Overview of USGS Activities in the Paso del Norte Region

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Presentation to the Paso del Norte Watershed Council

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USGS Organization

USGS Mission Areas

- Core Science Systems
- Ecosystems
- Energy and Minerals
- Environmental Health
- Land Resources
- Natural Hazards

- **Water Resources**
  - **Oklahoma-Texas Water Science Center**
    - Routine data collection
      - Field offices in El Paso, Lubbock, San Angelo, Tulsa, Wichita Falls, and Woodward
    - Hydrologic studies + routine data collection
      - Offices in Austin, Fort Worth, Houston, Oklahoma City, and San Antonio
  - **New Mexico Water Science Center**

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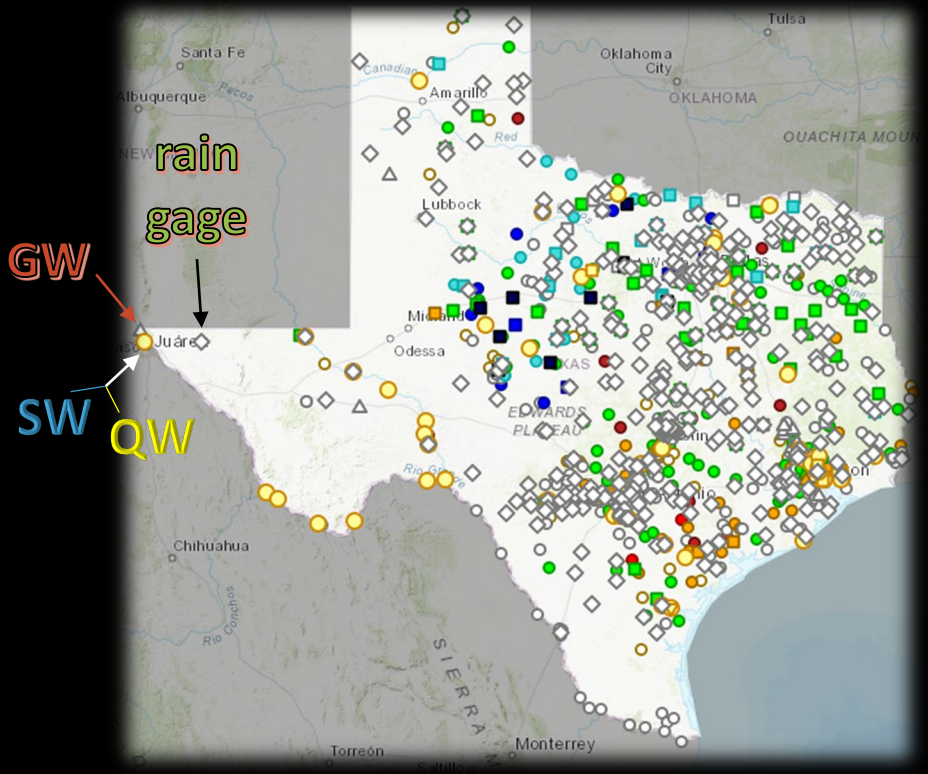
Routine Continuous Data Collection

- Texas Water Dashboard https://txpub.usgs.gov/txwaterdashboard/
- Streams, lakes, wells, water quality, rain, cameras



- 3 measurement sites in the Paso del Norte region:
  - Rain gage near Cornudas
  - Groundwater (GW) well near Vinton (operated by New Mexico WSC)
  - Streamflow (SW) and water-quality (QW) monitor on Rio Grande in El Paso, TX (operated by IBWC)
  - Other sites east in Pecos River basin and south near Presidio

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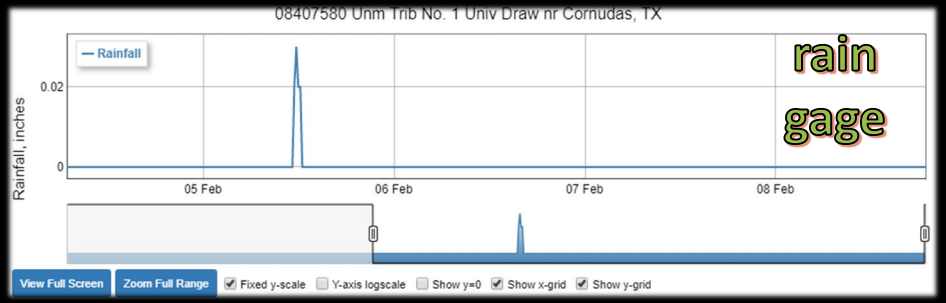
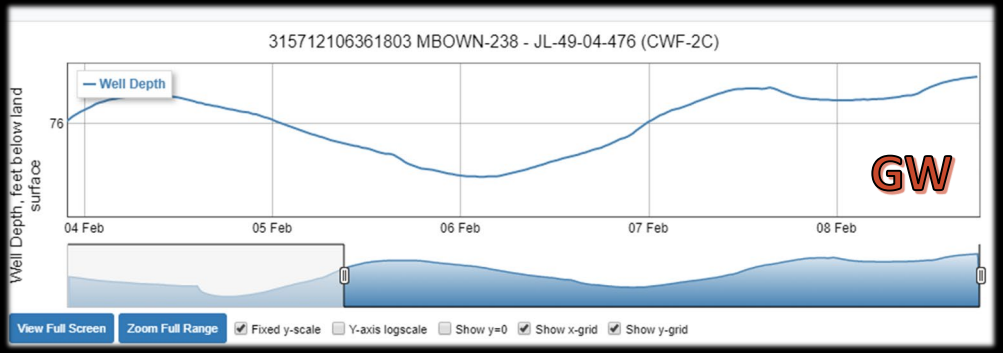
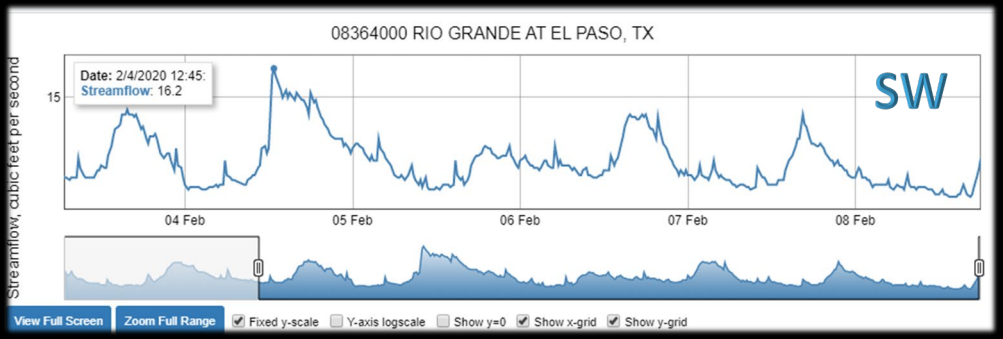
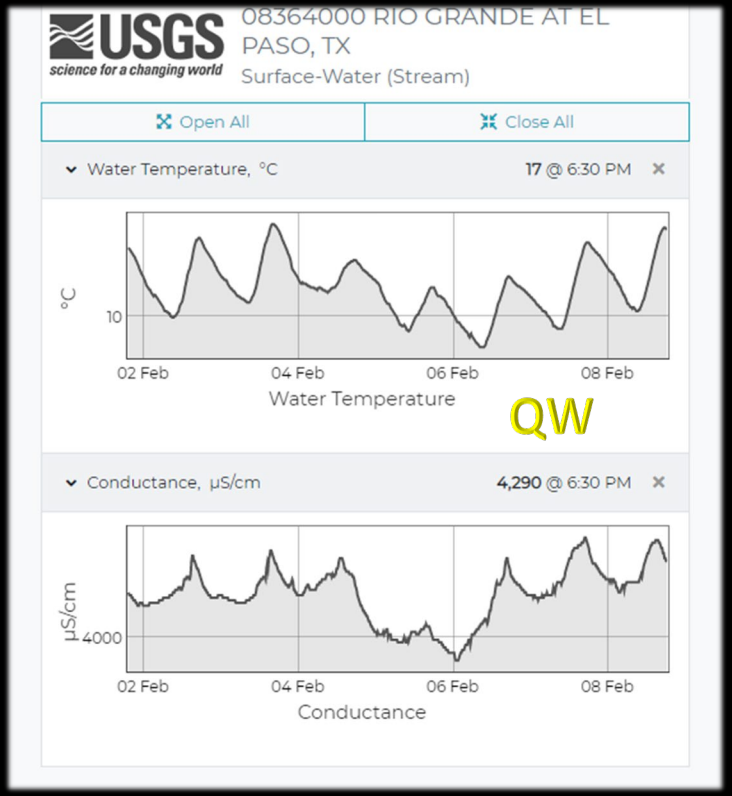
Routine Continuous Data Collection
Texas Water Dashboard



