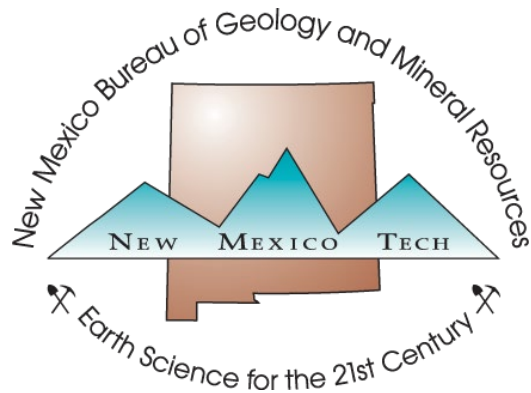


New Mexico's Progress on Aquifer Mapping and Monitoring

Stacy Timmons and Sean Connell
NM Bureau of Geology and Mineral Resources

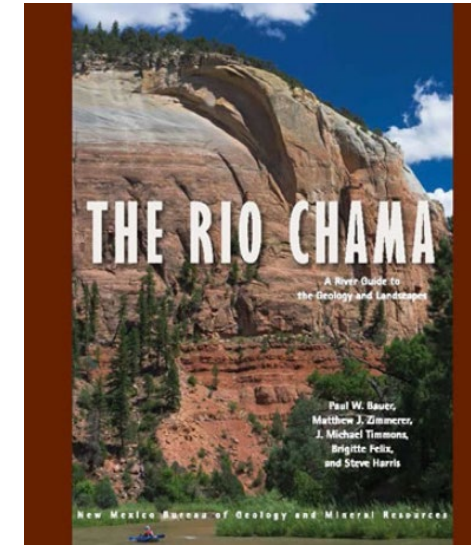


NM Bureau of Geology

A research division of NM Tech

Non-regulatory, state geologic survey,
providing science and service to NM since
1927

- Geologic Mapping and Hazards
- Energy
 - Oil/gas and geothermal
- Mineral Resources
- Laboratories
- Outreach and Education
- Hydrogeology / Water Programs



The Aquifer Mapping and Monitoring Program Team

Our mission

- Characterize quantity, quality, and distribution of groundwater within aquifers by integrating geology, geophysics, hydrology & geochemistry
- Our work is for New Mexico's communities, agencies, decision-makers, and managers to support informed, science-driven decisions on water resources
- We are funded by support from state, federal, local, and philanthropic sources



Altogether, our team currently has over 250 years of professional experience!

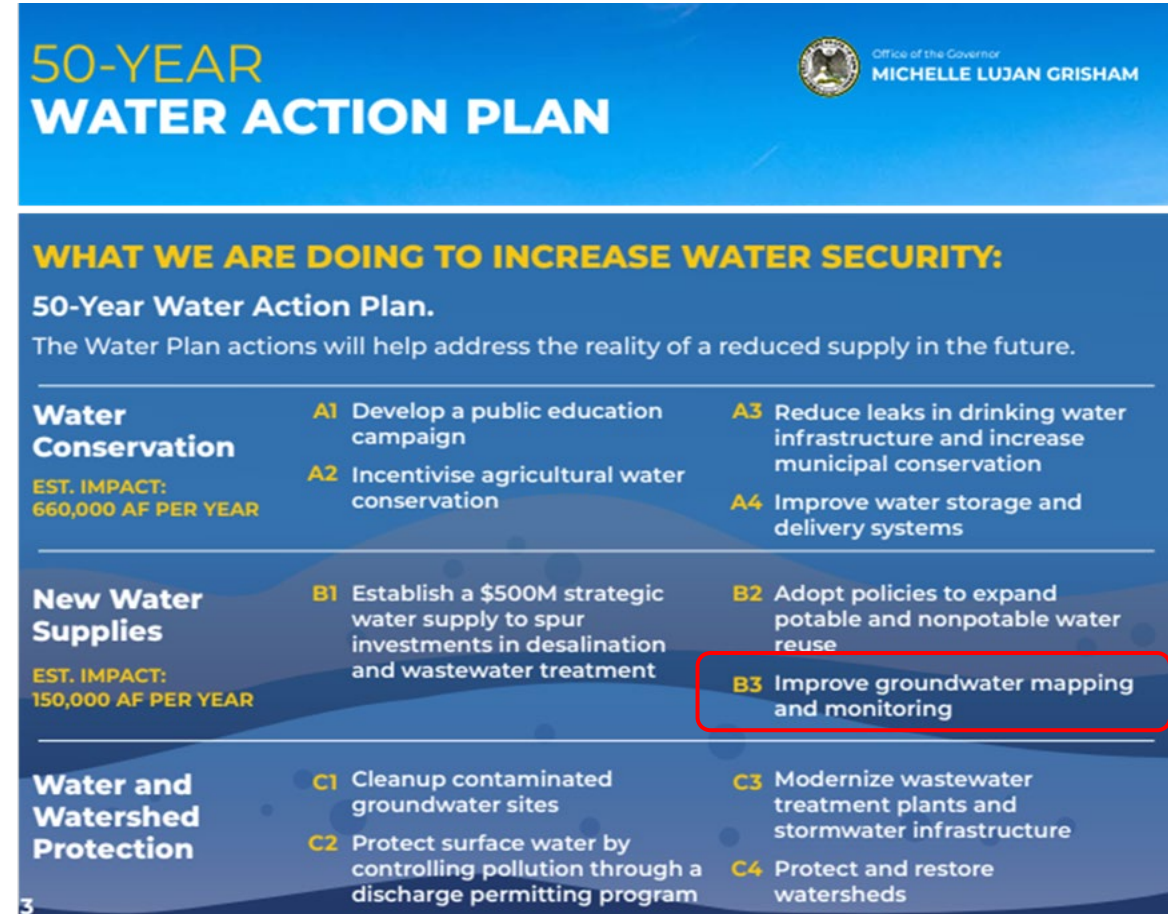
Role of NM Bureau of Geology in the 50-Year Water Action Plan

With funding support, the Bureau of Geology's role is to:

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

The Bureau's work supports:

- Identifying recharge locations and rates
- Groundwater budget estimation
- Tracking groundwater quality & contaminants
- Improving drought resilience
- Alternative water resource characterization & planning



50-YEAR WATER ACTION PLAN

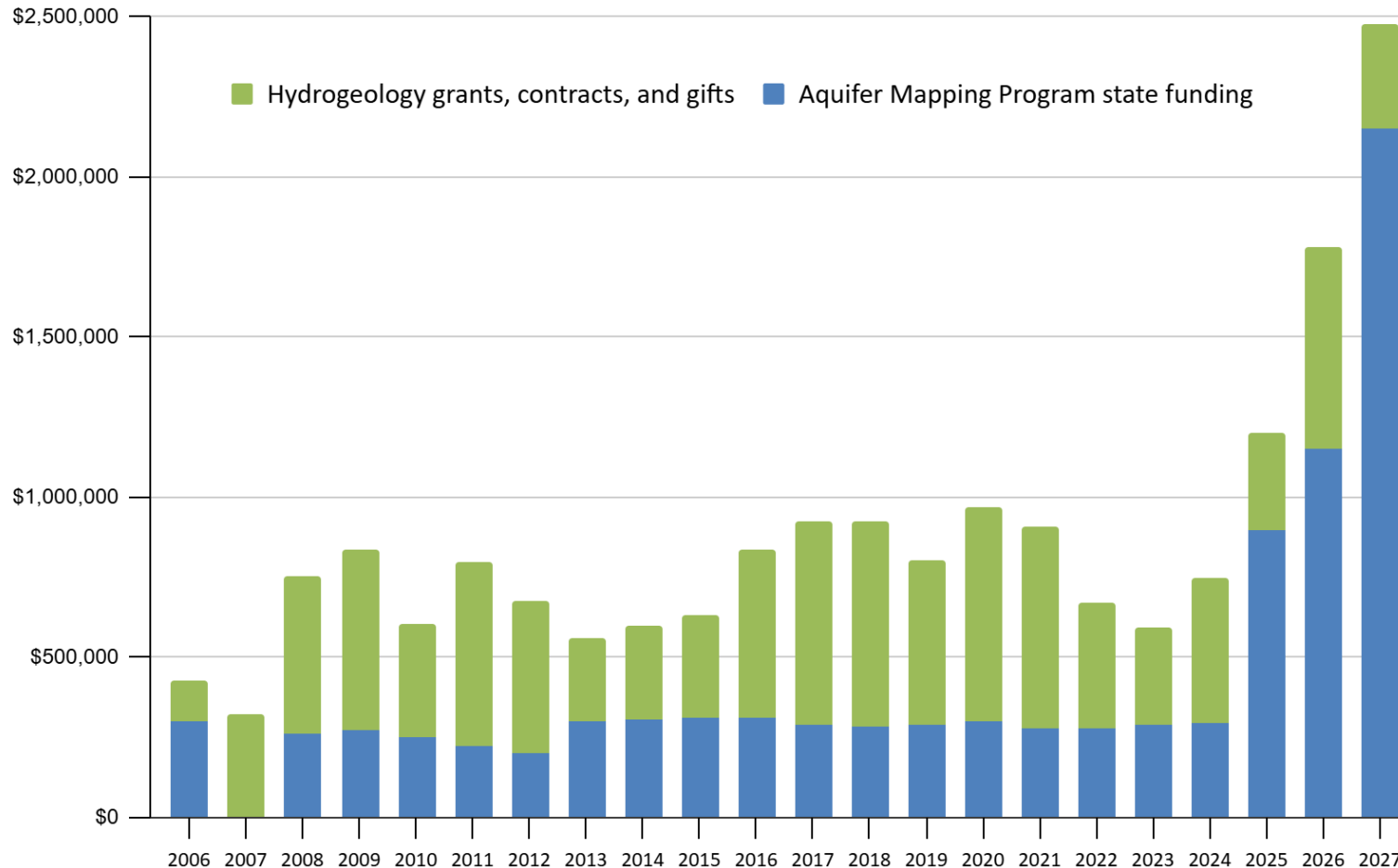
Office of the Governor
MICHELLE LUJAN GRISHAM

WHAT WE ARE DOING TO INCREASE WATER SECURITY:
50-Year Water Action Plan.
The Water Plan actions will help address the reality of a reduced supply in the future.

Category	Actions
Water Conservation EST. IMPACT: 660,000 AF PER YEAR	- A1 Develop a public education campaign - A2 Incentivise agricultural water conservation - A3 Reduce leaks in drinking water infrastructure and increase municipal conservation - A4 Improve water storage and delivery systems
New Water Supplies EST. IMPACT: 150,000 AF PER YEAR	- B1 Establish a \$500M strategic water supply to spur investments in desalination and wastewater treatment - B2 Adopt policies to expand potable and nonpotable water reuse B3 Improve groundwater mapping and monitoring
Water and Watershed Protection	- C1 Cleanup contaminated groundwater sites - C2 Protect surface water by controlling pollution through a discharge permitting program - C3 Modernize wastewater treatment plants and stormwater infrastructure - C4 Protect and restore watersheds

<https://water-dashboard.nm.gov/>

Thank you for your support!

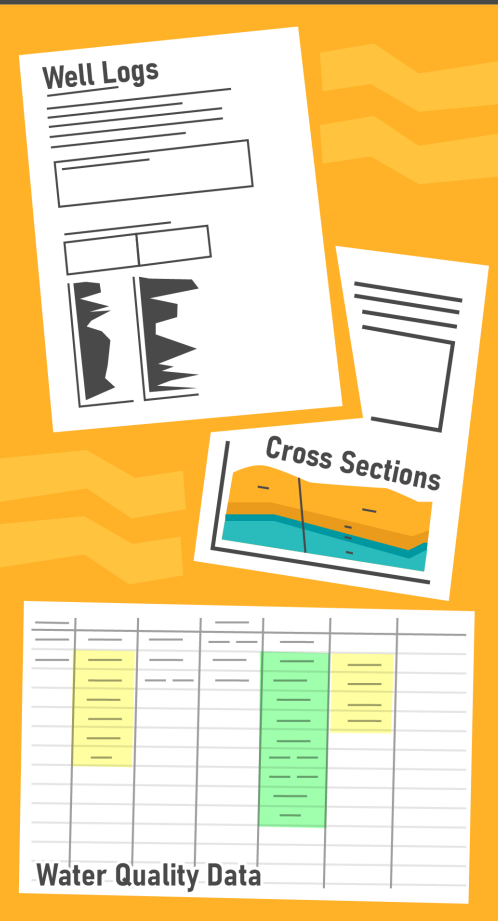


- **Non-recurring state funding**
 - FY2026: \$7.5M
 - FY2027-28: \$22M*
 - (*2M to NM Water Data)
- **Growth in staff**
 - Workforce recruitment
 - 10 new FTEs in 2025–26
- **Contractor support**
 - Help with new data collection, interpretation, model development, drilling, etc.

