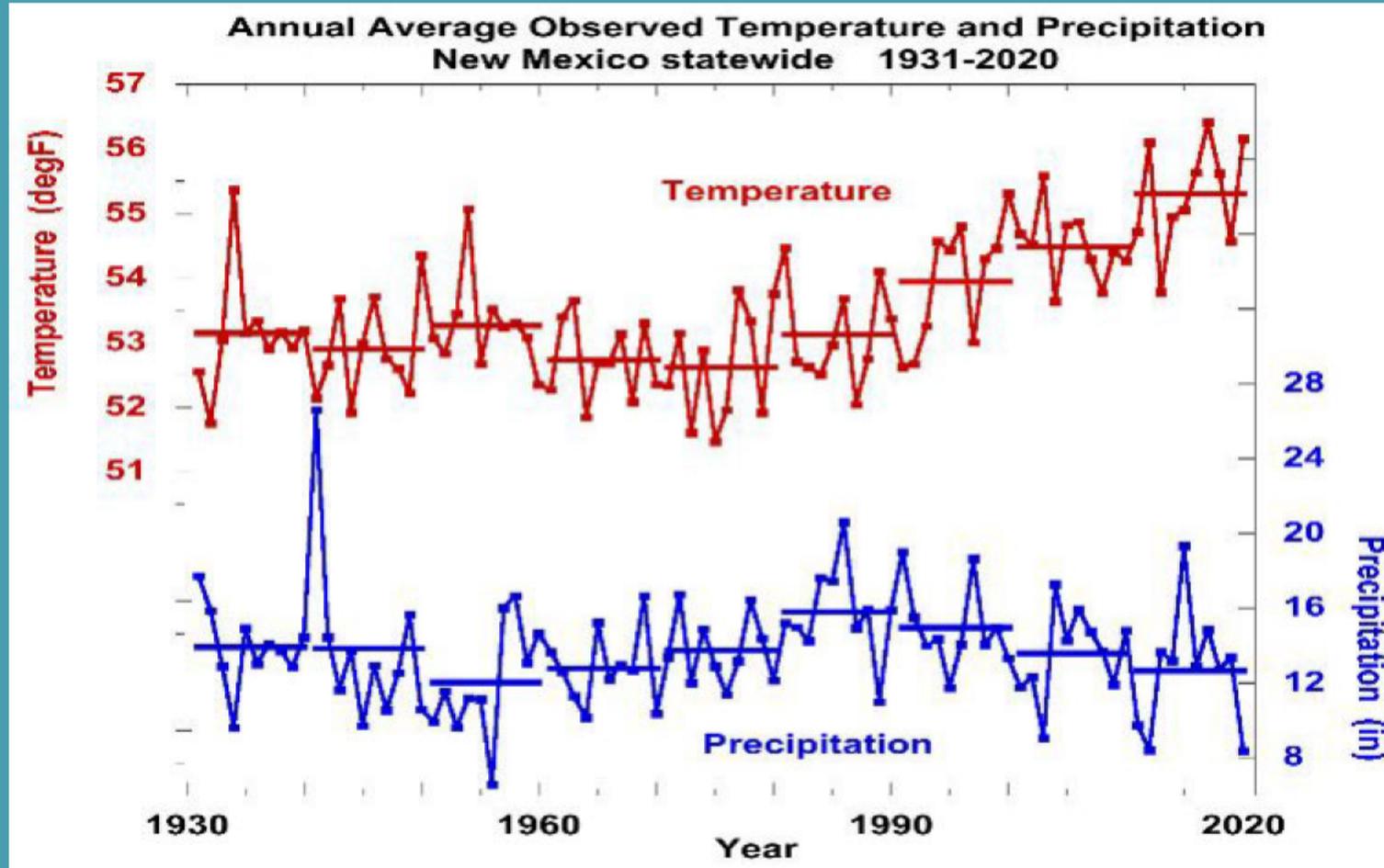
<https://geoinfo.nmt.edu/climatepanel>

Goal of this report:

Assess and synthesize recent scientific literature on climate, hydrology, and impacts of these changes

- Future climate projections
- Changes to the surface water budget
- Ecological dynamics
- Impact on soils
- Landscape change/fires/erosion
- Surface water and groundwater
- Sedimentation in rivers
- Extreme precipitation and flooding
- Water quality