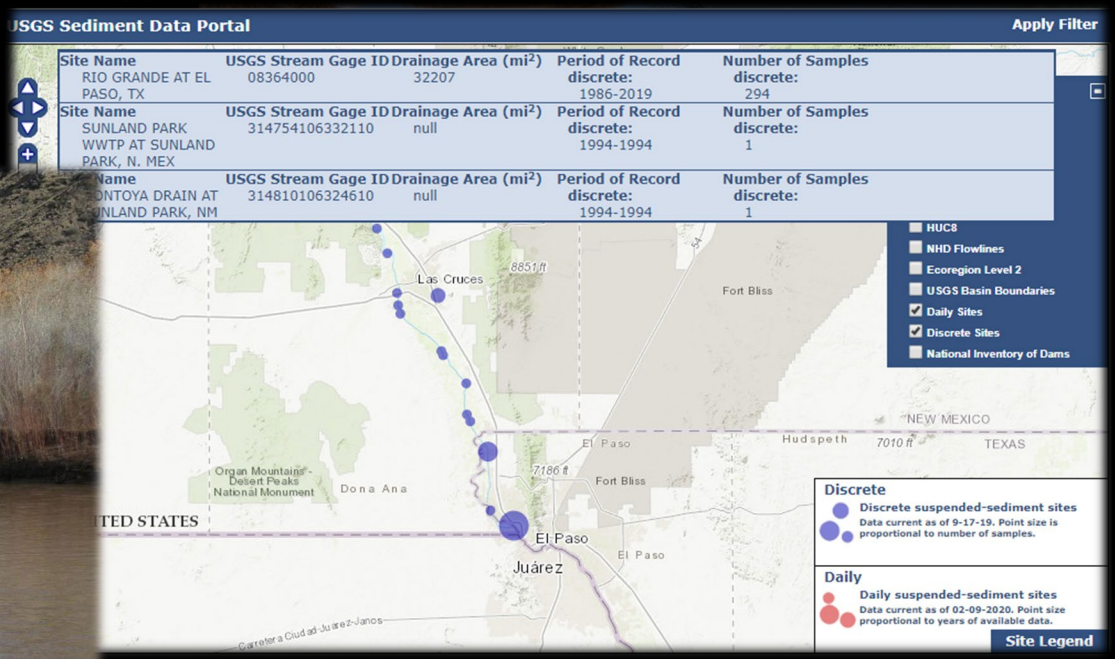






Routine Discrete Data Collection

- New Mexico Sediment Program
- Collecting suspended sediment data on the Rio Grande between Las Cruces and El Paso since 1970s
- https://cida.usgs.gov/sediment/ (website will be decommissioned on May 29, 2020; afterwards search USGS National Water Information [NWIS] web interface for data, https://waterdata.usgs.gov/nwis)



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Hydrologic Investigations

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National Water Resources Programs

- Integrated Water Availability Assessments
  - Transboundary Aquifer Assessment Program (TAAP)
  - Upper Rio Grande Focus Area Study
- National Water Quality Program
  - National Water Quality Assessment (NAWQA)
    - Bottom-Sediment Coring

Partnerships with other agencies

- Seepage of the Rio Grande from Leasburg Dam to El Paso
  - In partnership with Bureau of Reclamation, New Mexico Office of the State Engineer, City of Las Cruces Utilities, New Mexico Interstate Stream Commission, New Mexico State University, and the Elephant Butte Irrigation District
- Rio Grande Conservation Database
  - In partnership with U.S. Bureau of Reclamation, Rio Grande Joint Venture, and U.S. Fish and Wildlife Service
- Fort Bliss Data Release
  - In partnership with U.S. Army Air Defense Artillery Center and TAAP

Transboundary Aquifer Assessment Program (TAAP)

- Created by an Act of Congress in 2006
- Defined multiple objectives addressing binational collaboration and improvement of information on and understanding of priority aquifers
- In the U.S., collaboration of USGS Water Science Centers, Water Resources Research Institutes, and IBWC
- Focusing on the **Mesilla** and **Hueco Bolson** aquifers in the El Paso area
- Oklahoma-Texas Water Science Center primarily conducting water quality and geophysical studies
- Link to TAAP website

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Transboundary Aquifer Assessment Program (TAAP)

- Hueco Bolson groundwater quality study
- Water-quality data collected at 23 groundwater sites
- Groundwater near the Rio Grande geochemically similar to surface water in the Rio Grande
  - High dissolved solids
  - High arsenic concentrations
  - High uranium concentrations
  - Comparable detections of pesticides
  - Rio Grande isotopic signature
- Link to ScienceBase data sets
- Interpretive report in review

