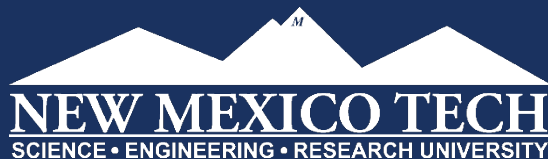


AQUIFER MAPPING PROGRAM UPDATE: CHARACTERIZATION AND MONITORING

FROM THE NEW MEXICO BUREAU OF GEOLOGY AT NEW MEXICO TECH

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Associate Director, Hydrogeology Programs

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Aquifer Mapping Program Manager,
Coordinator for Healy Groundwater Monitoring Network



NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES

- Research and service division of New Mexico Tech, in Socorro
- Established in 1927
- Non-regulatory, state geologic survey
- Budget is under Higher Education Department



HYDROGEOLOGY 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 only by philanthropic funds from Healy Foundation)
- \$295K annual state funding – plus grants and philanthropic funds

Water Data Initiative

- Began in 2019, after the Water Data Act passed
- Convening the work with multiple state agencies
- Working to make NM water data more accessible and usable
- \$250K annually, plus grants and philanthropic funds



New! Water Education Program

- Starting now!
- For legislators, staff and state leaders
- Developed following the model of previous Decision Makers Conferences
- Focusing on increasing awareness and education on critical water issues in NM
- \$325K – FY24, one year state funding



Working to address New Mexico's CRITICAL water issues

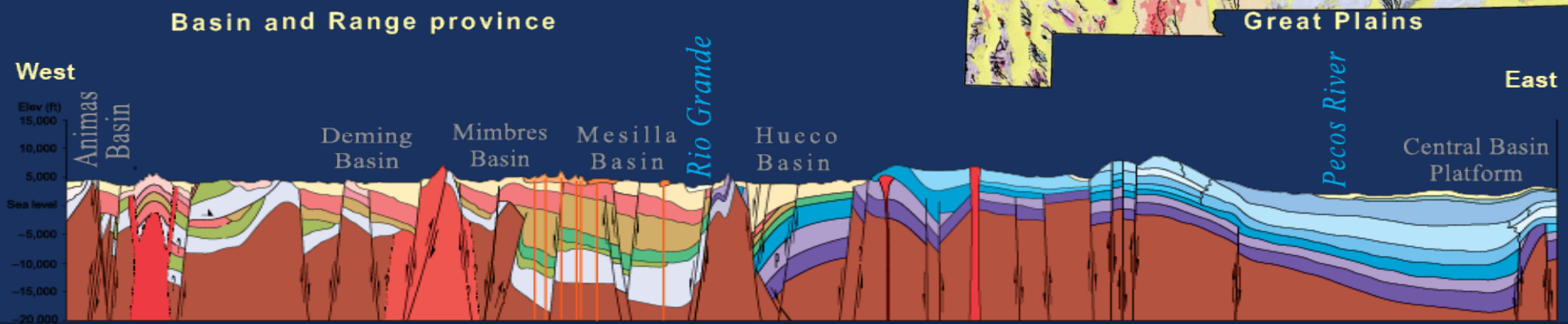
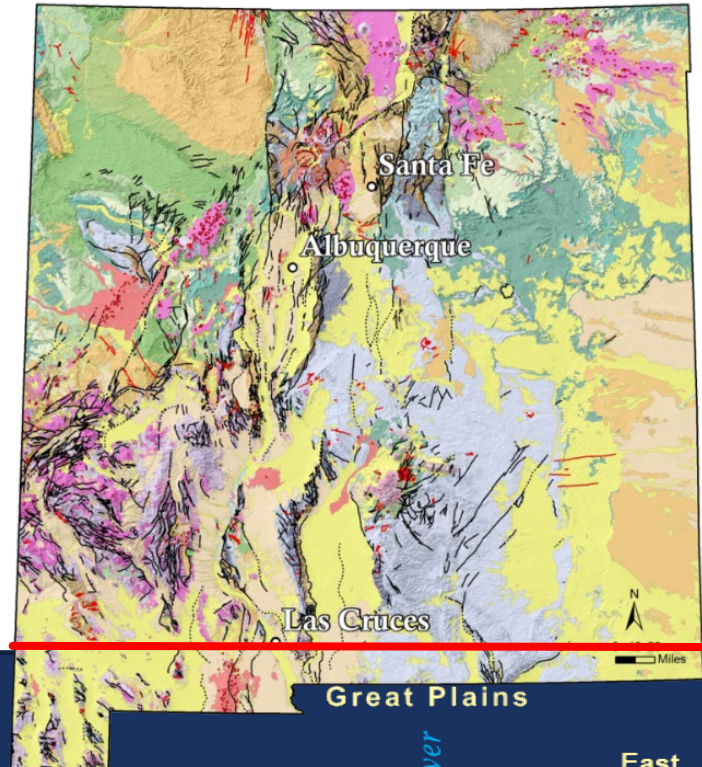
AQUIFER MAPPING PROGRAM: WHAT WE DO

Characterize **the quantity, quality, and distribution of groundwater** in aquifers using geology, geophysics, hydrology, and chemistry information

This program addresses state needs for groundwater and provides essential information used in planning, permitting, conserving, and protecting our most vital resource: WATER

