ROLE OF AQUIFER CHARACTERIZATION IN GROUNDWATER ADMINISTRATION

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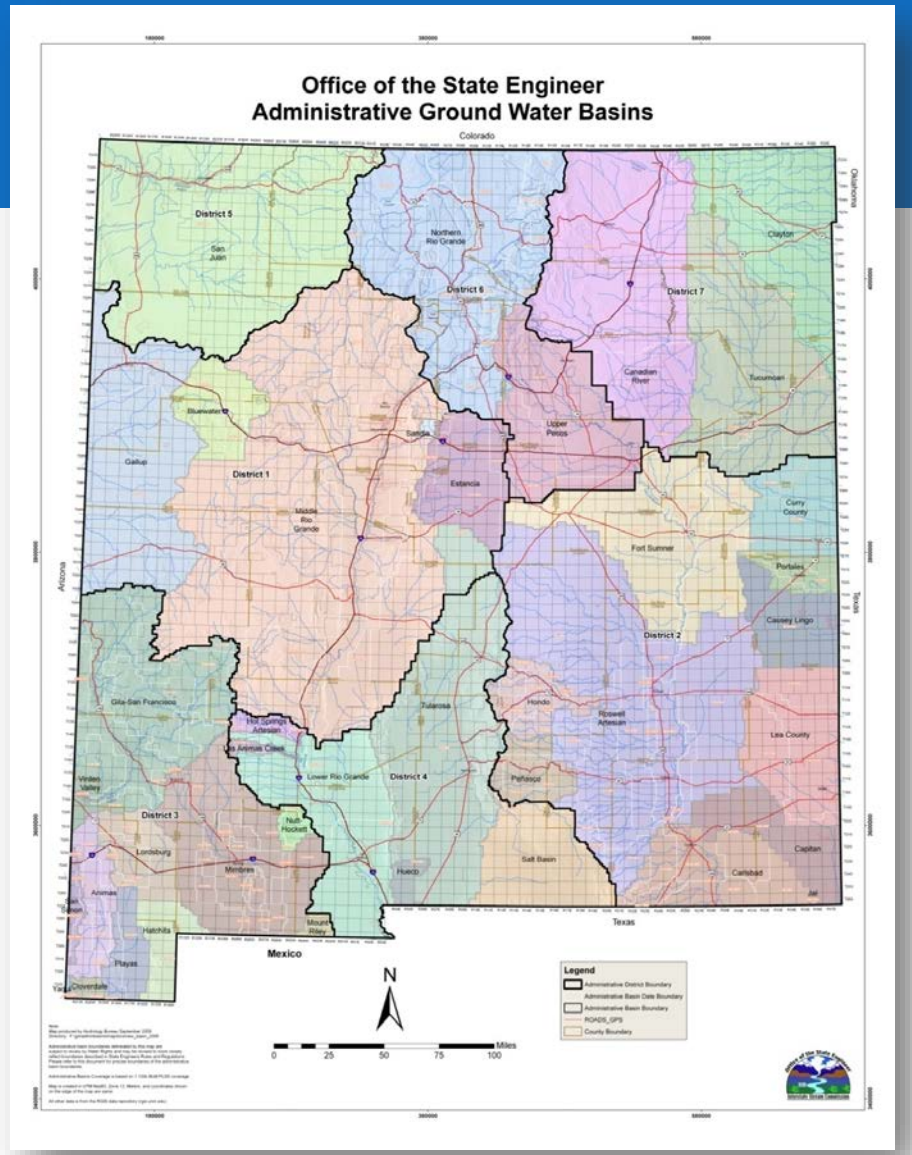
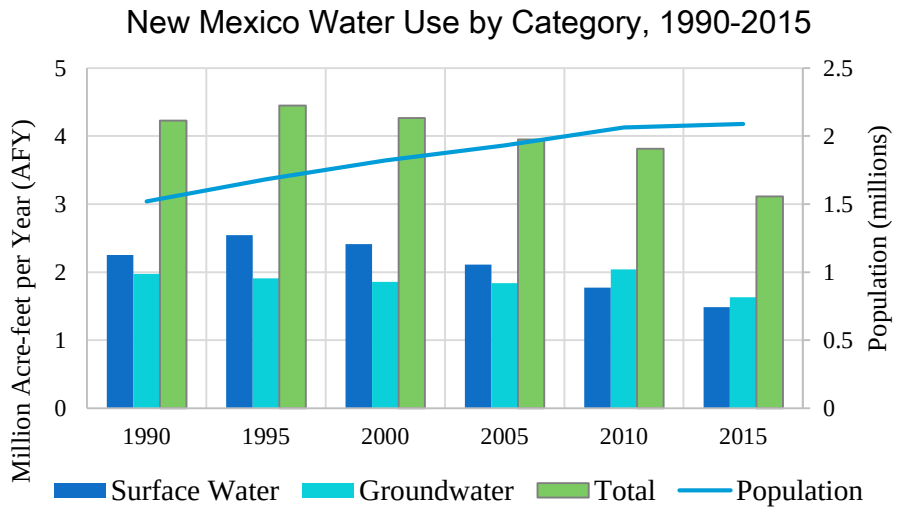
GROUNDWATER ADMINISTRATION