Step 1

Collect Existing Data

Collection of surveys, well logs, cross sections, water quality data, and models



Step 2

Collect New Data

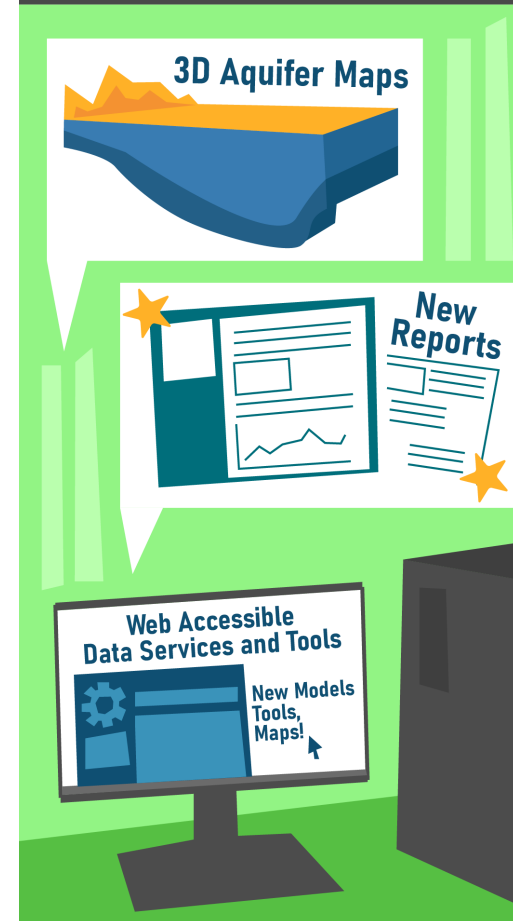
Conducting AEM surveys, drilling wells, groundwater level measurements



Step 3

Build New Aquifer Maps!

Building new models with new and old data, short reports, data services



[illegible]

- ✓ Scrape & text recognition (OCR) for ~170,000 summaries to create machine-readable datasets (*finished*)

- ## Scrape logs from WRRS

Water Right Summary



get image
fail

WR File Number:	RG 94885	Subbasin:	R05C	Cross Reference:	
Primary Purpose:	DOM 72-12-1 DOMESTIC CNF HOUSEHOLD				
Primary Status:	EXP Expired				
Total Acres:		Subfile:	Header:		
Total Diversion:	0.000	Cause/Case:			
Owner:	JOSEPH JOHNSON		Owner Class:	Owner	

Documents on File

(click field for details)

Transaction Images	Trn #	Doc	File/Act	Status 1	Status 2	Transaction Desc.	From/To	Acres	Diversion	Consumptive
 get images	551357	72121	2014-07-25	EXP	EXP	RG 94885	T		1.000	

Current Points of Diversion

POD Number	Well Tag	Source	Q64	Q16	Q4	Sec	Tws	Rng	X	Y	Map	Other Location Desc
RG 98862, POD 1										413828.5	3984739.6	

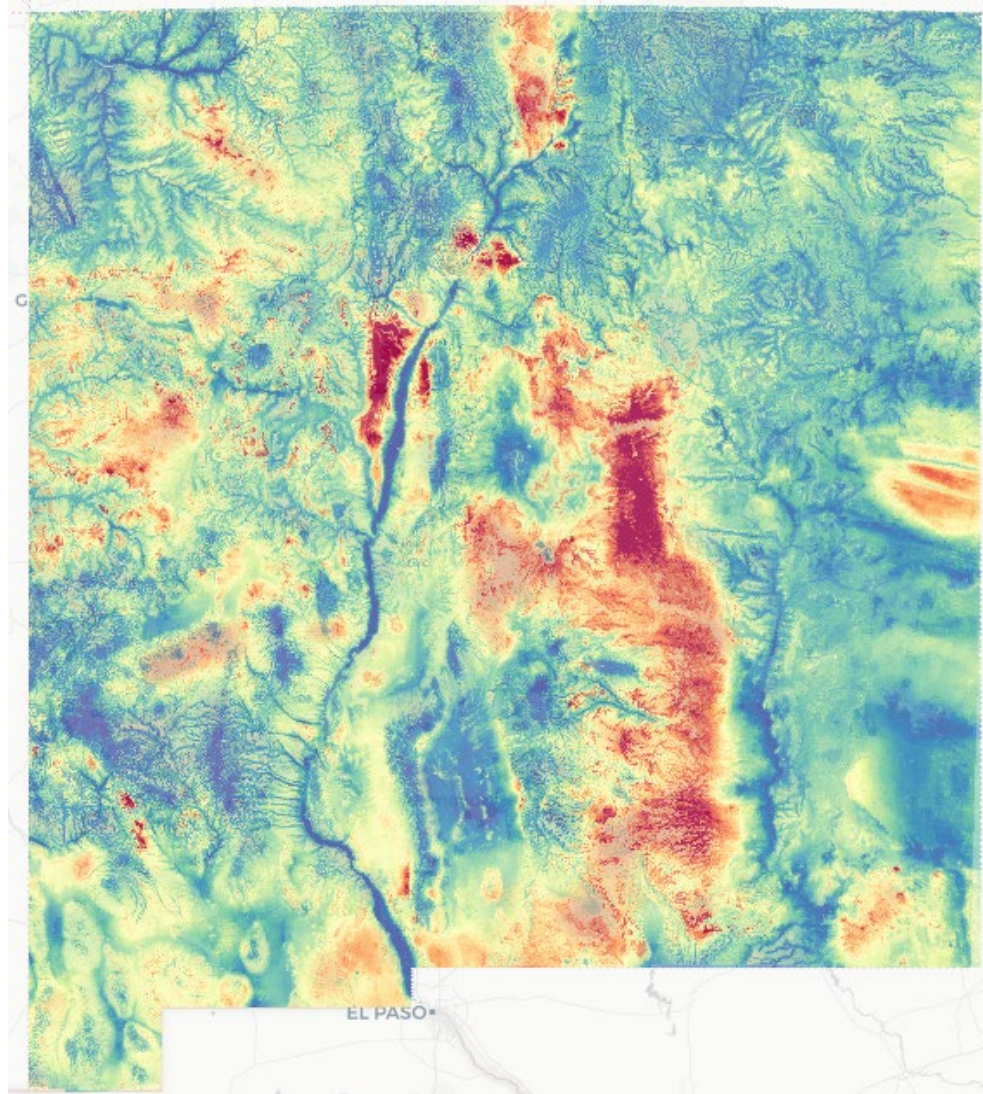
Clay mixed sand
mostly sand mixed with
mostly sand very little clay
sand & small gravel
sand & small gravel
sand & small gravel

Rock
Fine
Mixed
Coarse

Clay
Sand
Gravel
Silt
Sand & Clay
Sand & Gravel

Automated groundwater mapping

Preliminary Depth-to-Water Map



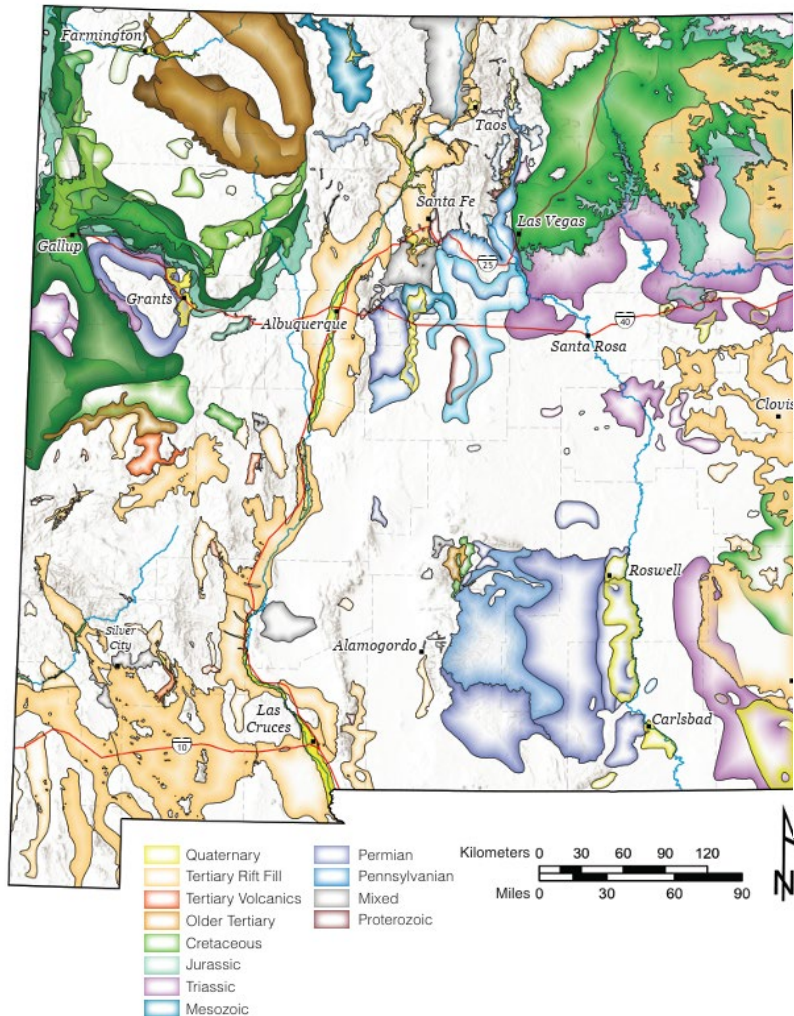
- Depth-to-water estimates based on data from NMBGMR, OSE, USGS, natural springs, and data from other regional providers to the Water Data Initiative
- Preliminary map of average depth to water developed using geostatistics and machine learning
- Provides an important baseline for planned projects to map year-to-year changes in groundwater levels

Depth to water (ft)

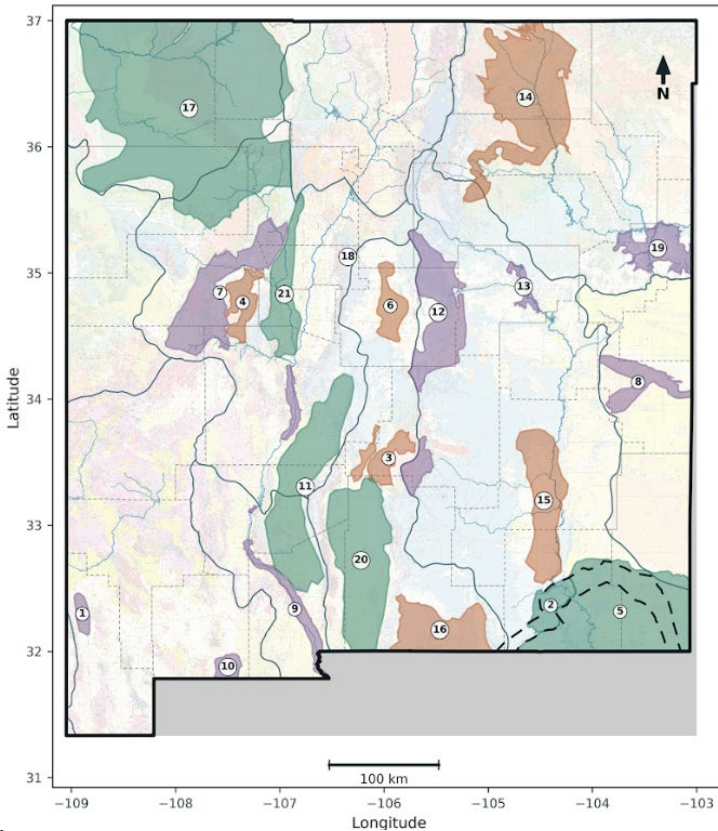
0 - 25	175 - 200	350 - 375
25 - 50	200 - 225	375 - 400
50 - 75	225 - 250	400 - 425
75 - 100	250 - 275	425 - 450
100 - 125	275 - 300	450 - 475
125 - 150	300 - 325	475 - 500
150 - 175	325 - 350	> 500

Statewide aquifer maps – Coming soon!

