FRESH AND BRACKISH WATER CHARACTERIZATION AND DATA NEEDS

FROM THE NEW MEXICO BUREAU OF GEOLOGY AT 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

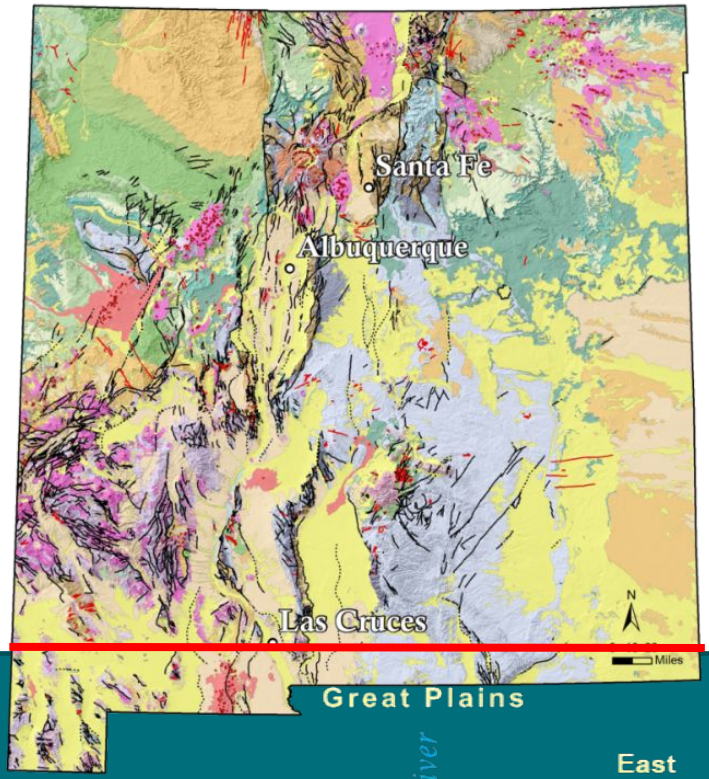
AQUIFER MAPPING PROGRAM: WHAT WE DO

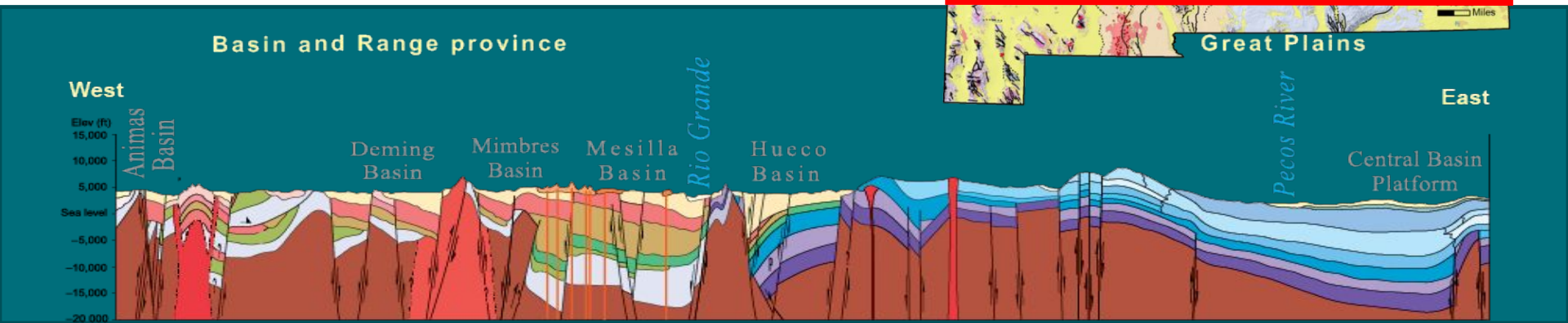
Characterize **the quantity, quality, and distribution of groundwater** in aquifers using geology, geophysics, hydrology, and chemistry information

