

BUREAU OF GEOLOGY AND MINERAL RESOURCES



Implementation of a Non-Traditional Groundwater Level Monitoring Network in New Mexico

NGWA 2017 Summit

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




BUREAU OF GEOLOGY AND MINERAL RESOURCES

New Mexico Bureau of Geology and Mineral Resources

We are a research and service division of New Mexico Tech (under Higher Education)
We serve as the geological survey for the state

Divisions of our agency:

- Energy
 - Oil/Gas
 - Geothermal
- Mineral/Economic
- Laboratories
- Outreach and education
 - Publications
 - Archives and collections
- Geologic mapping & hazards
- Hydrogeology - AMP (Started in 2006)



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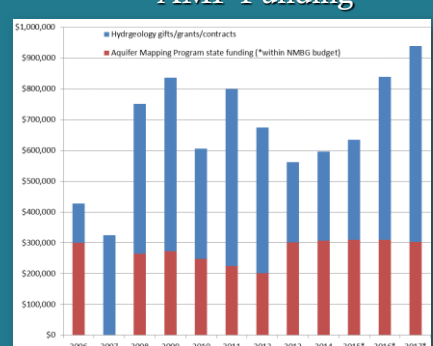
New Mexico Bureau of Geology and Mineral Resources

Components of our mission

- Distribute accurate information to scientists, decision makers, and the New Mexico public regarding the state's geologic infrastructure, mineral and energy resources, and geohydrology (including water quantity and quality).
- Create accurate, up-to-date maps of the state's geology and resource potential.
- Provide timely information on potential geologic hazards, including earthquakes, volcanic events, soils-and subsidence-related problems, and flooding.
- Act as a repository for cores, well cuttings and a wide variety of geological data. Provide convenient physical and internet access to such resources.
- Provide public education and outreach through college teaching and advising, a Mineral Museum, and teacher- and student-training programs.

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AMP-Funding



Funding has varied and been supplemented by grants/contracts

Combined funding currently supports 8 full time staff, and partial support of several other NMBGMR staff and students

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Aquifer Mapping Program

Frequently asked questions in New Mexico (besides "red or green?")

- Where is the groundwater?
- How much is there?
- What is the water quality?

Answers require understanding of the complex geology of our state. We are addressing our water-limited reality by using many of our in-house resources and in turn are:

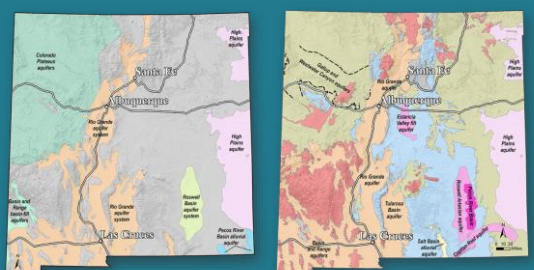
- Building better maps and information on groundwater resources, availability, and recharge
- Expanding basic groundwater monitoring – keeping an eye on the groundwater "account balance"
- Improving New Mexico's understanding of our water resources



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Aquifer Maps of New Mexico

Maps for many of our aquifers lack certain necessary details (i.e. depth, boundaries, sub-basin connections)



USGS principal aquifer map
Grey regions = no major aquifers or it's unknown

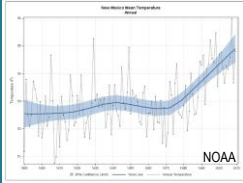
Groundwater Atlas from NMOSE

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Future of Water in New Mexico

Climate change = less water

- Reduced snowpack; variable monsoons
- Increased evapotranspiration rates
- Reduction in surface water flow and recharge to groundwater
- Increase demand on groundwater
- Increased vulnerability
- Increased litigation?



