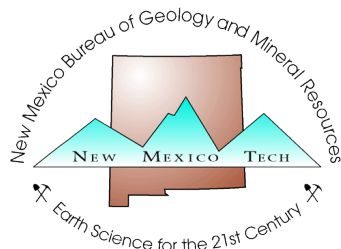
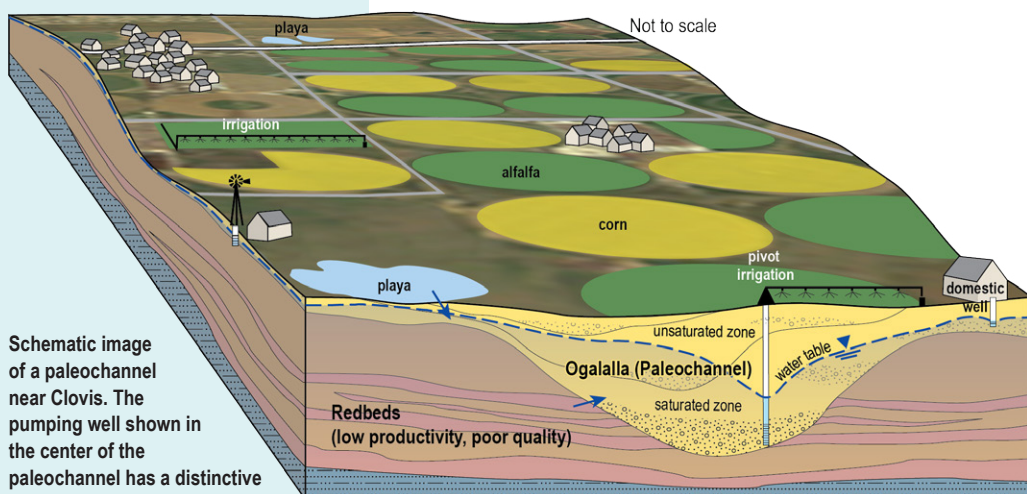


The New Mexico Bureau of Geology and Mineral Resources

A Division of
New Mexico Tech



Aquifer Mapping Program 2018



Schematic image of a paleochannel near Clovis. The pumping well shown in the center of the paleochannel has a distinctive “cone of depression” around the well. Many decades of high volume groundwater pumping, with little to no natural recharge, has left regions of this aquifer with less than 5 years remaining at the current rates of decline.



Carefully measuring groundwater level in a well using steel tape method.

Aquifer mapping is the scientific process of characterizing the groundwater quantity and quality within New Mexico’s aquifers. With a combination of techniques based in geology, hydrology, geochemistry and geophysics, we can create a variety of maps and interpretations of our aquifers. We are the only non-regulatory state agency engaged in this specialized, multidisciplinary water science and research. We are building upon a wealth of existing information, adding new and innovative techniques and data, and ultimately providing the state with a better understanding of our water resources.

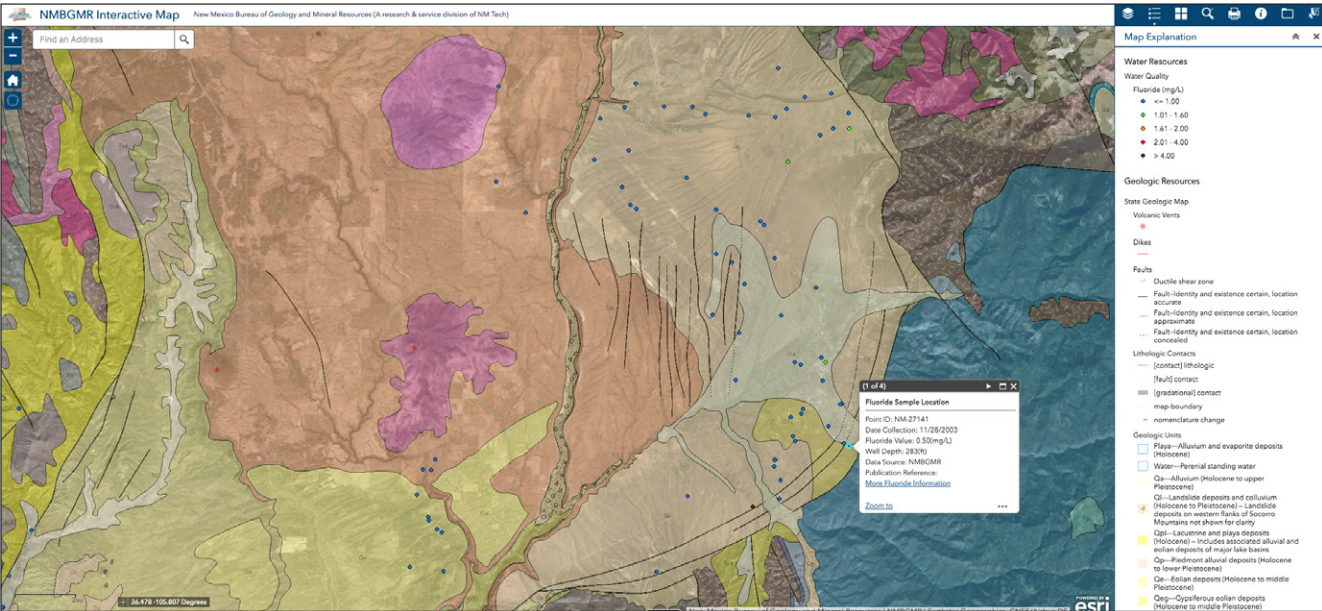
Working around the state to characterize New Mexico’s aquifers, our research topics include:

Water quality characterization

Utilizing our state-of-the-art laboratory facilities that serve the public and the research communities, our water chemistry data provide a useful tool for understanding water resources. As water flows in and over the diverse geology of our state, ions and minerals are added to the water. Many of our hydrogeology studies, such as our work in the Sacramento Mountains, Taos or Curry-Roosevelt Counties, utilize water chemistry to “fingerprint” the geologic sources of naturally occurring minerals and contaminants in the water. Applications for these data include characterization of groundwater–surface water interactions, which we utilized along the Animas River, following the Gold King Mine spill in 2015. We also use water quality information to help us characterize the relationship between our fresh and brackish water resources.

Water quantity estimation

Having an accurate understanding of the quantity of water available relies upon an understanding of the saturated thickness of the aquifer and the basin’s geologic



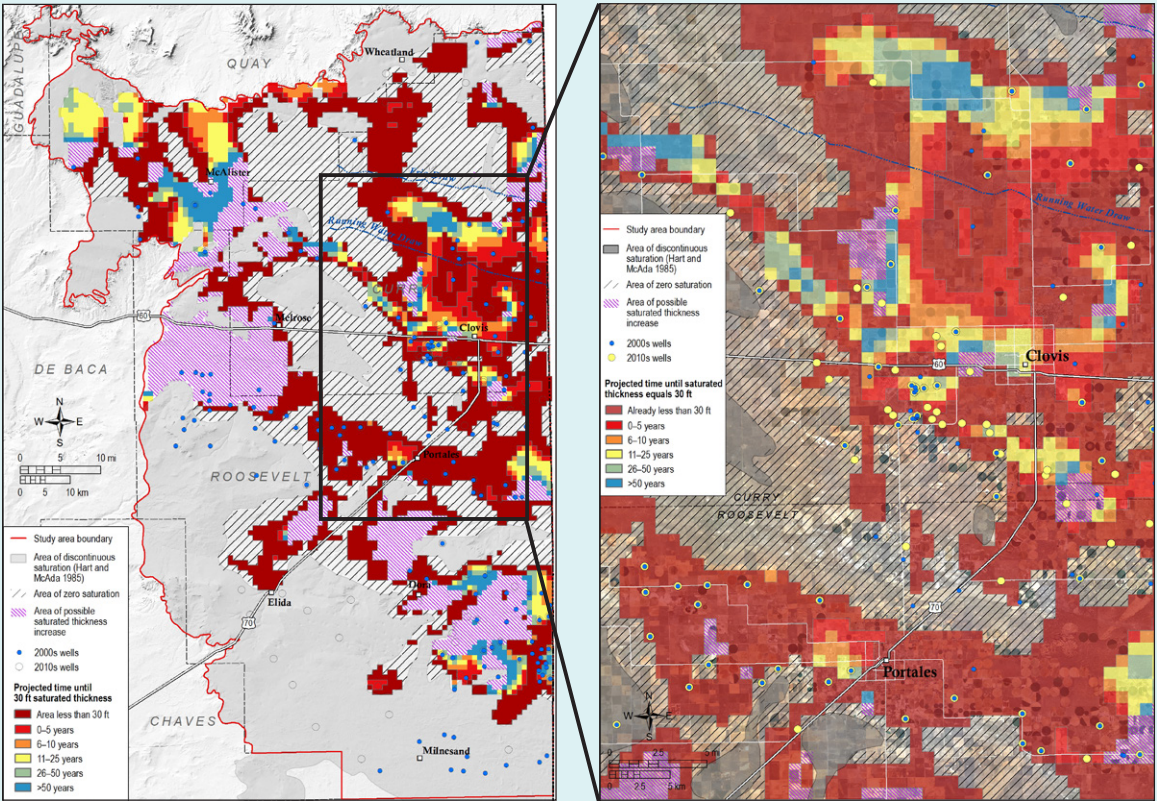
View and download water quality information at geoinfo.nmt.edu/maps/.

