

Climate Change In New Mexico Over the Next 50 Years- Impacts on Water Resources

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A collaborative effort between the Interstate Stream Commission and the New Mexico Bureau of Geology and Mineral Resources



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

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WATER RESOURCES

- Experienced team of scientists
 - Fred Phillips, Dave Gutzler, Craig Allen, Dave DuBois, Mike Harvey, Phil King, Les McFadden, Bruce Thomson, and Anne Tillery
- Follows the framework of a NAS consensus study and is a **compilation** and **integration** of existing data
- Many Zoom meetings and writing
- Peer-reviewed and opened for public comment
- **GSA Frye Award Winner 2023!**

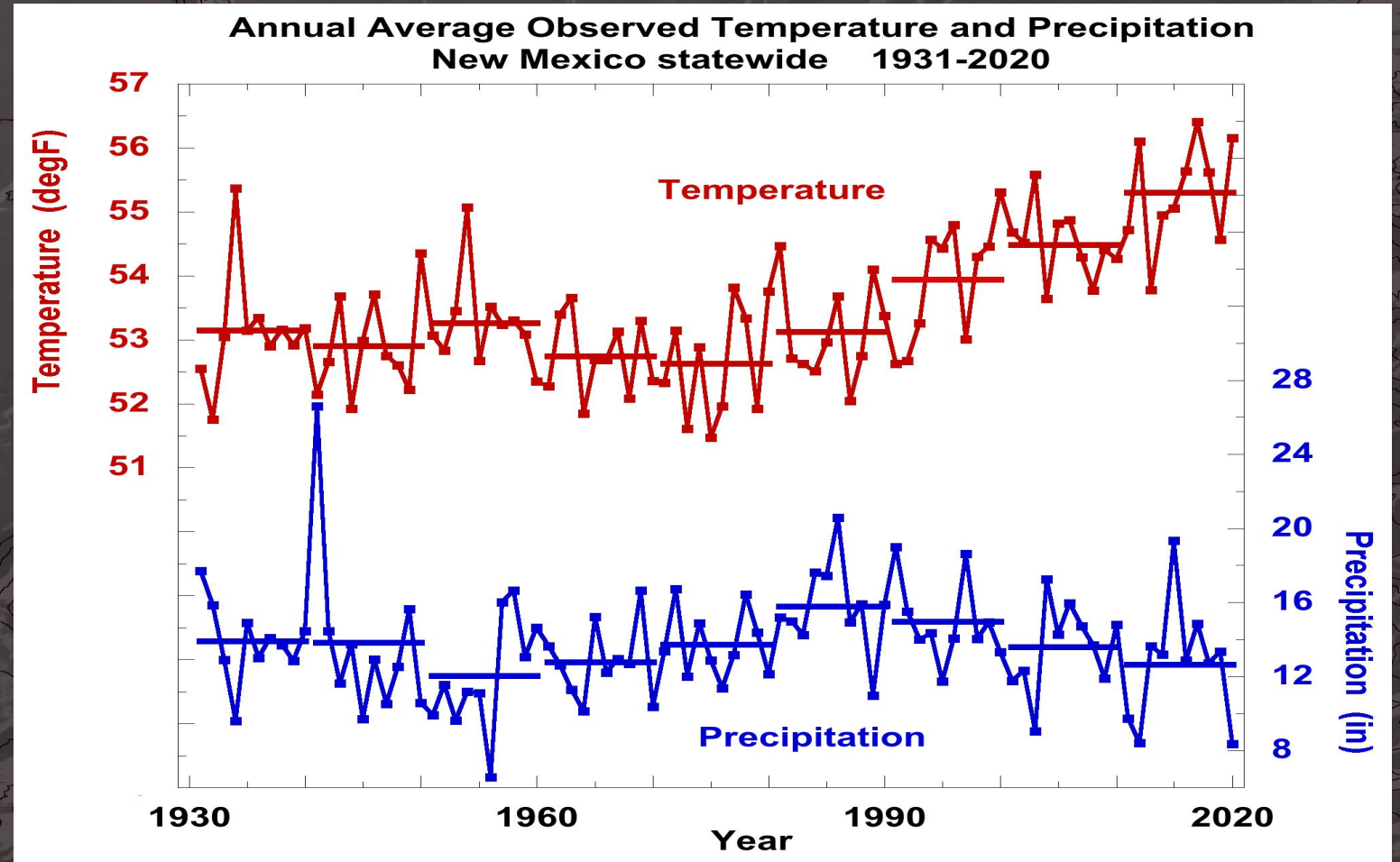
New Mexico Bureau of Geology and Mineral Resources Bulletin 164

Or... Search for: Bureau of Geology climate report

Why do we need this?