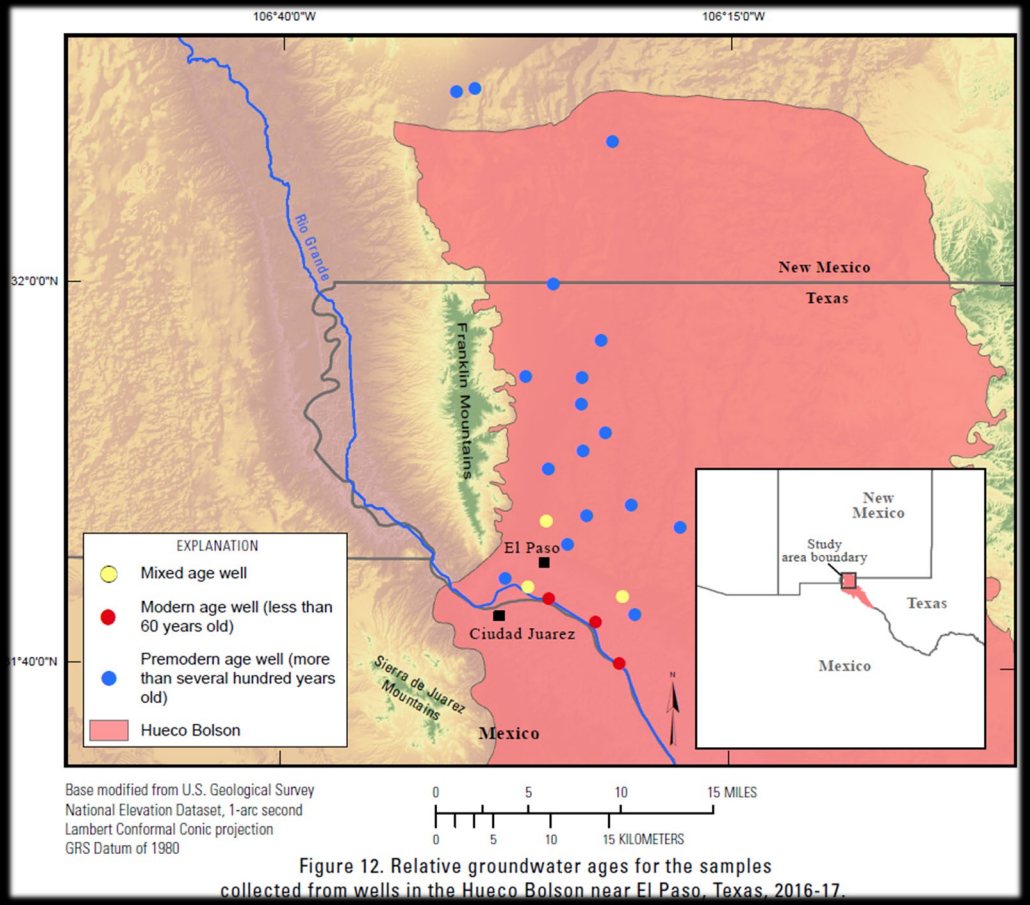

Figure 12. Relative groundwater ages for the samples collected from wells in the Hueco Bolson near El Paso, Texas, 2016-17.

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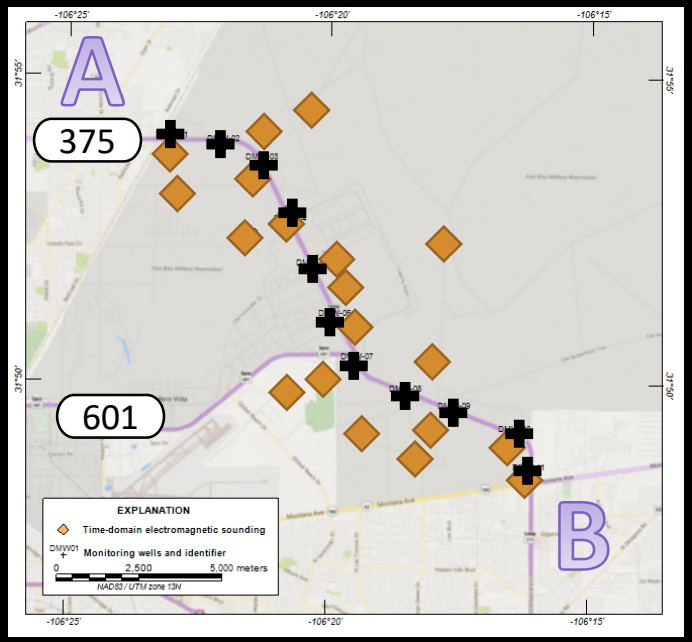
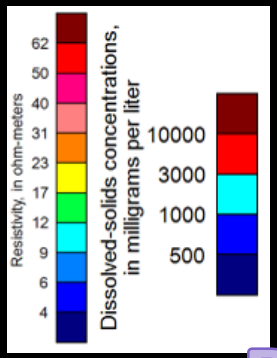
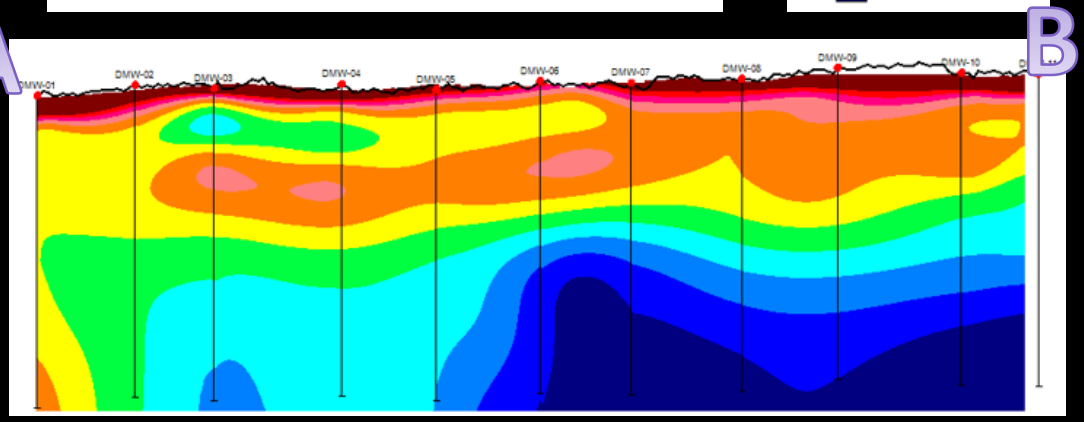
Transboundary Aquifer Assessment Program (TAAP)

- Hueco Bolson surface geophysics
- Time-domain electromagnetic soundings collected at 18 sites
- Measures subsurface resistivity used to define subsurface freshwater/ saline-water transition zone
- Correlation between resistivity and dissolved solids using specific conductance measured in groundwater monitoring wells
- Publications in preparation







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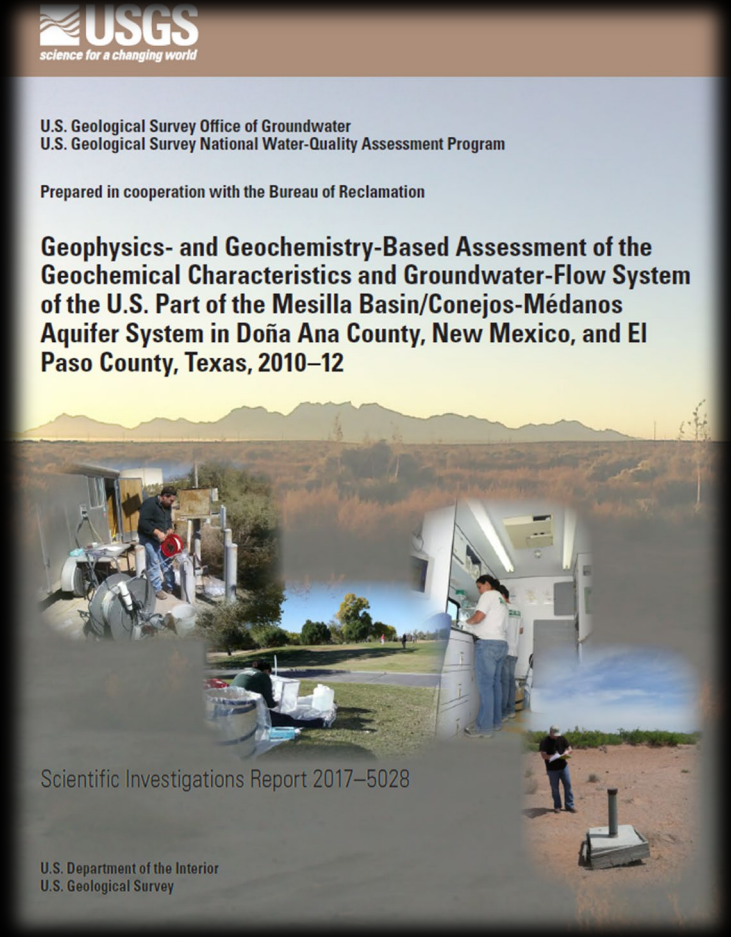
Transboundary Aquifer Assessment Program (TAAP)

