Aquifer Mapping Program
A very active statewide hydrogeology program collaborating with state, federal, local and tribal entities to better characterize the New Mexico’s critical aquifers.

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 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.

New Mexico Bureau of Geology and Mineral Resources
geoinfo.nmt.edu/resources/water

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.
Whether it relates to surface water or groundwater, fresh water or saline water, long-term or short-term efforts, presently, our research topics include:

Water quality characterization
Utilizing our newly renovated state-of-the-art laboratory facilities that serve the public and the research community, our water chemistry data provides 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, Questa or Curry-Roosevelt Counties, utilize the 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, as we are utilizing along the Animas River, following the Gold King Mine spill (working with the New Mexico Environment Department). 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 the saturated thickness of the aquifer and the basin’s geologic structure. In some regions of New Mexico, this basic geologic information is lacking. Our geologic mapping program at the Bureau of Geology strives to map, in detail, the distribution of aquifer-bearing units and the structures that compartmentalize our aquifers. With this information, we can better estimate the quantities of water available. Funding from the NM Water Resources Research Institute, as part of a statewide water assessment, supports our work using historic groundwater levels to estimate groundwater storage changes. Several newly acquired geophysical instruments at New Mexico Tech and the Bureau of Geology enable us to explore the dynamics of shallow or deep groundwater storage changes. For example, we can examine infiltration rates along a river or estimate annual or seasonal changes of the amount of groundwater in storage. These tools can help us to answer some of the state’s important water quantity questions.

Hydrologic connections
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. New efforts underway at the Bureau of Geology, such as the collaborative groundwater level monitoring network, will compile historic data, facilitate user-friendly crowd-sourced data collection, and help to promote increased awareness of rural water issues around New Mexico. We hope to prevent water outages such as the one that occurred in Magdalena in 2013.
Aquifer Mapping
Program
Current Projects 2016

Animas River
long-term monitoring

Client and Study Area: With the New Mexico Environment Department and many other collaborators, we are looking along the Animas River, from CO-NM state line to Farmington.

Issues: In response to the Gold King Mine spill (August 2015), as part of a long-term monitoring effort underway with several other state agencies and universities, we will characterize the groundwater-surface water interactions with regard to the hydrologic interactions and the water quality in the groundwater, using private domestic wells.

Products: Maps showing how groundwater moves in the alluvial aquifer near the Animas River at different seasons and flow regimes; reports and datasets describing the water chemistry and possible geologic or mine related influences on the groundwater along the Animas.

Funding: New Mexico Environment Department, with collaborations at New Mexico Tech, University of New Mexico, New Mexico State University, New Mexico Office of the State Engineer, and the US Geological Survey.

Water quality characterization

Client and Study Area: Looking at all of New Mexico, we have started to compile and digitize legacy water quality data, and make it publicly available through a interactive web map.

Issues: Large quantities of water quality data, for both fresh and brackish water resources, exist only in paper form. We are working to digitize and locate these records on maps, providing information useful in source water protection planning.

Products: Several reports discussing fresh and brackish water resources for the state and in the eastern Tularosa Basin, as well as web map datasets of newly digitized water quality data.

Funding: New Mexico Environment Department and Bureau of Geology

Southern Taos Valley

Client and Study Area: Taos County groundwater systems in the southern Taos Valley between the Picuris Mountains and the Rio Grande.

Issues: Water sustainability during rapid development; sources of recharge: age of groundwater; interconnection between aquifers; the Rio Grande, and tributaries.

Products: A hydrogeologic conceptual model of groundwater and surface water systems will provide decision-making tools for Taos County planning and zoning, and help the County, historic communities, acequias, and neighborhoods, to better plan new development that sustains and conserves water resources.

Funding: Taos County, Healy Foundation, Aquifer Mapping Program and Bureau of Geology.

San Agustin Plains and Alamosa Creek watershed

Client and Study Area: Support for New Mexico interests (NMDOE/ISC, NM EMNRD, NM Department of Game and Fish) in the Plains of San Agustin and Alamosa Creek watershed, eastern Catron and western Socorro counties.

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 state 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, Bureau of Geology, National Cooperative Geologic Mapping Program, Healy Foundation, and the NMDOE.

Statewide water assessments

Client and Study Area: WRRI in collaboration with NM Tech, USGS, NMDOE, and NMSU to address recharge and groundwater issues statewide in New Mexico.

Issues: Working with WRRI to develop datasets to aid in analysis of statewide water assessments. These datasets will help address water scarcity challenges and improve water planning needs for New Mexico.

Products: A publicly available database, technical reports and ArcGIS maps that are focused on 1) potential recharge areas within NM and 2) regional groundwater level and storage changes.

Funding: WRRI with support from the Aquifer Mapping Program, Bureau of Geology, and New Mexico Tech.

Hydrogeology of the Questa Area

Client and Study Area: Support for New Mexico and local interests (NMED, NM OSE/ISC, Village of Questa, Taos County, NM EMNRD, NM Department of Game and Fish) in the area of Questa, New Mexico, from the base of the Sangre de Cristo Mountains to the Rio Grande.

Issues: A gap in regional scientific information for deep and shallow, sediment-volcanic aquifers and surface waters in the Questa area; diverse local issues, including sustainable sources of drinking water, sources of water to springs and streams that feed fisheries and discharge to the Rio Grande, the character of natural, background water quality, and possible impacts from mine-related waters.

Products: Regional hydrogeologic conceptual model describing ground water and surface water interactions; important understanding of local effects of faults and geology on water quality; a decision-making tool for local interests to use toward water development needs.

Funding: Healy Foundation, the Aquifer Mapping Program, Bureau of Geology, National Cooperative Geologic Mapping Program.

Curry - Roosevelt Counties regional hydrogeology

Client and Study Area: New Mexico Environment Department (NMED) and Eastern Plains Council of Governments (EPCOG); Curry County and northern Roosevelt County.

Issues: As part of a regional Source Water Protection Plan being developed by EPCOG for NMED, we are assessing the regional hydrogeology of this region. Future water availability and water quality are major concerns in the region.

Products: A technical report that will serve as an appendix in the regional Source Water Protection Plan. This will be a compilation of existing geologic and hydrologic information, in addition to several new water level measurements and water chemistry samples. This will help decision making in the region about water use and management issues.

Funding: New Mexico Environment Department, Bureau of Geology, Aquifer Mapping Program.

This hydrograph shows groundwater level changes in La Cienega (near Santa Fe) since the 1950s. In 2016, this information will be released in Bureau of Geology Bulletin 161.