AQUIFER MAPPING AND MONITORING IN NEW MEXICO

NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES

A RESEARCH AND SERVICE DIVISION OF NEW MEXICO TECH

NEW MEXICO AQUIFER MAPPING

NEW MEXICO WATER DATA

NEW MEXICO WATER EDUCATION

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NEW MEXICO TECH
SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

New Mexico Bureau of Geology and Mineral Resources
New Mexico Tech
Earth Science for the 21st Century

WATER PROGRAMS AT NM BUREAU OF GEOLOGY

Aquifer Mapping and Monitoring Program

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

Groundwater level monitoring (currently funded by philanthropic funds from Healy Foundation)

Water Data Initiative

Began in 2019, after the Water Data Act

Convening the work with multiple state agencies

Working to make NM water data more accessible and usable

Water Education Program

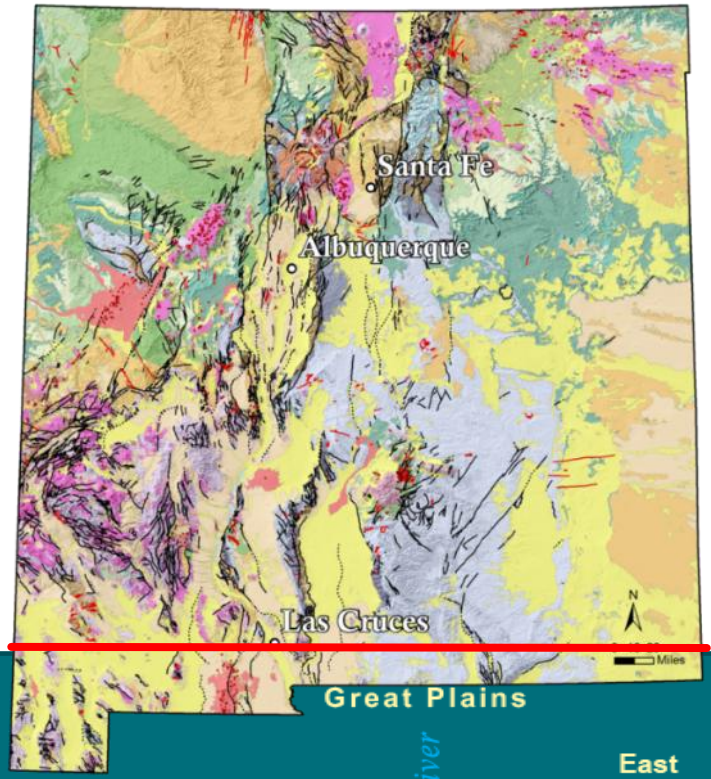
For legislators, staff and state water leaders

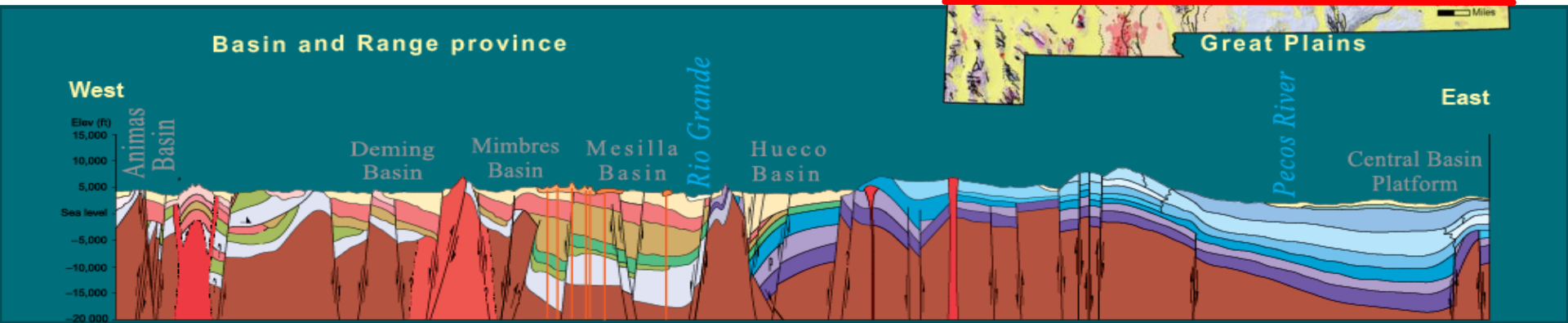
Focusing on increasing awareness and education on critical water issues in NM

Growing program to include tribal water issues and increasing public education

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 federal, state, regional, local, and philanthropic sources
- New Mexico's geology is complex, and so are the aquifers

