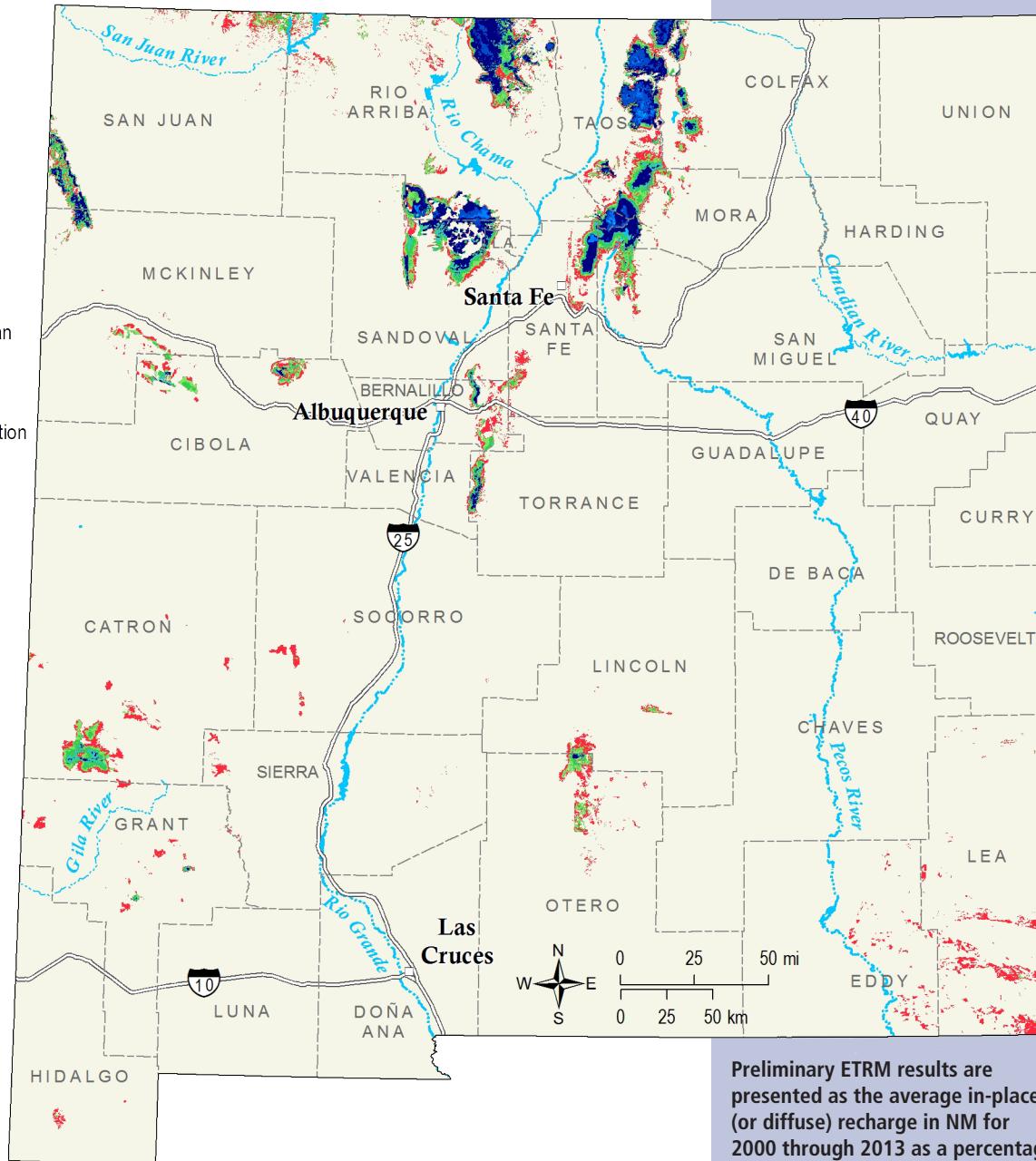


Estimating Groundwater Recharge for the Entire State of New Mexico

Funding for this project is from the New Mexico Water Resources Research Institute, and the Aquifer Mapping Program at the New Mexico Bureau of Geology & Mineral Resources, a division of New Mexico Tech.