New Mexico's climate is warming

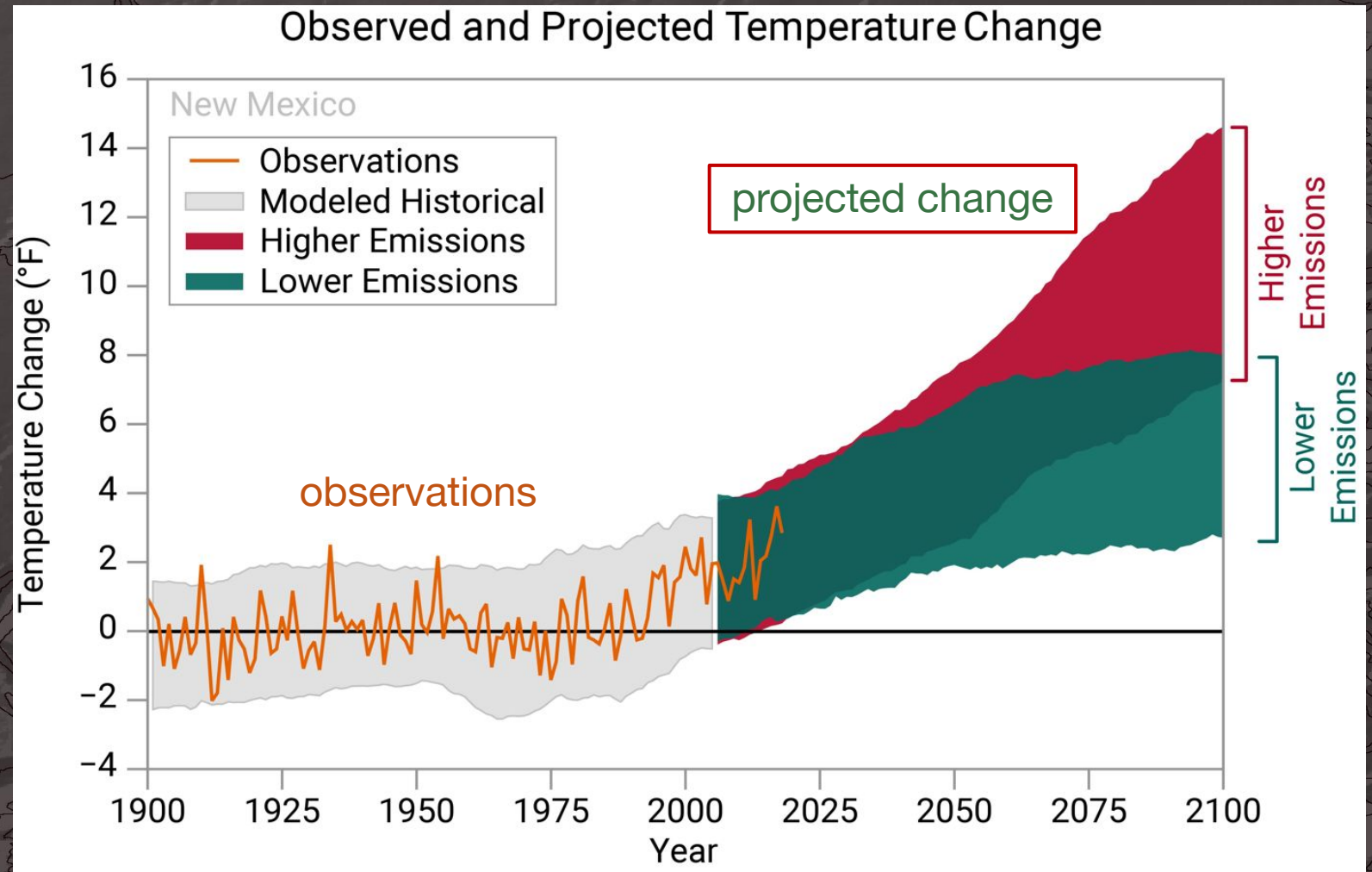
Water planning for our state must account for ongoing and future changes to our climate and water resource reliability