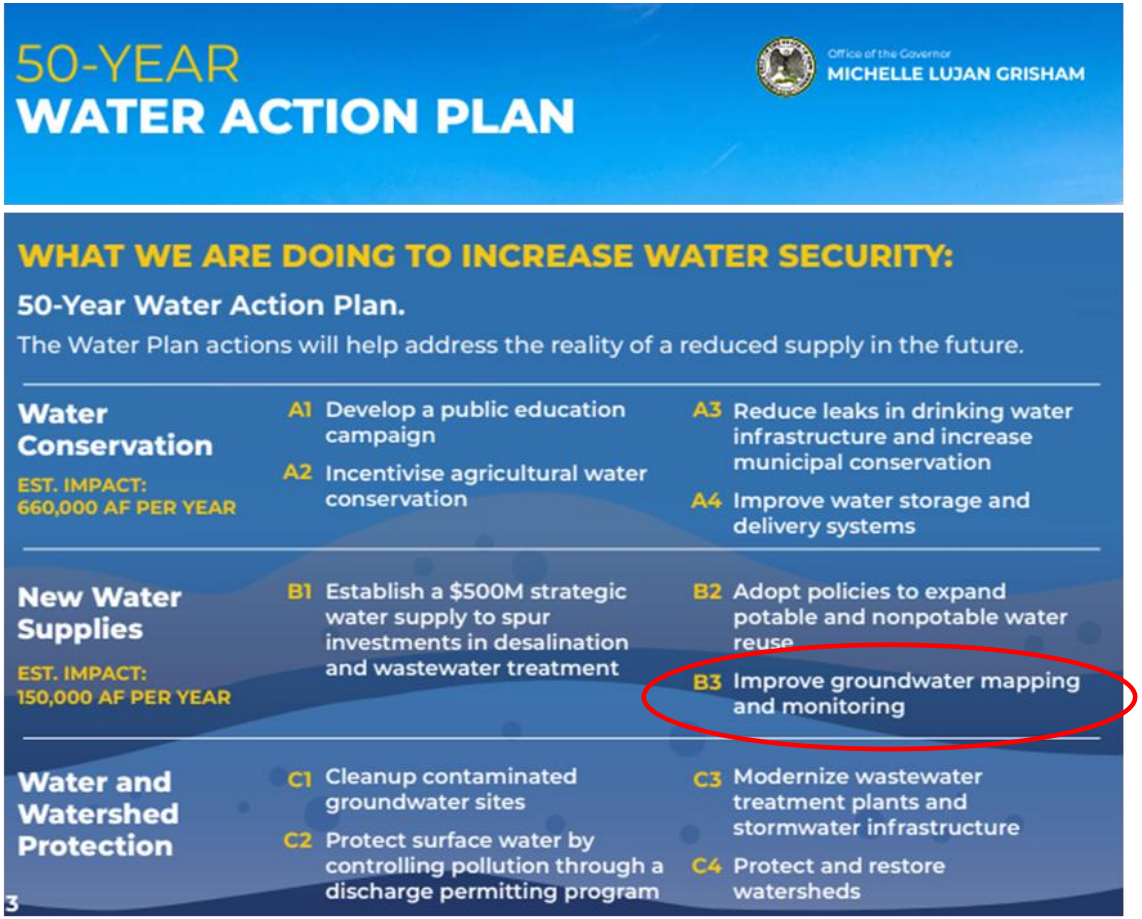




NM BUREAU OF GEOLOGY WORK FROM THE 50-YEAR WATER ACTION PLAN

Upon fulfillment of funding:

1. Characterize all major and minor aquifers in the state (fresh and brackish)
2. Characterize all major aquifers by 2032
3. Build a statewide groundwater monitoring network with 100 new dedicated wells by 2037



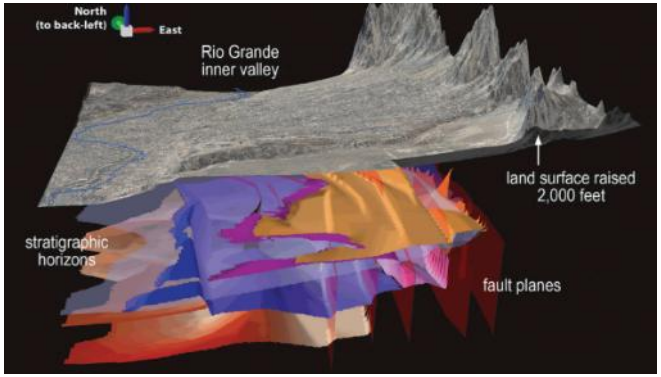
https://www.nm.gov/wp-content/uploads/2024/01/New-Mexico-50-Year-WaterAction-Plan.pdf

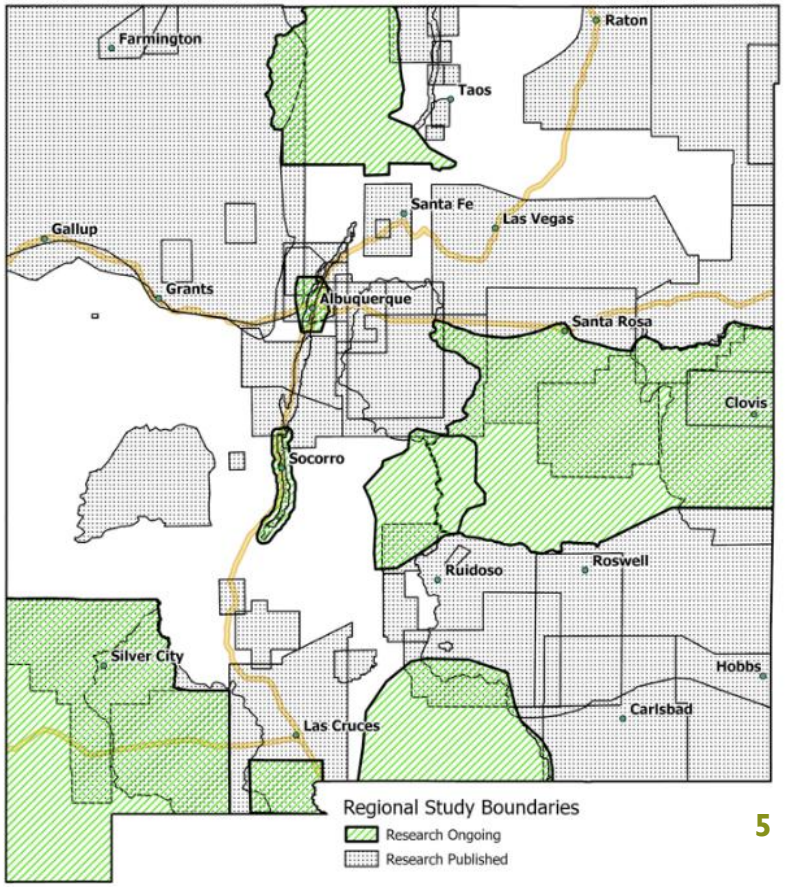
50-YEAR WATER ACTION PLAN HIGHLIGHTS OUR TWO BIGGEST CHALLENGES ON GROUNDWATER

1. MANY AQUIFERS HAVE NOT BEEN FULLY CHARACTERIZED

Complete aquifer maps include:

1. Geologic units and hydrogeologic unit(s) characteristics
2. Depth to water/ groundwater elevations
3. Boundaries of aquifer(s), impactful geologic structures, and recharge areas
4. Water quality characteristics

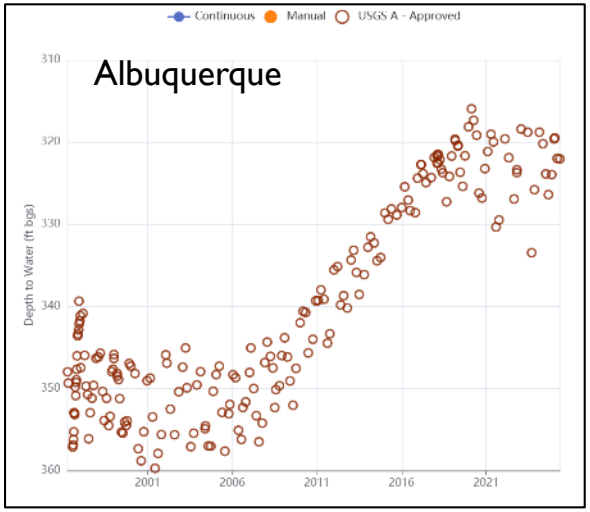


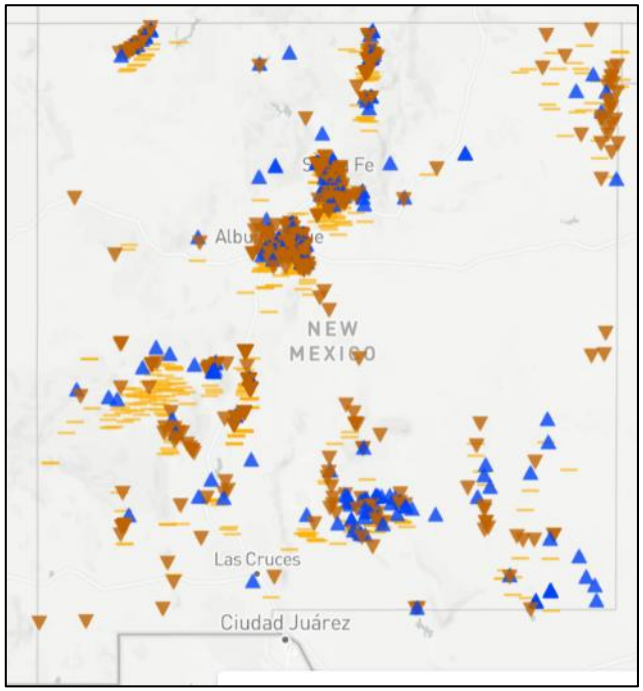


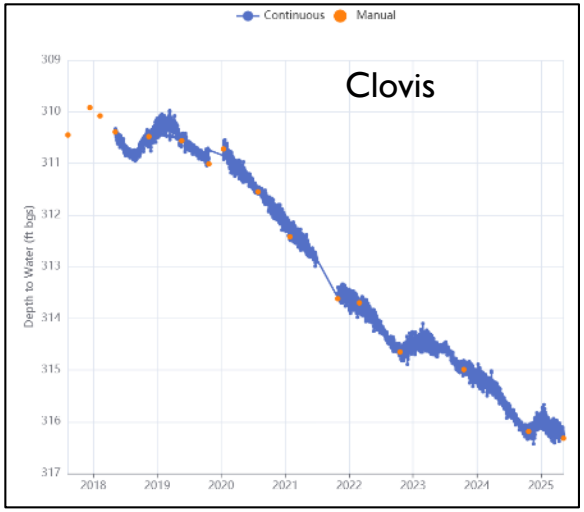
50-YEAR WATER ACTION PLAN HIGHLIGHTS OUR TWO BIGGEST CHALLENGES ON GROUNDWATER

2. GROUNDWATER LEVEL MONITORING COVERAGE IS INSUFFICIENT

- Significant spatial gaps across the state
- Many sites are not measured frequently enough
- Most sites are "reused" wells – not drilled with monitoring purpose