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





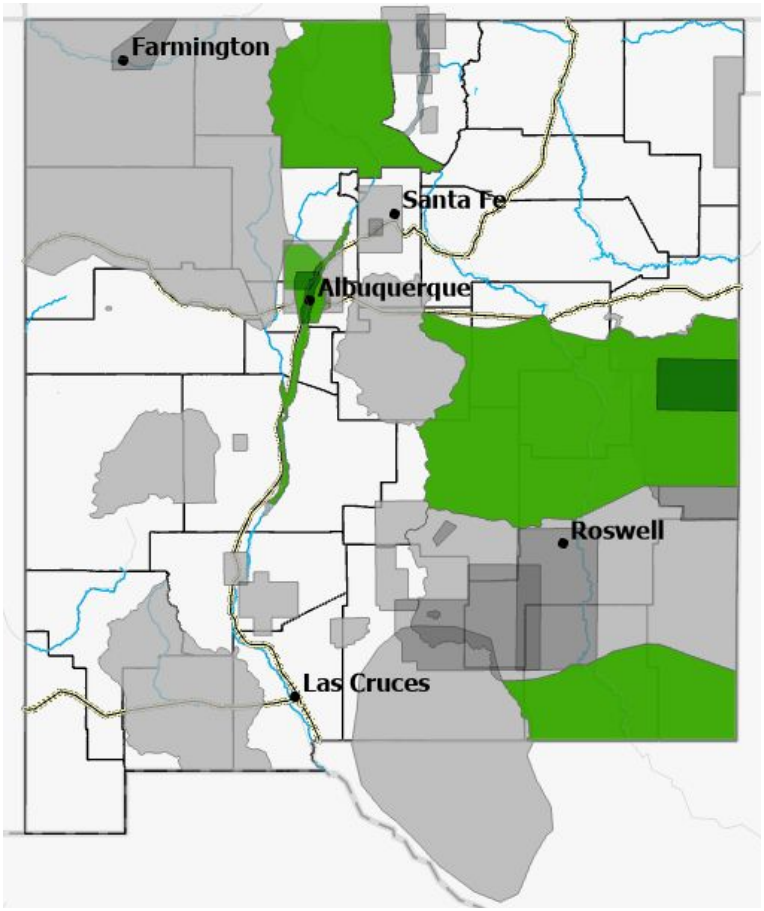
AQUIFER CHARACTERIZATION GENERALIZED WORKFLOW

1. Identify the research questions, goals of project, and study area
2. Compile existing data and evaluate* *(i.e. geology, surface water, groundwater levels/trends, boundaries of aquifers, aquifer thickness, aquifer properties, geochemistry)*
3. Collect new data to fill gaps** *(i.e. collect samples, drill wells, collect geophysical measurements, expanded mapping)*
4. Synthesize and interpret data to address goals of project

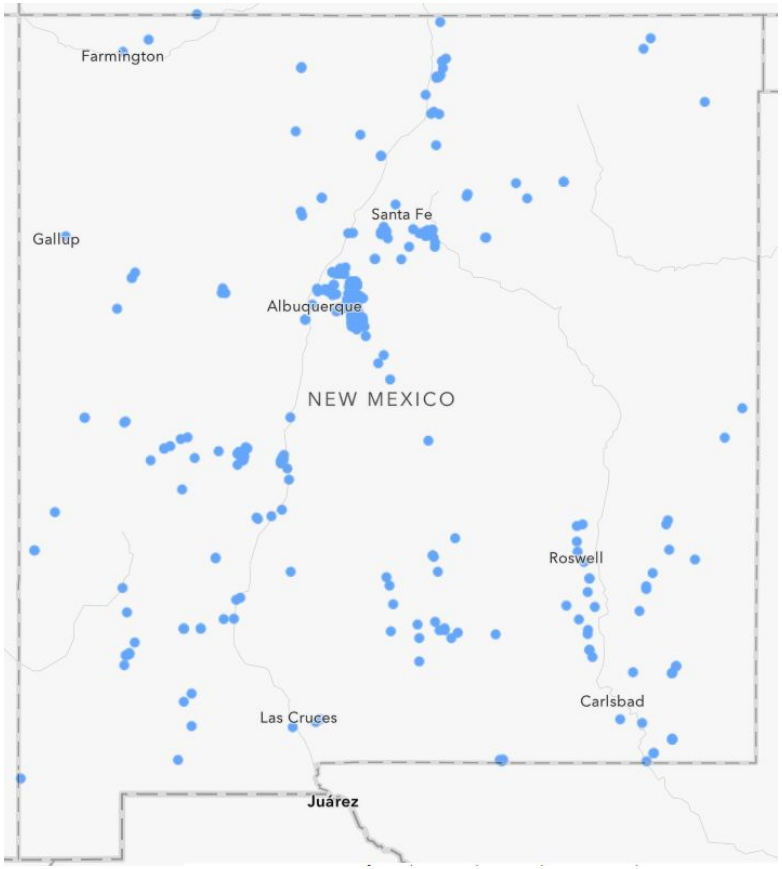
*Substantial time investment in step 2

**Substantial financial investment in step 3

AQUIFER MAPPING AND MONITORING WORKING ACROSS NM



Aquifer Mapping in 2023



Healy Collaborative Groundwater Monitoring Networks 2023

STATEWIDE BRACKISH WATER ASSESSMENT (2016)