Decade-average temperatures have been climbing steadily for the past 50 years

Precipitation has no clear trend but is hugely variable, annually and decadal
4 of the 5 driest years since 1930 have occurred in the past two decades

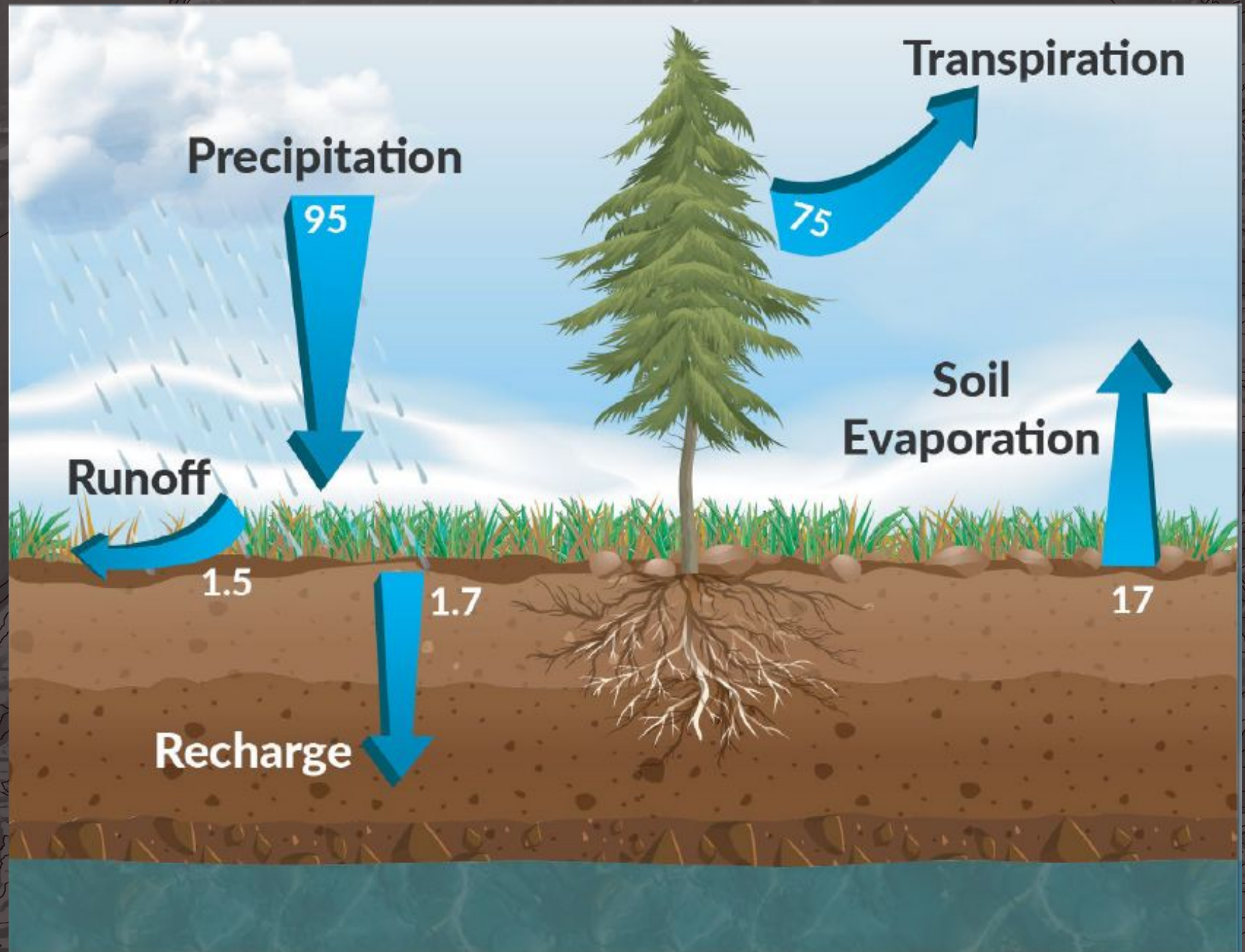
New Mexico's climate will continue to warm in response to increasing concentrations of atmospheric greenhouse gases