structure. In many regions of New Mexico, this basic geologic information is lacking. Gift funding from the Healy Foundation has helped us to begin New Mexico’s first comprehensive three-dimensional aquifer maps.

Evaluation of the subsurface groundwater connections between regional basins requires a solid understanding of the geologic framework. Utilizing our geologic mapping program and deep well data (cuttings and core archived with our oil and gas program), we can add new geophysical techniques, including gravity, resistivity, and magnetics, to describe groundwater basins and their margins.

Monitoring efforts

Some of the most important information related to water in New Mexico is the long-term monitoring data collected on groundwater levels, surface water flow, and water quality changes. As the state’s geologic survey, part of our mission is to act as a repository for earth science related data. Also supported by gift funding from the Healy Foundation, we are building the Collaborative Groundwater Level Monitoring Network. With help from New Mexico Rural Water Association and the New Mexico Environment Department, we are providing new groundwater monitoring for rural water communities. With basic groundwater monitoring, we hope to help prevent water outages such as the one that occurred in Magdalena in 2013.

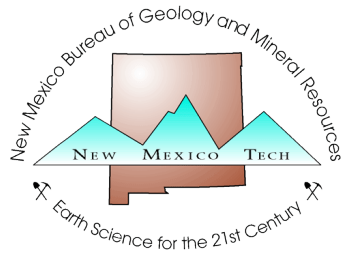


Images show the lifetime of the Ogallala aquifer in the region around Curry and Roosevelt Counties to when the aquifer reaches 30 ft of saturated thickness (or less). Areas in dark red are already less than 30 ft, while areas in lighter red–orange have about 5–10 years until they reach 30 ft saturated thickness of the aquifer. This thickness is approximately what is needed to run large center pivot irrigation. Project results at: <https://geoinfo.nmt.edu/resources/water/projects/curry-roosevelt> .



Good resource management requires good science and collaboration

- Geologic maps
- Hydrostratigraphic characterization
- Water-level measurements and groundwater flow conditions
- Geochemical characterization
- Hydrologic and well database
- Geophysical surveys
- Deep drill holes
- 3D geologic models



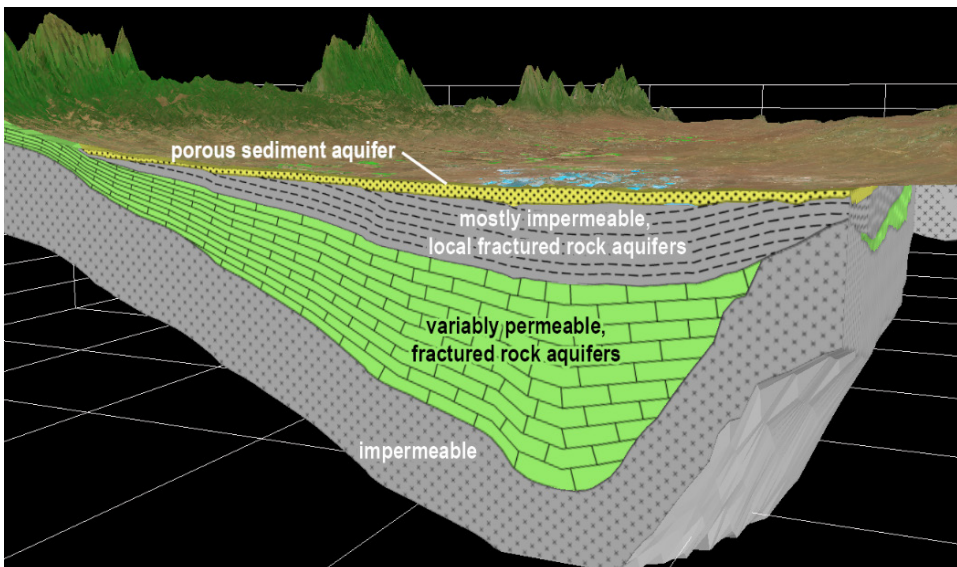
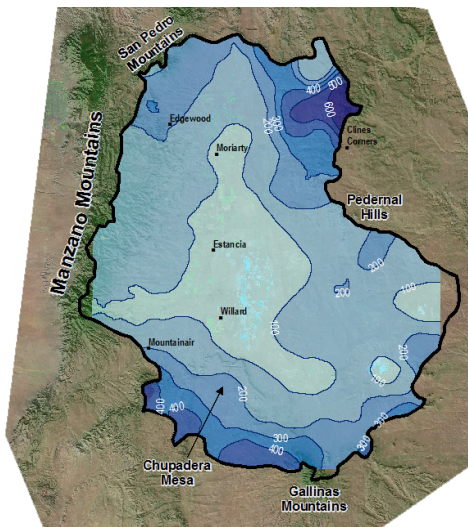
Aquifer Mapping Program 2018–2019 Projects