- Funding to NMBGMR from NMED – Drinking Water Bureau
- Digitized and compiled legacy water quality data – mostly drinking water wells from USGS, NMED and NMBGMR studies

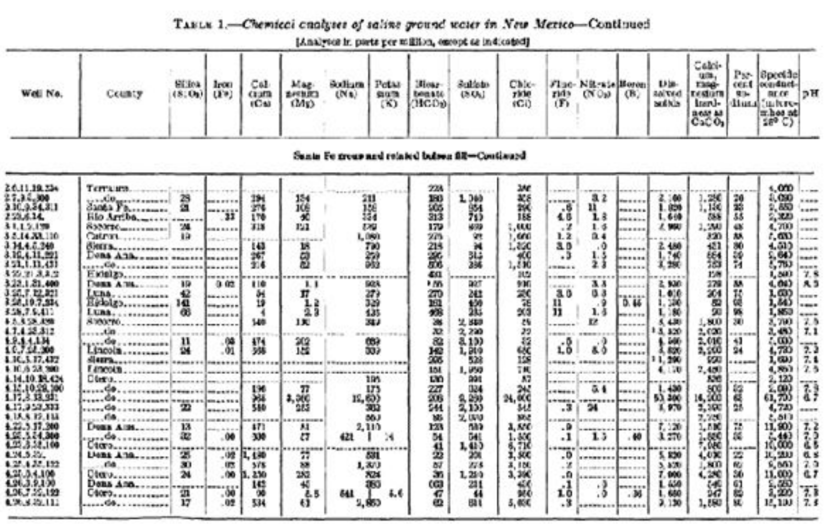
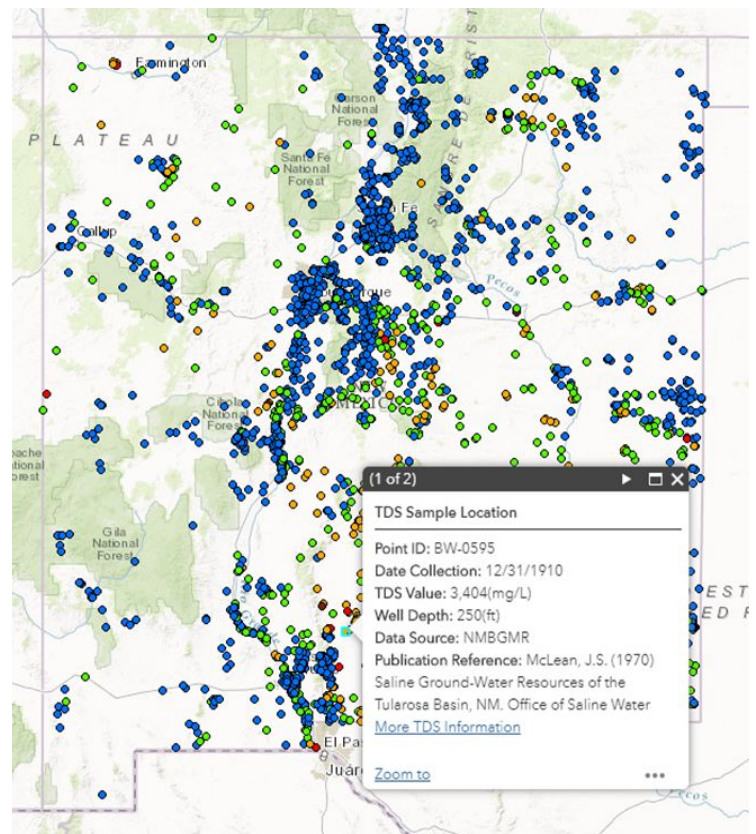


TABLE 1.—*Chemical analyses of saline ground water in New Mexico*—Continued

[Analyses in parts per million, except as indicated]

Well No.	County	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Calcium, magnesium hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25° C)	pH



STATEWIDE BRACKISH WATER ASSESSMENT (2016)

Basin/Region	Number of available records	Mean TDS (mg/L)
San Luis Basin	300	330
San Agustin Basin	185	341
Española Basin	612	390
Mimbres Basin	265	617
San Marcial and Engle Basins	32	704
Albuquerque Basin	987	881
High Plains Aquifer	560	996
Socorro and La Jencia Basins	379	1,002
Mesilla Basin	408	1,217
Estancia Basin	561	1,288
Palomas Basin	203	1,297
Jornada del Muerto Basin	173	1,354
Raton and Las Vegas Basins	80	2,336
San Juan Basin	1,011	2,373
Tularosa Basin	959	3,184
Roswell Artesian Basin	632	3,548
Capitan Reef Aquifer	13	54,046