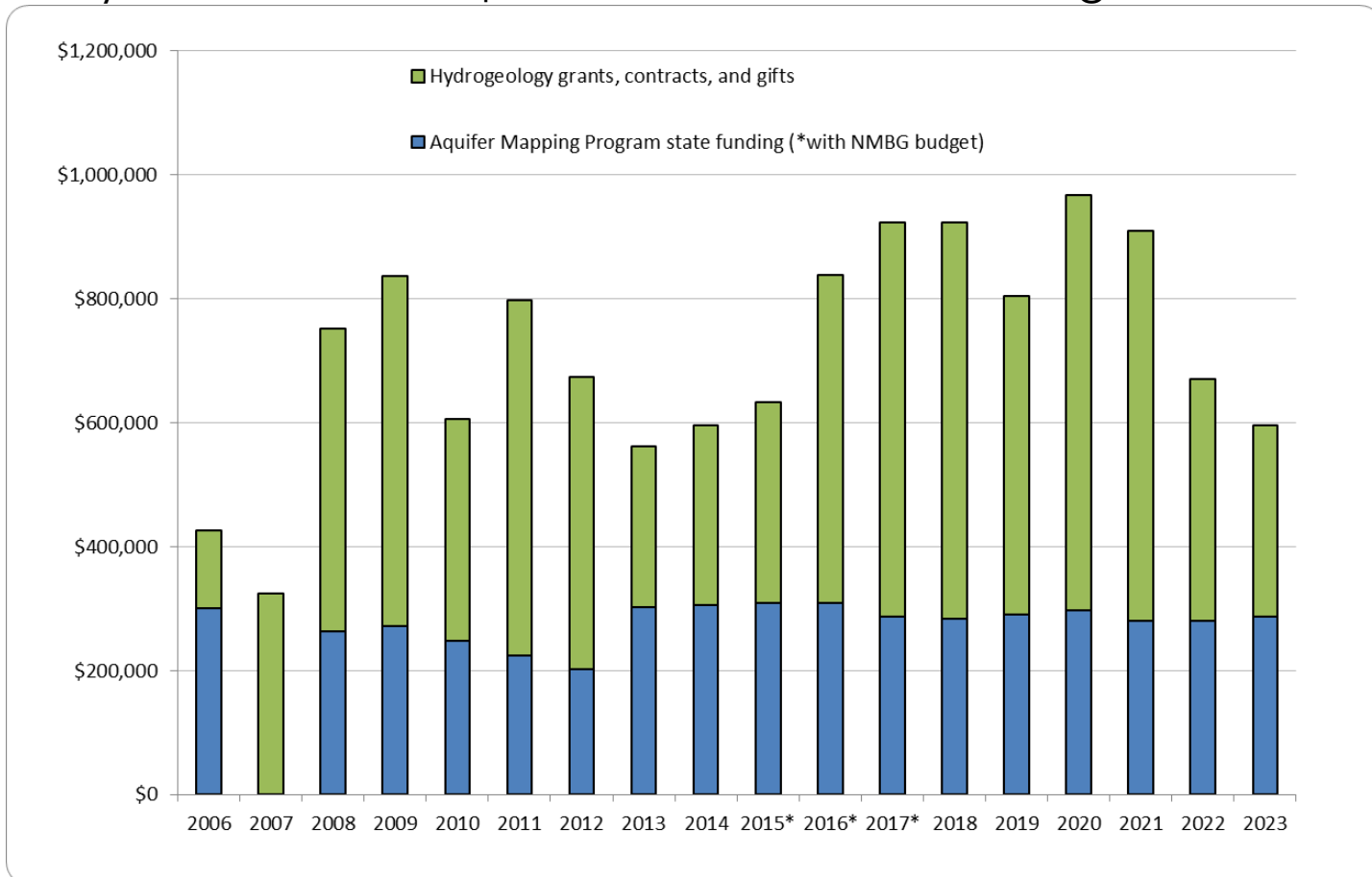
AQUIFER MAPPING PROGRAM WORKING TO SERVE NEW MEXICO

- Serving as the only non-regulatory state agency engaged in this specialized, multidisciplinary water science and research
- The Aquifer Mapping Program was officially created in 2006
- Funding has been a combination of state, regional, local, and philanthropic sources
- New Mexico's geology is complex, and so are the aquifers