- The State Engineer has authority over the supervision, measurement, appropriation, and distribution of all surface and groundwater in New Mexico, including streams and rivers that cross state boundaries.
- In New Mexico, an increasing proportion of demand is met by groundwater.
- 40 Declared Underground Water Basins cover the entire surface of the state.
- The Water Resources Allocation Program (WRAP) is responsible for administering the appropriation and use of groundwater in these basins.



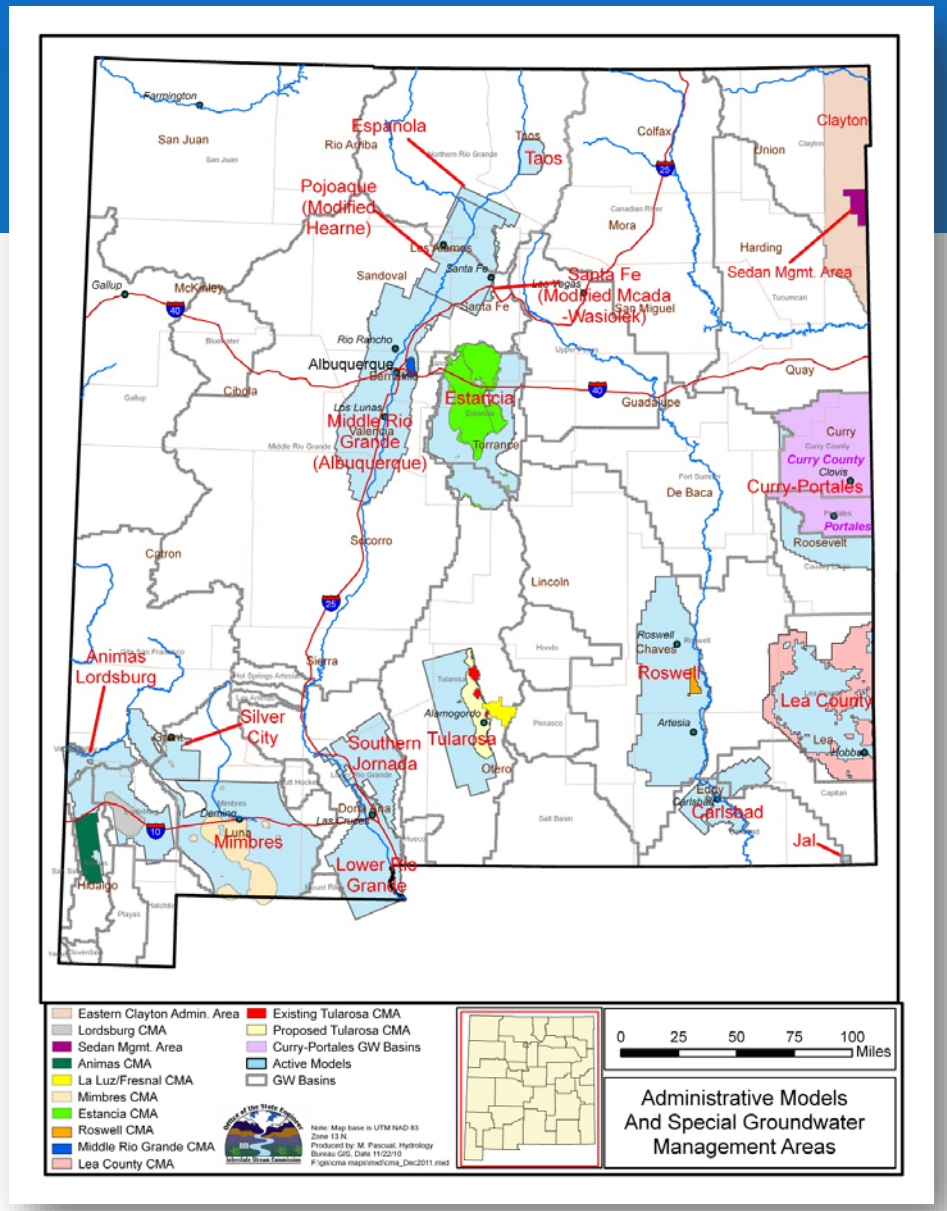


THE HYDROLOGY BUREAU'S ROLE

- Technical Bureau within the Water Rights Administration Program (WRAP).
- 10 Senior Hydrologists with backgrounds in hydrology, engineering, geology, climate science, data science, and programming.
- Bureau hydrologists provide technical support by collecting hydrologic data, developing hydrologic models, evaluating water availability, quantifying hydrologic impacts, assisting in policy development and planning, and providing expert testimony for litigation.
- To support groundwater administration, we aim to utilize the best available science and collaborate with the following:
    - **New Mexico Bureau of Geology**
    - US Geological Survey
    - Universities (UNM, NMT, NMSU)
    - New Mexico Environment Department
    - New Mexico Energy, Mining and Natural Resources Department
    - New Mexico State Land Office
    - US Bureau of Reclamation
    - National Laboratories (Sandia, LANL)
    - Jet Propulsion Laboratory (NASA)

GROUNDWATER MODELS

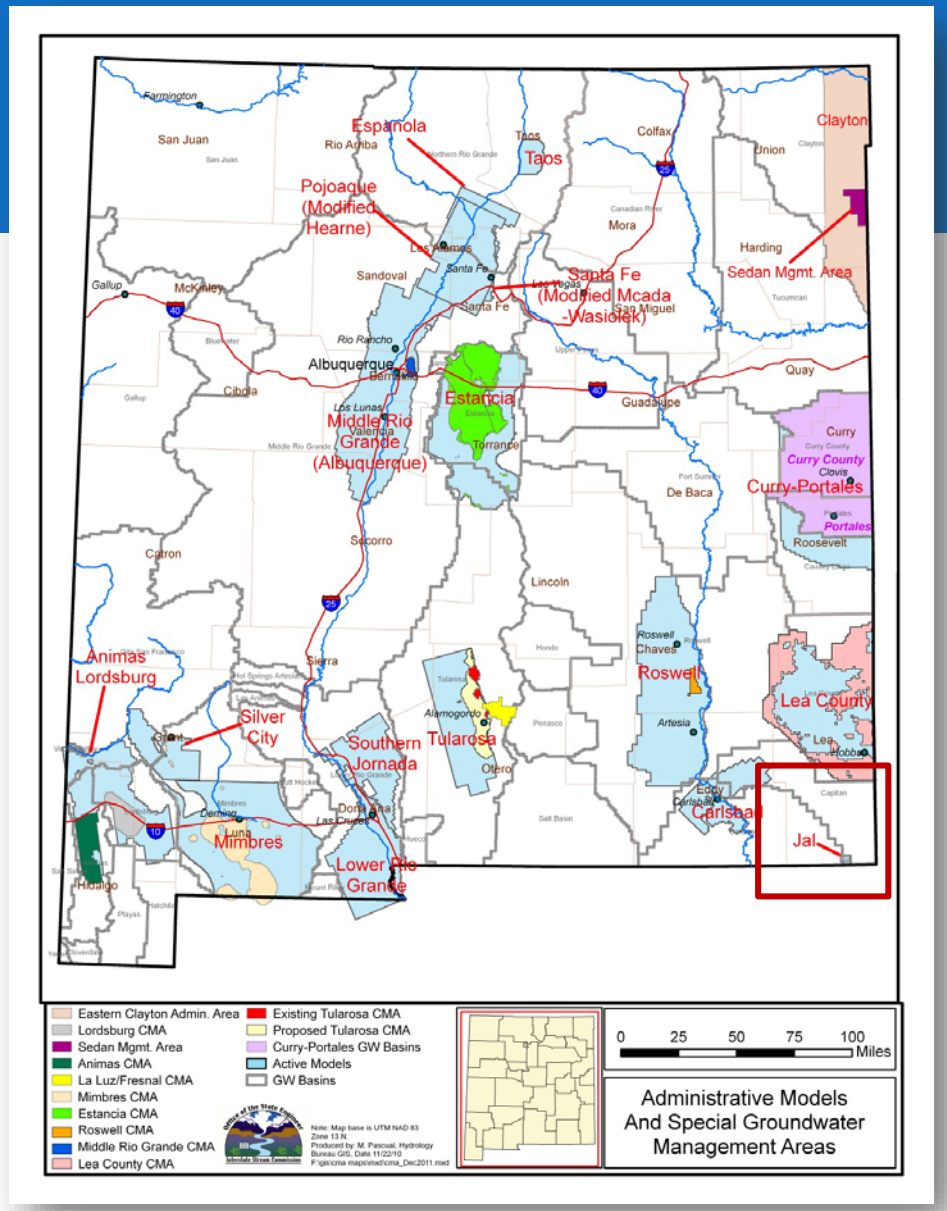
- MODFLOW models developed and maintained by Hydrology Bureau; provide basis for basin-specific groundwater rights administration through “administrative guidelines”.
- Rely on NM Bureau of Geology, USGS for data from hydrogeologic investigations.
- Model projections are used to predict the effects of the exercise of water rights and help to identify areas of excessive drawdown.
- These models are also used for other water resource planning and management purposes.
- They are developed to address existing and emerging water management questions and require a detailed understanding of hydrogeology and water level changes over time.