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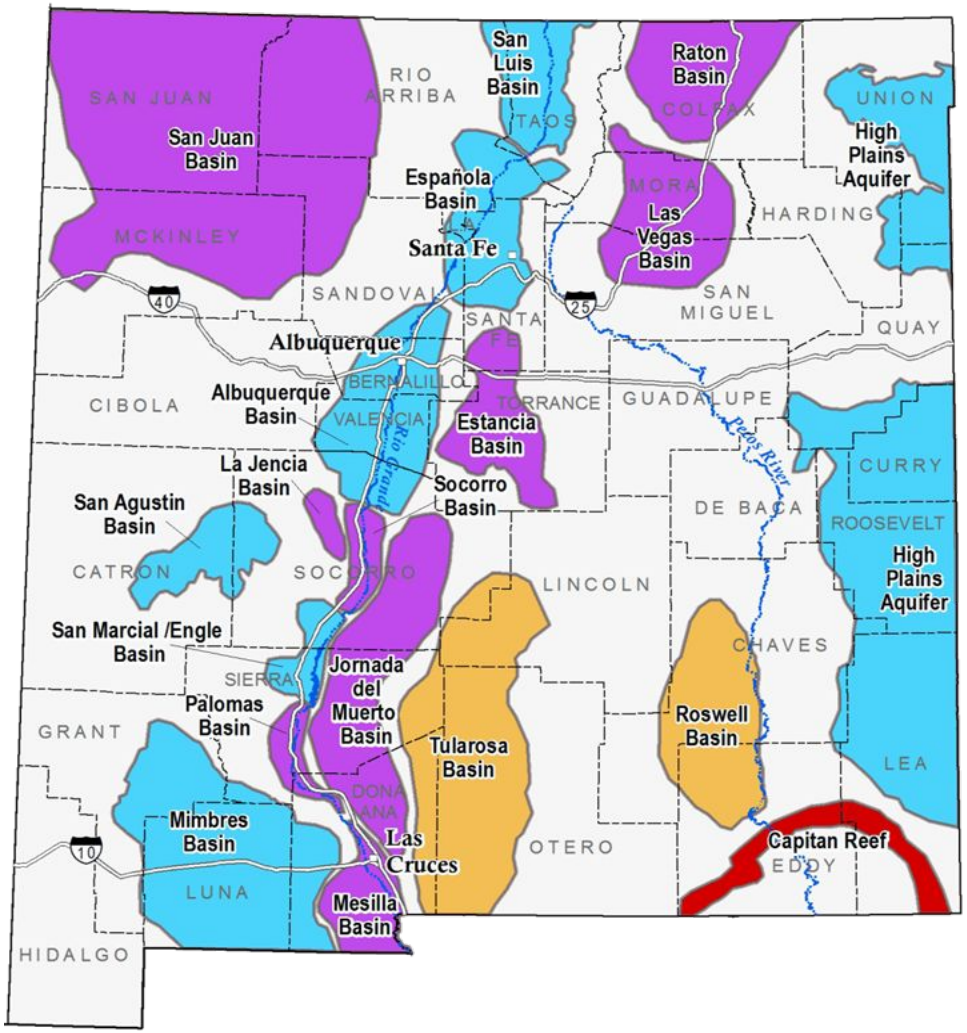
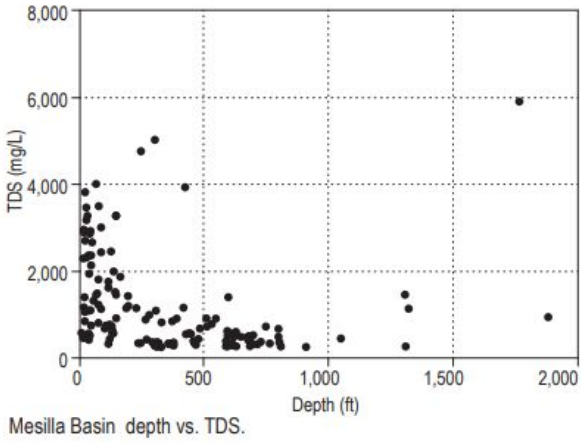


EXAMPLE: MESILLA BASIN

- Sand and gravel aquifers; shallow alluvial aquifer and basin fill material, Santa Fe Group
- Aquifers are hydrologically connected to Rio Grande system
- Water quality and salinity are variable in the valley; sparse data on west mesa



Mesilla Basin depth vs. TDS.