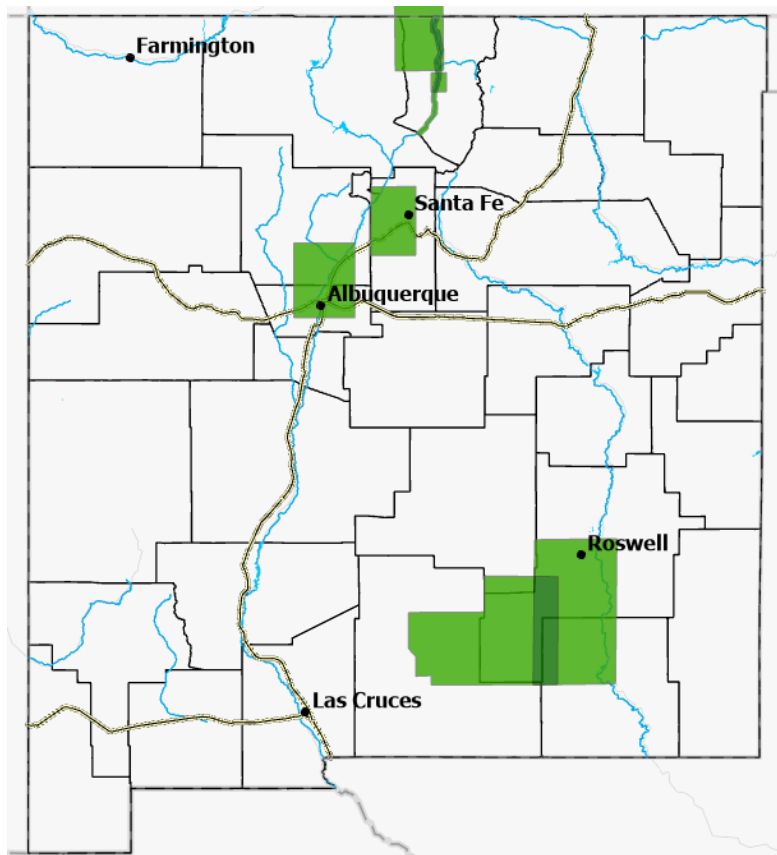


AQUIFER MAPPING PROGRAM BUDGET

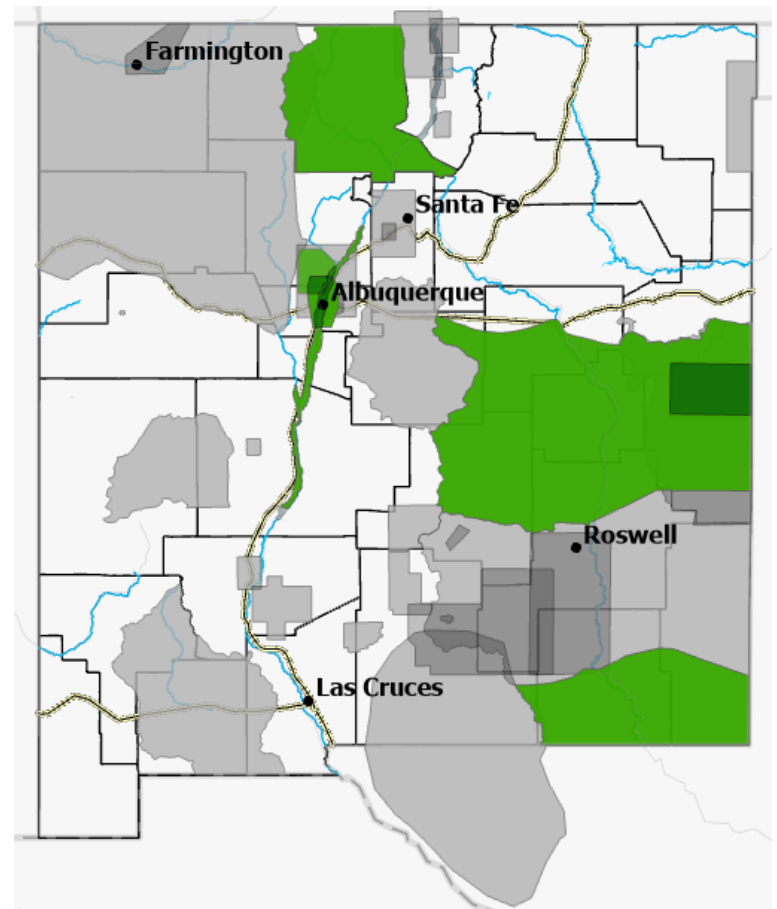
FY24: \$295K Aquifer Mapping Program (state funding, base budget NMBGMR) with estimated \$250K from contract funding



AQUIFER MAPPING PROGRAM HAS MADE GREAT PROGRESS OVER THE YEARS



Aquifer Mapping Program in 2006



Aquifer Mapping in 2023

AQUIFER MAPPING PROJECTS IN 2023-2024

Current Projects

- 3D Aquifer Mapping (Healy Foundation, NMBGMR, EMNRD, USGS - STATEMAP)
- Albuquerque Water Table Mapping (ABCWUA)
- Middle Rio Grande Aquifer Storage and Recovery (MRGCD, Thornburg Foundation)
- Hydrogeologic Atlas of NM (NMBGMR)
- Rio Arriba Regional Hydrogeology (1-year state appropriation)
- High Plains Aquifer Monitoring (Ogallala Land & Water Conservancy)
- Healy Collaborative Groundwater Monitoring Network (Healy Foundation and NMBGMR)