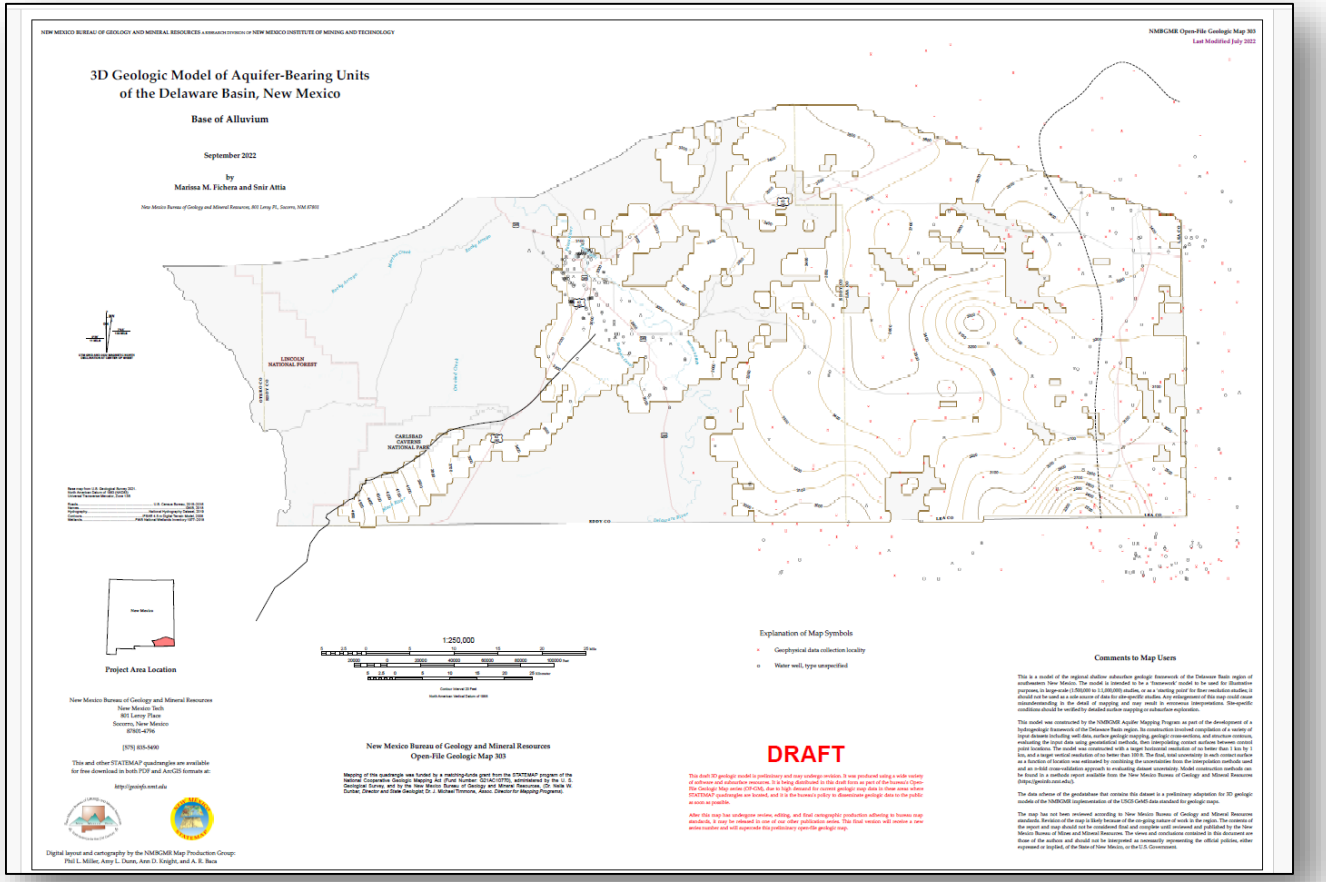
GROUNDWATER MODEL DEVELOPMENT

Example of Southeast New Mexico

- Over the last decade, there has been a rapid increase in demand for water in the Delaware Basin, primarily for use in oil and gas.
- Applications were targeting deeper aquifers than were represented in existing models.
- Needed to predict the cumulative effects of pumping in a complex multi-aquifer system in a groundwater-dependent region.
- Existing data on aquifer characterization was limited.



SOUTHEAST NEW MEXICO MODEL

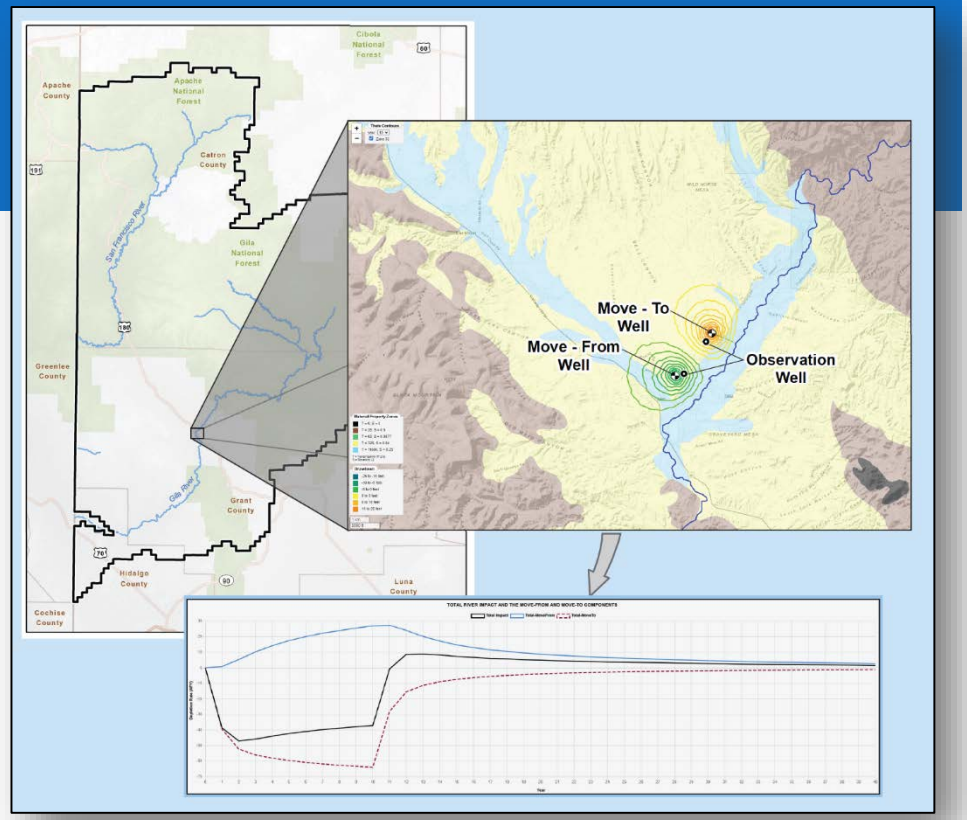


Fichera and Attia, 2022

- In collaboration with the NM Bureau of Geology, staff reviewed thousands of oil and gas well logs to delineate geologic formations.
- The Bureau of Geology compiled this data and developed detailed geologic maps of basin units.
- Hydrology compiled a comprehensive well file of groundwater diversions.
- Elevation-based, calibrated numerical model is currently under development.

IMPROVED MANAGEMENT

- Majority of the state does not have administrative groundwater models and many existing models can be improved.
- Aquifer characterization and water level monitoring will provide more reliable data upon which to improve existing models and develop new ones.
- Improved models enhance the efficiency and consistency of water right application evaluations.
- Refined models allow for more accurate and rapid evaluation of current and emerging problems.



Statewide Analytical Model (AnI)

Aquifer Drawdown → Groundwater Availability → Sustainable Yield Estimates

THANK YOU!

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