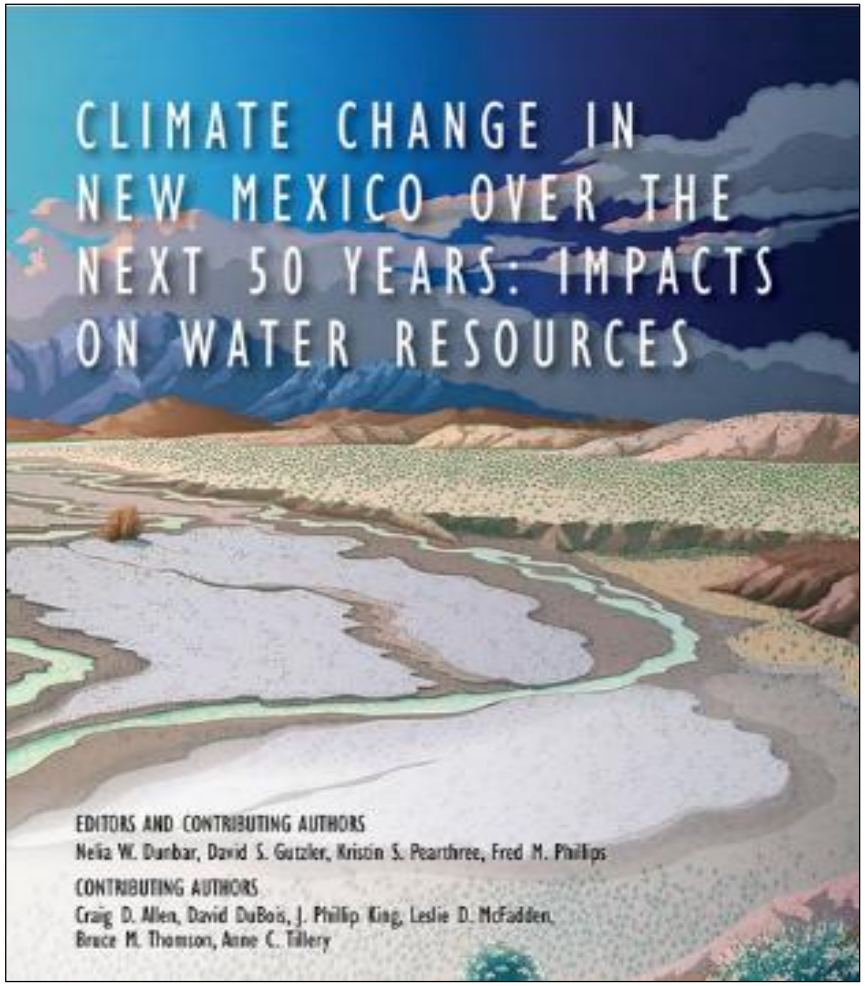






https://weaver.newmexicowaterdata.org/

OUR WATER SUPPLY IS LIMITED AND FURTHER REDUCED DUE TO CLIMATE CHANGE



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

- Average temperatures warming 5-7°F over next 50 years
- Increasing aridity
- 25-30% reduction in surface water
- Increasing demand on groundwater
- Increasing wildfire

Project funded by NM ISC for state water planning

OUR VISION FOR AQUIFER CHARACTERIZATION AND MONITORING

Complete regional aquifer characterization

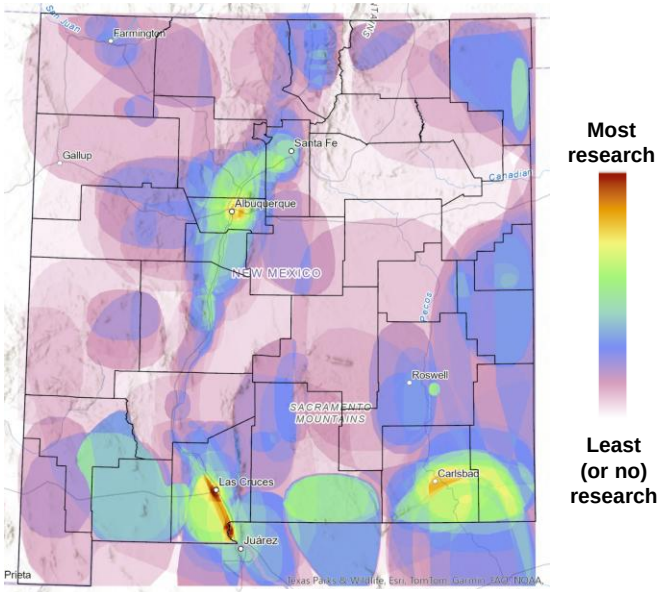
- Compile existing data, reports and models
- Address data gaps (water chemistry, water levels, geophysical studies, etc.)
- Build improved conceptual and functional models
- Full characterization of groundwater basins, including brackish and freshwater resources

Build long-term groundwater monitoring

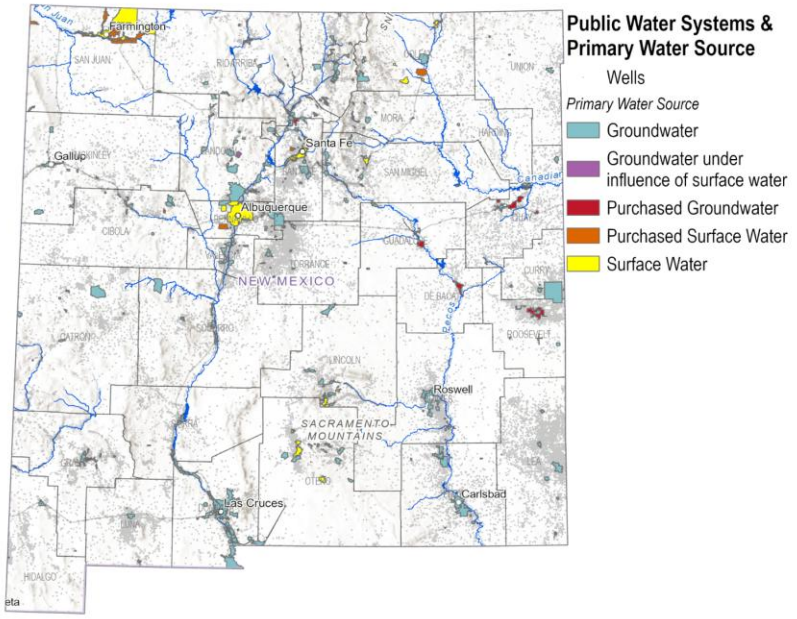
- Drill wells to fill data gaps; utilize high quality existing wells
- Collect abundant data on each drilled well (geophysics, chemistry, age data)
- Set wells for long-term monitoring with telemetry for aquifer levels, possibly water quality
- Continued operation and maintenance; reporting updates

COMPILE SUBSURFACE DATASETS

- Uneven distribution of groundwater studies across New Mexico
- Identify key sources of surface & subsurface data to support regional hydrogeologic characterization & building integrated 3D geological framework models
- Create comprehensive catalog of **all** relevant borehole data in NM
  - Collect, digitize, & archive machine-readable lithology & logs