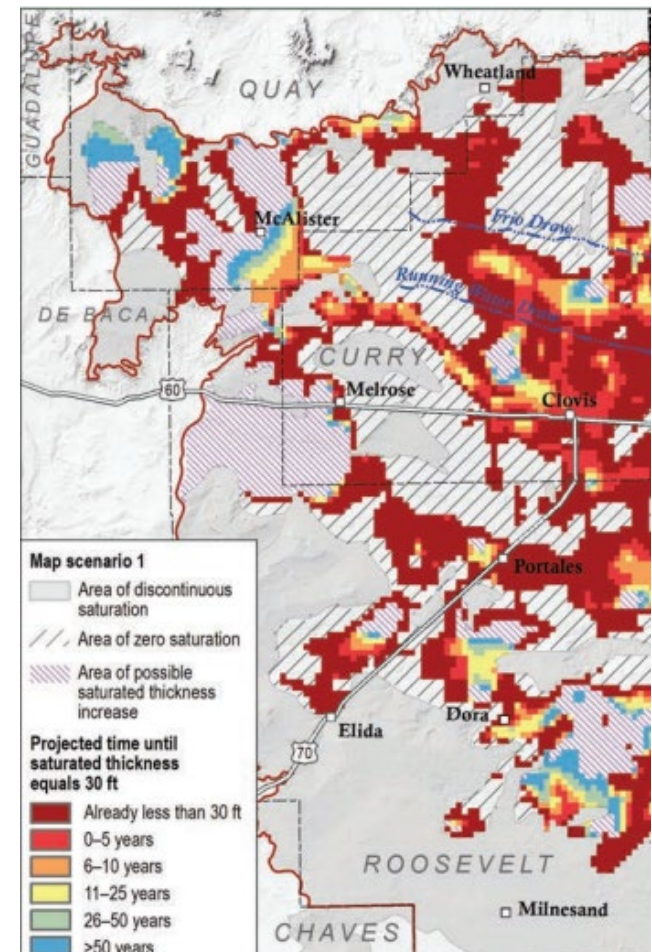
Recently Completed Projects

- Mimbres Basin Hydrogeology (NMBGMR, Healy Foundation)
- Salt Basin Hydrogeology (Bureau of Reclamation)
- Rio Rancho Hydrogeology (City of Rio Rancho)
- Delaware Basin 3D Geology (USGS, EMNRD)

(Primary funding sources in parentheses)

PREVIOUS AND CURRENT WORK IN CENTRAL HIGH PLAINS (NEAR CLOVIS / PORTALES)

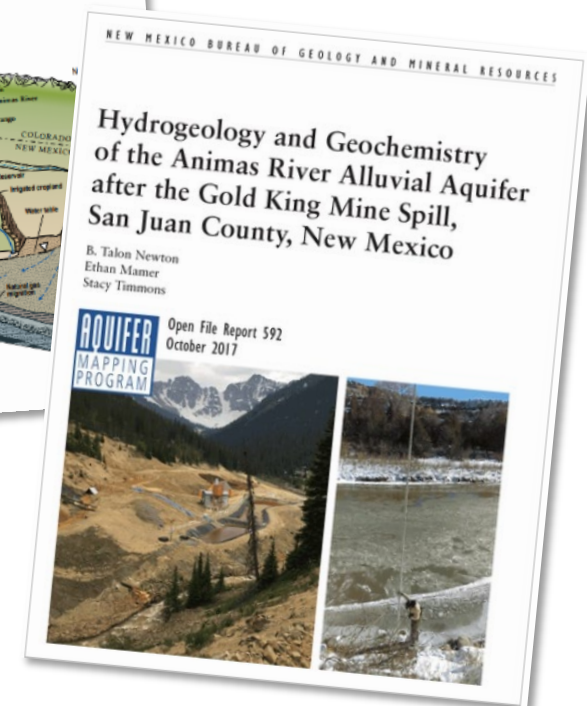
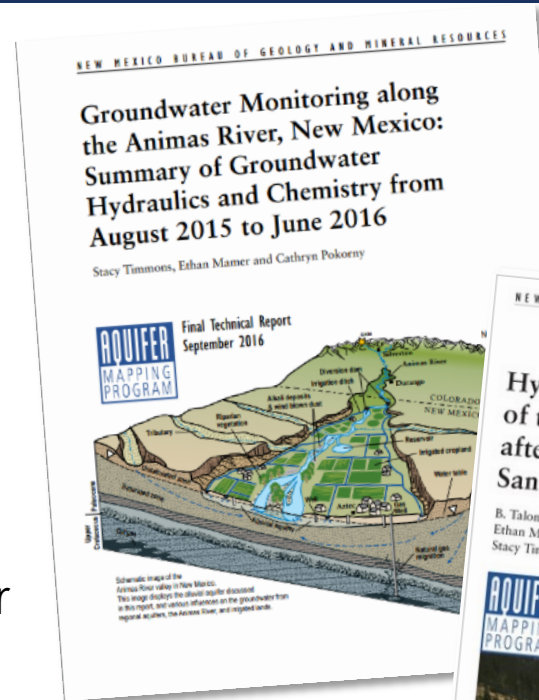
- **A Hydrogeologic Investigation of Curry and Roosevelt Counties, New Mexico, NMBGMR OFR-580**
 - Funded by New Mexico Environment Department, Drinking Water Bureau \$100,000. 2014 – 2015
- **Lifetime Projections for the High Plains Aquifer in east-central New Mexico, NMBGMR Bulletin 162**
 - Funded by the City of Clovis, Curry County, Eastern New Mexico Water Utility Authority, and New Mexico Bureau of Geology and Mineral Resources. \$68,500. 2016 – 2017.
- **Water Table Mapping and Groundwater Storage Estimates from Groundwater-level Measurements**
 - Funded by Ogallala Land and Water Conservancy. \$93,839. 2022-present