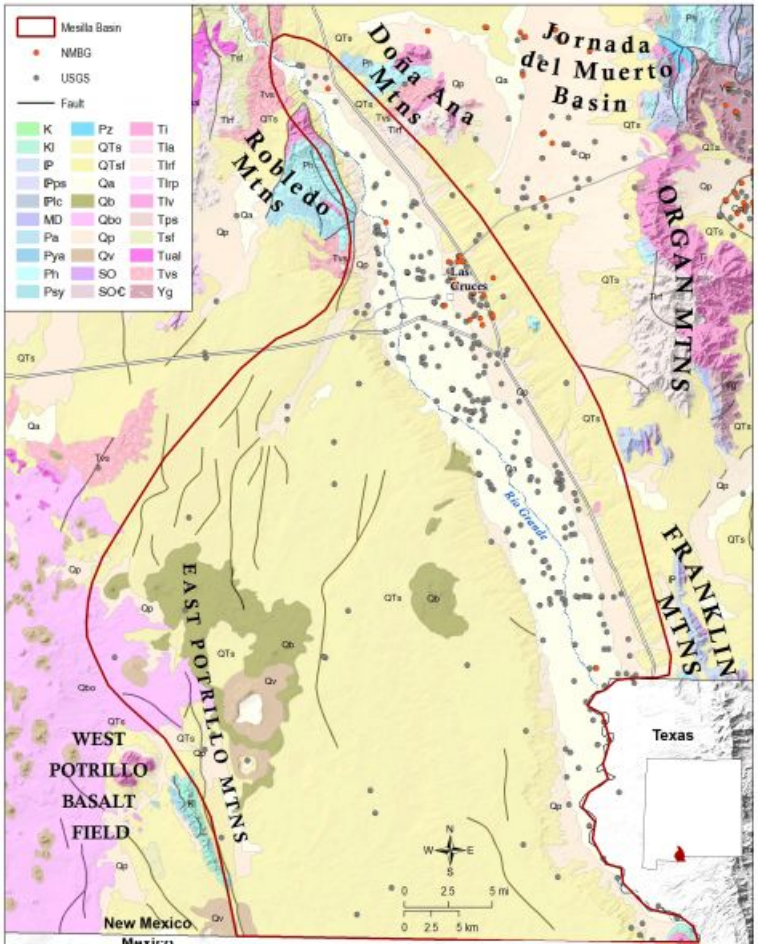
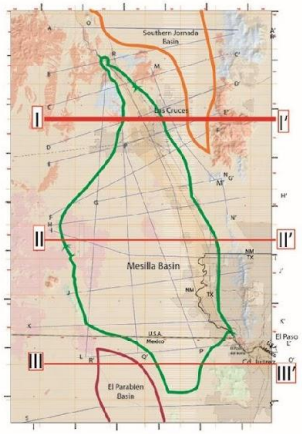
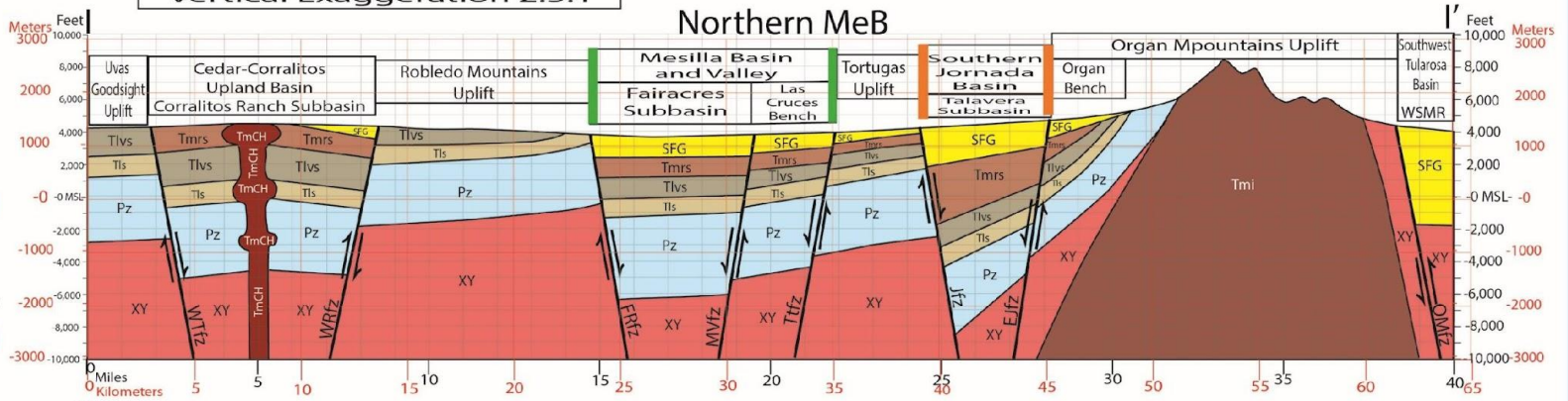