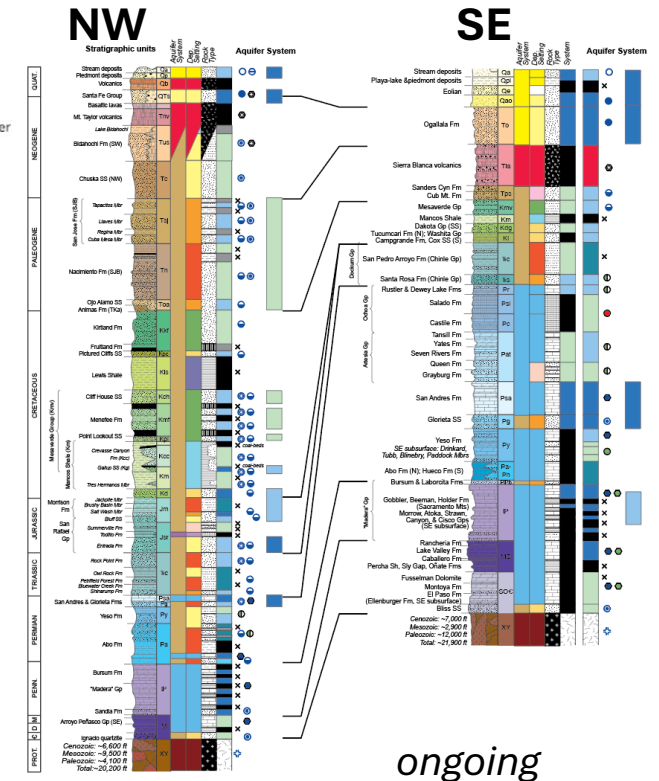
Fresh-water (coming soon)



Brackish-water (coming soon)

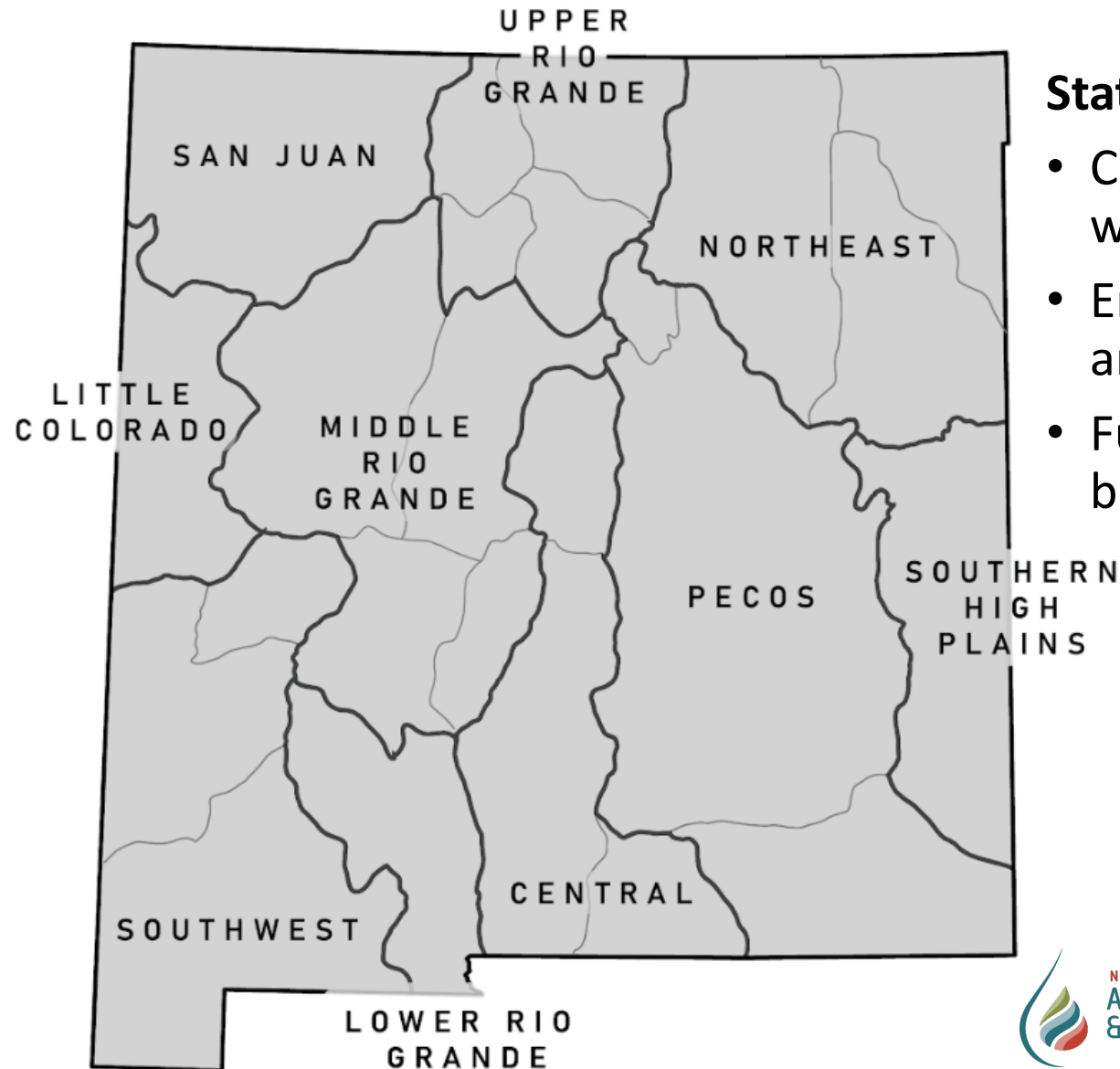


Regional Hydrostratigraphic Sections



- Maps identify currently known sources of fresh- and brackish-water
- Regional stratigraphic sections identify aquifer-depth trends

NM groundwater summaries – Coming soon!

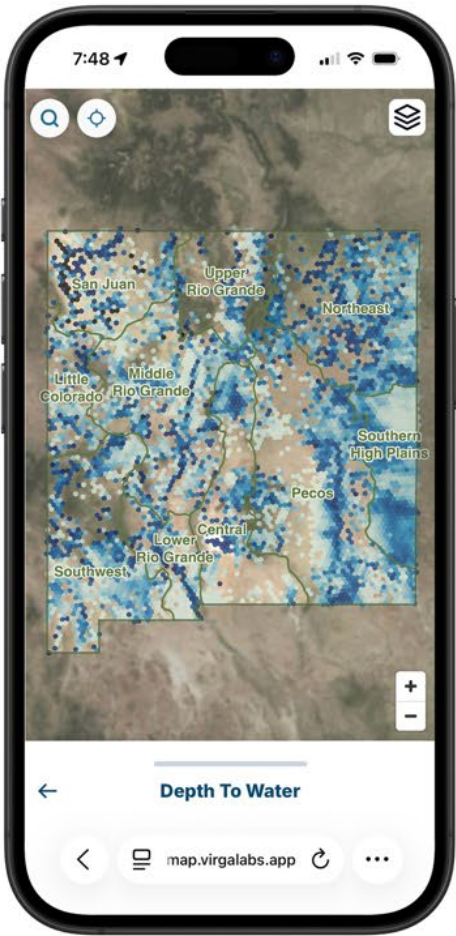
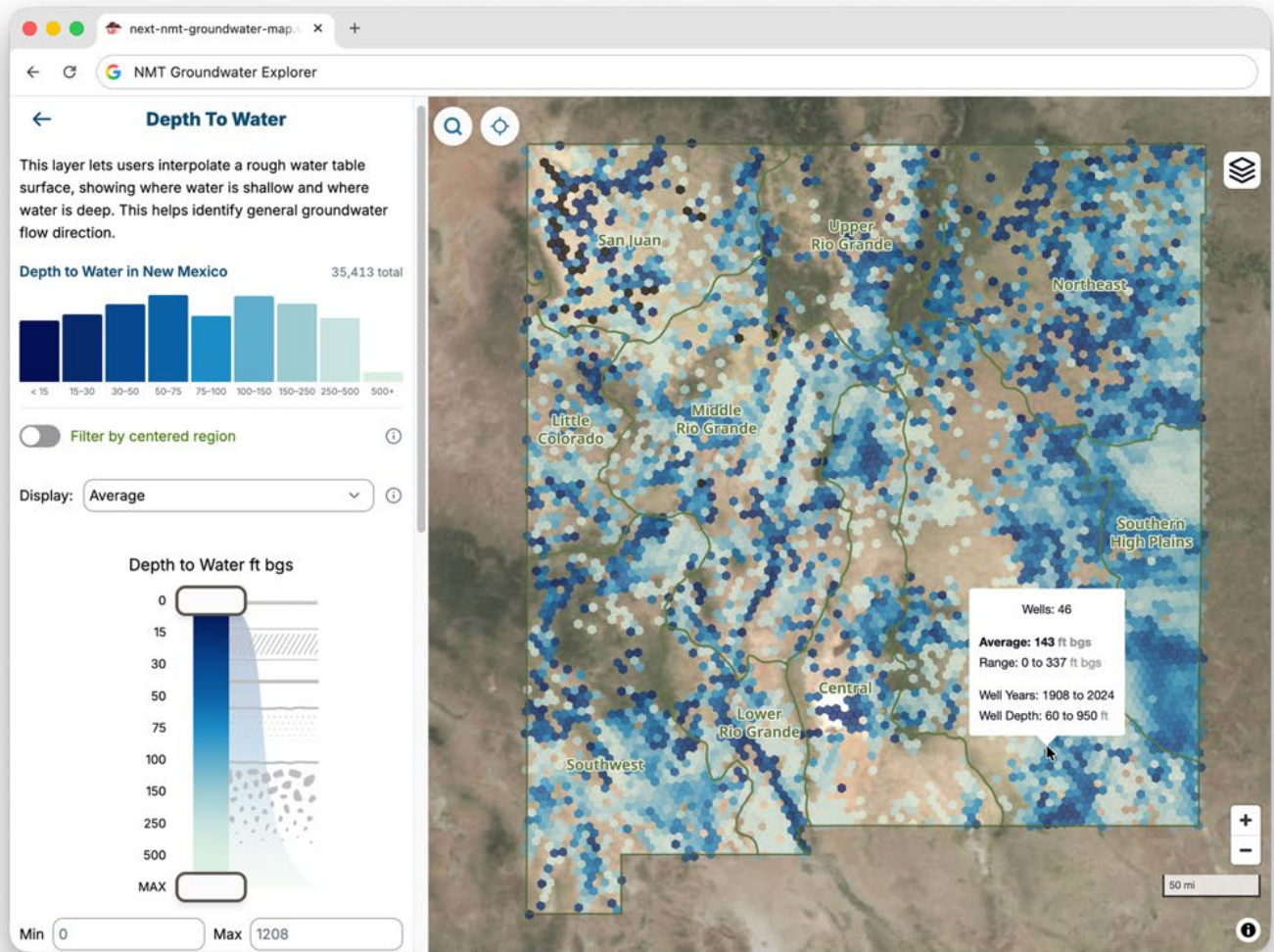


Statewide Groundwater Summaries

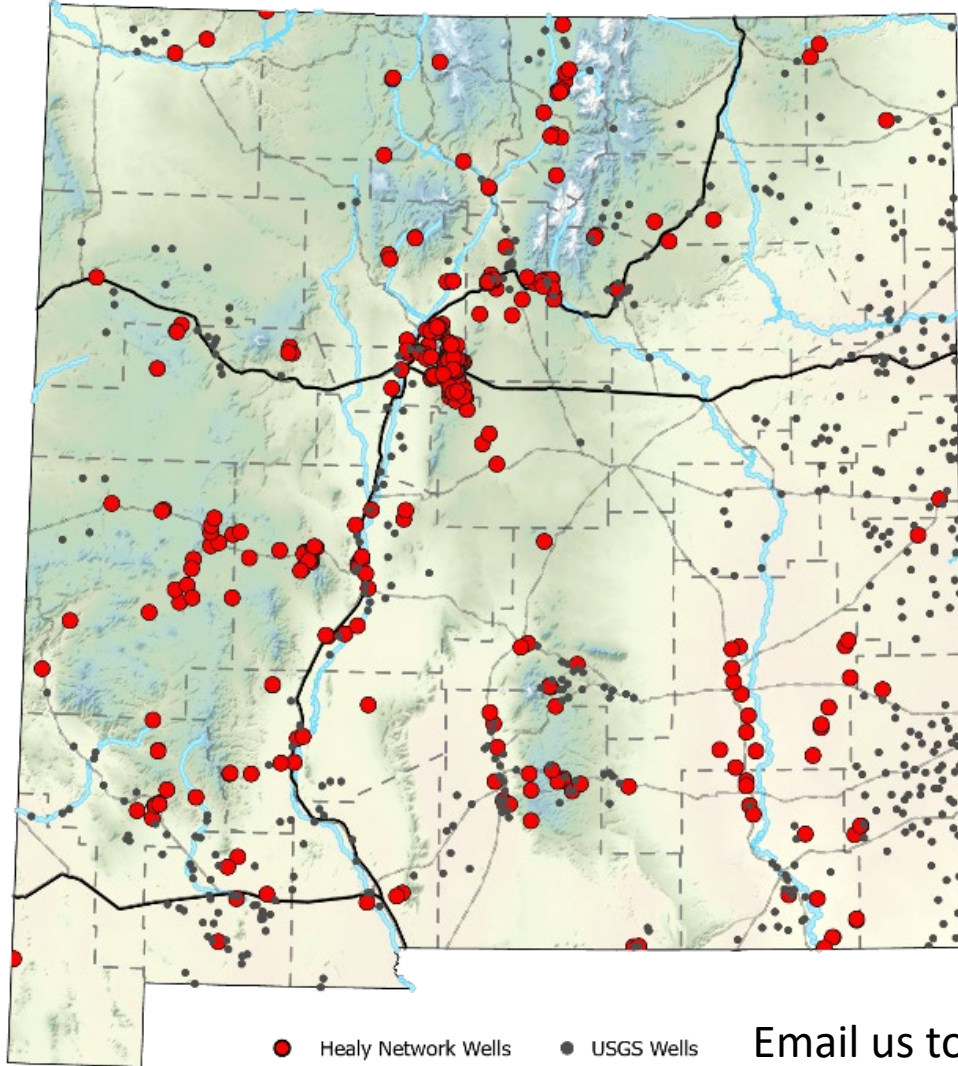
- Comprehensive groundwater summaries of 10 regions with sub-regions and short Fact Sheet synopses
- Emphasize current understanding and identify regions and data gaps for focused (future) research
- Funding provided by Thornburg Foundation and AMMP base funding



NM Groundwater Explorer – Coming soon!