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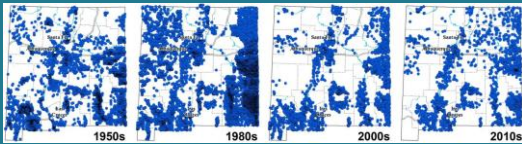
OSE/USGS Groundwater Monitoring Network

- Network is comprised of continuous/biannual/annual and 5-year monitoring
- Monitoring completed by USGS, OSE and contractors to OSE



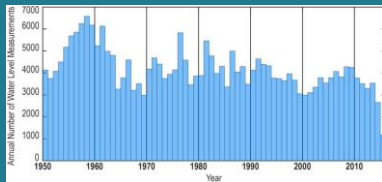
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Fewer groundwater level measurements



Coverage of water level measurement has gotten smaller

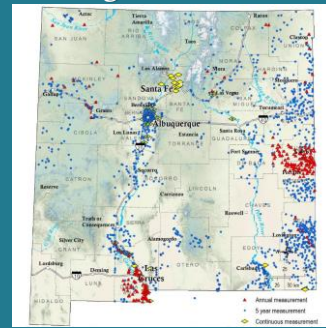
Fewer measurements have been collected in recent decades



Groundwater level measurements from USGS and NMBGMR

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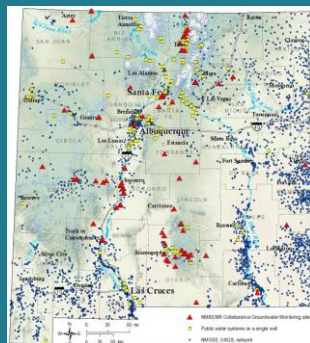
OSE/USGS Groundwater Monitoring Network 2012-2016



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Collaborative Groundwater Monitoring Network

- Filling the spatial and temporal gaps
- Taking in data from 3rd parties
- Emphasis on rural communities and single source
- Collaborating with NMRWA, NMACD, NMED, OSE, USGS, Consulting Firms, and Others to prevent data duplication and promote outreach
- Rolling short term monitoring into the network



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Collaborative Groundwater Monitoring Network



DATA SHARING
A well owner/operator can submit accurate water level measurements to NMBGMR database to become publicly available data.

FREE PROGRAM!

- If well is in "key" location, fits rural criteria and works well with our equipment, we will install groundwater level monitoring equipment - for FREE!
- We will take manual measurements - for FREE!
- We will archive YOUR data - for FREE!



WELL SHARING
NMBGMR can visit site and, if well is appropriate, we can set up equipment for continuous water level measurement.



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Data Sharing



"Water consumption will increase as long as populations and development increase, but **water resources are finite**. It is inevitable that **demand will exceed supply** at some point. To approach and manage that point in a sensible and equitable manner will require **reliable data**. Long term data collection is needed to establish a **historical baseline and emerging trends**. We are participating because we want reliable data to show the trends for our aquifer.

Benefits of participating lie in the future. At this point we are gathering data to establish a baseline of the aquifer levels. That will enable us to **quantify and sensibly manage aquifer declines** of the future.

1. Legal and engineering decisions are based on data, not opinions or emotions. A person needs hard data to protect their water rights.
2. Good data will indicate when it's necessary to invest in a legal battle and when it isn't. These battles are costly, so it is advisable to pick your battles wisely. That requires data.
3. Sharing the data will help others make informed decisions.
4. **Sharing the data is a constructive way to participate in the management of the aquifer.**
5. Sharing the data establishes a persons good intentions. Legal institutions do not favor obstructionists."

-G. Dunagan (water operator, Ruidoso, NM)

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Data Sharing WHAT ABOUT DATA QUALITY?

- We provide training to people taking water levels and providing that data to us. Onsite training or in group sessions.
- If water level monitoring is not available for a region, the only other data source is water levels reported on driller logs or declarations, which can be very poor quality or out dated.
- There is a LOT of data collected by consultants and other agencies that are not housed anywhere, these data will finally have a home!
- In some areas, less quality data are better than NO data. For unconfirmed data or unknown monitoring techniques, we will flag it in the database.