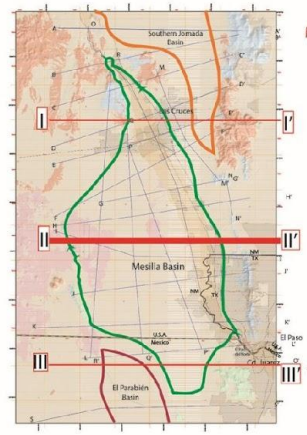
PLATE 2C:
Transverse Sections I-I′, II-II′ and III-III′
Vertical Exaggeration 2.5:1

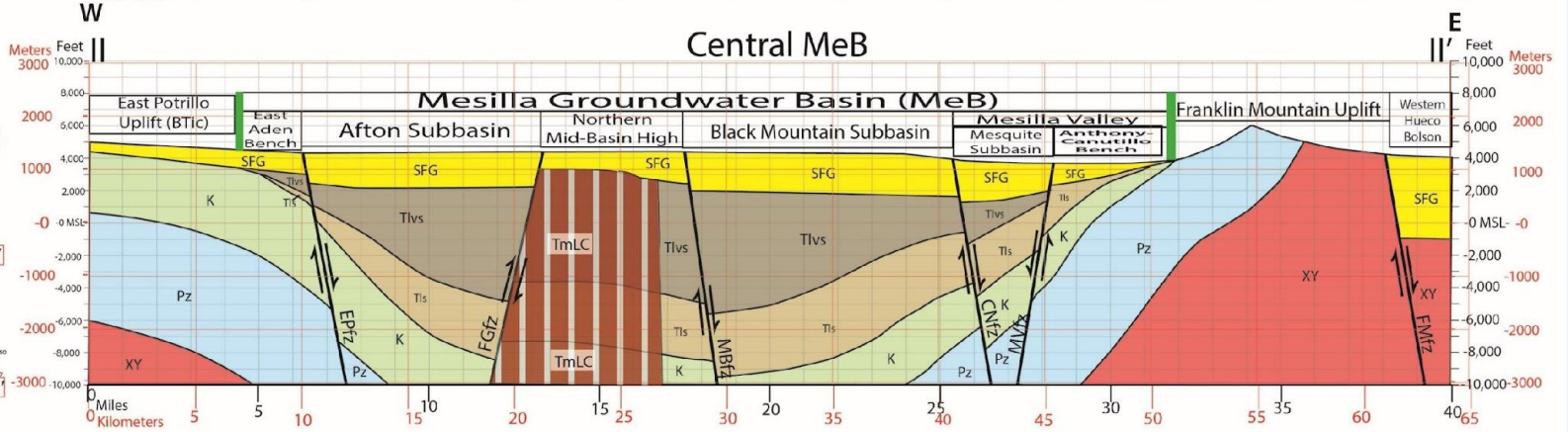


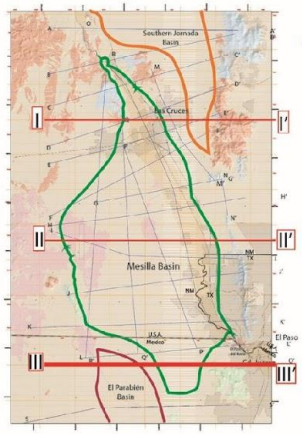
Northern MeB



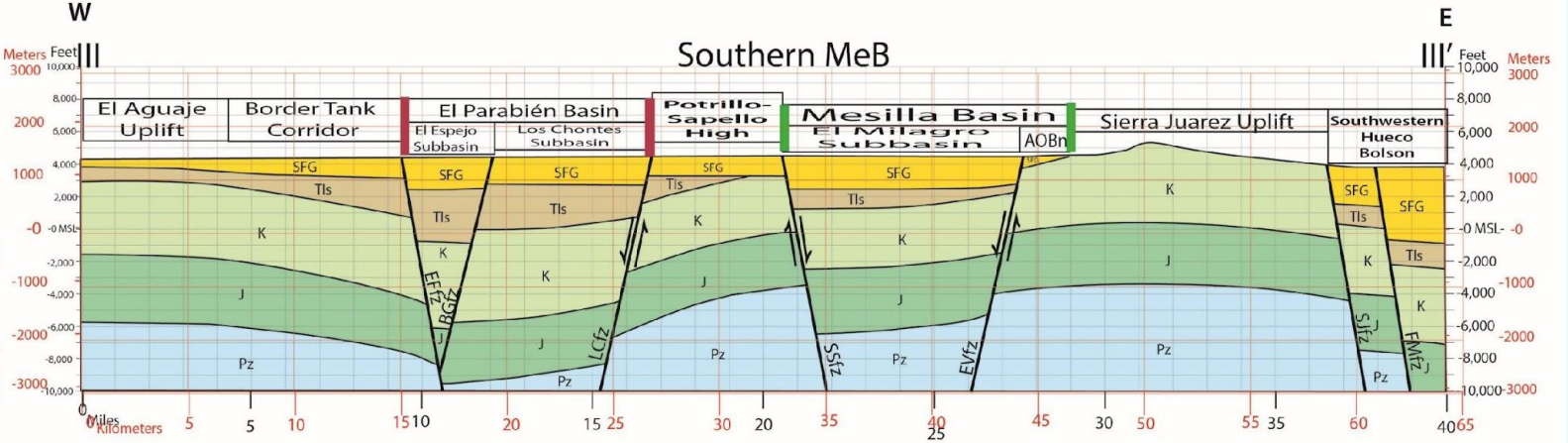
Central MeB





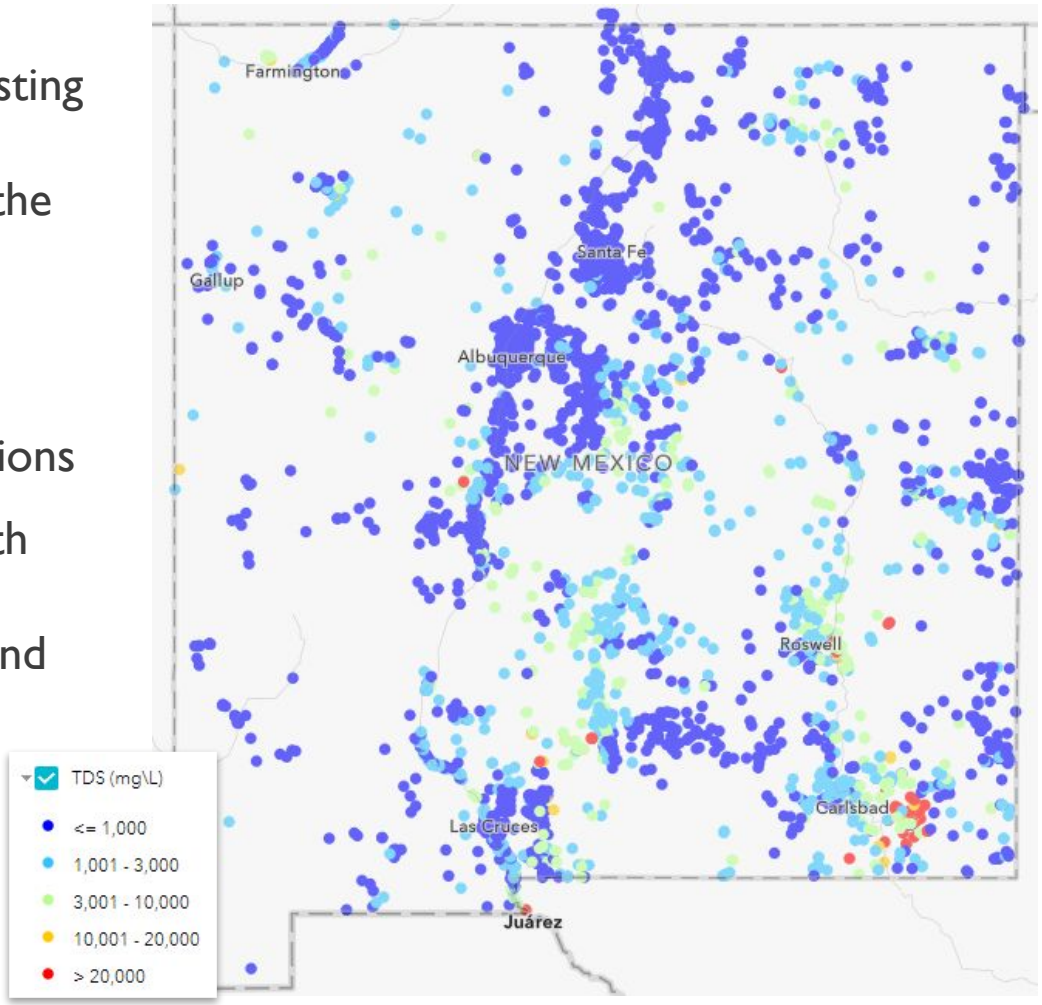


Southern MeB



RESULTS SHOW THAT IN MOST REGIONS, DATA IS INSUFFICIENT TO FULLY CHARACTERIZE BRACKISH WATER

- Chemistry data derived only from existing water supply wells is insufficient to provide a thorough understanding of the distribution of groundwater salinity
- Compiled data are useful for regional trends, but we lack data statewide to address detailed brackish water questions
- Region specific studies are needed with exploratory wells focused on characterizing geology, water quality and aquifer properties