With persistent drought conditions, more groundwater-level monitoring is needed



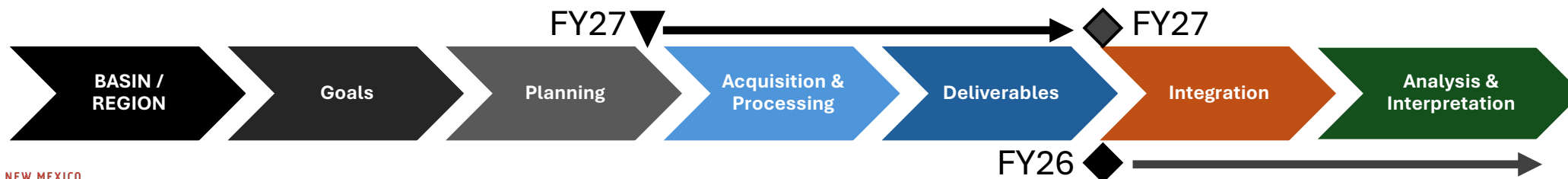
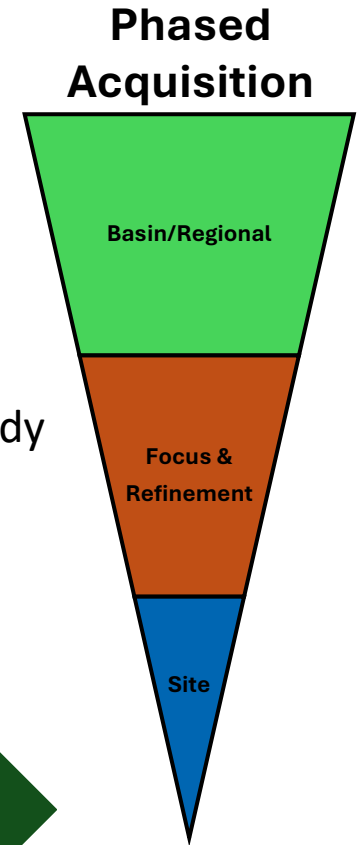
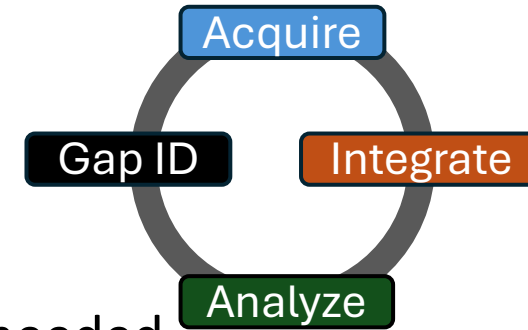
- NMBGMR maintains a network of 330+ wells (funded by the Healy Foundation)
 - **Free to all well owners**
- Cooperative NMOSE–USGS agreement to measure ~600 wells annually
- Working to fill significant spatial gaps across the state
- Most sites rely on repurposed wells
 - Not drilled for monitoring purposes
- Expand measurements and add new data collection to improve groundwater monitoring across state



Email us to get involved! nmbg-waterlevels@nmt.edu

Geophysical acquisition & data integration strategies

- **Iterative integration** to reduce uncertainties & achieve aquifer mapping goals in a timely manner
 - Acquire new geological and geophysical datasets
 - Integrate with available datasets (legacy data & previous surveys)
 - Analyze & Interpret
 - *Identify gaps in knowledge & data that can be reasonably reduced*
- **Phased Geophysical Acquisition:** start large & refine where needed
 - Regional coverage: large-scale AEM surveys to identify major hydrogeologic features
 - Refinement: preliminary interpretation & data-gap analysis to identify areas requiring additional study
 - Site identification: locate optimal drilling sites for observation & brackish water exploration wells
- **Goal:** define water resources and identify/optimize well locations

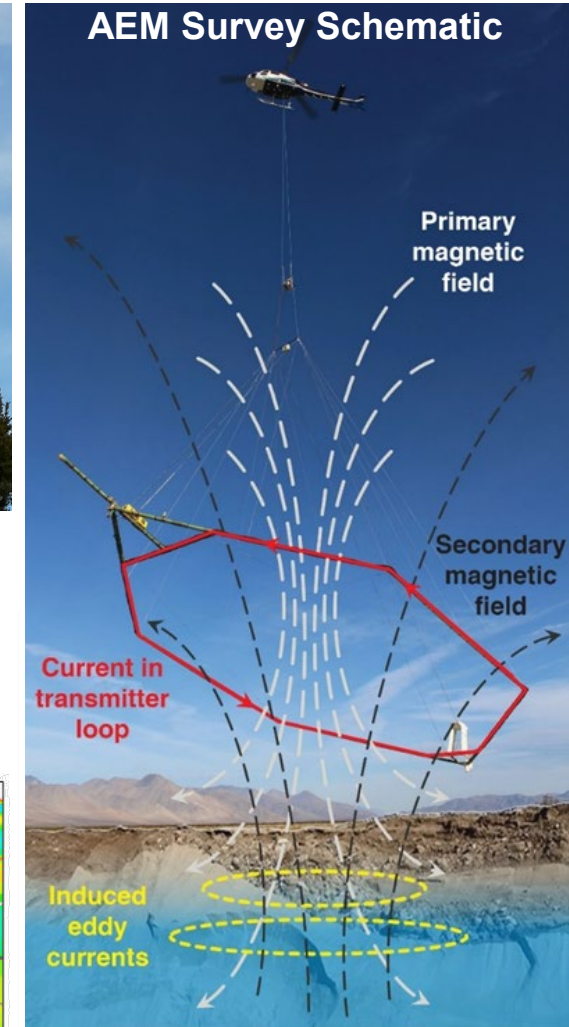
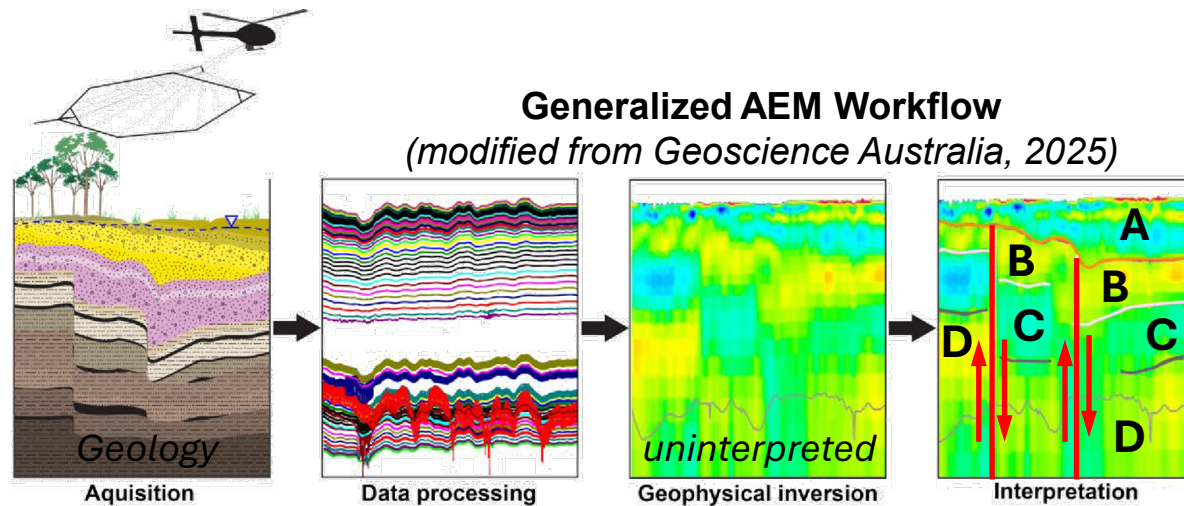


Geophysics for groundwater resources: Airborne Electromagnetic Surveys (AEM)

AEM surveys to identify fresh & brackish water

- Measures electrical resistivity of the shallow earth
- Covers extensive areas without ground disturbance
- Facilitates aquifer mapping & characterization goals
- Locates optimal sites for monitoring wells
- Depth of investigation (DOI) based on FY2026 AEM results
 - ~200–2000 ft (mean $\approx$ 1100 ft)

- **Resistivity/Rock/Water**
- Deploy complementary geophysical techniques to explore bedrock aquifers & refine regional AEM studies



California Dept. of Water Resources

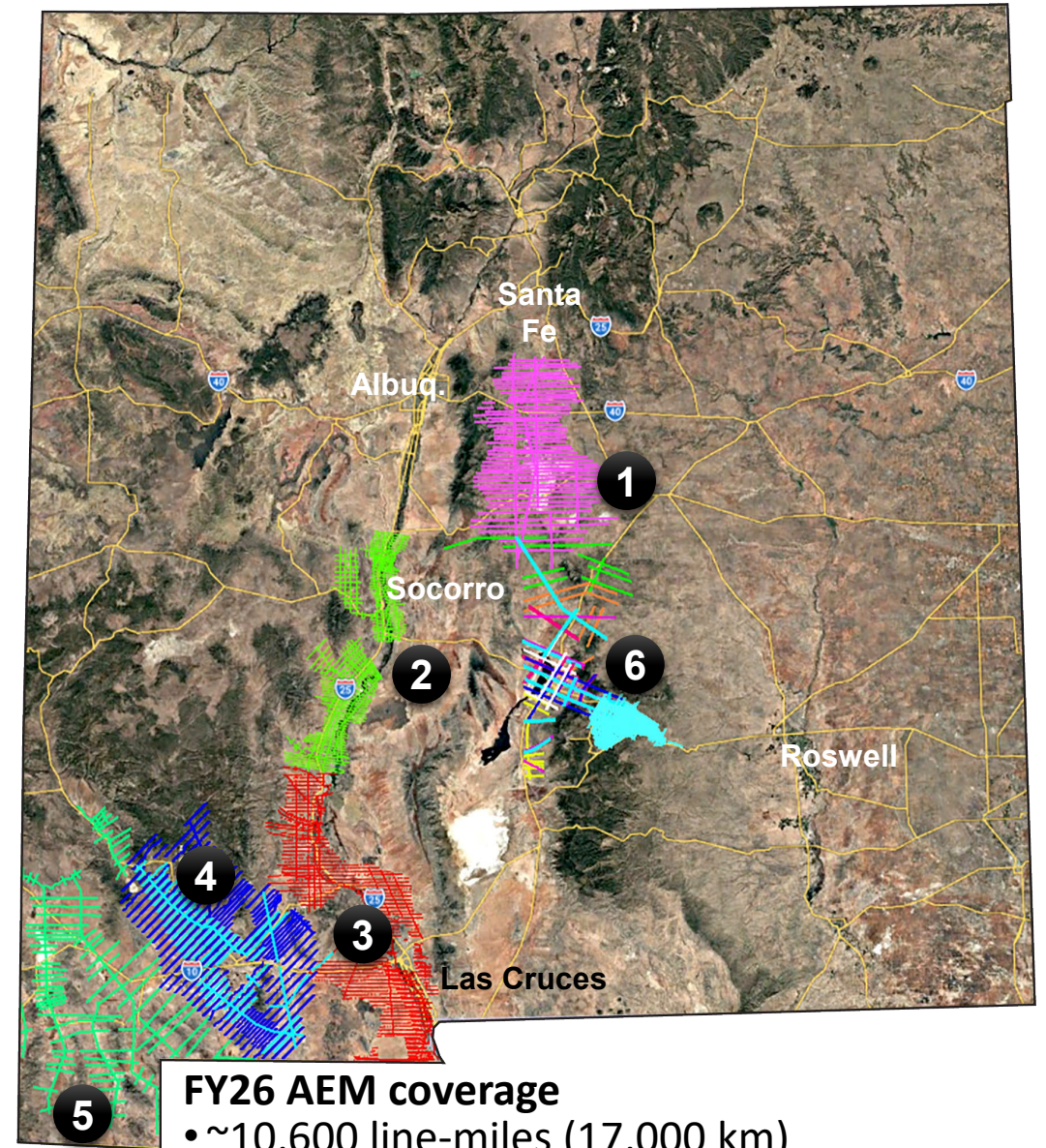
FY 2026 AEM survey summary

Six regional-scale surveys completed to date

1. Estancia Basin
2. Middle Rio Grande
3. Lower Rio Grande
4. Mimbres Basin
5. Southwest Bootheel – Gila - Animas Regions
6. Northern Tularosa Basin & Ruidoso Slope

Next steps (underway)