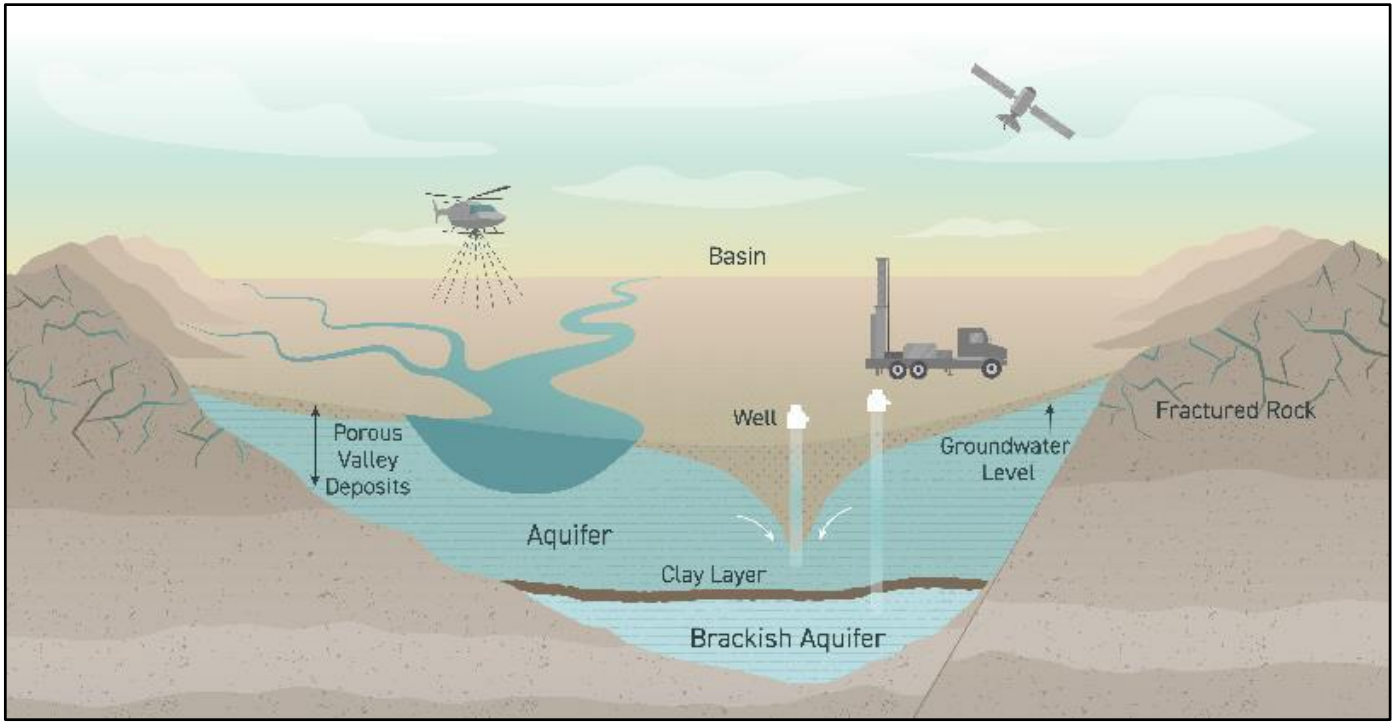


AI-generated map stack of hydrogeologic studies



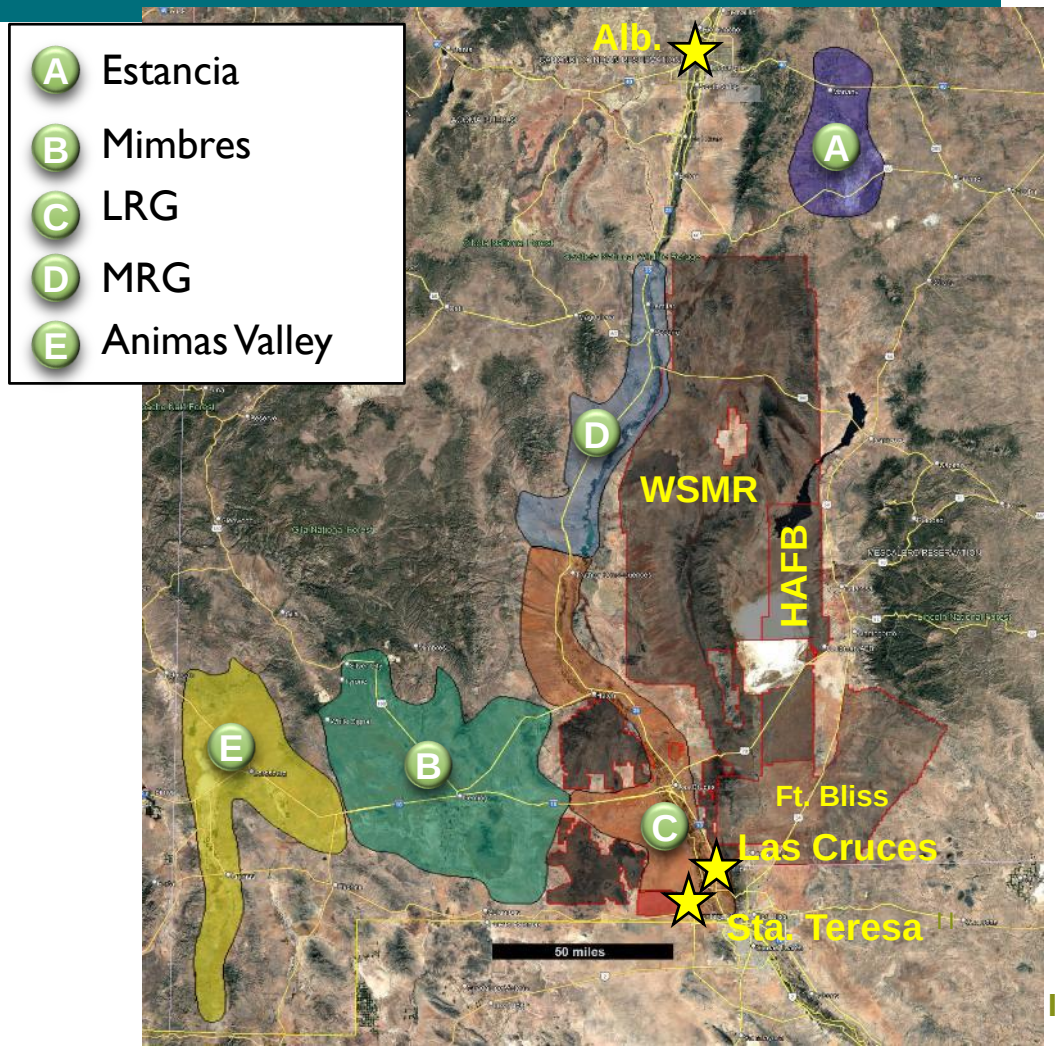
NEW DATA COLLECTION

- Collect geophysics (i.e. airborne electromagnetic surveys (AEM))
- Measure groundwater depths / changes
- Geochemical sampling
- Geologic mapping
- Drill wells