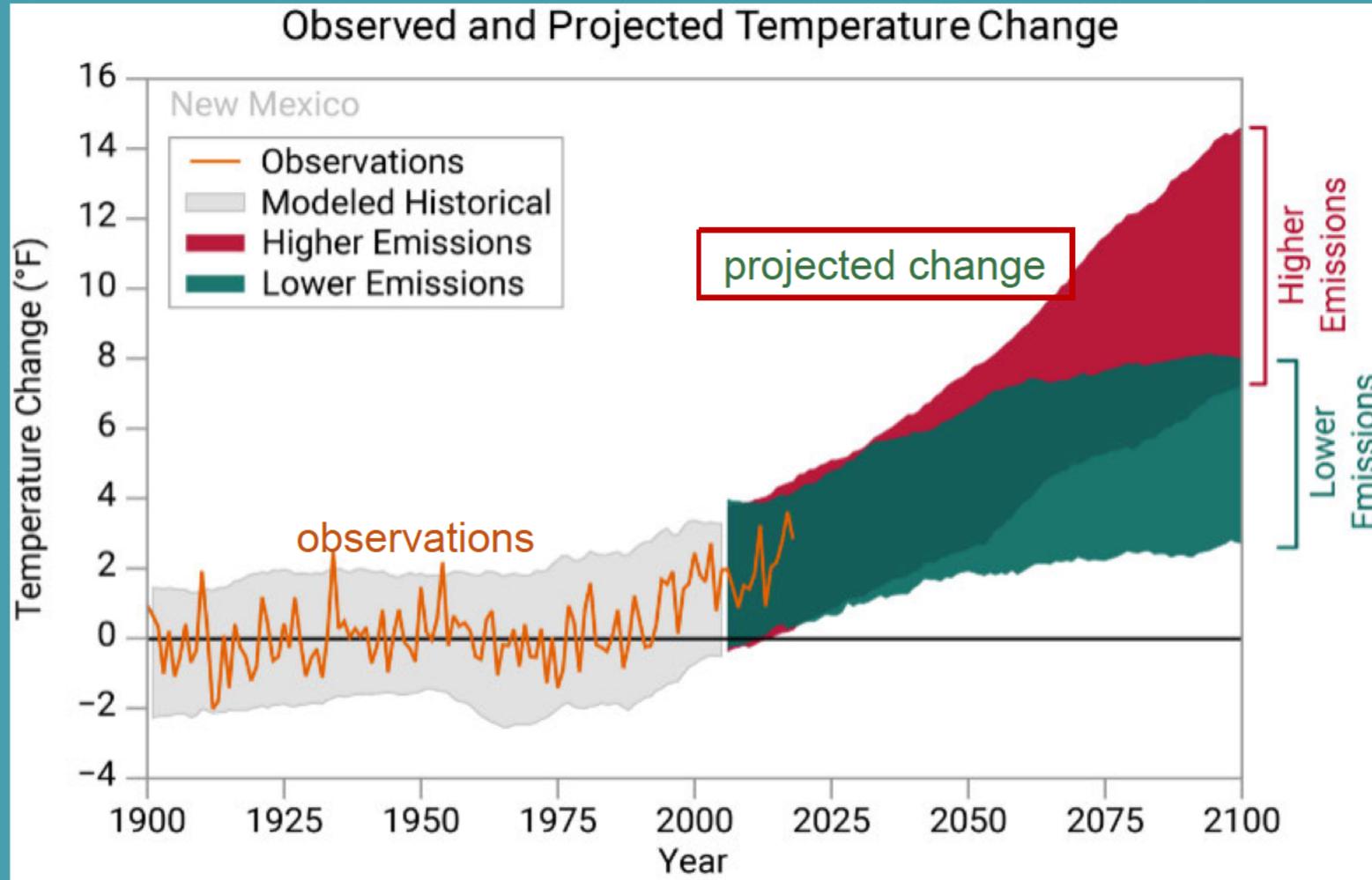
New Mexico's climate is warming



Decade-average temperatures have been climbing steadily for the past 50 years, 2 degrees F since 2000

Precipitation is highly variable, at least 4 of the 5 driest years have occurred in the past two decades

New Mexico's climate will continue to warm in response to increasing concentrations of atmospheric greenhouse gases



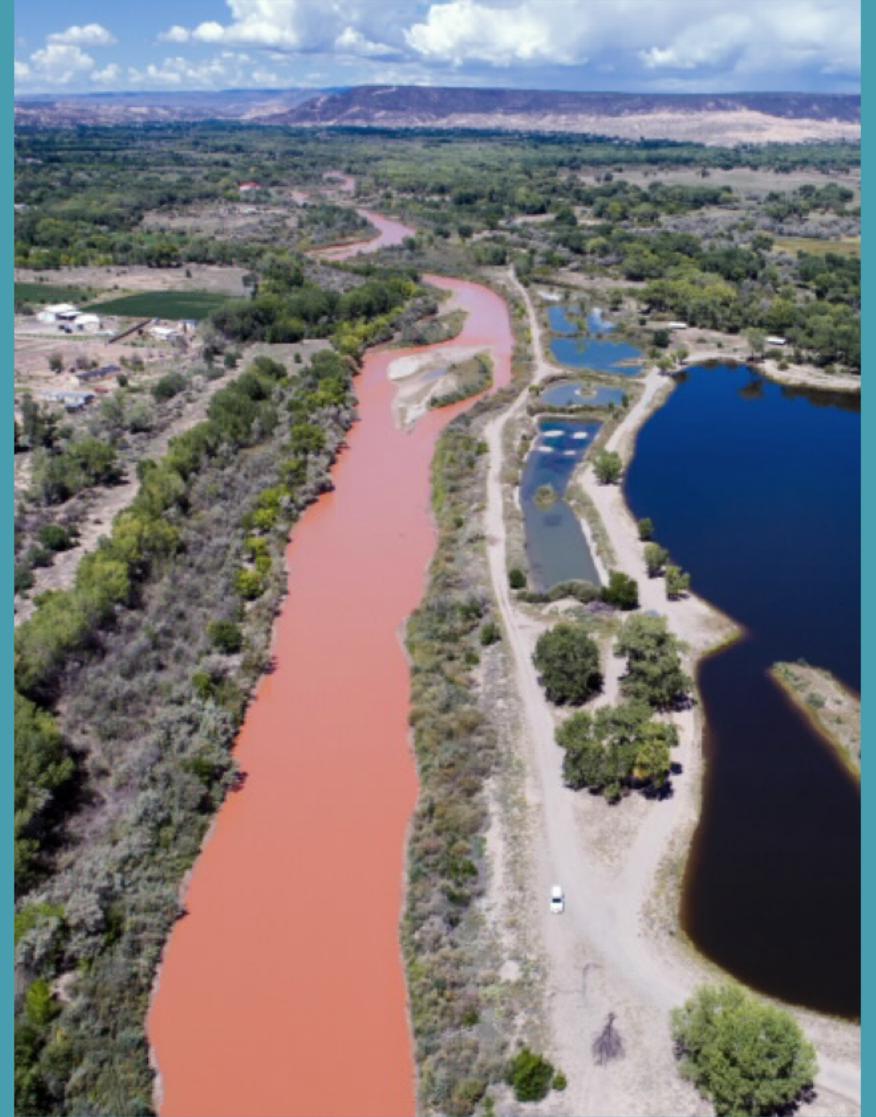
Red and **green** bands represent future temperature increases in NM projected by an ensemble of climate models, in response to **higher** or **lower** rates of future greenhouse gas emissions

Climate change is impacting New Mexico's water resources in multiple ways

- Lower streamflow and recharge because of increased aridity
- Variability in precipitation
- More extreme precipitation and flooding events
- Hotter, more severe droughts
- Decreasing snowpack → earlier and diminishing snowmelt runoff
- Greater demands on groundwater, with less recharge to groundwater
- Vegetation stress
- Increasing catastrophic forest fires
- Increasing sedimentation in rivers / reservoirs
- Irreversible damage to soils through loss of vegetation and erosion
- Degraded quality of surface waters