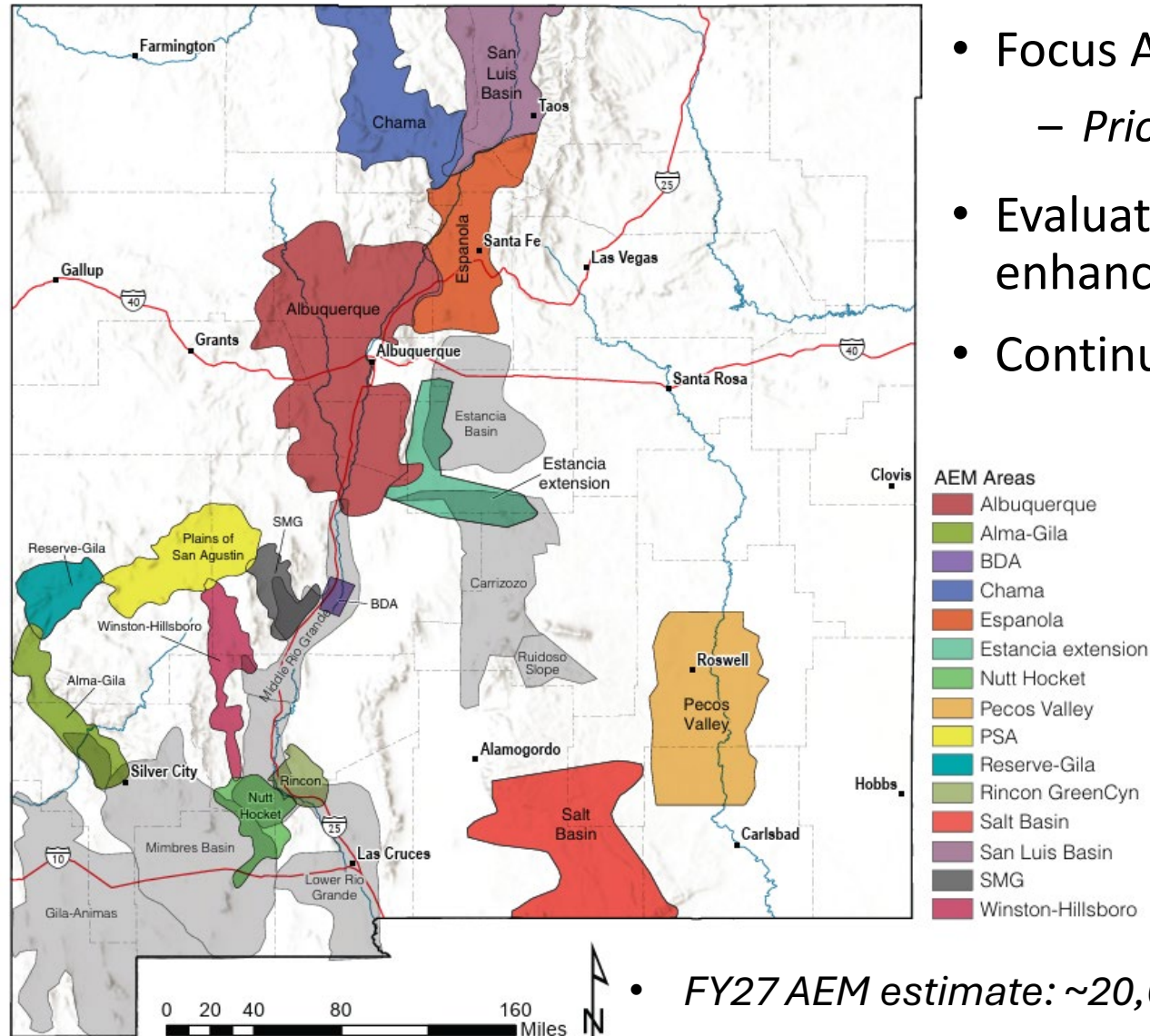
- Data processing and interpretation
- Data-gap analysis
- 3D framework model development
- Identify exploratory observation well sites
- Follow-up surveys to refine data coverage & depth



FY26 AEM coverage

- ~10,600 line-miles (17,000 km)
- ~14% of the state
- Average DOI: 335 m (1100 ft)
–Range: 61–610 m (200–2000 ft)

Prioritized geophysical survey regions over the next 2 years



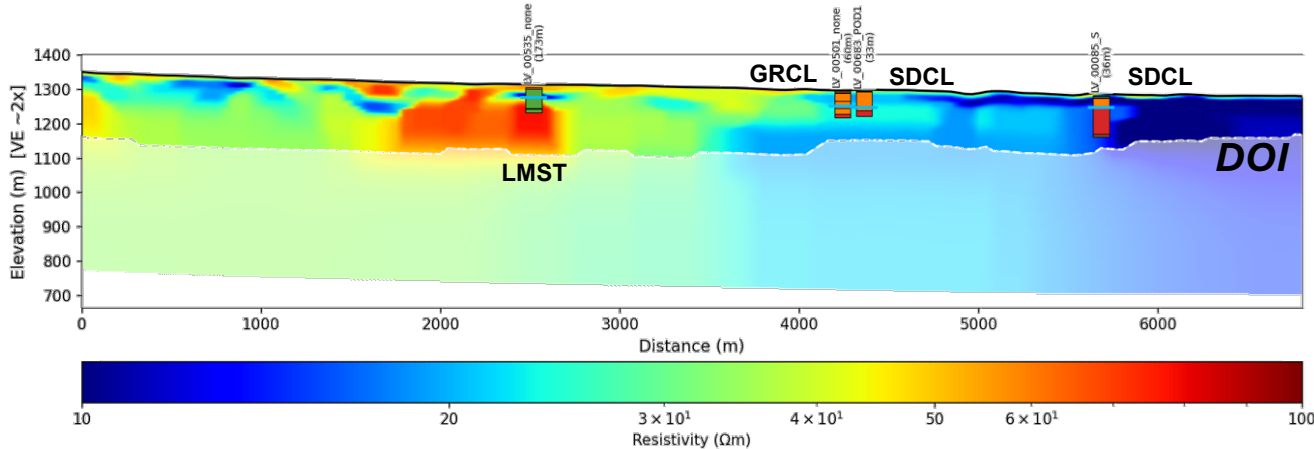
- Focus AEM on new regions & data infill of FY26 study areas
 - *Prioritize all alluvial basins (e.g., Rio Grande basins)*
- Evaluate additional geophysical techniques that can enhance bedrock aquifer studies
- Continue data collection, integration, and interpretation
- Build & improve 3D hydrogeologic framework models using new datasets
- Improve aquifer mapping & characterization
- Carefully site long-term monitoring & brackish-water drilling sites
- Continue community outreach & engagement
 - Learn more from community stakeholders

• FY27 AEM estimate: ~20,000 line-miles (+17% more of state)

Resistivity-to-Rock-to-Water transforms

- Correlate resistivity patterns to well-log & geologic data
- Clustering of specific rock types by resistivity for mapping geology in saturated & unsaturated conditions
- Identify different types of water (*fresh* vs. *brackish*)

AEM Profile & Lithology Logs



Lithology Codes

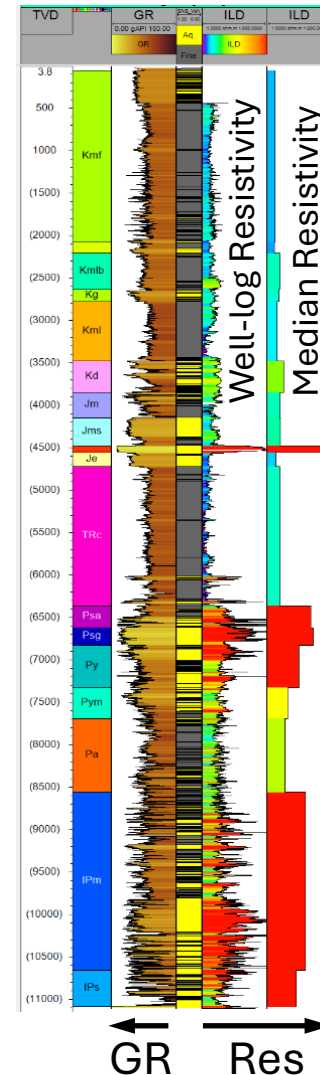
CGLM	SDCL
CLAY	SDGL
CLCH	SDST
GRCL	SGVC
LMST	SOIL
ROCK	Water level
SAND	DOI

Transcribed driller's log

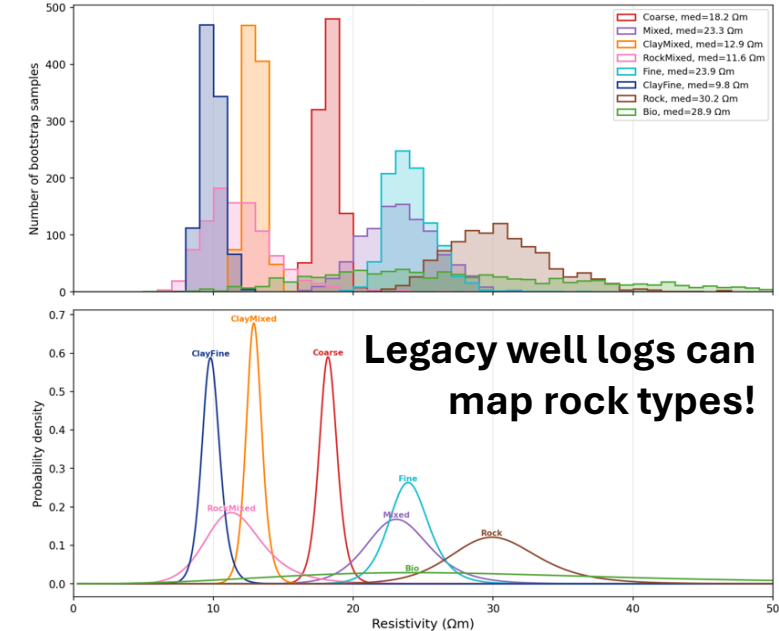
LV_00501_none

Top (m)	Bot (m)	lithCode	Facies	Material Description
0.0	0.9	SOIL	Surf	topsoil soil
0.9	4.9	GRCL	ClayMixed	clay with rocks
4.9	7.3	CLAY	Clayfine	clay
7.3	29.3	GRCL	ClayMixed	clay with rocks
29.3	50.3	GRCL	ClayMixed	clay with gravel
50.3	51.8	SAND	Coarse	sand
51.8	67.1	SGVC	ClayMixed	clay with sand & gravel
67.1	79.2	SDGL	Coarse	sand gravel

Geophysical log

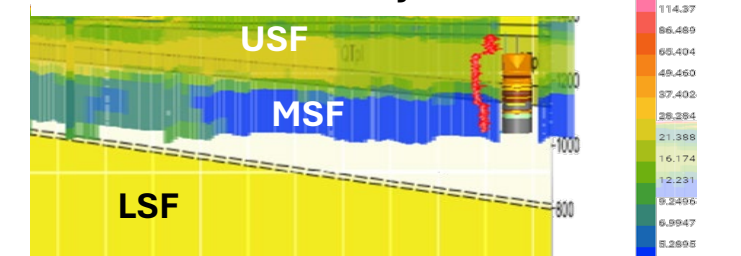


Resistivity-to-Rock Typing

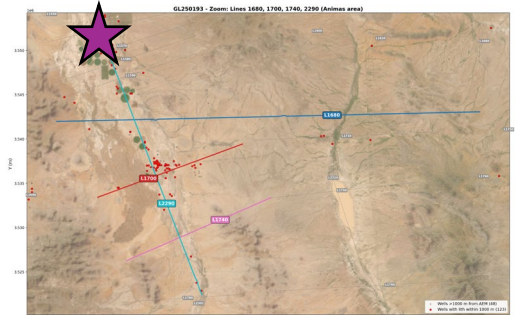
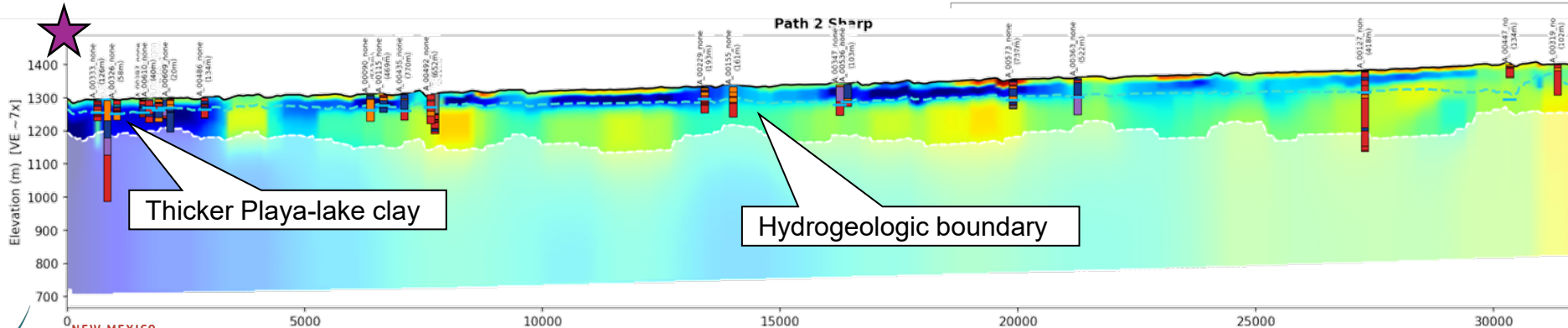


Legacy well logs can map rock types!