RESPONSIVE TO STATE NEEDS FOR RESEARCH AND SCIENCE ON WATER

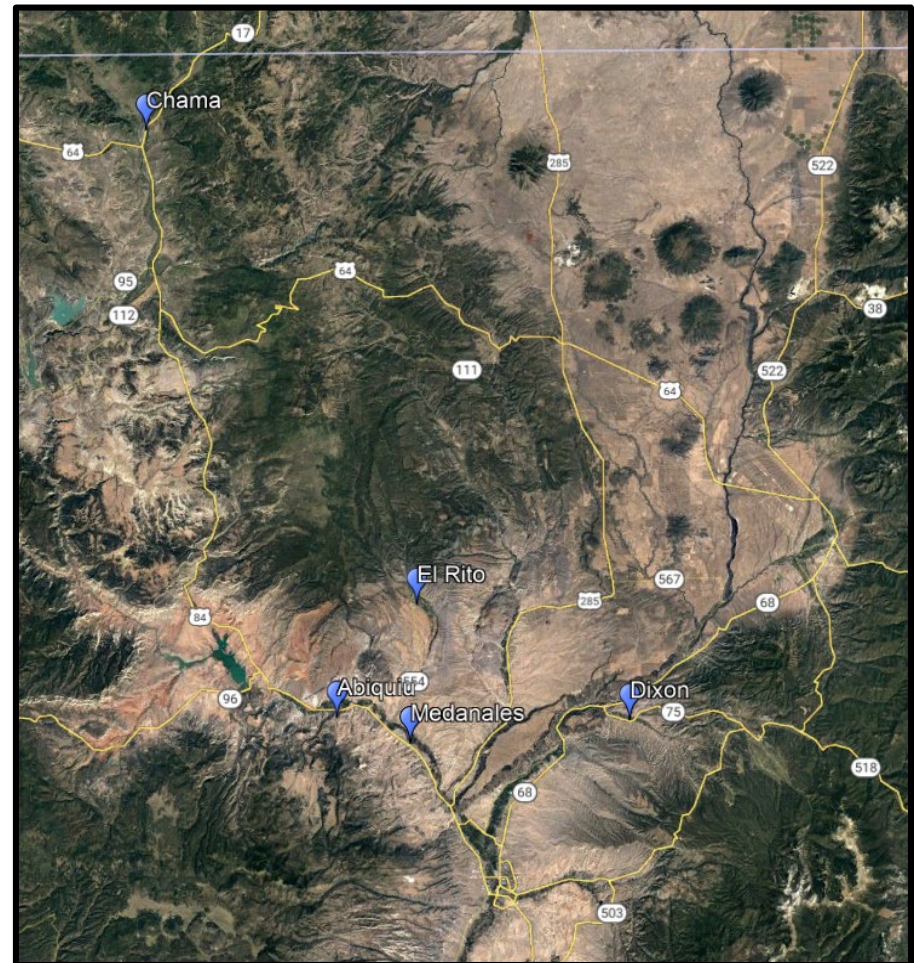
Farmington area:

- Previous work along Animas River after the Gold King Mine event (2015)
- Evaluation of impacts to groundwater quality along the Animas River
- Examined wells – surface water interaction
- Repeat assessment of groundwater quality



NEW PROJECT: RIO ARRIBA COUNTY REGIONAL HYDROGEOLOGY

- Project in FY24 to characterize the groundwater aquifers in Chama, Dixon, Abiquiu, Medanales, and El Rito communities (1 yr appropriation from Rep. Susan Herrera)
- Evaluating quantity and quality of water in regional aquifers
 - Identify recharge mechanisms
 - Characterize groundwater flow direction and rates
 - Sampling for geochemistry
- Community engagement and information sharing

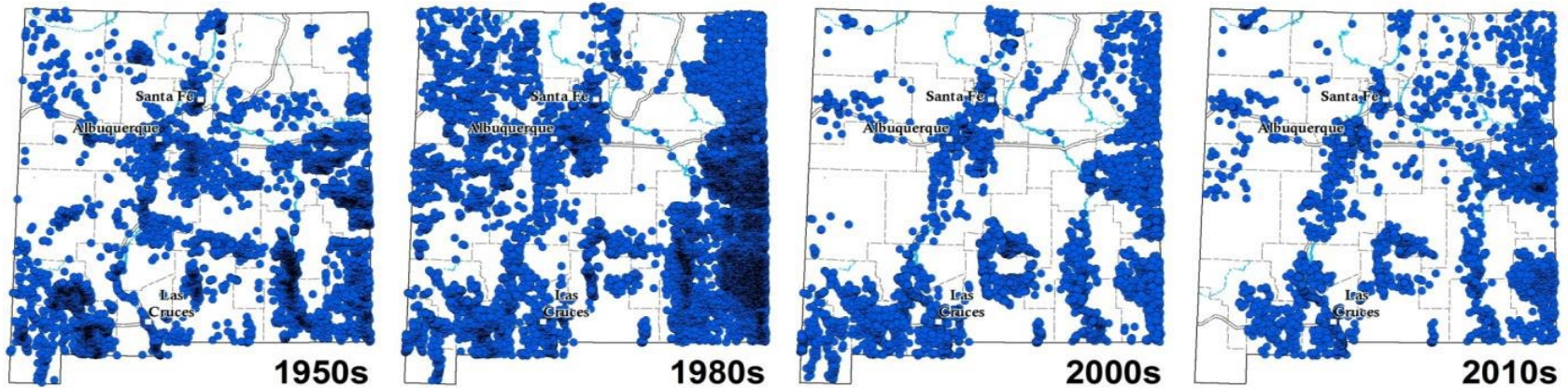


OUTREACH AND EDUCATION IN NORTHEAST NM: N⁴WPP

- Navajo Tech - New Mexico Tech - Navajo Nation Water Purification Project
- Filtration technology developed at New Mexico Tech is being deployed at locations across the Navajo Nation, starting with a test unit at Navajo Tech (NTU)
- NTU students are working with Navajo Nation chapters to measure and qualify groundwater quality and determine suitable locations to install filters
- Creating a “pipeline” for NTU students to continue on to a graduate program at NMT
- Outreach and symposiums specifically for high school students
 - Nov. 3 @ UNM Gallup campus students will compete in a video competition and written test on water resources