- Mesilla Basin/ Conejos-Médanos geochemistry and geophysics
- Geochemical sampling identified multiple geochemical groups within the aquifer system and potential groundwater-flow paths
- Highly mineralized water was identified in the southeast corner of the study area representative of ancient marine groundwater
- Geophysics was used to identified areas of dense, highly saline water upwelling through fractures within the bedrock and confirmed with historical dissolved-solids concentrations
- **Link to Scientific Investigations Report**



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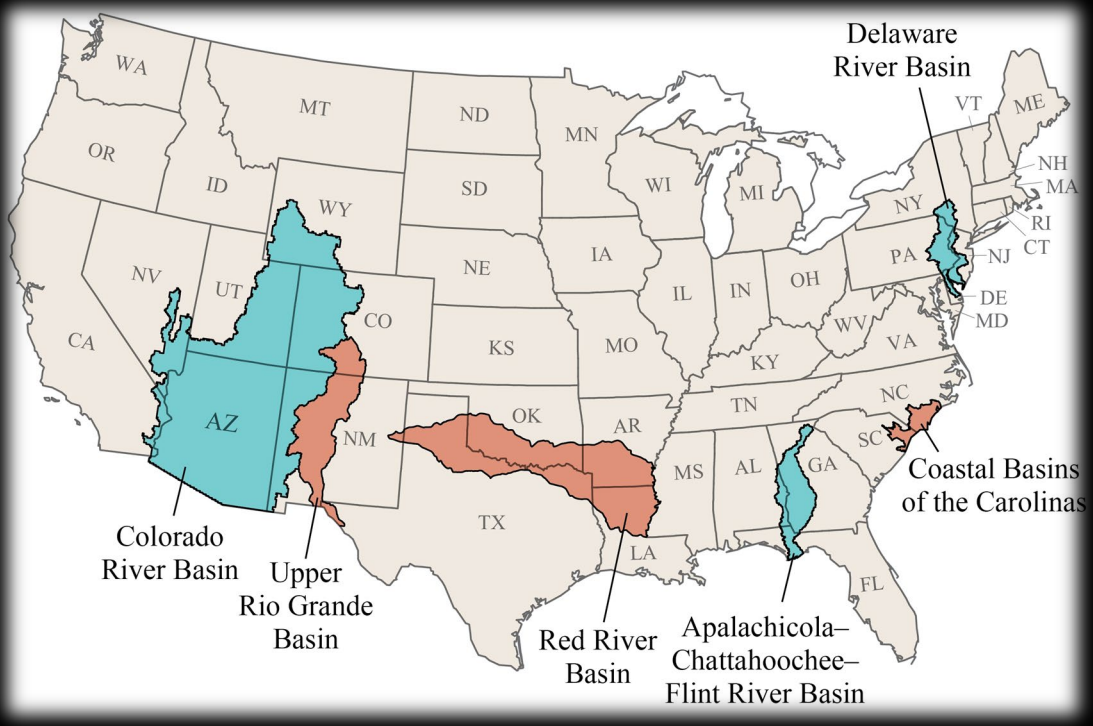
Upper Rio Grande Focus Area Study

Objectives:

- Focus on a geographic area where there is substantial competition over water resources
- Improve the understanding of the volume, timing, manipulation, and consumption of water



- Engage with local stakeholders to ensure research is relevant and timely in a regional and national context
- Link to Upper Rio Grande Focus Area Study website

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Upper Rio Grande Focus Area Study

- Four year study, multiple publications in review
- Collaboration of several USGS Water Science Centers
- Study components:
  - Surface water - assess timing and trends and snowmelt processes
  - Groundwater - map water-level surfaces and changes in selected subbasins; evaluate loss of groundwater in storage
  - Groundwater/surface-water interaction - estimate the base flow component of streamflow
  - Water use and water use trends
  - Environmental flows

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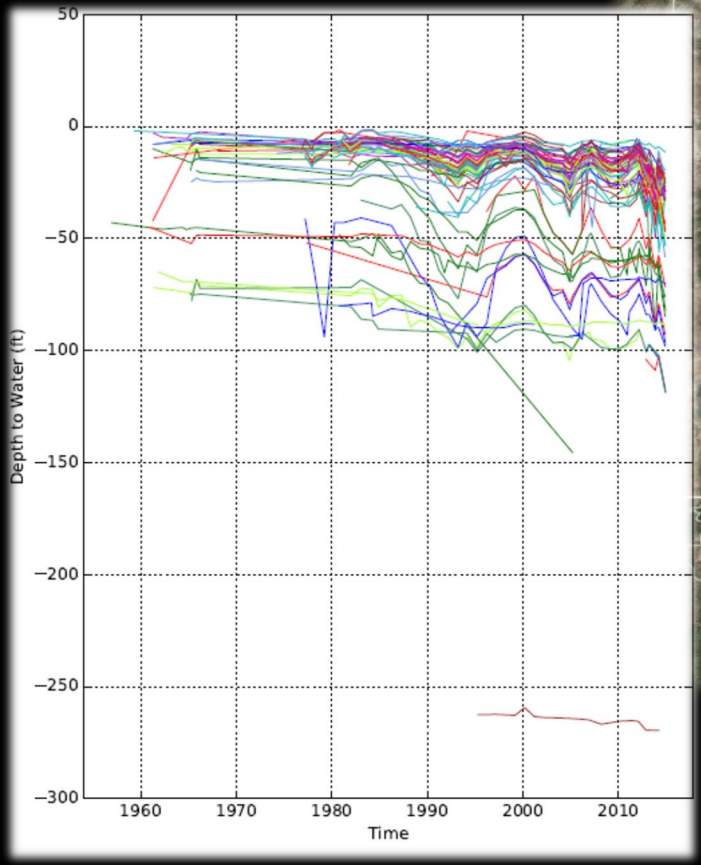
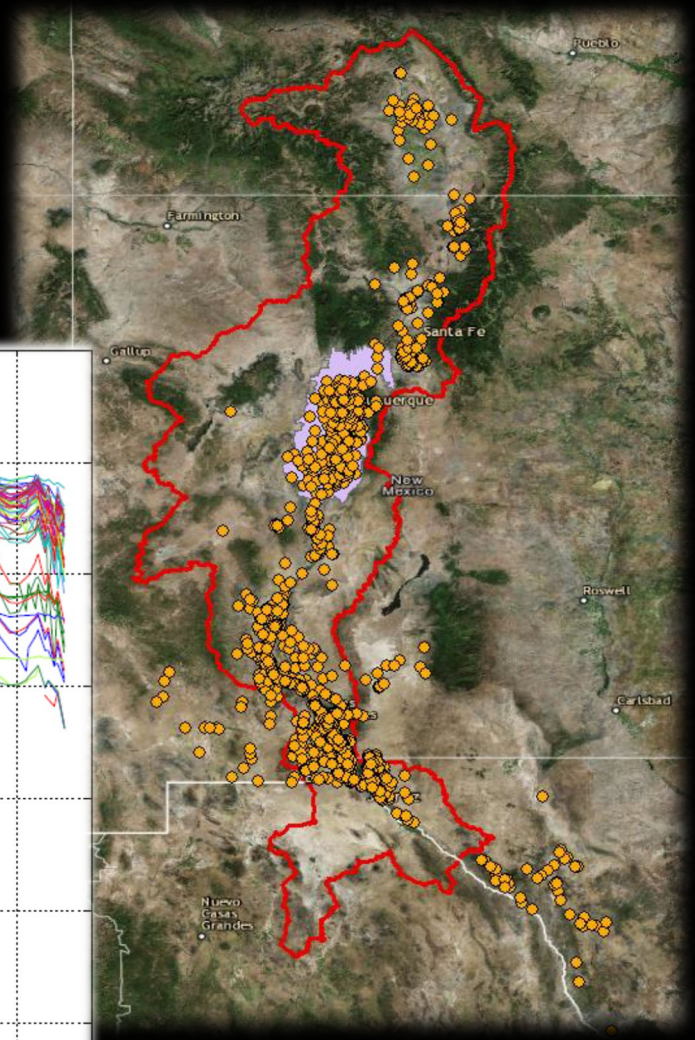
Upper Rio Grande Focus Area Study