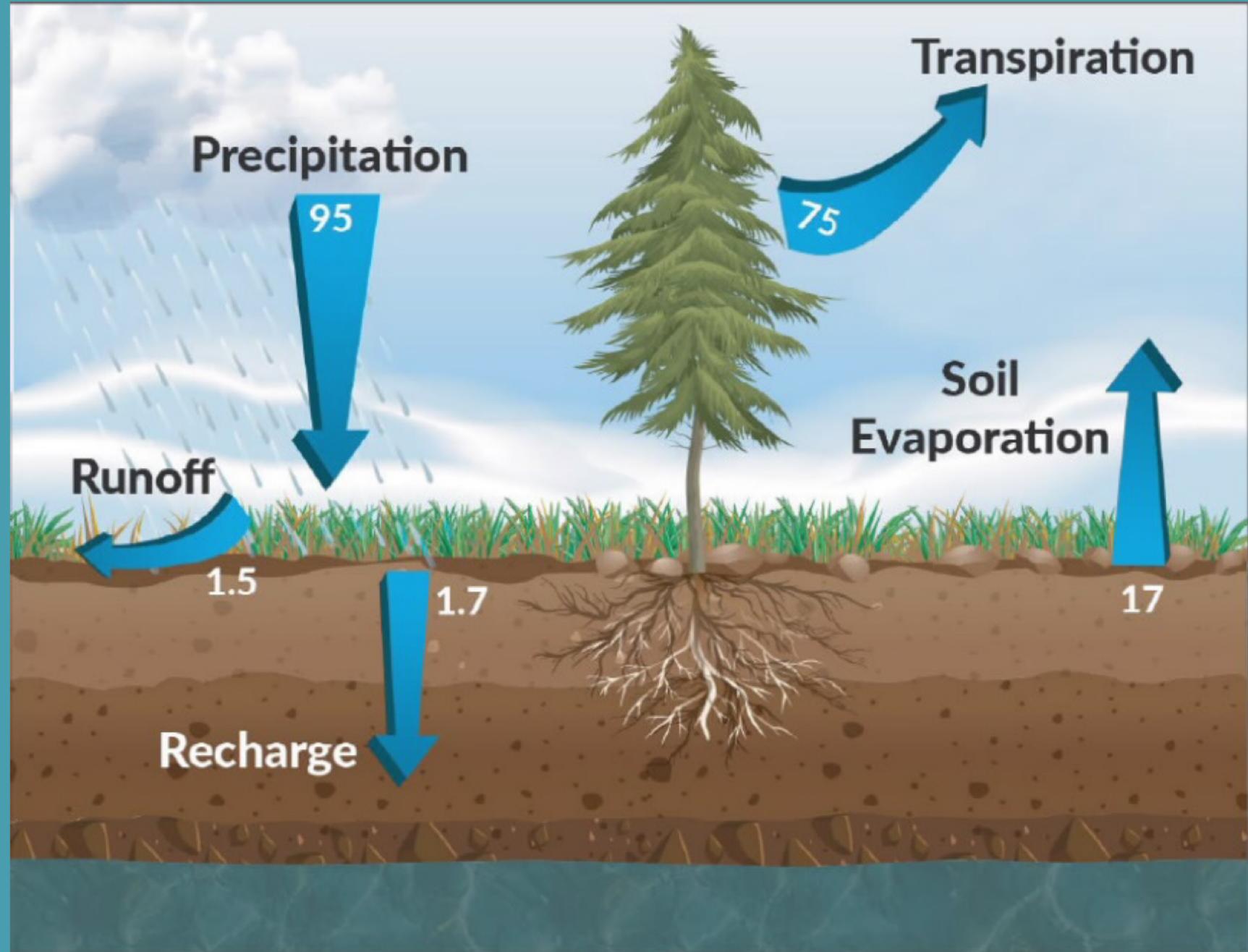
Impact on New Mexico Rivers

- Over next 50 years, flow will decline by 16-28%
- Due to extreme precipitation and fire-driven disruption of watersheds, the amount of sediment delivered to rivers will double
- Beds of undammed rivers will be built up
- Reservoir capacity will be reduced
- Channels will narrow