3D Aquifer maps and visualizations

Issues: Only limited regions of the state have detailed maps of aquifers, and there is no central location of maps of all aquifers. Many maps of aquifers are surface maps, or simple 2D maps. In order to evaluate the available quantity of groundwater, we first need more complete 3D maps of aquifers. This process is time intensive, requiring geologic and hydrologic expertise.

Products: Over several years, publicly available maps of aquifers will display the known extent of active aquifers. Maps will have associated text to describe what is known about groundwater in each region, and can highlight regions where more information is required.

Funding: Healy Foundation, Aquifer Mapping Program, and the New Mexico Bureau of Geology & Mineral Resources.



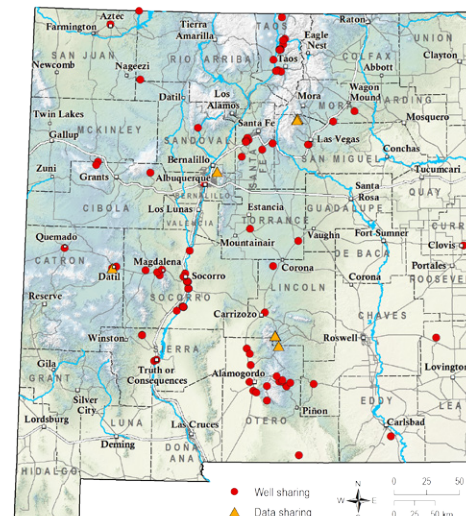
Images from the 3D Aquifer Visualization project, showing depth to water in upper image; in lower image, the surface and subsurface views of geology and hydrology, as an example, in the Estancia Basin.

San Agustin Plains and Alamosa Creek watershed

Issues: Groundwater availability and sustainability in the Plains of San Agustin; groundwater quality and source of water to springs at the Monticello Box, Alamosa Creek watershed.

Products: Hydrogeologic information for agencies and the public about groundwater in the central Plains of San Agustin and Alamosa Creek watershed, and their interconnection with the Rio Grande Valley; public outreach and education.

Funding: Aquifer Mapping Program, New Mexico Bureau of Geology & Mineral Resources, National Cooperative Geologic Mapping Program, Healy Foundation, and the NMOSE.



Working to collect groundwater data across New Mexico, some of our collaborating locations are shown on map.

Sunshine Valley

Issues: Improve understanding of sources of groundwater, its occurrence, movement and relation to surface water and recharge. Data collection will include groundwater levels, water quality, water age-dating, and geophysical characterization. This region fills a gap in research efforts previously done by the New Mexico Bureau of Geology & Mineral Resources and collaborators.

Products: Technical report including data and maps, and non-technical fact sheet for non-scientists. Information about groundwater movement and aquifers in this key location of northern New Mexico.

Funding: Healy Foundation, Aquifer Mapping Program, and the New Mexico Bureau of Geology & Mineral Resources.

USGS National Groundwater Monitoring Program

Issues: Few water level data for New Mexico are nationally available on the interactive map hosted by the U.S. Geological Survey and the Advisory Committee on Water Information (<https://cida.usgs.gov/ngwmn>). Sharing data to this service will improve visibility of the New Mexico Bureau of Geology & Mineral Resources groundwater monitoring sites and shed light upon groundwater issues across the state.

Products: Long term, stable web map services built upon dynamic database connections between national databases, state databases and the New Mexico Bureau of Geology & Mineral Resources.