- Groundwater study component by the Oklahoma-Texas Water Science Center
- Compiled and evaluated water-level data with respect to data limitations
- Evaluate status and trends of water-levels and their relations to hydrogeologic controls, hydraulic properties, and stresses





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Upper Rio Grande Focus Area Study

- Water use study component examined consumptive use of water related to irrigation
- Digitized irrigated acres for 2015
- Polygons (1 meter resolution) with attributes of:
  - Land type
  - Crop type
  - Irrigation type
- Link to ScienceBase datasets

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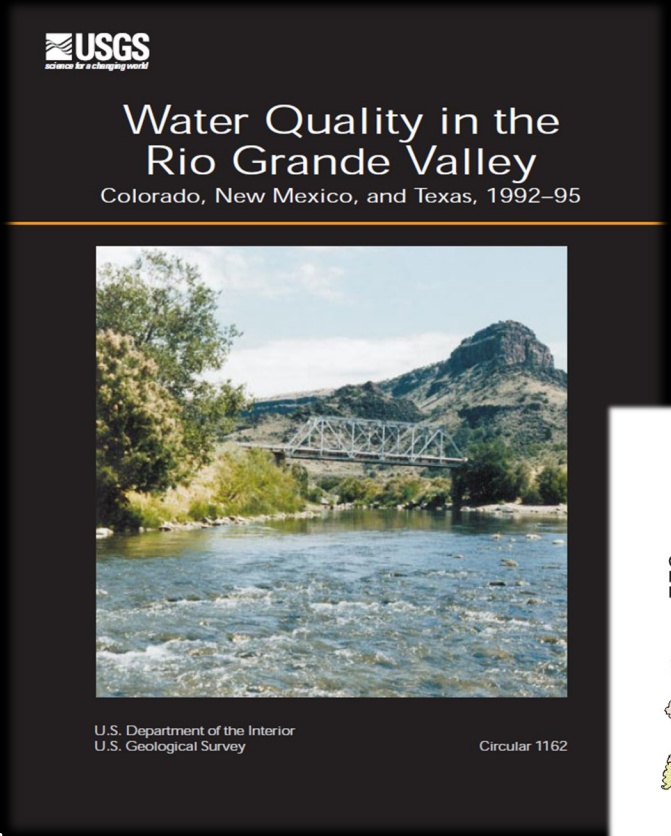
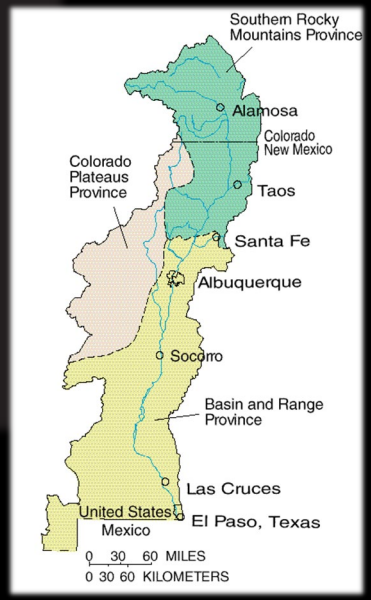
National Water Quality Assessment (NAWQA)

- Program started in 1991 and had 3 objectives:
  - describe the status,
  - assess trends, and
  - develop understanding of the Nation's water quality
- Operates on a decadal time scale
- Uses consistent sampling and analytical methods across the Nation
- Multidisciplinary: surface water, groundwater, biology, hydrology, chemistry, ecology, and modeling





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National Water Quality Assessment (NAWQA)

- Water-quality trends at NAWQA surface water sites
- Rio Grande at El Paso, TX, sampled by NAWQA by the New Mexico Water Science Center
- Link to NAWQA surface-water trends website

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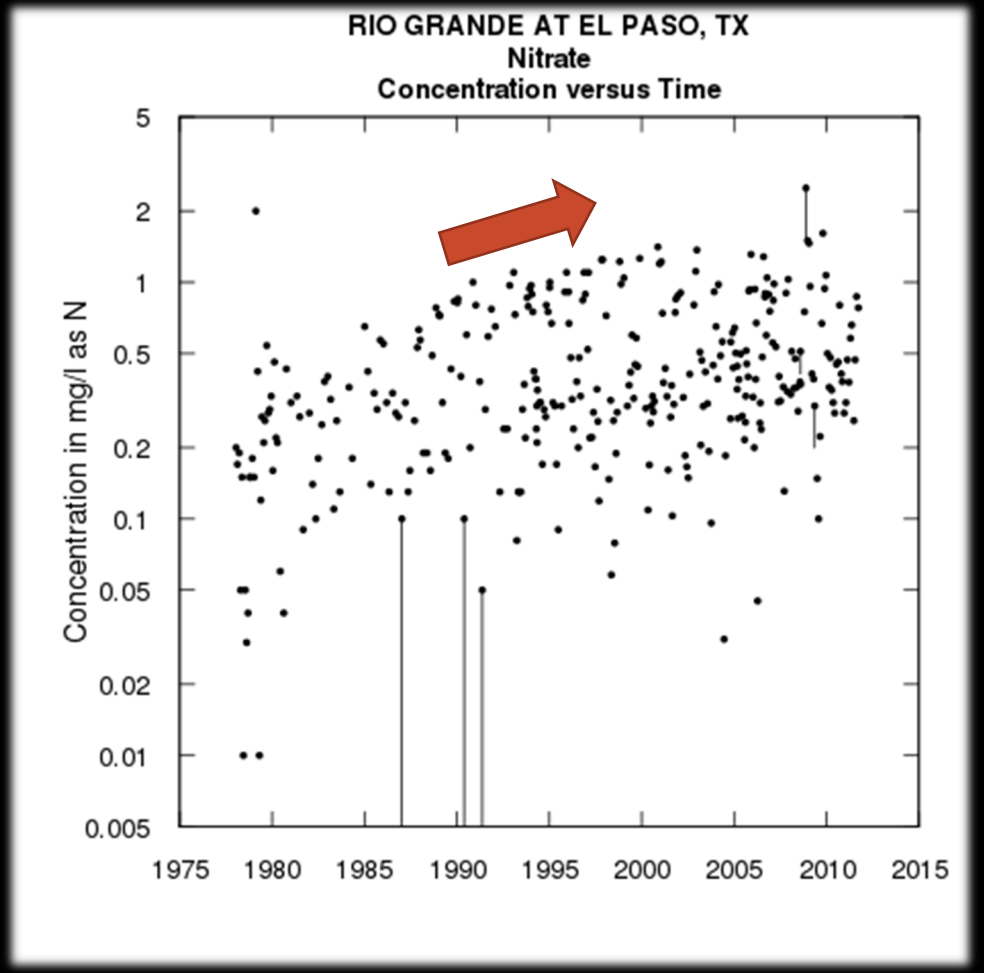
National Water Quality Assessment (NAWQA)