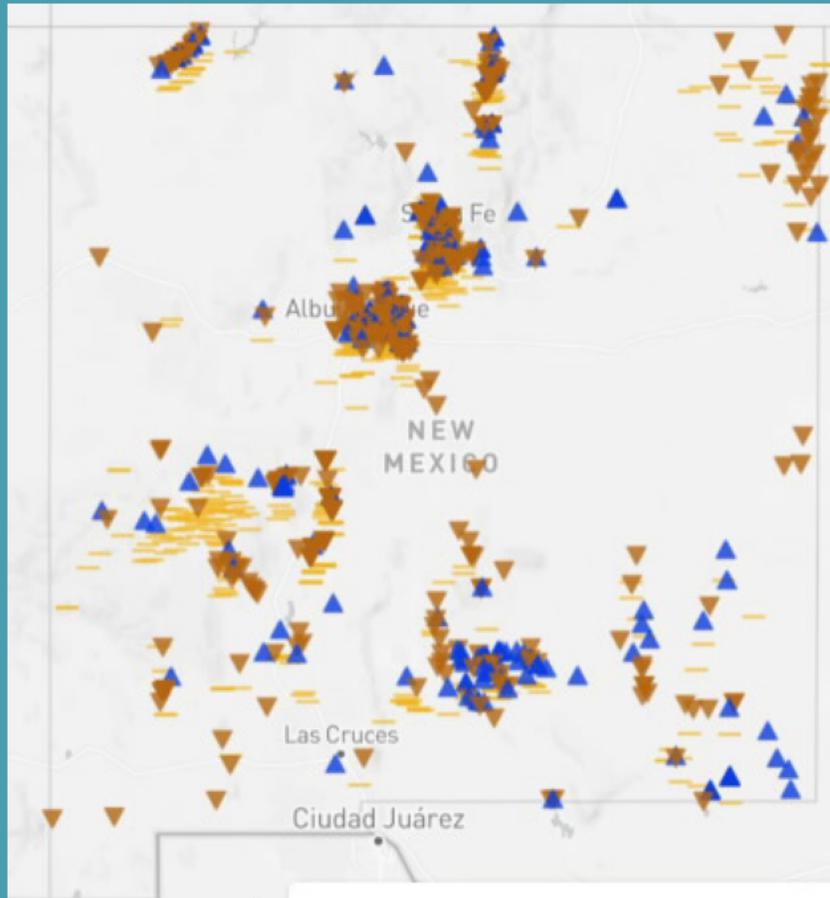


Land-surface water budget in New Mexico's arid climate

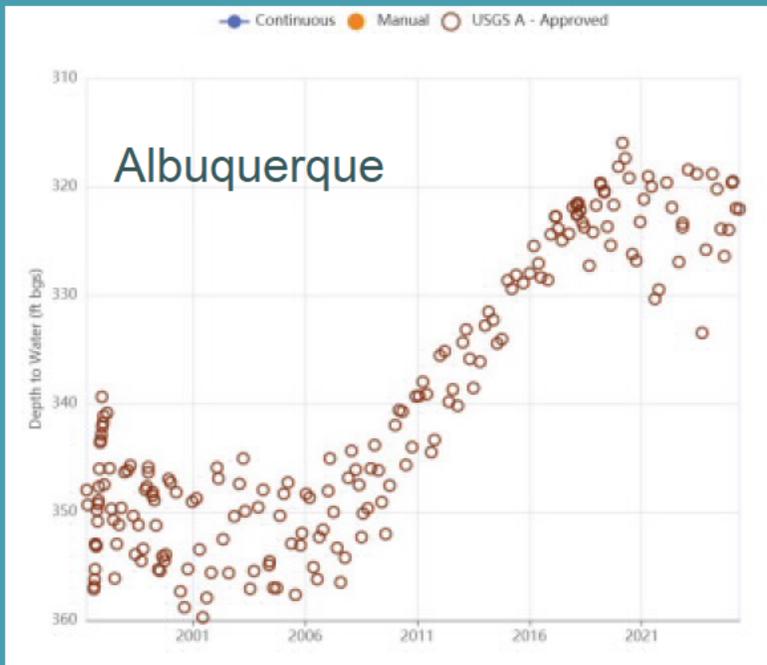
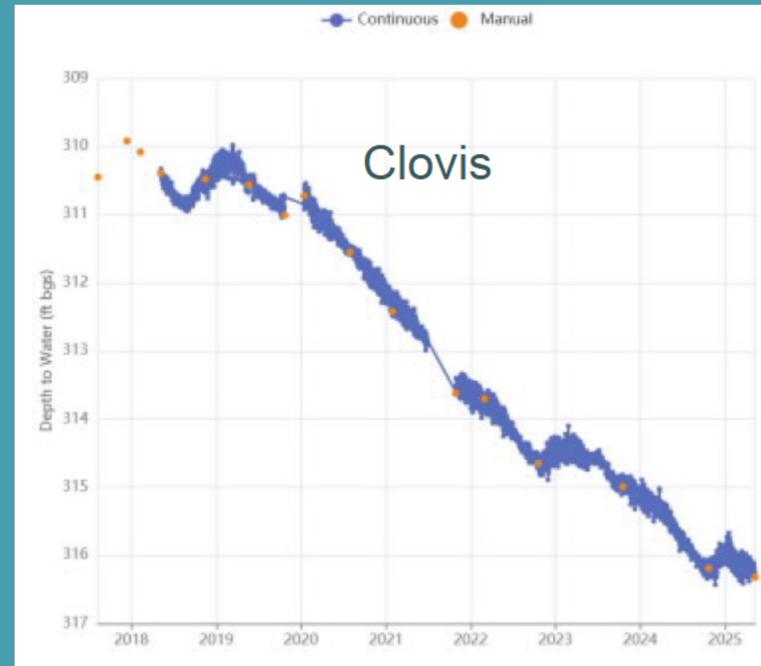
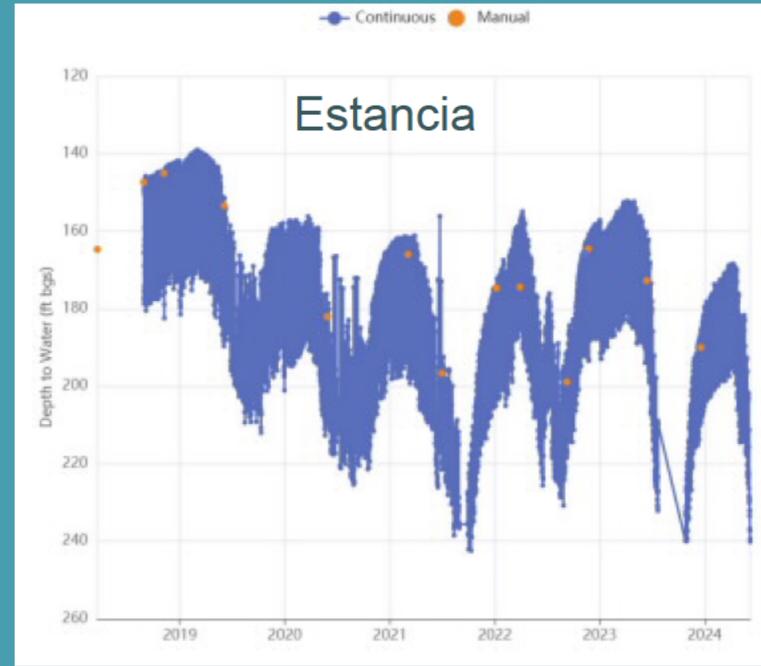
Numbers represent millions of acre-feet per year



Climate change impacts on New Mexico's groundwater



- Stable
- ▲ Increasing (less depth to water) ↑
- ▼ Decreasing (more depth to water) ↓



<https://weaver.newmexicowaterdata.org/>

Groundwater is not easily characterized

New Mexico's geology is complex

Defining boundaries of aquifers/aquifer systems requires detailed geologic and hydrologic information.

Questions we need to answer:

1. How much groundwater is available?

Water planning and management

2. What is the groundwater quality?

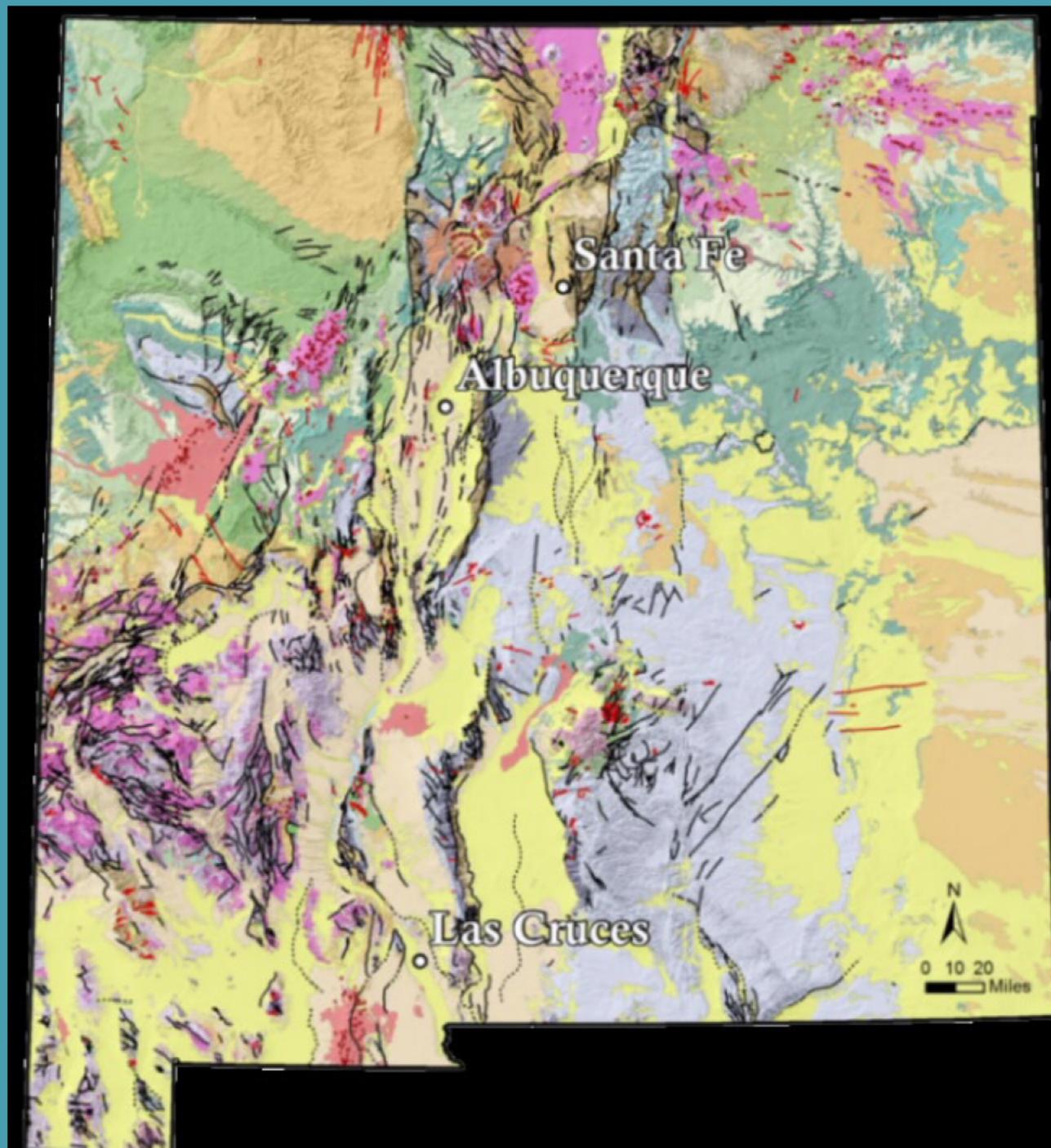
Fresh or brackish water

Contaminants

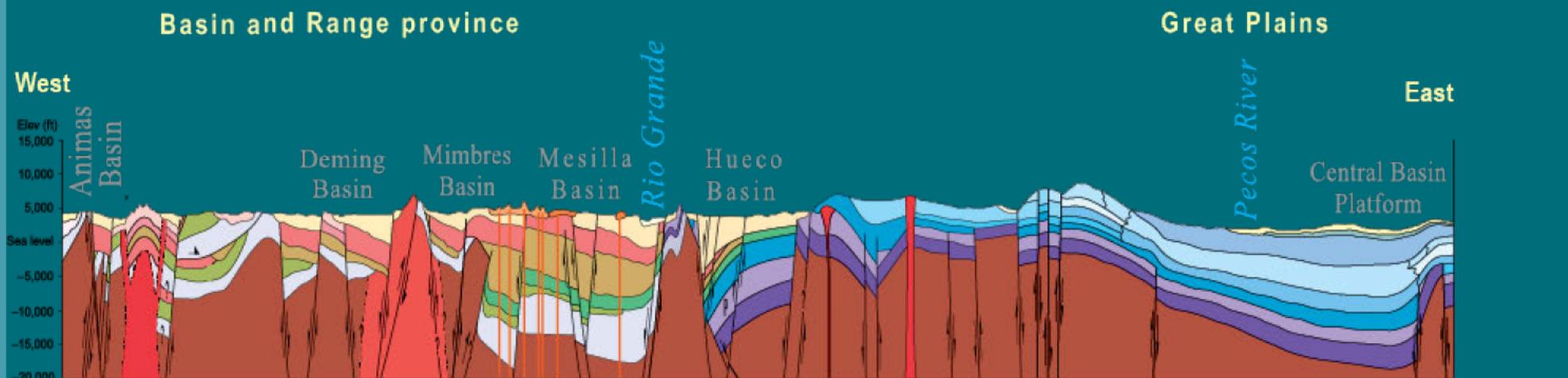
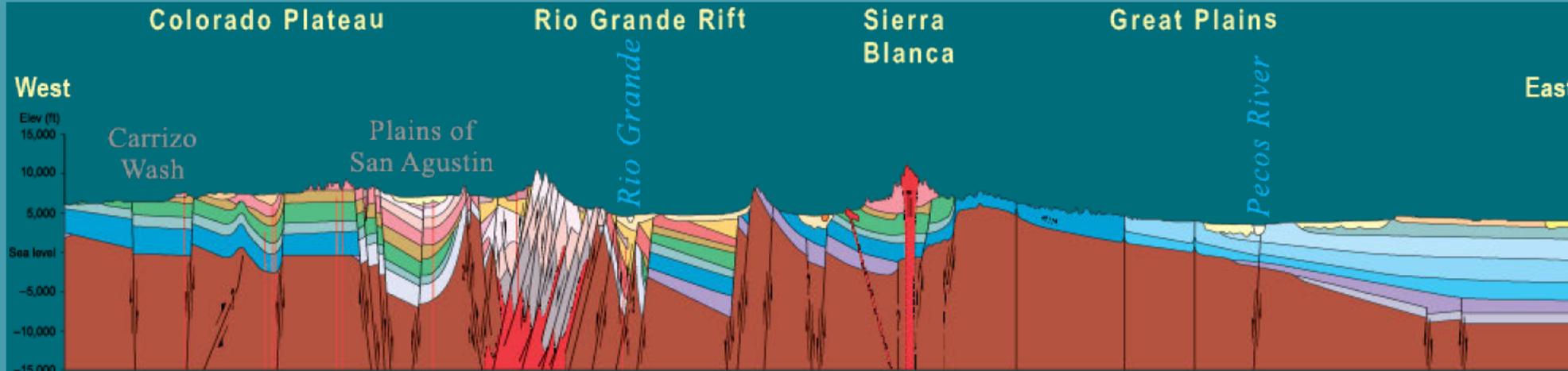
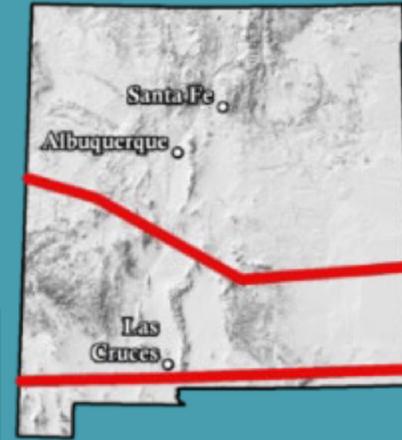
3. Is there recharge to the groundwater?