ETRM 14yr Mean Annual Diffuse Recharge as a percentage of annual precipitation

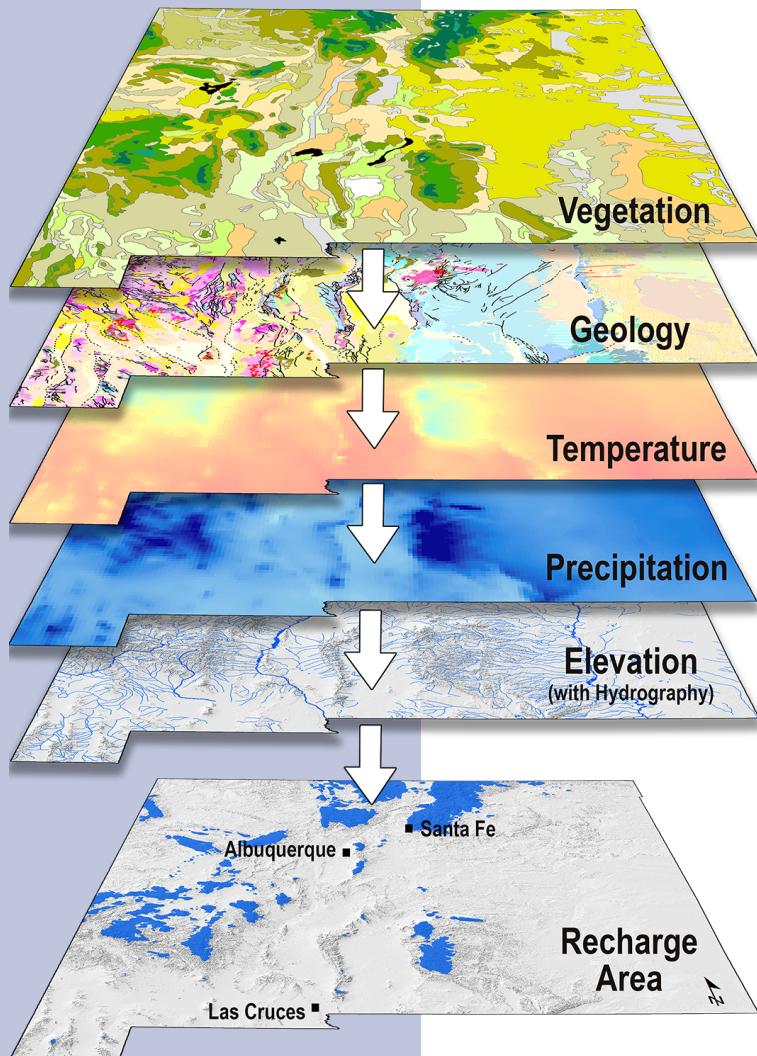
- <2%
- 2 - 4%
- 4 - 6%
- 6 - 8%
- 8 - 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%



Groundwater recharge is the process by which water from the land surface, such as precipitation, snowmelt, and stream flow, moves downward through the subsurface to a saturated groundwater system, or aquifer. As part of the Statewide Water Assessment (SWA), researchers from the NM Bureau of Geology & Mineral Resources and the Earth and Environment Science Department at NM Institute of Mining and Technology are developing a model that estimates groundwater recharge for the entire state of New Mexico.

Preliminary ETRM results are presented as the average in-place (or diffuse) recharge in NM for 2000 through 2013 as a percentage of average annual precipitation. Most recharge occurs in the high mountains. Over most of the state, little or no groundwater recharge occurs. These results do not take into account focused recharge, such as through streams or arroyos.

Groundwater provides about 50% of water use in New Mexico, supplying water for municipalities, industry, and agriculture, among other uses. Heavy pumping of groundwater has resulted in the decline of groundwater levels and reduction of groundwater in storage in aquifers across the state. Predicted warmer temperatures in the future will likely increase demand for groundwater while potentially decreasing recharge rates. Therefore, effective water resource management requires an understanding of the rate and distribution of groundwater recharge to New Mexico's aquifers.



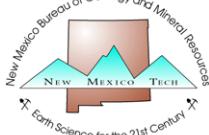
The Statewide Water Assessment (SWA) is a collaborative effort to quantify the different components of the water budget over the entire state of New Mexico. Collaborators include the NM Water Resources Research Institute (WRRI), the NM Office of the State Engineer, the United States Geological Survey, NM Tech, New Mexico State University (NMSU), and Tetra Tech, Inc. Funding for the SWA, which was provided by the State Legislature through WRRI and matching funds from collaborators was used to support graduate students at NM Tech and NMSU.

It is a very difficult task to estimate groundwater recharge, especially over such a large area with the extreme variability in topography, geology, and climate that we see in New Mexico. The Evapotranspiration and Recharge Model (ETRM) aims to accurately estimate recharge and to be accessible and user-friendly to provide a useful tool for a variety of users, including researchers and water managers. The ETRM uses existing spatial datasets that describe precipitation amounts, weather and climate conditions, and soil parameters throughout the state to model the daily soil water balance. Soil water balance calculations consider water stored within the soil layer, the infiltration of rain and snowmelt, and the removal of water from the soil by evaporation and use by plants. The accounting of these different components of the water cycle is used to calculate the amount of water that can percolate deep enough to recharge local and regional aquifers. The state has been divided into 250 meter by 250 meter grid cells and the ETRM has calculated a soil water balance on a daily basis from 2000 through 2013 for each cell. Currently the ETRM only considers rain and snowmelt that infiltrates into the soil at the location where it falls (diffuse recharge). Results show that most groundwater recharge primarily occurs at higher elevations that are characterized by higher annual precipitation rates and cooler temperatures. We are currently working to include the estimation of focused recharge, which occurs in ephemeral streams and arroyos where surface runoff accumulates during large rainfall or snowmelt events.

geoinfo.nmt.edu/resources/water
<https://goo.gl/HDjTD2>



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We are a non-regulatory governmental agency (the state's geological survey) that conducts scientific investigations leading to responsible development of the state's mineral, water, and energy resources.