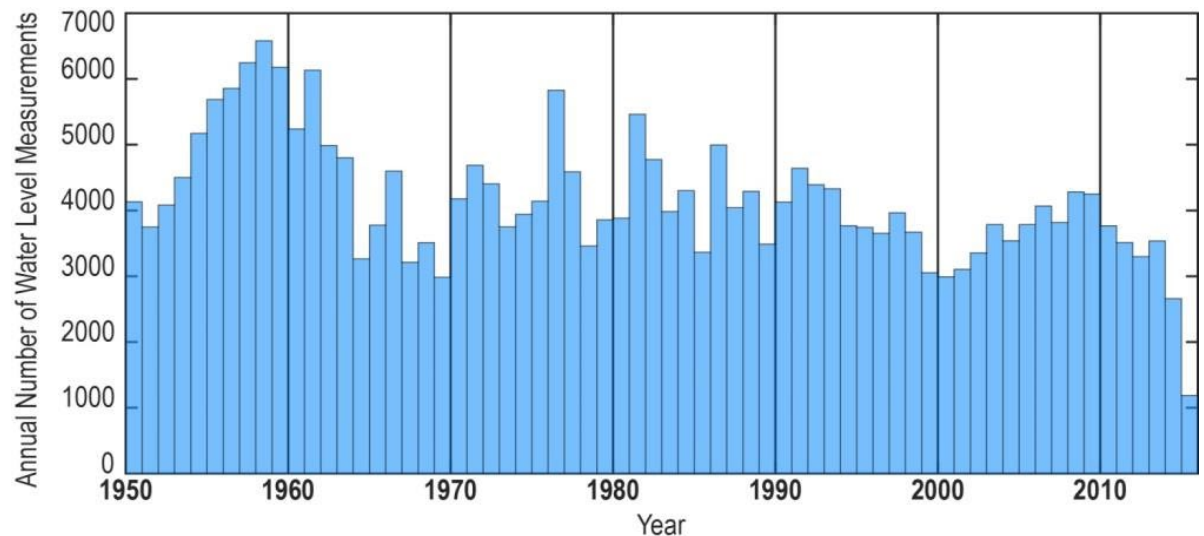
THERE IS A NEED FOR IMPROVED GROUNDWATER LEVEL MONITORING



Groundwater level measurements from USGS and NMBGMR

Coverage of water level measurements has declined

Fewer measurements have been collected in recent decades

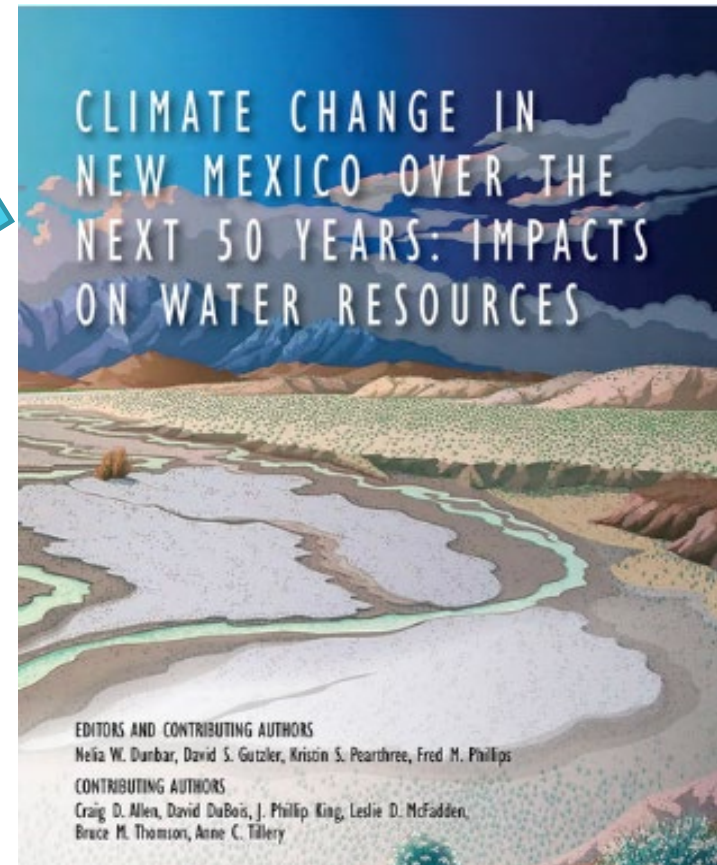


WHY SHOULD WE MONITOR OUR AQUIFER LEVELS?

As we face increasing aridity, less surface water, and more groundwater use, having groundwater data becomes even more critical



- Water level monitoring is our check on the “account balance”
- Data can inform our decision-making – tracking changes (rise or decline)
- One way to protect the resource is to have data to show what you have!