Sustainability

Connection of aquifers or rivers



Complex geology = Complicated aquifers



FROM THE 50-YEAR WATER ACTION PLAN

Upon fulfillment of funding:

1. Characterize all major and minor aquifers in the state (fresh and brackish)
2. Characterize all major aquifers by 2032
3. Build a statewide groundwater monitoring network with 100 new dedicated wells by 2037

50-YEAR WATER ACTION PLAN

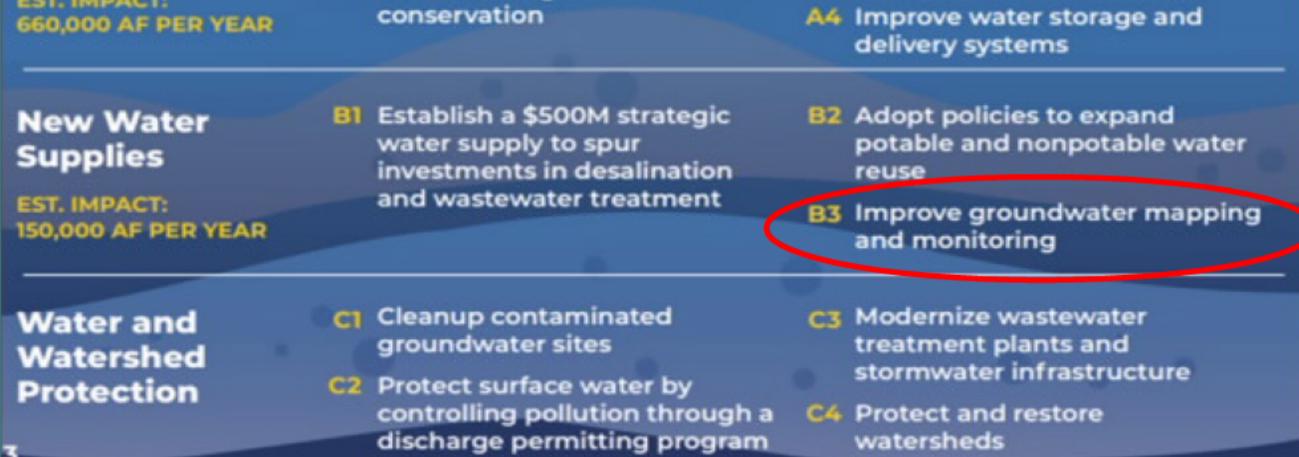

 Office of the Governor
MICHELLE LUJAN GRISHAM

WHAT WE ARE DOING TO INCREASE WATER SECURITY:

50-Year Water Action Plan.

The Water Plan actions will help address the reality of a reduced supply in the future.

Water Conservation <small>EST. IMPACT: 660,000 AF PER YEAR</small>	A1 Develop a public education campaign A2 Incentivise agricultural water conservation	A3 Reduce leaks in drinking water infrastructure and increase municipal conservation A4 Improve water storage and delivery systems
New Water Supplies <small>EST. IMPACT: 150,000 AF PER YEAR</small>	B1 Establish a \$500M strategic water supply to spur investments in desalination and wastewater treatment	B2 Adopt policies to expand potable and nonpotable water reuse B3 Improve groundwater mapping and monitoring
Water and Watershed Protection	C1 Cleanup contaminated groundwater sites C2 Protect surface water by controlling pollution through a discharge permitting program	C3 Modernize wastewater treatment plants and stormwater infrastructure C4 Protect and restore watersheds

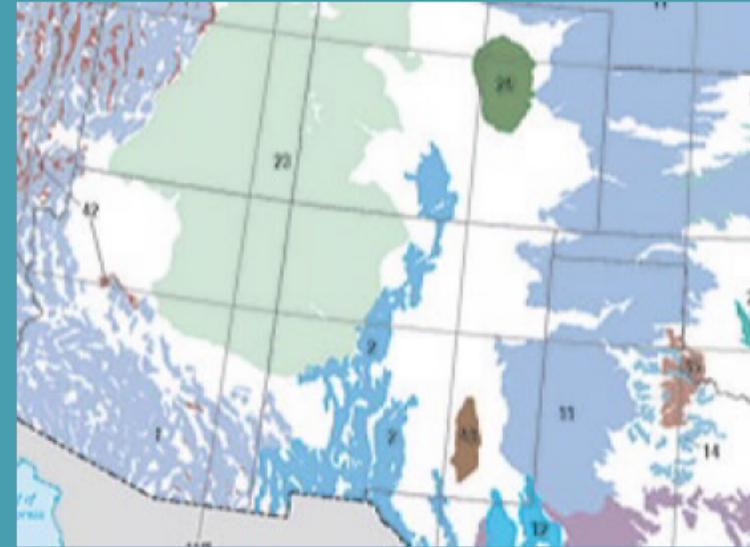


Aquifers in New Mexico have not been fully mapped

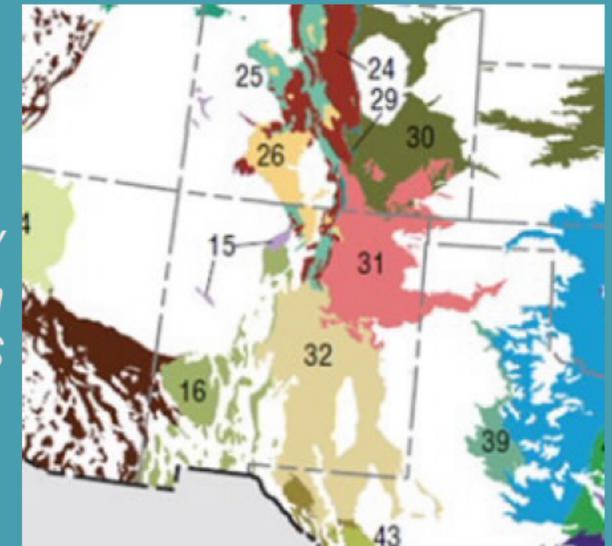
Complete aquifer maps include:

1. Geologic units and hydrogeologic unit(s) characteristics
2. Depth to water/ groundwater elevations
3. Boundaries of aquifer(s), impactful geologic structures, and recharge areas
4. Water quality characteristics

Current project: Building first complete 2D map of major and minor aquifer boundaries using existing well data, reports and geologic information (funded by OSE/ISC)



*Principal
aquifers from
USGS*



*Secondary
aquifers from
USGS*

With NEW state appropriation (FY26), we are working to improve maps of New Mexico's aquifers

Compile existing data, such as

- Information from existing wells
- Geologic mapping, hydrologic mapping/testing results
- Geophysical and other survey data
- Geochemical sampling results