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

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

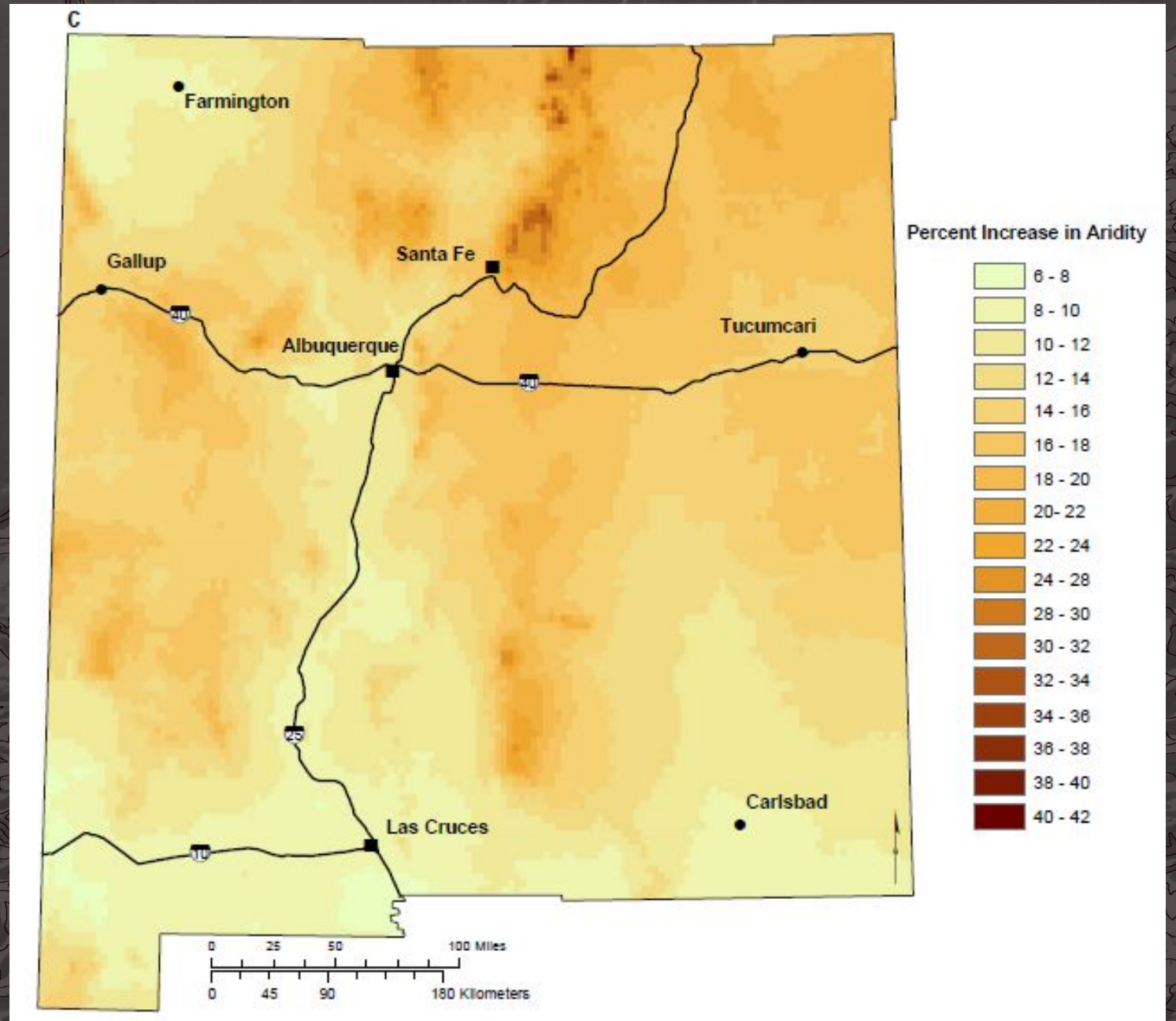
Numbers represent millions of acre-feet per year



Even with precipitation not decreasing, New Mexico will become more arid because of increasing air temperature

- The amount of water that air can “hold” goes up as the air temperature rises (a $\sim 2^{\circ}\text{F}$ increase in temperature allows air to hold 7% more water vapor).
- Liquid water will be lost more rapidly from plants and soil.
- Amount of water available for runoff and recharge, which are small to begin with, will go down.