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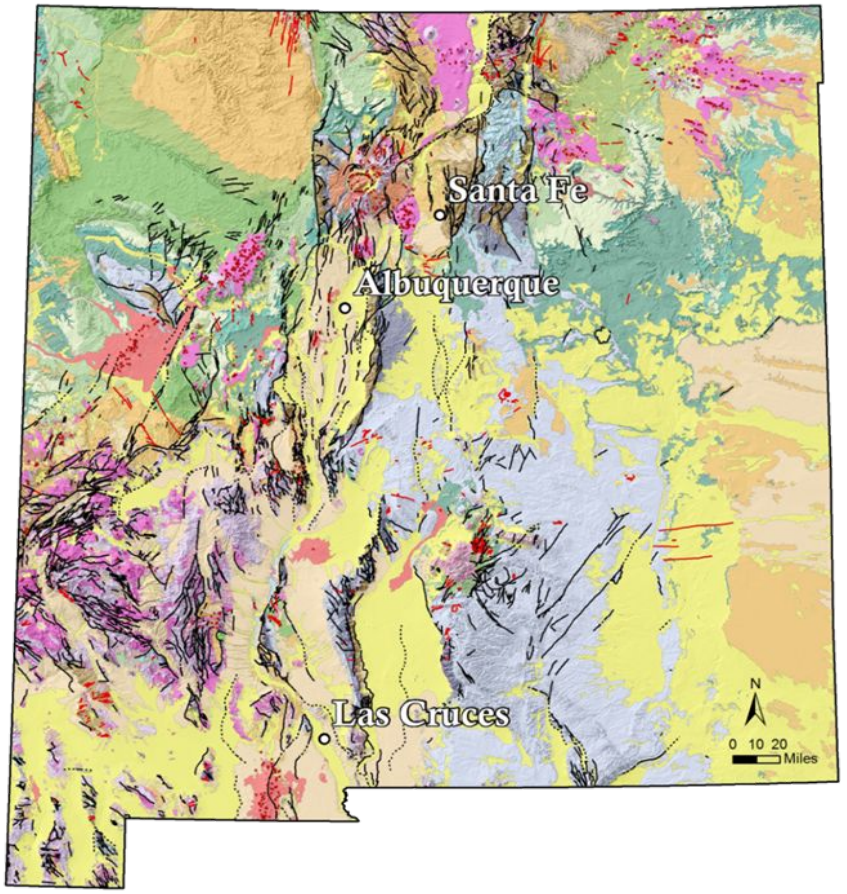
BRACKISH WATER – EXTRA INFORMATION NEEDED

Full aquifer characterization is needed, with immediate and long term funding

- Detailed subsurface geologic and hydrologic mapping
- Exploratory wells
- Geophysical characterization
- Water chemistry analyses
- Environmental tracers to evaluate residence time, recharge rates, and connection with surface water
- Hydraulic testing for aquifer properties (short and long tests)
- Commitment to long-term monitoring
- Open and fully accessible data (alignment with Water Data Act)

WATER RESOURCES – IT ALL RELATES BACK TO THE GEOLOGY

- Water quality distribution (spatially and vertically)
- Volume of water
- Productivity of the aquifer
- Connections between aquifers and/or surface water
- Suitability for different uses
- Waste disposal considerations (for brackish water)



NEW MEXICO AQUIFER MAPPING

NEW MEXICO WATER DATA

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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)

FUNDING REQESTS FOR FY25 TO SUPPORT WATER PROGRAMS AT NMBGMR

Water Education Program

- Goal: $250K annual recurring (currently non-recurring funding)
- 1.5 FTEs, and event costs - hosting, venue, hotels and transportation

Water Data Initiative

- Goal: add $500K to annual recurring (currently at $250K)
- Add 4 new FTEs + operational costs
- Does not include other agency budget needs

Aquifer Mapping and Monitoring

- Goal: add $1,200K to annual recurring (currently at $290K) + substantial non-recurring costs
- Add 8 FTEs to build and maintain state monitoring / mapping program