Geologic Cross-Section with AEM overlay



- ## Leapfrog Animation ▶



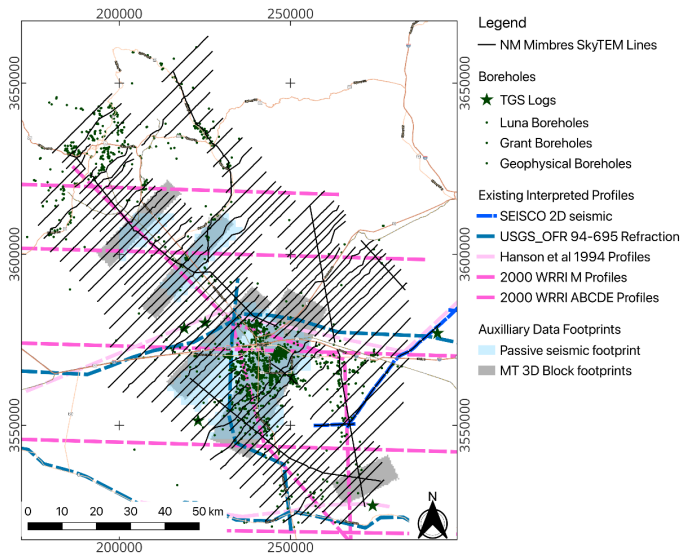
Mimbres Basin (Grant & Luna County)

- **Integrated 3D geophysical modeling (AEM, MT, seismic, gravity–magnetics)**

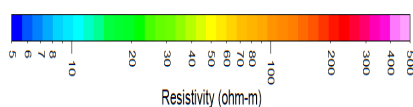
- Base of Aquifer includes alluvium & Gila Group hydrostratigraphic units
- Deeper floor (blue) contains thick playa-lake clays (aquitards)

Base of Aquifer surface elevation (m)

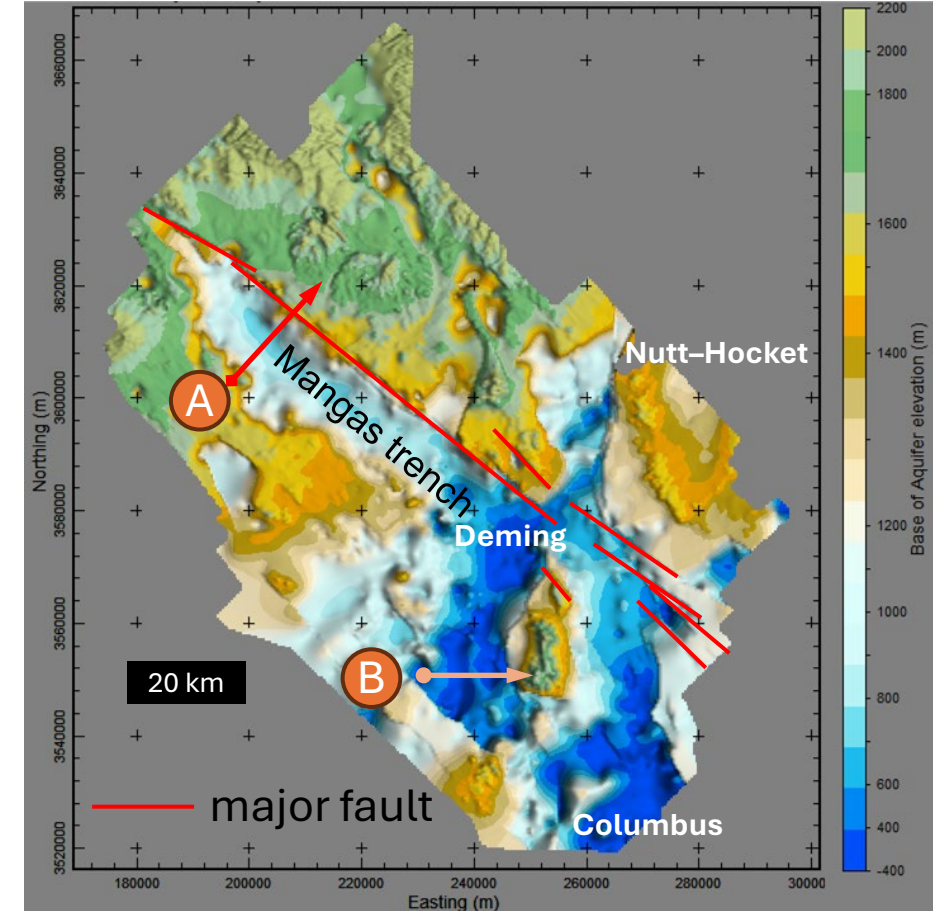
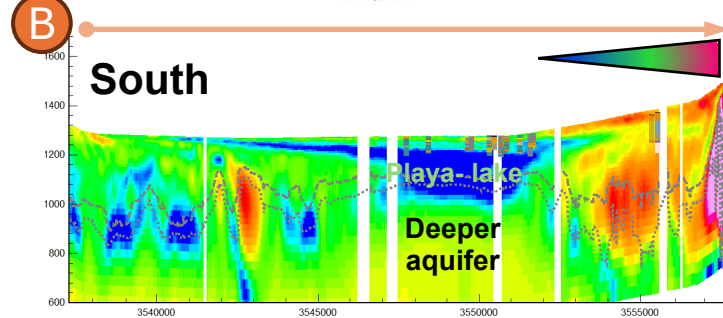
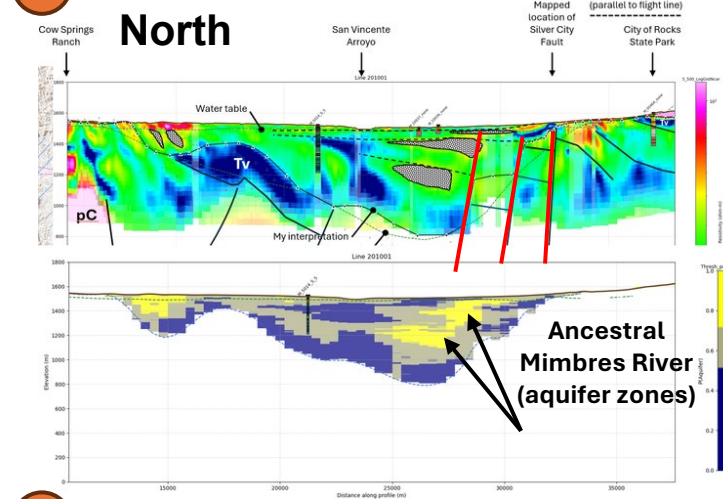
Multiple Geophysical Coverages



Cross-section scale: 5–500 Ω m



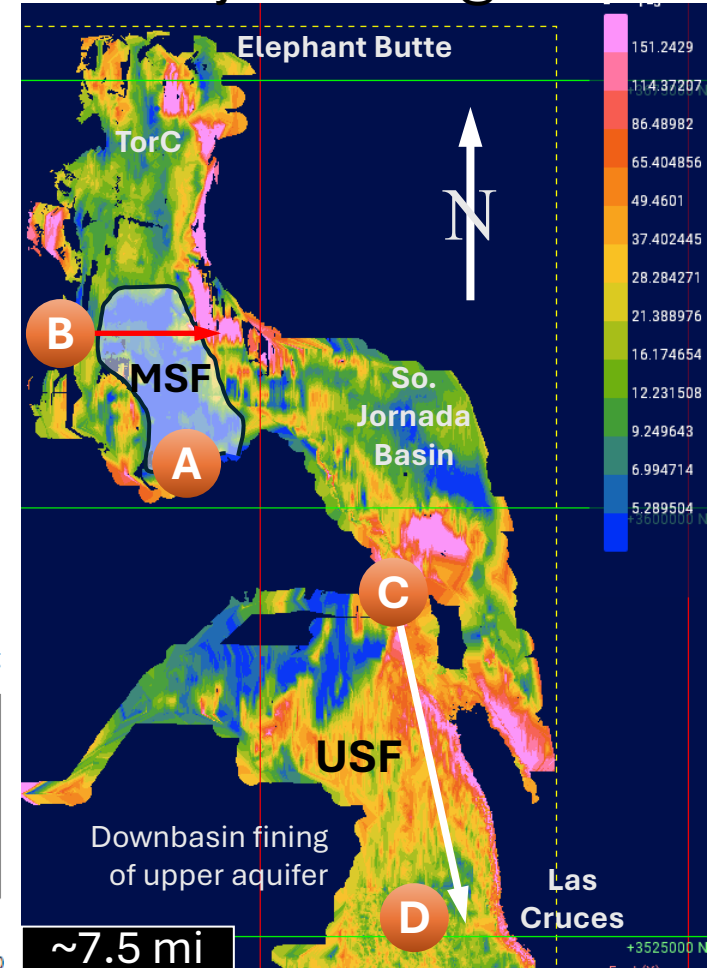
A Interpreted AEM Profiles



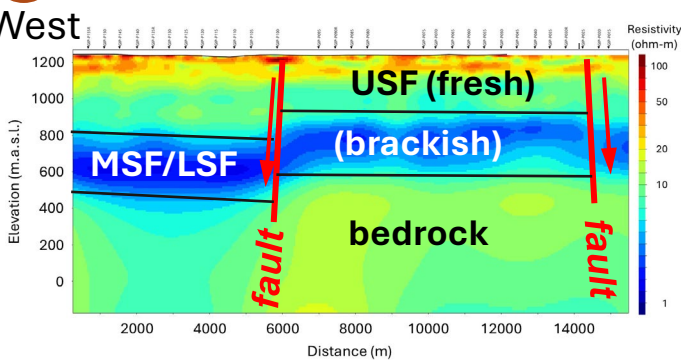
Lower Rio Grande basins (Doña Ana & Sierra County)

- A. Map extensive aquitard in middle Santa Fe Group (MSF) regional aquifer system in the southern Palomas Basin
 - Important information for defining Managed Aquifer Recharge opportunities
- B. Resistivity trends show downstream changes in tributary aquifer lithology
 - Aquifer heterogeneity and connectivity
 - Identify/Assess potential storage & recovery projects
- C. Upper Santa Fe Group (USF, ancestral Rio Grande) depositional patterns
 - Refine location of brackish-water exploratory well (ISC)

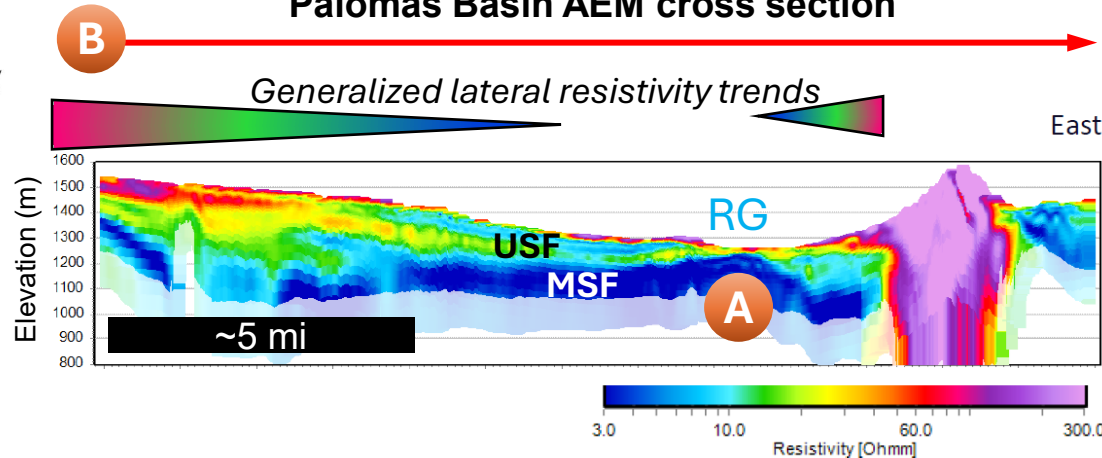
Lower Rio Grande Basins
Resistivity model slice @3940 ft elev.