- Water-quality trends at Rio Grande at El Paso, TX
- Sampled by the New Mexico Water Science Center NAWQA team
- Upward trends of nitrate, suspended sediment, prometon, and atrazine
- Downward trends of sulfate, metolachlor, tebuthiuron, and dacthal
- Link to NAWQA surface-water trends website



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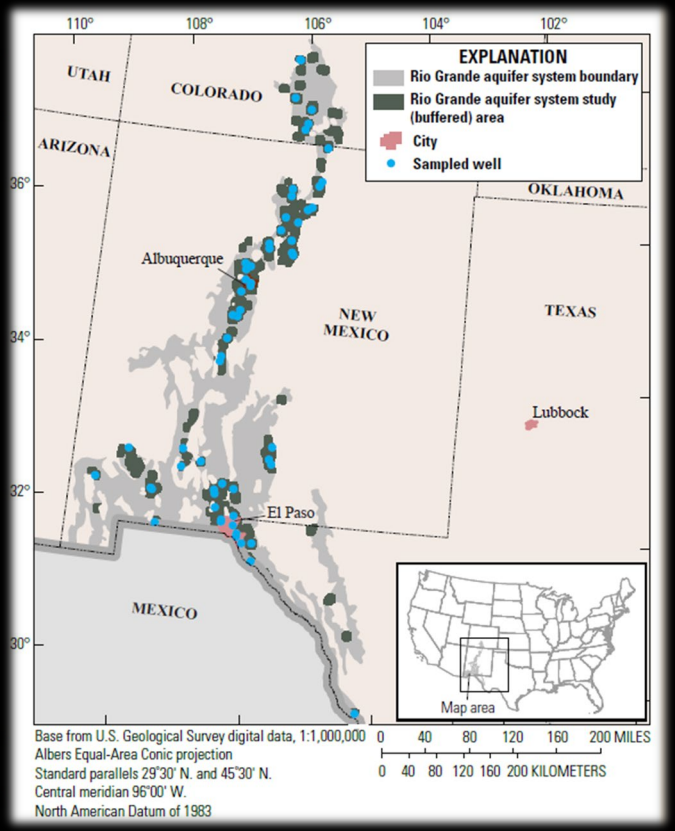
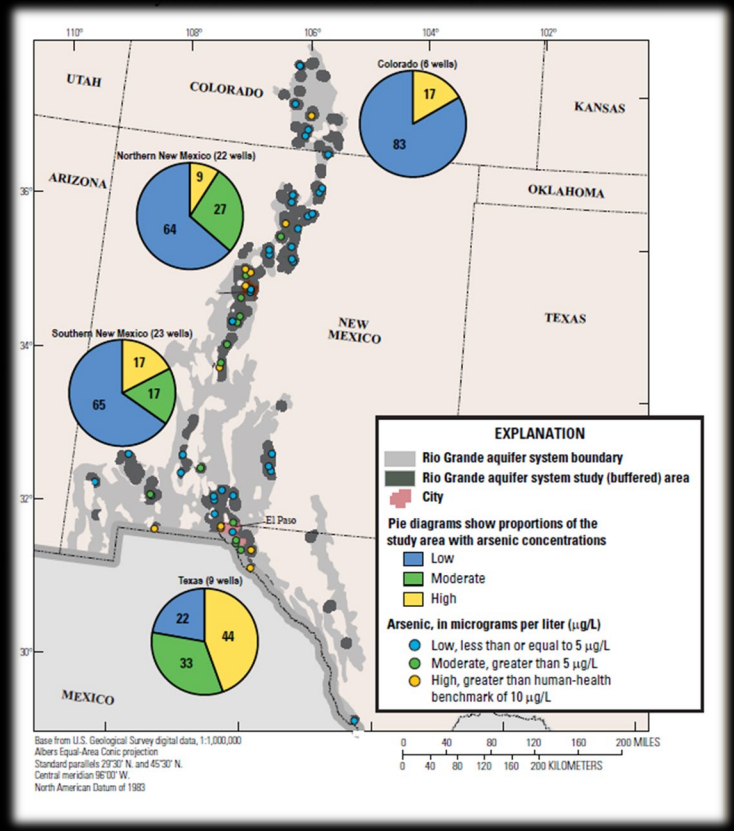
National Water Quality Assessment (NAWQA)

- Sampled 60 public supply wells in the Rio Grande aquifer system (9 in Texas) in 2014
- Organic constituents not detected or low concentrations
- Arsenic, fluoride, strontium, and uranium detected at high and moderate concentrations





[Link to Fact Sheet 2017–3047]

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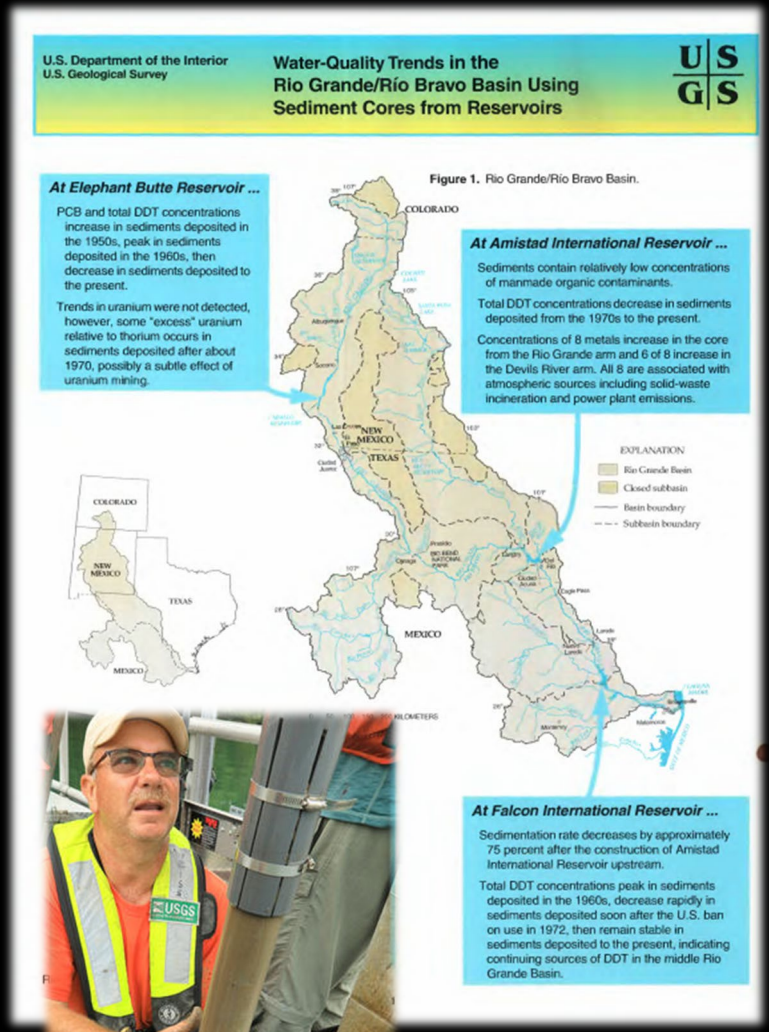
National Water Quality Assessment (NAWQA)