Funding: Cooperative funding from U.S. Geological Survey, and the New Mexico Bureau of Geology & Mineral Resources.

Collaborative groundwater level monitoring

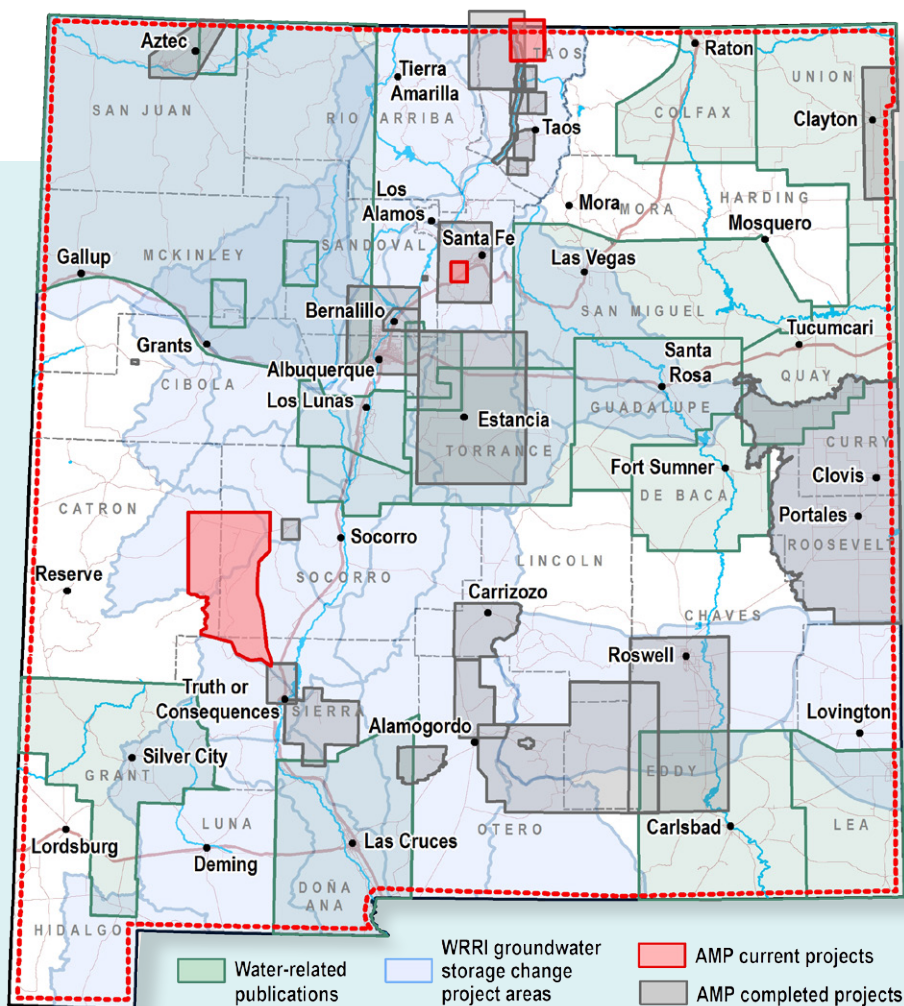
Issues: Facing long-term droughts and climate change, many rural communities, especially those on single wells for water supply, need information on groundwater availability. By providing groundwater level monitoring, we will help inform these communities and the state about the dynamics of the groundwater variability in rural regions.

Products: Interactive web map groundwater data, easy to locate wells and associated water level data. This will provide web data to inform decision-making and funding prioritization. We will provide groundwater level data in regions with significant gaps in coverage. In some locations, real-time data will be available.

Funding: Healy Foundation, Aquifer Mapping Program, and the New Mexico Bureau of Geology & Mineral Resources.



Collecting water samples from warm springs in Taos County.

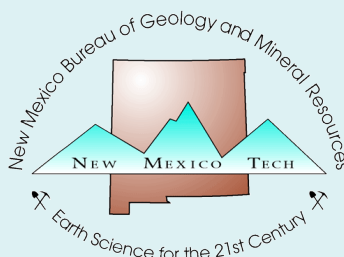
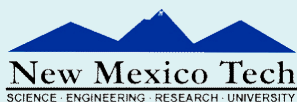


Please visit our website
for information on
project areas and data

geoinfo.nmt.edu/resources/water/amp



geoinfo.nmt.edu/maps



New Mexico Bureau of Geology & Mineral Resources

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.