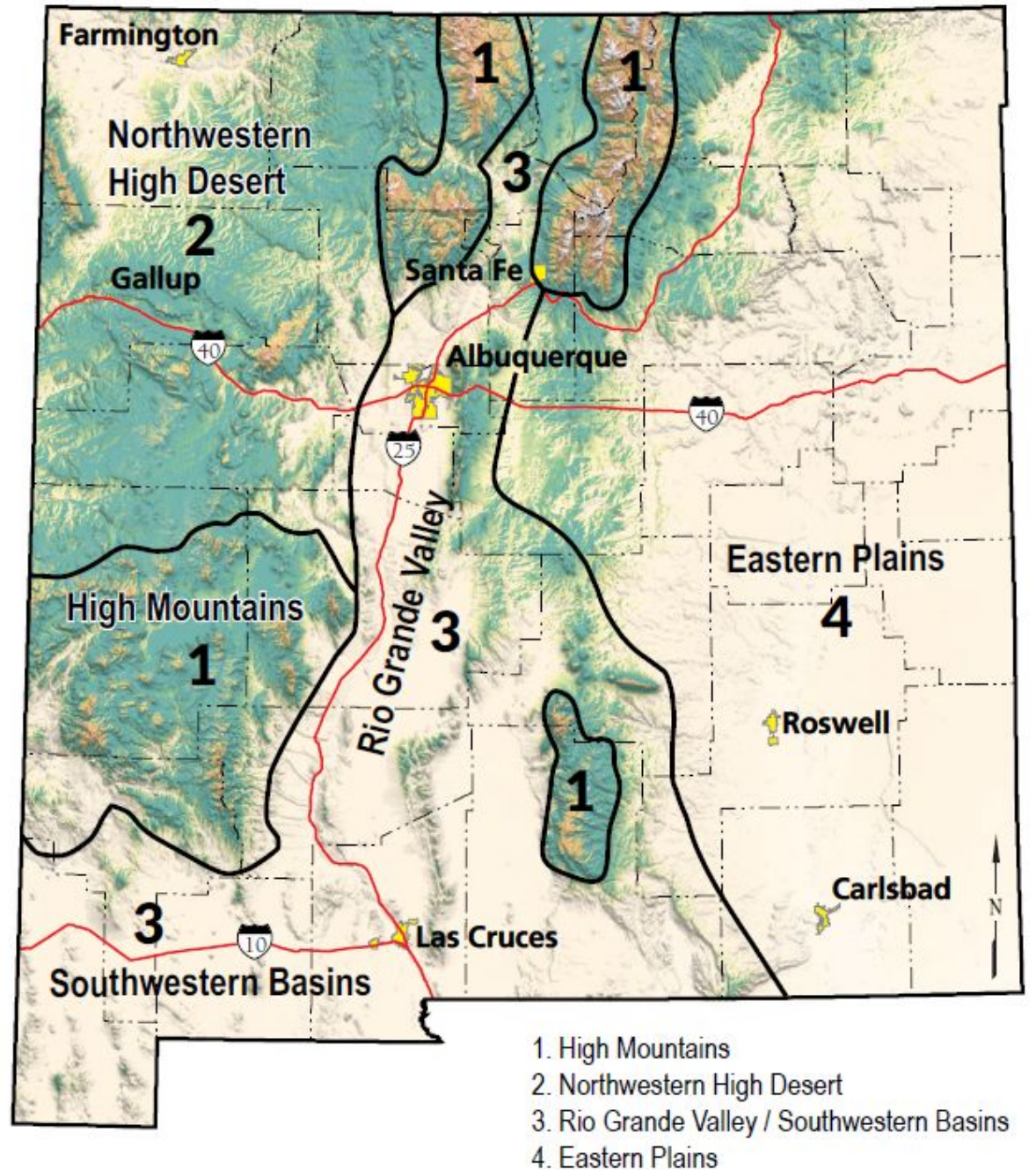
Percent increase in aridity between 1970-2000 and 2040-2069



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