PLANNED PROJECT AREAS THIS YEAR

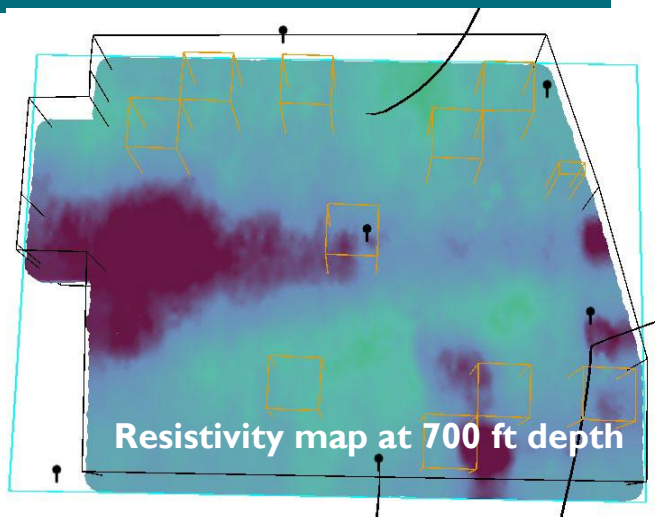
- Goal to conduct basin-scale geophysical surveys to locate fresh & brackish water down to 1000-1500 feet.
- Planning projects to optimize airborne electromagnetic (AEM) surveys spacing, refining models where needed with detailed surveys where needed
- Current efforts include using 1D resistivity models to choose the best technology, evaluating vendors & tools, and applying well-log data to improve accuracy in detecting fresh- and brackish-water zones



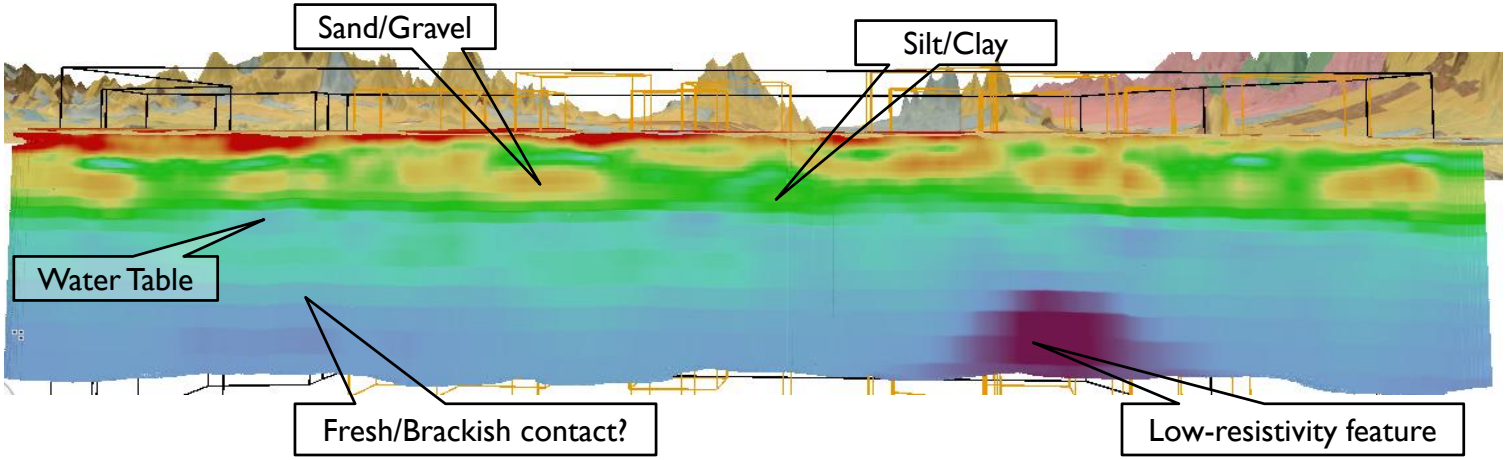
EXAMPLE: SANTA TERESA STUDY BY NM ISC

Preliminary Results of Santa Teresa AEM study

- ISC 2024-25 study to locate brackish-water in west Mesilla Basin with limited well data
- Preliminary findings used to guide well placement
- Reveals hydrogeologic features in alluvial basins, including potential brackish / geothermal anomalies
- Data helps optimize upcoming NMBGMR airborne electromagnetic surveys