Build initial draft maps/model

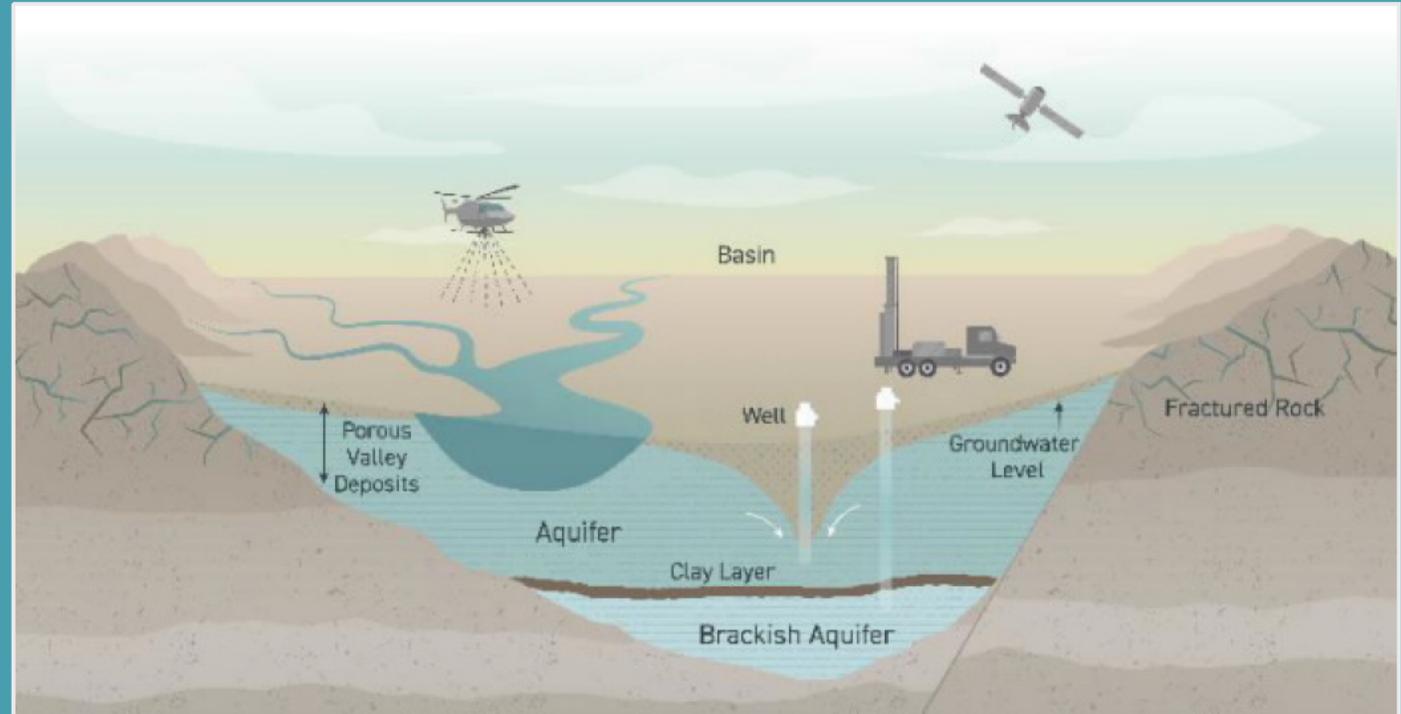
- Evaluate data gaps

Fill data gaps

- Drill wells*
- Collect geophysics*
- Geologic mapping
- Measure groundwater depths / changes
- Geochemical sampling

Update maps/model

Long term monitoring for change



Many challenges ahead for water in New Mexico

- Prepare for increased use of groundwater
 - Less streamflow / less recharge
 - Wells going dry at times or permanently
 - Improve metering / measurement coverage
 - Improve subsurface understanding/ mapping (+ alternative water supplies)
- Reduced storage capacity in reservoirs and increasing difficulty for water deliveries / compact compliance
- Increasing change creating water conflict and management challenges