- Water-quality trends from reservoir bottom-sediment cores
- Assessment of fluvial and atmospheric inputs to water bodies
- Cored Elephant Butte, Amistad, and Falcon Reservoirs in ***1995***
- Elevated concentrations of arsenic, chromium, and nickel in Amistad; concentrations of DDT at levels of concern in all 3 reservoirs
- Cored Cochiti Lake near Albuquerque, NM in 1996

  (*fun fact – my first USGS report!)*



Link to Fact Sheet FS-221-96

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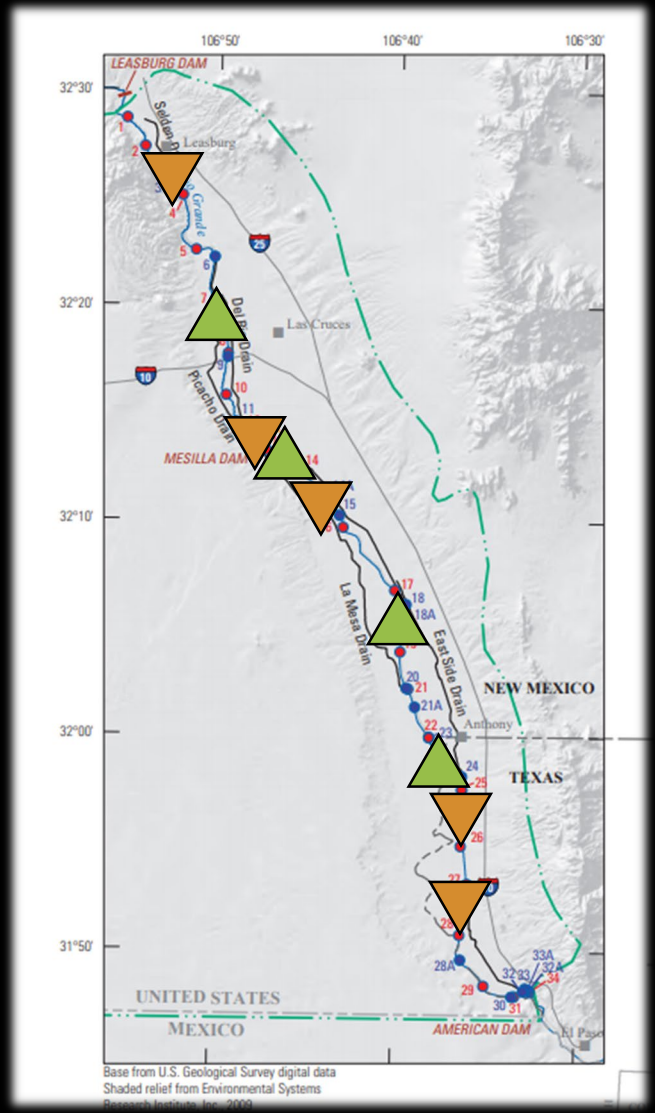
Seepage of the Rio Grande from Leasburg Dam to El Paso

- Streamflow measurements at sites along Rio Grande, inflows, outflows, and wastewater treatment plants
- 1988 to 1998 and 2006 to 2016, February during no-flow or low-flow in non-irrigation season
- April 2018 during bankfull with releases from Caballo Dam for irrigation
- 9 subreaches had net seepage gain or loss: 4 gaining ▲, 5 losing ▼
- Overall net seepage loss along the entire reach
- Link to Scientific Investigations Report



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Mapping Conservation Activities in the Rio Grande/Rio Bravo del Norte Basin

- Partnership with U.S. Bureau of Reclamation, Rio Grande Joint Venture, and U.S. Fish and Wildlife Service
- Need for a comprehensive data resource that catalogs and spatially represents locations of natural resource conservation activities
- Improve natural resource management decisions and facilitate coordination of conservation efforts throughout the basin

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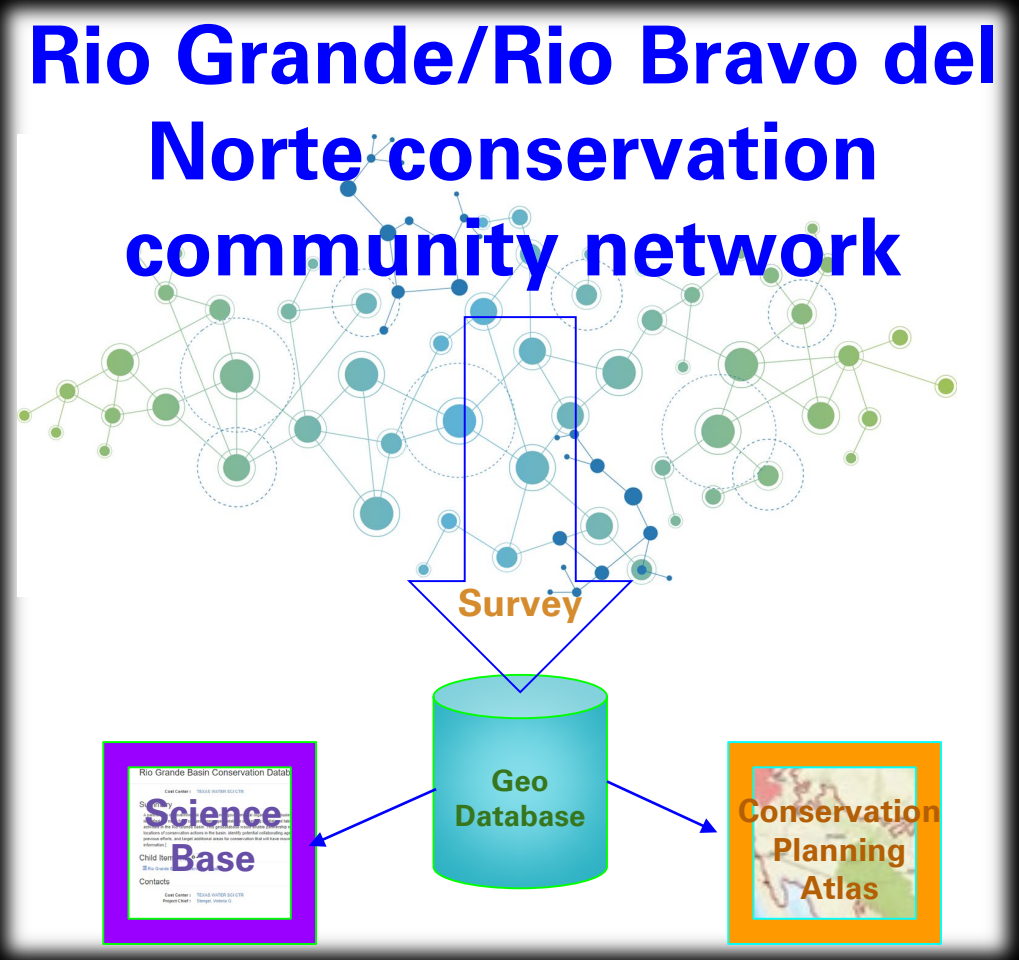
Mapping Conservation Activities in the Rio Grande/Rio Bravo del Norte Basin