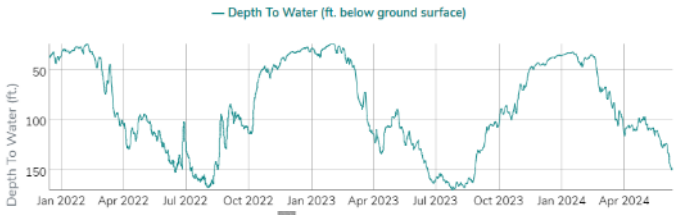


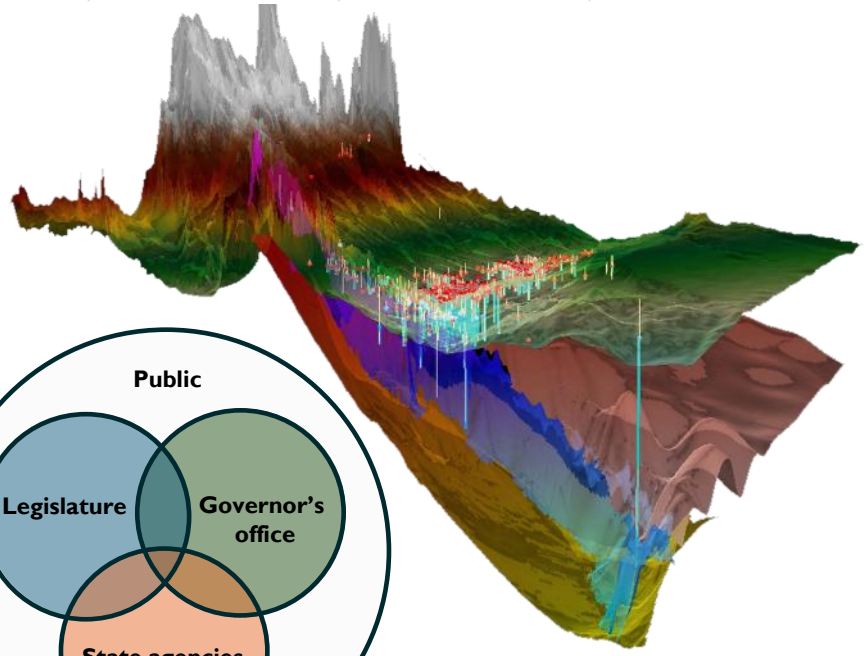
Resistivity cross section: Preliminary Results



OUR GOAL IS TO PROVIDE THE STATE WITH ANSWERS!

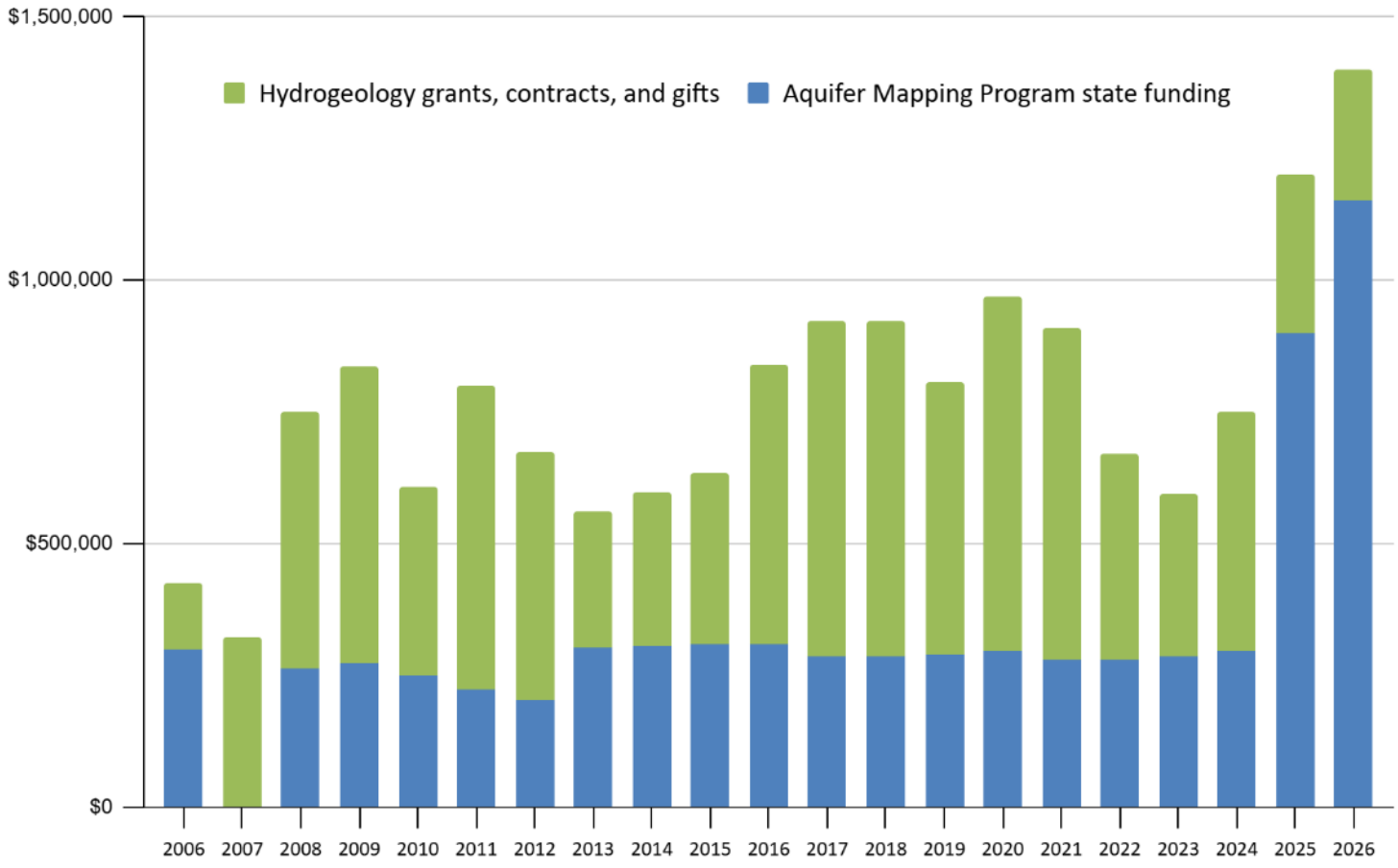
- Build 100+ well network for dedicated groundwater monitoring for statewide groundwater level tracking
- Online, accessible aquifer visuals
- Detailed subsurface data and model layers for groundwater management and planning
- For stakeholders - Published best estimates of aquifer boundaries, existing water quality (fresh and brackish), and production potential





Stakeholders

CURRENT AQUIFER MAPPING BUDGET AND SINCE 2006



Plus $7.5M non-recurring for FY2026

AQUIFER CHARACTERIZATION AND MONITORING: TARGET FUNDING

Goal: Map all aquifers by 2037 with 100+ new monitoring wells for tracking change

Recurring funding:

- Annual funding now at $1,150,000 (FY26)
- **Additional funding needed: $1M**
  - Recurring costs to cover new staff FTEs, software licenses, project/data management
- After 2037, program focus shifts from building / data acquisition to long-term maintenance and updating / improving models

Non-recurring funding:

- Received $7.5M for FY26
- **Target funding for FY27: $20M**

NEW MEXICO AQUIFER MAPPING

NON-RECURRING FUNDING GOALS

Estimated funding to complete characterization of aquifers and establish groundwater monitoring network over next 11 years

Year	FY	Drilling wells	Surveys/Mapping	Consultants/ Researchers	Other data collection*	Annual estimate	Major costs (estimate)
1	2026	$650,000	$3,500,000	$2,350,000	$1,000,000	$7,500,000	2-4 test wells; 3-4 surveys
2	2027	$12,000,000	$4,000,000	$3,000,000	$1,000,000	$20,000,000	10-12 wells; 3-4 surveys
3	2028	$12,000,000	$4,000,000	$3,000,000	$1,000,000	$20,000,000	10-12 wells; 3-4 surveys
4	2029	$12,000,000	$4,000,000	$3,000,000	$1,000,000	$20,000,000	10-12 wells; 3-4 surveys
5	2030	$12,000,000	$4,000,000	$3,000,000	$1,000,000	$20,000,000	10-12 wells; 3-4 surveys
6	2031	$8,650,000	$3,000,000	$3,000,000	$1,000,000	$15,650,000	8-10 wells; 2-3 surveys
7	2032	$8,000,000	$3,000,000	$3,000,000	$500,000	$14,500,000	8-10 wells; 2-3 surveys
8	2033	$8,000,000	$3,000,000	$3,000,000	$500,000	$14,500,000	8-10 wells; 2-3 surveys
9	2034	$8,000,000	$3,000,000	$3,000,000	$500,000	$14,500,000	8-10 wells; 2-3 surveys
10	2035	$8,000,000	$1,000,000	$3,000,000	$500,000	$12,500,000	8-10 wells; 1-2 surveys
11	2036	$8,000,000	$1,000,000	$2,000,000	$500,000	$11,500,000	8-10 wells; 1-2 surveys
12	2037	$2,000,000	$1,000,000	$1,000,000	$500,000	$4,500,000	wrap up 2-4 wells; shift to O&M and updates
		$99,300,000	$34,500,000	$32,350,000		**$175,150,000**	100+ wells tracking fresh and brackish water; major and minor aquifers mapped

* Other data collection includes student/ staff support, lab analyses, and field campaigns in regions of study

Questions?

Thank you for your support and helping us get this important work done!

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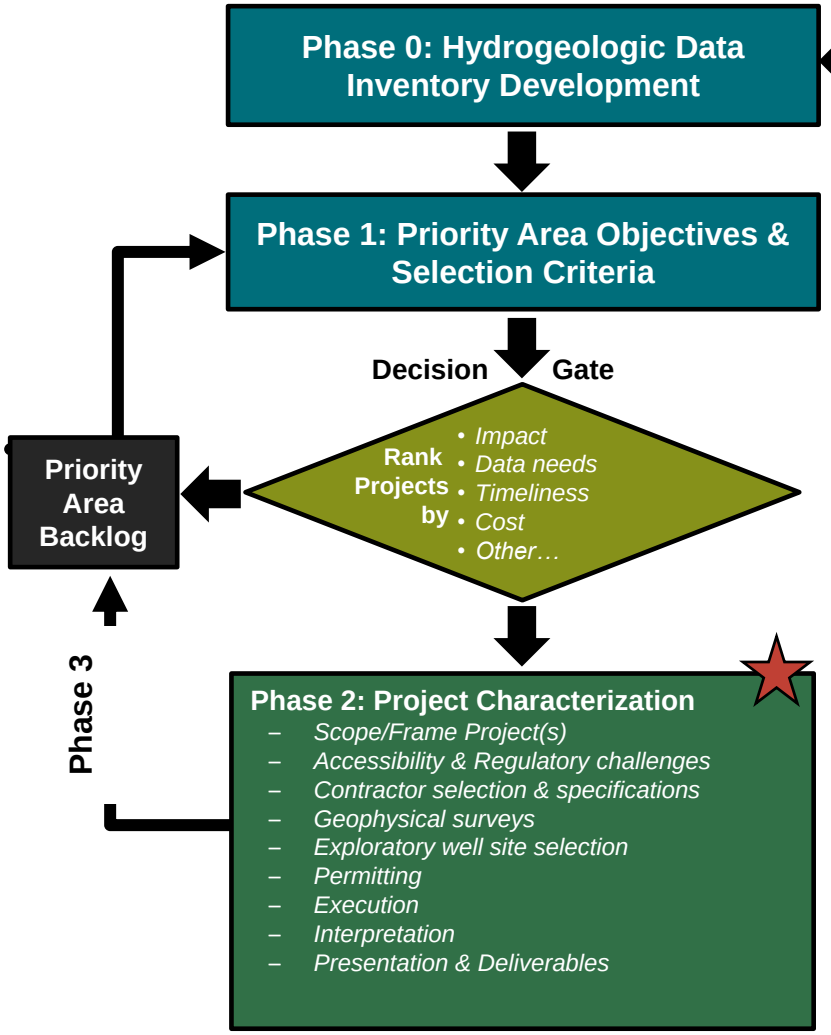
SIMPLIFIED PROGRAM WORKFLOW



- **Phase 0: Existing Data Inventory**
  - Build initial knowledge bases
- **Phase 1: Priority Area Selection Criteria**
  - Select first round of priority areas for detailed study
- **Phase 2: Project Characterization**
  - Scope/Frame/Plan Priority Area Projects
  - Acquire field data (*surveys, drilling, logging, sampling, etc.*)
  - Analyze & interpret new data
  - Present results
- **Phase 3: Review Priority Area Backlog**
  - Incorporate previous learnings & select new project from backlog