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Well Sharing



Annual Monitoring-Manual Measurements

"Number one I want to keep track of the water level. Tech is a great school. Nice to help."
-S. Olney (private well owner)



Continuous Monitoring-w/ WellIntel



Continuous Monitoring-w/ Pressure Transducer




"Quemado Mutual Water is participating in the Statewide Collaborative Network to help get a handle on what the water draw and recovery of our well is doing. In the process, we can help give an overall picture of the water in our region and the state."
-Water Operator, Quemado

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Equipment

We are utilizing

- WellIntel - continuous monitoring
- Pressure transducers- continuous monitoring
- E-line- manual measurements
- Steel tape- manual measurements

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Collaborative Groundwater Monitoring Network



For more information on how we are utilizing WellIntel, please come to:

THE POWER OF NETWORKS: INCREASING THE VISIBILITY OF LOCAL GROUNDWATER RESOURCES

Tomorrow at 2pm in Room102 A


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Training

"New Mexico Rural Water Association is proud of our partnership with New Mexico Bureau of Geology and their Aquifer Mapping Program. Their work in the field, as well as their training in the classroom, brings a new level of knowledge and awareness to water systems around New Mexico about the importance of monitoring and managing their drinking water supplies for the benefit of their customers and communities."

-B. Conner, Executive Director NMRWA



Outreach Opportunities



At the garden/outdoor classroom at the Museum, we have a well that we use to water crops and plantings. It has been our goal to **incorporate the well in education** and we have done a few activities over the years. Receiving the monitor at the end of September and being a part of the Aquifer Mapping Program has allowed educators and participants in programs the chance to observe changes in our water table, **greatly increasing education opportunities.** We are now more aware that our water comes from the aquifer. The level is constantly changing, even if it's just a fraction of an inch - which prompts us to ask why - which then leads to deeper awareness of how water is available in our state. The data on the WellNet website is interesting because we can see how other wells are performing and get a sense for the differences in depths of groundwater all over the state. The process to get the monitor was very easy, as the Bureau of Geology staff worked with our schedule, installed it quickly, and gave us ideas on how to set up the area around the wellhead to protect the device and make it accessible. The Museum is grateful to the Bureau of Geology for the monitor and looks forward to **developing ways to share info with the public.**

-Cimelda Snyder-Bryan, NMMNHS Garden Programs Coordinator


Thus Far....



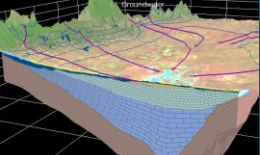
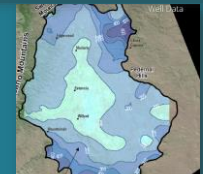
★ New Cooperators!
▲ MMRIS/AMR Collaborative Cooperative Monitoring Sites

Where are we going with this?

- Improve groundwater awareness and public education
- Webmap - public data
- Build better aquifer maps



<https://geoinfo.nmt.edu/maps/>

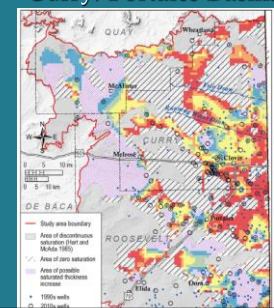

Aquifer Lifetime Map – Curry/Portales Basins

Project Overview

- Estimating the usable lifetime of the High Plains Aquifer, if practices continue to follow historical trend
- Uses projected decline rates calculated from historical water level data
- Open File Report 591 (goo.gl/Li7Na)

Results

- With little recharge and heavy groundwater pumping since 1950s some regions have less than 5-10 years remaining lifetime of aquifer
- Projected scenarios of 30 ft of saturated thickness; scenario for lifetime of large-capacity irrigation wells
- Dark red = less than 30 ft saturated thickness remains / less than 5 years at current rates of decline

Funded by City of Clovis, Curry County and ENMWUA

It Takes a Community to Build a Network And it Wouldn't be Possible Without...

- Healy Foundation
- AMAZING AMP Team
- New Mexico Rural Water Association
- Cooperators – Data and well sharing
- Those who spread the word

For More Information

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