D MT fault mapping near Sta. Teresa

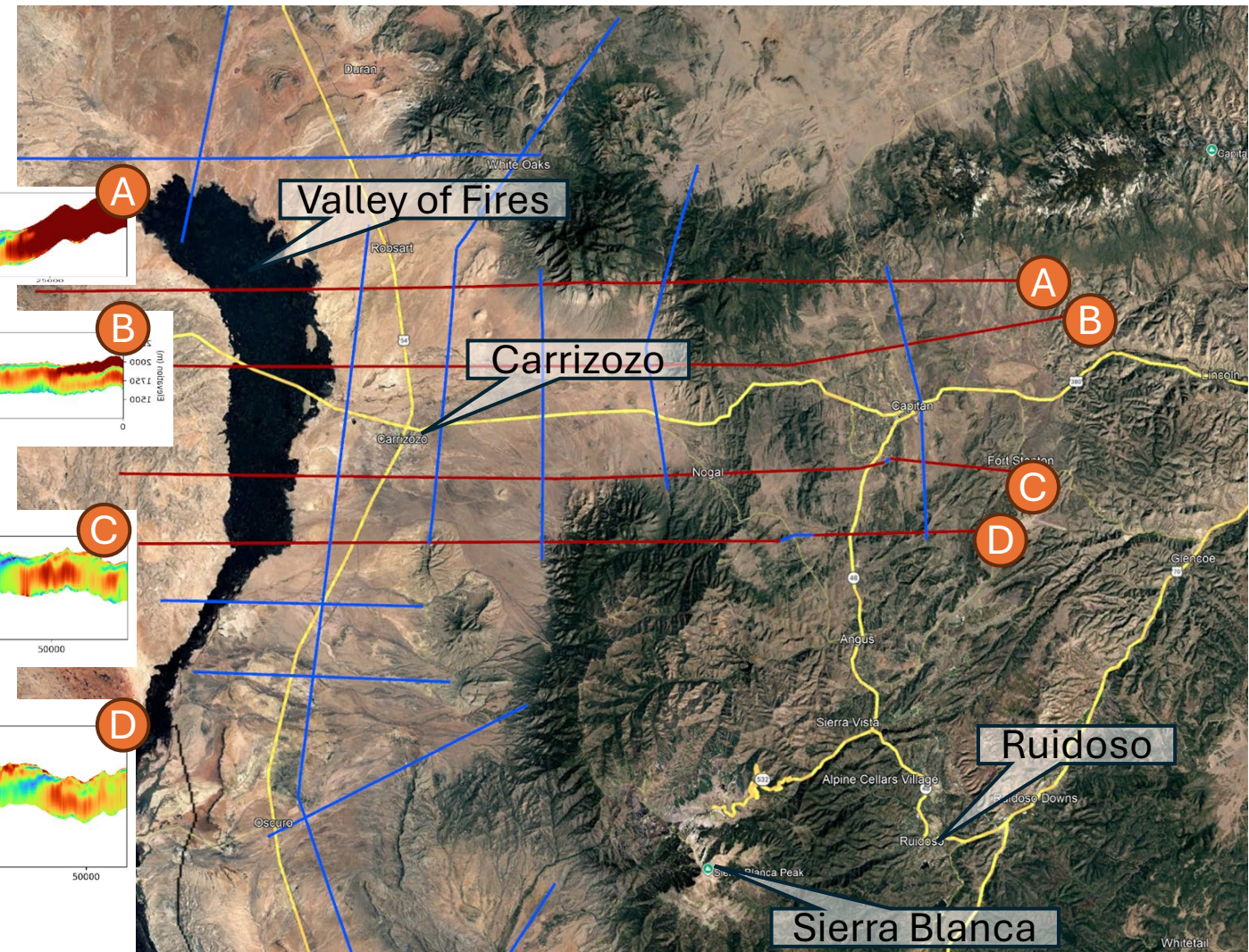
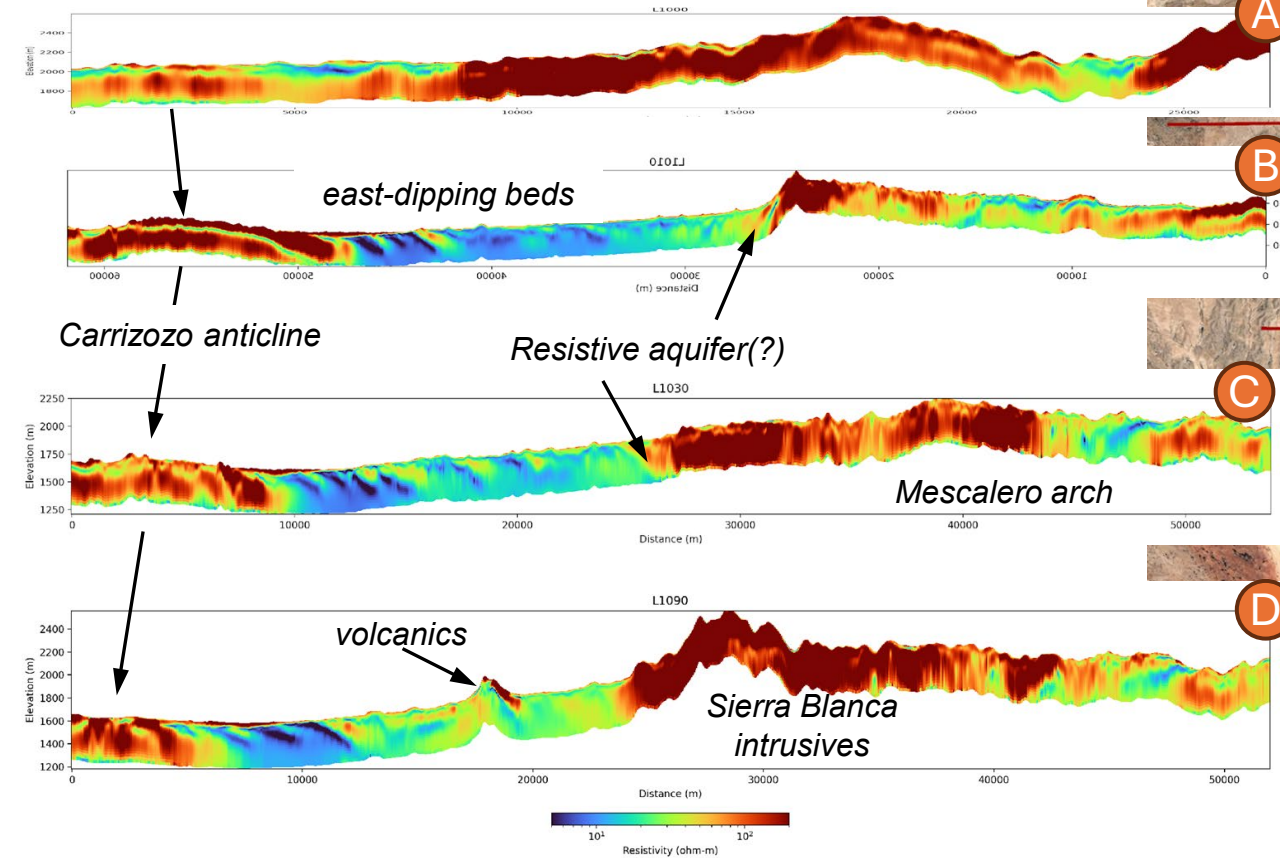


Palomas Basin AEM cross section



Northern Tularosa Basin area (Carrizozo area, Lincoln County)

- Map faults & folds impacting groundwater
- Test of shallow/deep AEM survey tools

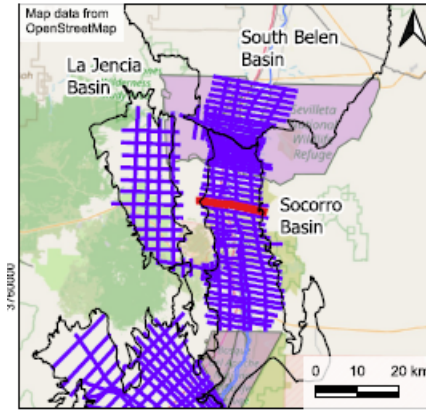


Middle Rio Grande basin (Sierra & Socorro County)

Southern part

- Define basin boundary & structures
- Map water table
- Identify fresh/brackish water regions
- Site wells
 - *Monitoring & brackish water*

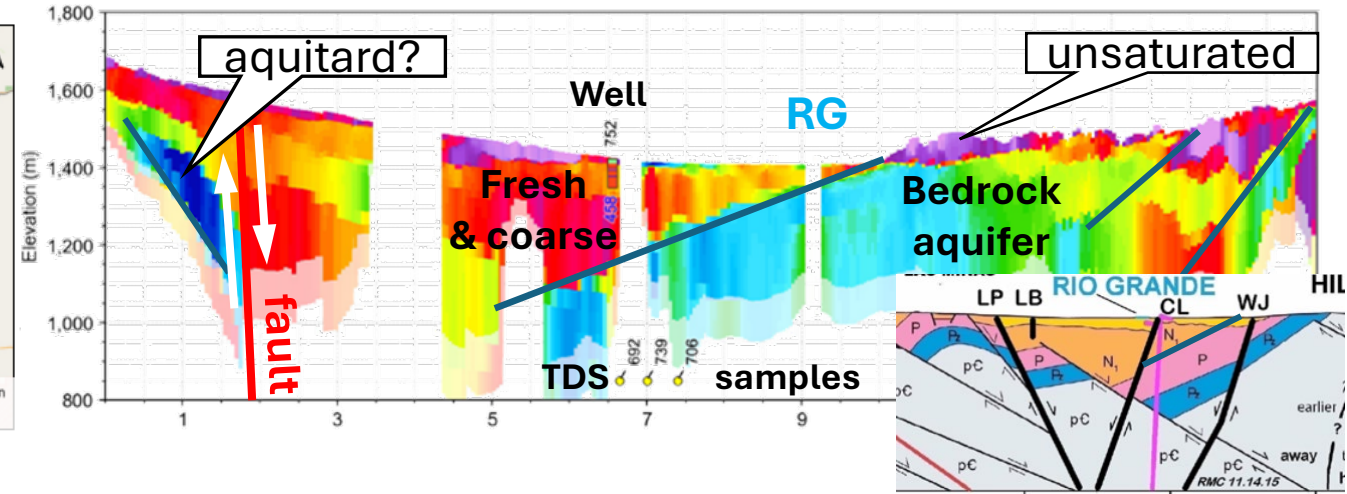
Line Location



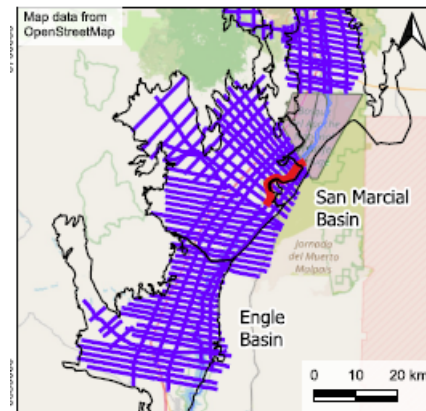
WEST

Line 211700 across basin

EAST

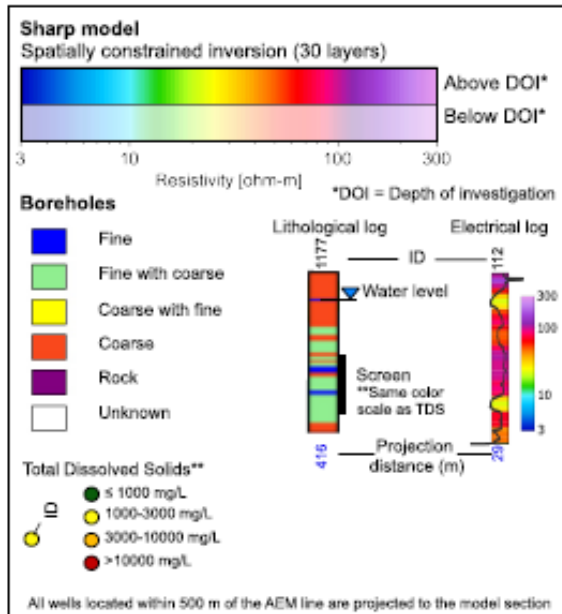
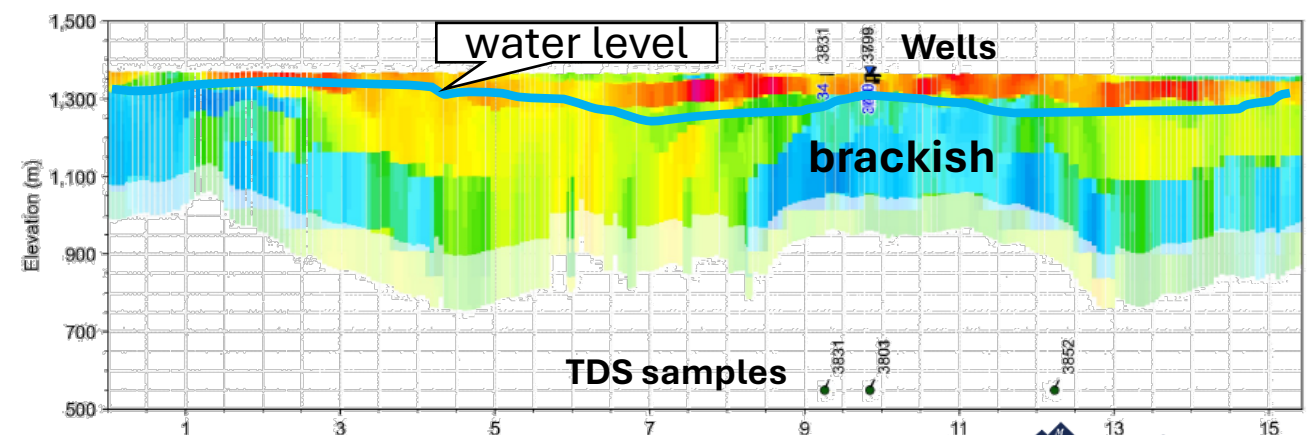