- Plan to distribute survey to other federal agencies
- Consolidate survey responses in a geospatial database
- Publish database in ScienceBase
- Interactive webmapping application published to the Desert Landscape Conservation Planning Atlas



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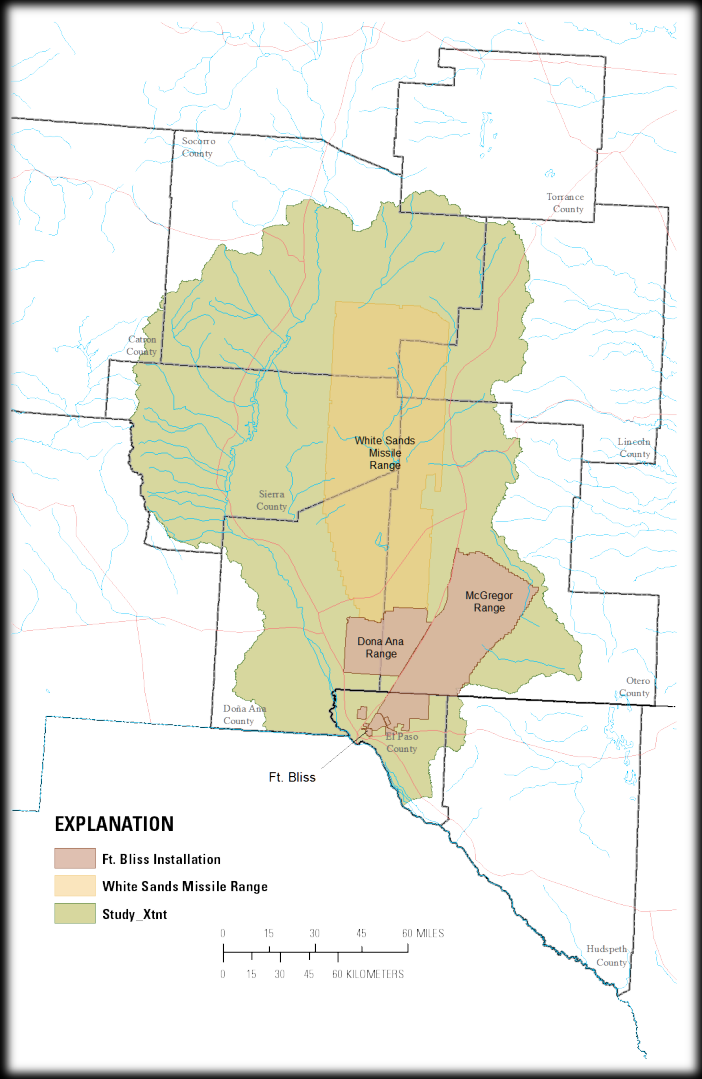
Fort Bliss Data Release

- Comprehensive, installation-wide characterization of hydrologic data resources
- Geographic scope includes watersheds and groundwater basins that contribute to:
  - Fort Bliss
  - White Sands Missile Range
  - McGregor Range
  - Doña Ana Range
- Data release currently in preparation



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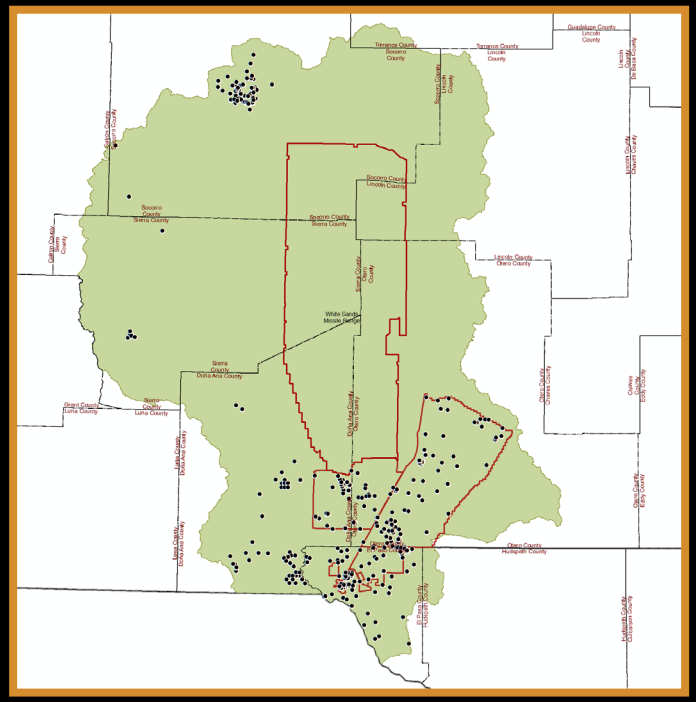
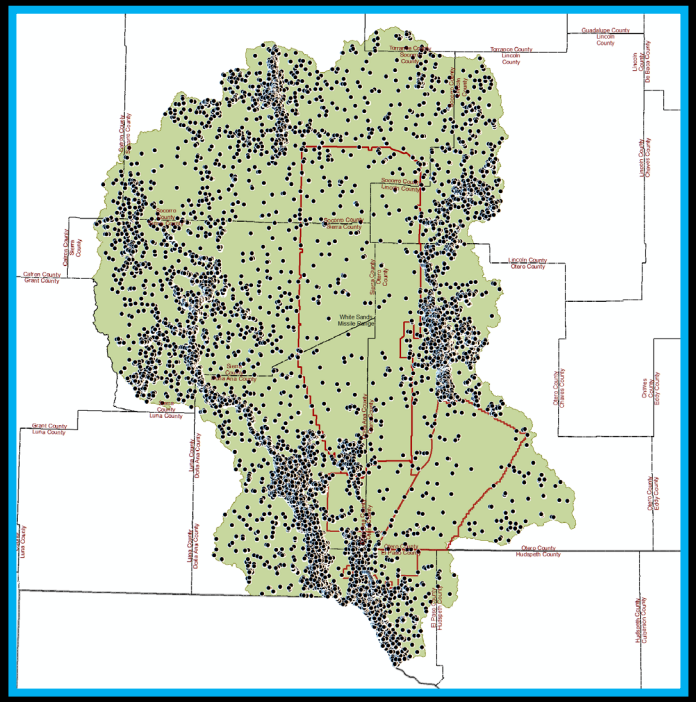
Fort Bliss Data Release

- Data types
  - Soils
  - Land cover
  - Surficial Geology
  - Aquifers
  - Streamflow gaging sites
  - Well locations and logs
  - Water-level data
  - Water-quality data
  - Geophysical data



BEFORE: ~400 sites (water wells)
0 wells w/ Water Level data
0 wells w/ Water Quality data



AFTER: ~26,000 sites (wells and surface water)
~4,000 wells w/ Water Level data
~2,000 wells w/ Water Quality data

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Summary of USGS Activities in the Paso del Norte Region

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- Routine data collection
  - Streamflow, groundwater levels, water quality, rainfall, suspended sediment
- Hydrologic investigations
  - Transboundary Aquifer Assessment Program (TAAP)
  - Upper Rio Grande Focus Area Study
  - National Water Quality Assessment (NAWQA)
  - Bottom-Sediment Coring
  - Seepage of Rio Grande from Leasburg Dam to El Paso
  - Rio Grande Conservation Database
  - Fort Bliss Data Release

Thank you!

Contact information:

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Questions?