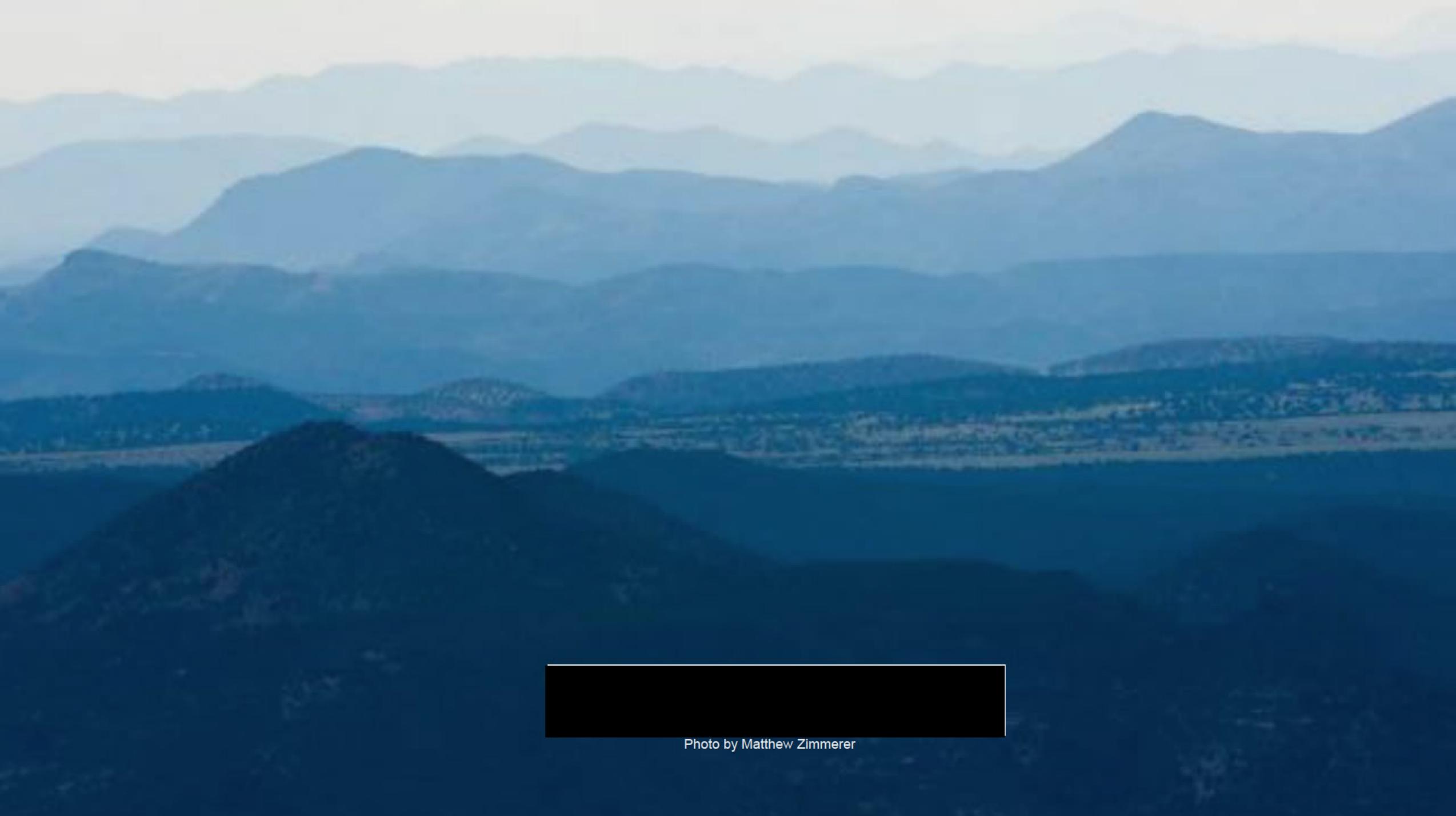


Photo by Matthew Zimmerer

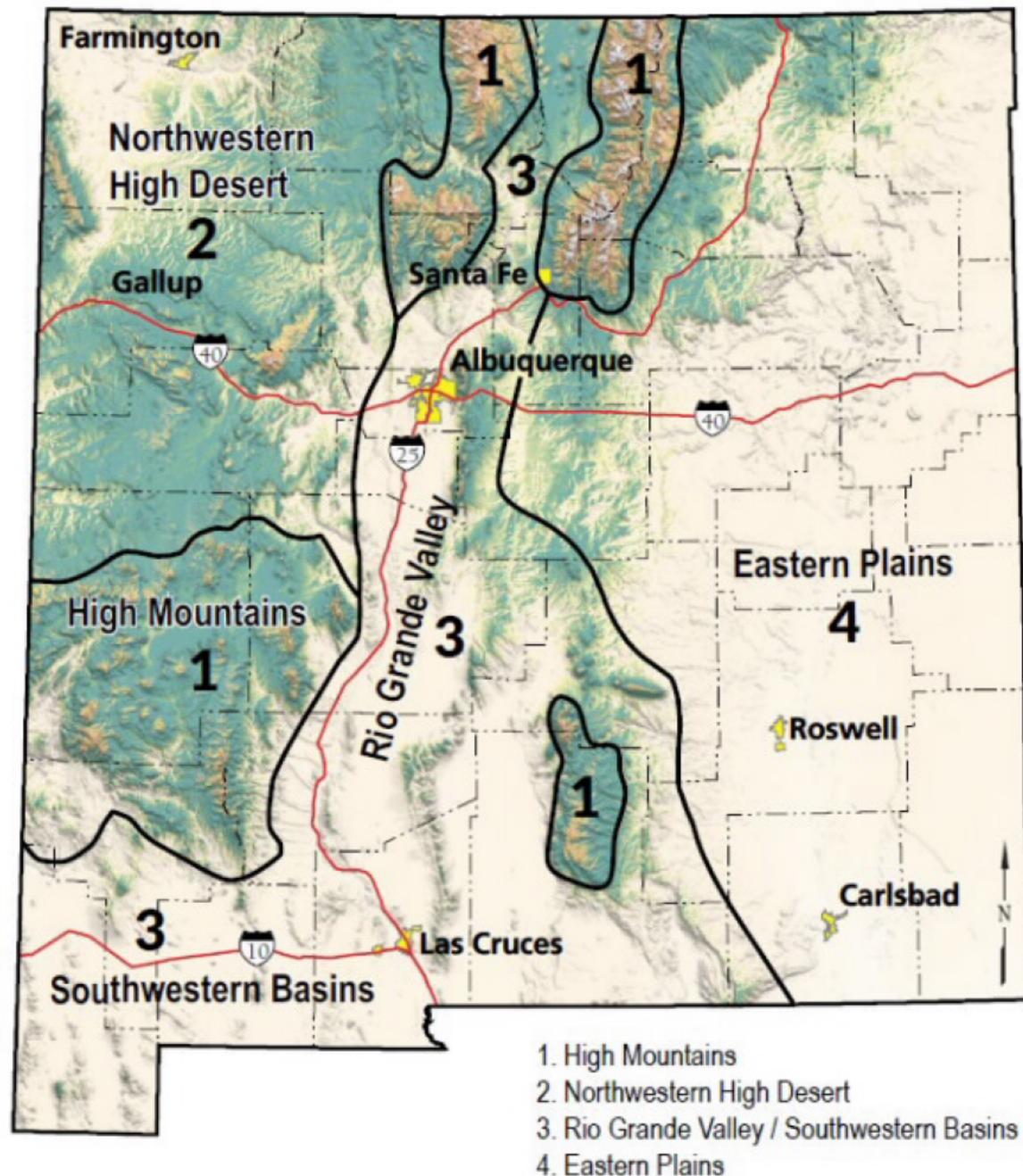
Extra slides

<https://geoinfo.nmt.edu/climatepanel>

Statewide and Regional Impacts

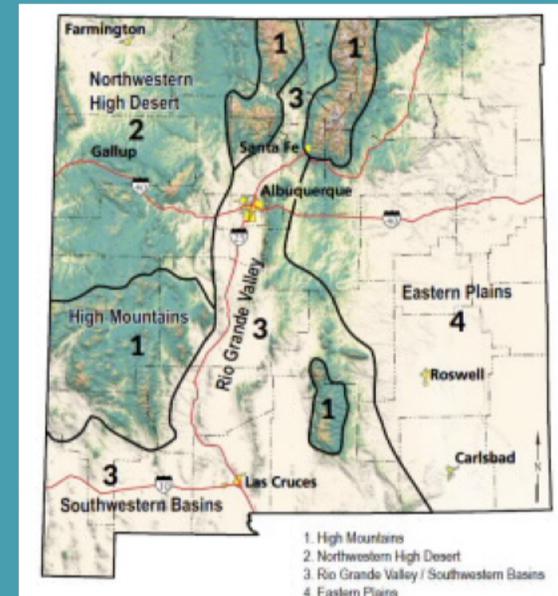
New Mexico is a state characterized by varied landscape. Increasing temperature will have different impacts on different parts of the state. We identified 4 regions which may experience similar impacts.

1. High Mountains
2. Northwestern High Desert
3. Rio Grande Valley/SE Basins
4. Eastern Plains



Dominant Impacts by Region

- **High Mountains**
 - Will be most impacted by climate change, and impacts will be felt throughout the state. Less snowmelt and higher evapotranspiration
 - Changes to plant communities and increased wildfire will be felt not only in the mountains, but also in “downstream” areas
- **Northwestern High Desert**
 - Loss of soil
 - Increased dustiness
 - Increased arroyo incision
 - Possible transition from grasses to shrubs



Dominant Impacts by Region

- **Southwest Basins/Rio Grande Valley**

- Lower river flows (25% lower flow in Rio Grande in 50 years), changes in timing of runoff, trending earlier
- Greater loss of water from reservoirs (with a 5 degree temperature increase, Elephant Butte will lose 2 additional feet of water per year)

- **Eastern Plains**

- Extreme precipitation events
- Loss of soil, increased desertification
- Increased dustiness