Line Location



NORTH

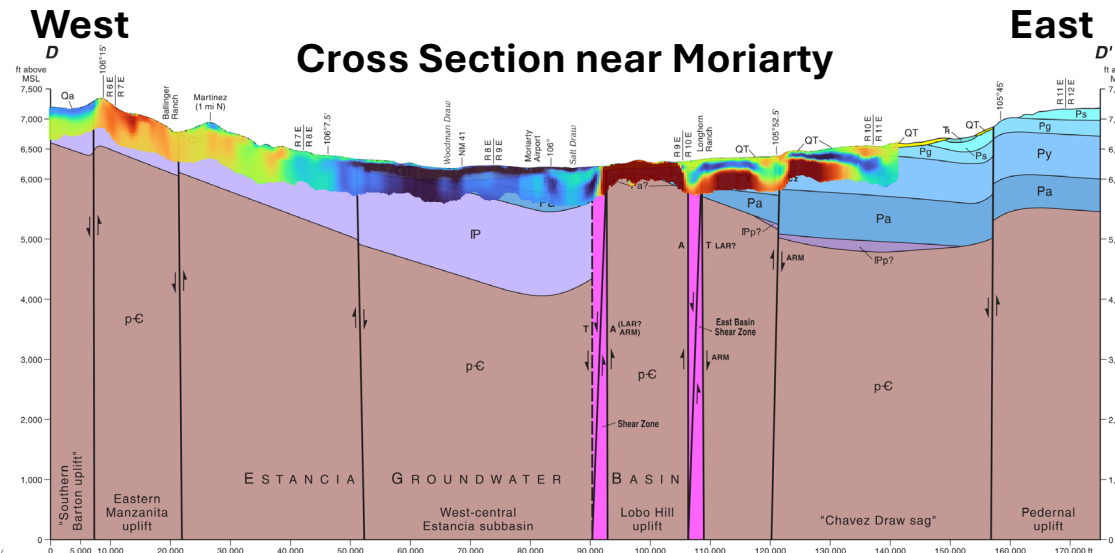
Line 401400, along Rio Grande (south of BDA) SOUTH



Estancia Basin (Bernalillo, Torrance, and Santa Fe County)

Animation ►

- Transform data into a 3D subsurface model
- Resistivity colors highlight geology & groundwater conditions
- Integrate wells, geology, groundwater levels & quality, and geophysical data into a common interpretational framework
- Map basin geometry, faults, flow paths, recharge, and fresh/brackish water
- Identify priorities for further investigation & monitoring



New Mexico Water Data

Rachel Hobbs

NM Bureau of Geology and Mineral Resources



THE WATER DATA CHALLENGE: WHERE TO FIND THE DATA?

- As we face warmer, drier years ahead, water managers, planners, and decision makers need quick access to robust water data!
- New Mexico's water data has been in various formats
- Goal is FAIR – Findable, Accessible, Interoperable, Reusable



THE SOLUTION: THE WATER DATA ACT

Enacted by the state of New Mexico in 2019

NMSA 1978, § 72-4B

**OUR MISSION: TO MAKE FINDING WATER
DATA SIMPLE!**

Our Vision: New Mexicans will have
accessible and useful data for water
management and planning

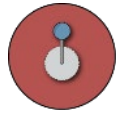


Energy, Minerals and Natural Resources Department



The NM Water Data Landscape

Data Providers



Regional



Federal



State



Research

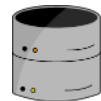
Data Types



CKAN



Spreadsheet



Database

Application Programming Interfaces (API)

Machine-readable APIs provide a menu of data that can be pulled into applications

Data Integration

NMBGMR is working to integrate data from multiple sources

Applications, Tools, Maps, Dashboards

The result is data available to the user community and developers for applications and web tool development



THE NEW MEXICO WATER DATA CATALOG: YOUR GATEWAY TO NEW MEXICO'S WATER DATA

- A catalog of downloadable datasets and linked applications, web maps, tools and resources
- Over 300 datasets and 78 applications shared by 67 different organizations
- Helps users find what is out there!
- New geospatial search feature

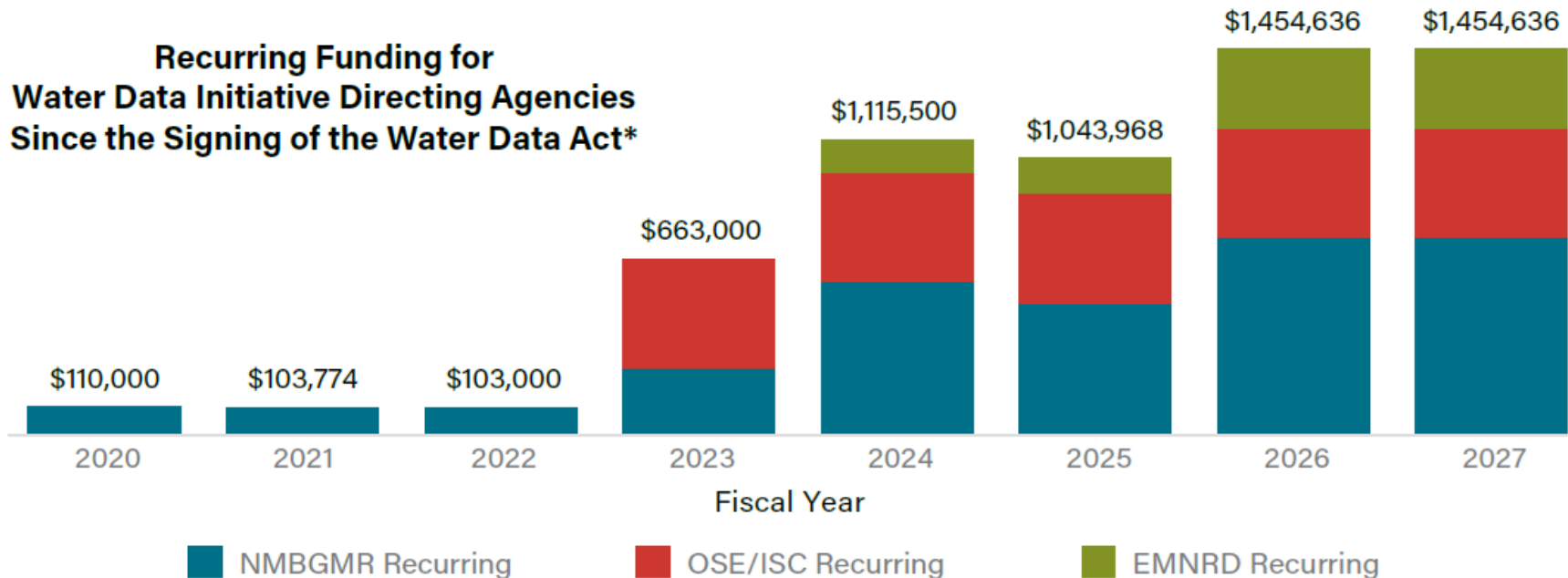
visit catalog.newmexicowaterdata.org



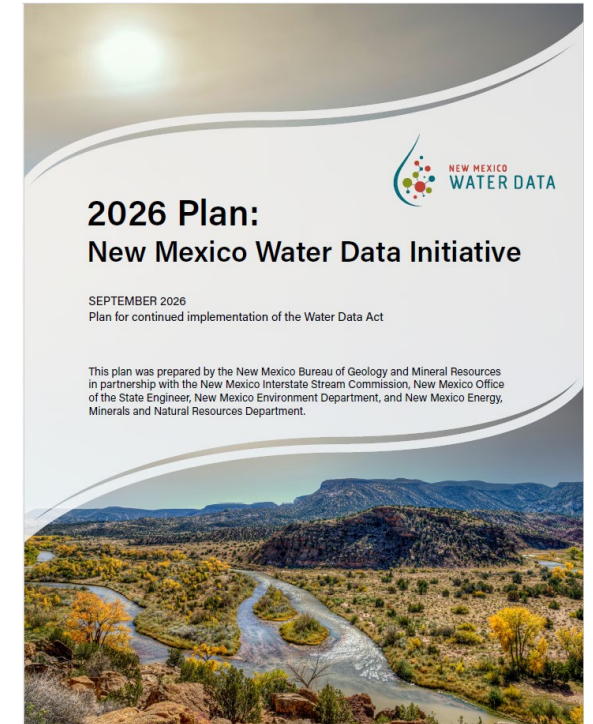
JUST PUBLISHED! 2026 WATER DATA PLAN

- Submitted every year as a requirement of the Water Data Act
- Compiled data from the WDI Directing Agencies
- Provides information on accomplishments from the past year
- Provides goals and budgetary needs for coming year

**Recurring Funding for
Water Data Initiative Directing Agencies
Since the Signing of the Water Data Act***



*To date, NMED has received no recurring state funding for Water Data Act implementation.



2026 Annual Plan — At a Glance

FY2026 Accomplishments by the Numbers



476

Seepage Datasets
Compiled, *NMBGMR*



8M+

Data Requests Served,
EMNRD



65M+

Pages Digitized, *NMED*



5,094

Digital Meter Entries, *OSE*



594

Public Water Systems
Captured, *ISC*

STATE RECURRING FUNDING Received vs. Still Needed

NMBGMR

Recurring funding goal: \$1,500,000

\$750,000 received

\$750,000 still needed

OSE/ISC

Recurring funding goal: \$1,275,000

\$410,000 received

\$865,000 still needed

EMNRD

Recurring funding goal: \$318,536

\$294,636 received

**\$23,900
still needed**

NMED

Recurring funding goal: \$1,164,469

\$1,164,469 still needed

Total recurring goal (all agencies):
Received to date:
Remaining gap:

\$4.26M / year
\$1.45M / year
\$2.80M / year

FY2027 Priorities — What's Next



Geothermal Data Platform Design
EMNRD



**Ocotillo Data Management
Platform Expansion**
NMBGMR



Water Quality Permitting Database
NMED Expansion



**WATERS + Real-Time Water
Measurement Modernization**
OSE/ISC



**Water Data Funding Opportunity
Round 2**
NMBGMR / NM Tech



**Digital Regulatory Data
Platform Expansion**
NMED

ACCELERATING WATER DATA MODERNIZATION: THE NM WATER DATA FUNDING OPPORTUNITY



- In FY26, NMBGMR launched a program to help New Mexico state agencies implement the Water Data Act.
- NMBGMR and New Mexico Tech established the Water Data Funding Opportunity to support water data modernization efforts.
- More than \$1M has been distributed to Directing Agencies for projects focused on modernizing, digitizing water data, and discovery/ planning.

Agency	Project Supported by Water Data Funding Opportunity	Award
NMED	Project Velocity—AI-Powered Search for Water Regulatory Documents	\$ 299,999
OSE	GIS Application Modernization—Protecting Senior Water Rights	\$ 53,430
OSE	WATERS Well Log and Measurement Modules Prototype	\$ 111,682
OSE	Analytical Interface (Ani) Development	\$ 131,283
ISC	Historical Riparian Evapotranspiration Geodatabase	\$ 182,239
EMNRD	Geothermal Data Platform Discovery—Phase 1 Needs Assessment and Framework	\$ 299,999
Total Awarded to Directing Agencies in FY2026		\$ 1,078,632

IMPACTFUL WATER DATA PROJECTS AT NMBGMR

- New modernized database for NMBGMR water data
- Water data integration system
- Seepage study explorer
- Geothermal water data discovery
- Data Catalog Improvements
- Integrated water data viewer
- Data integration engine
- Geophysical data management and sharing platform



Database Roadmap



Integration System
Roadmap



Seepage Study Explorer



Improved Data Catalog



Integrated Water Data
Viewer



Data Integration Engine

Water Data Workshop: December 2-3, 2026

The 2026 Water Data Initiative Workshop will be held December 2-3, 2026, at the Sheraton Albuquerque Airport Hotel.

This workshop will bring back the popular Application Showcase and offer more short courses for hands-on learning. Details on registration and programming will be announced in the coming months.

Visit newmexicowaterdata.org or sign up for the monthly Water Data Newsletter to stay informed.



Thank You!

Sign up for our newsletter



Building digital platforms to share information and data



Ways we share information

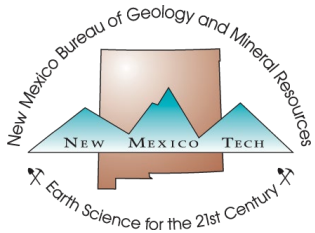
- Twice-annual newsletter (***Get AMMPed!***)
- Build new data platforms for compiling and sharing geophysical data across New Mexico
- New Mexico Bureau of Geology website redesign underway, with publications and data links
- Working with New Mexico Water Data Initiative to continue building datasets and tools to improve information access

<https://geoinfo.nmt.edu/resources/water/amp/>



https://geoinfo.nmt.edu/publications/periodicals/get_Ammped/home.cfm

Thank you for helping us do this important work for New Mexico!



For more information, please contact Stacy Timmons: stacy.timmons@nmt.edu