<https://geoinfo.nmt.edu/ClimatePanel/report/home.html>

HEALY COLLABORATIVE GROUNDWATER MONITORING NETWORK

Since 2016, we have been working to broaden coverage and frequency of groundwater level monitoring across New Mexico through community collaboration

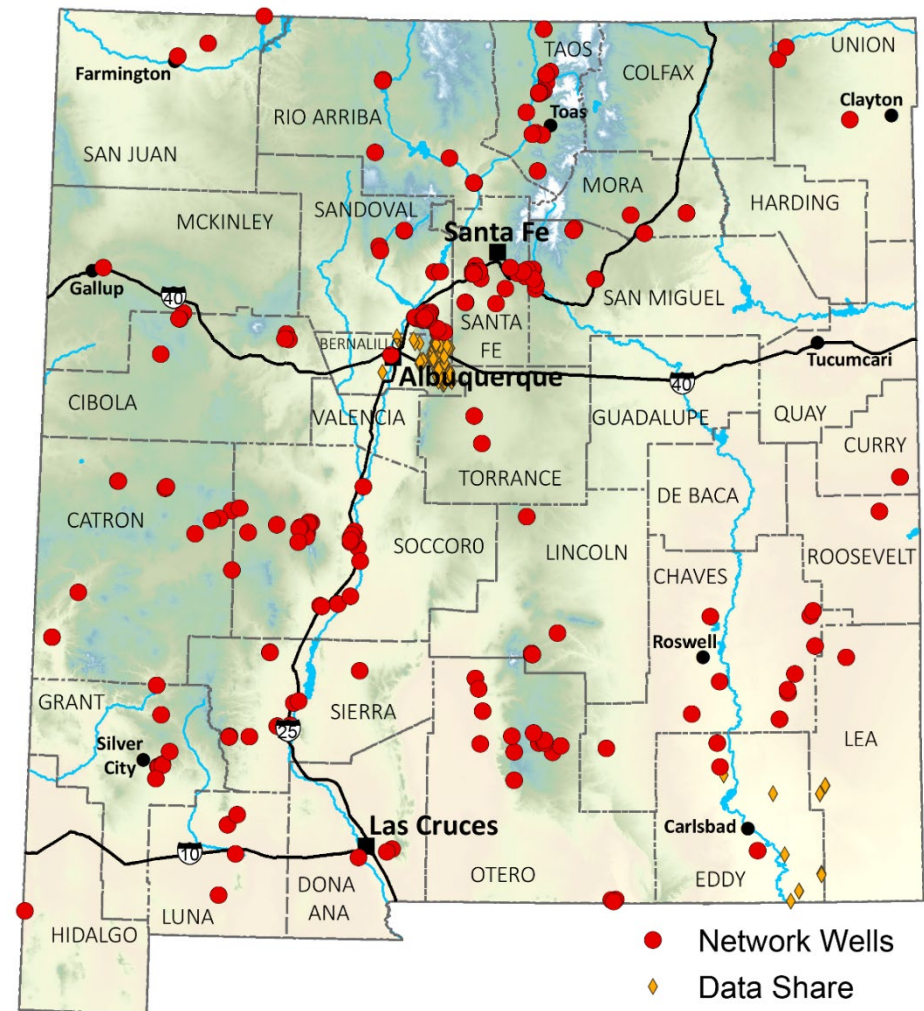
- Groundwater level data collection
- Training and education
- Data archiving and sharing



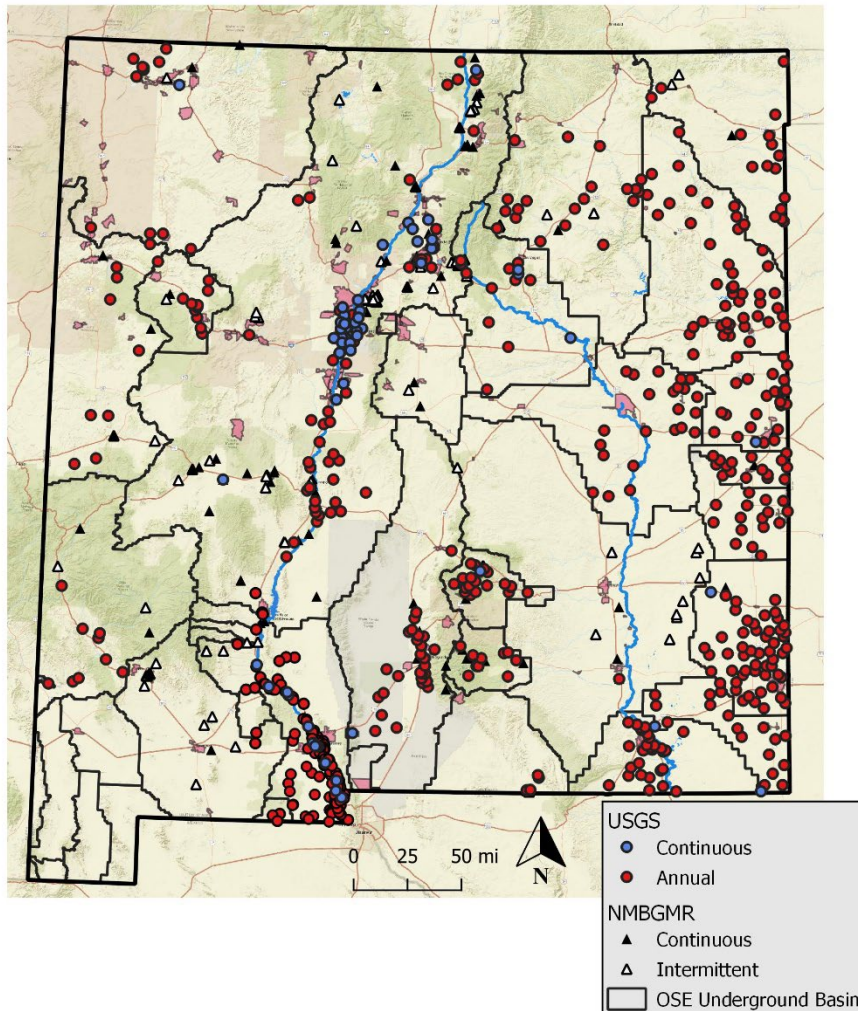
HEALY COLLABORATIVE GROUNDWATER MONITORING NETWORK

Current Network

- Filling the spatial, depth and temporal gaps
 - 97 continuous monitored wells
 - 111 wells monitored manually
 - 538 wells share data
 - 746 total wells
- Collaborating with many other agencies/groups to prevent data duplication and promote outreach
- NMBGMR collects data, it is free for well owner
- **Supported by ~\$100K annually from Healy Foundation**



GROUNDWATER LEVEL MONITORING COVERAGE OF THE STATE IS STILL INCOMPLETE



- USGS has a cooperative agreement with NMOSE to measure about 800 wells annually
- NMBGMR measures about 200 wells annually
- Significant spatial gaps across the state
- Many sites are not measured frequently enough
- Most sites are “reused” wells – not drilled with monitoring purpose

OUR VISION FOR THE FUTURE: AQUIFER CHARACTERIZATION AND MONITORING

Essential recommendations of the Water Policy and Infrastructure Task Force (2022)

Complete regional aquifer characterization

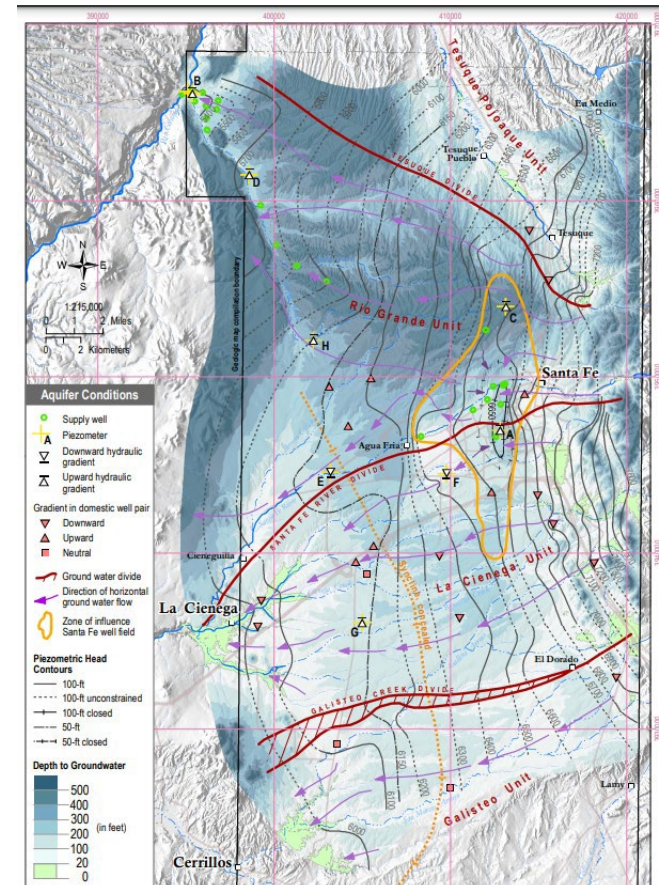
- Cover the state following a regional approach to address critical groundwater basins
- Compile existing data, reports and models
- Address data gaps (water chemistry, water levels, geophysical studies, etc.)
- Build improved conceptual and functional models
- Full characterization of groundwater basins, including brackish and freshwater resources

Build long-term groundwater monitoring

- Regional selection based on priority, land access, depths, and costs
- Drill wells to fill data gaps; utilize high quality existing wells
- Collect abundant data on each drilled well (geophysics, chemistry, age data)
- Set wells for long-term monitoring with telemetry for aquifer levels, possibly water quality
- Maintain O&M; reporting updates

WHAT CAN WE GAIN FROM IMPROVED AQUIFER MAPPING AND MONITORING?

- Regional knowledge of depth to water, flow directions, water quality, and basic aquifer properties
- Real-time data tracking of how groundwater is changing
- Better understanding of distribution and properties of fresh and brackish water aquifers
- Identification of ideal managed aquifer recharge locations
- Improved decision-making for long-term investments in water infrastructure
- Water management, modeling, and planning improvements based on science and data



IT'S TIME TO INCREASE THE STATE INVESTMENT IN GROUNDWATER MAPPING AND MONITORING

We aim to cover the state with enough aquifer characterization and monitoring to support groundwater management and water planning in future, more challenging conditions.

To do this, we need to:

1. Increase base budget
2. Build staff capacity
3. Non-recurring funding for one-time costs (i.e. drilling exploratory / monitoring wells with complete data collection)
4. Maintain monitoring, build and update models long-term

FUNDING GOALS TO SUPPORT AQUIFER CHARACTERIZATION AND MONITORING

Aquifer Mapping and Monitoring

Our Goal: Increase base budget and non-recurring funding to build modern, data-rich regional aquifer characterizations across the state while establishing a long-term groundwater monitoring network.

1. RECURRING BUDGET (additional \$1,250K) to build staff capacity for up to 8 FTEs to build and maintain a statewide aquifer mapping and monitoring program
2. NON-RECURRING BUDGET (\$4 to 10M / year for 10 years): Over several years, work to install exploratory and monitoring wells to fill data gaps
3. Expect collaboration with other state and federal agencies, along with job opportunities for industry, and projects with higher education universities

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