

Regional Groundwater Availability Study of the Edwards-Trinity Aquifer in parts of Pecos, Brewster, Jeff Davis and Reeves Counties, Texas

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In cooperation with the Middle Pecos Groundwater Conservation
District, Pecos County, City of Fort Stockton, Brewster County, and
Pecos County Water Control and Improvement District No. 1

Outline

- Background
- Project Overview
- Study Area
- Phase I
 - Data Compilation
 - Data Collection
 - Data Management
- Phase II: Conceptual Model
- Phase III: Numerical Model



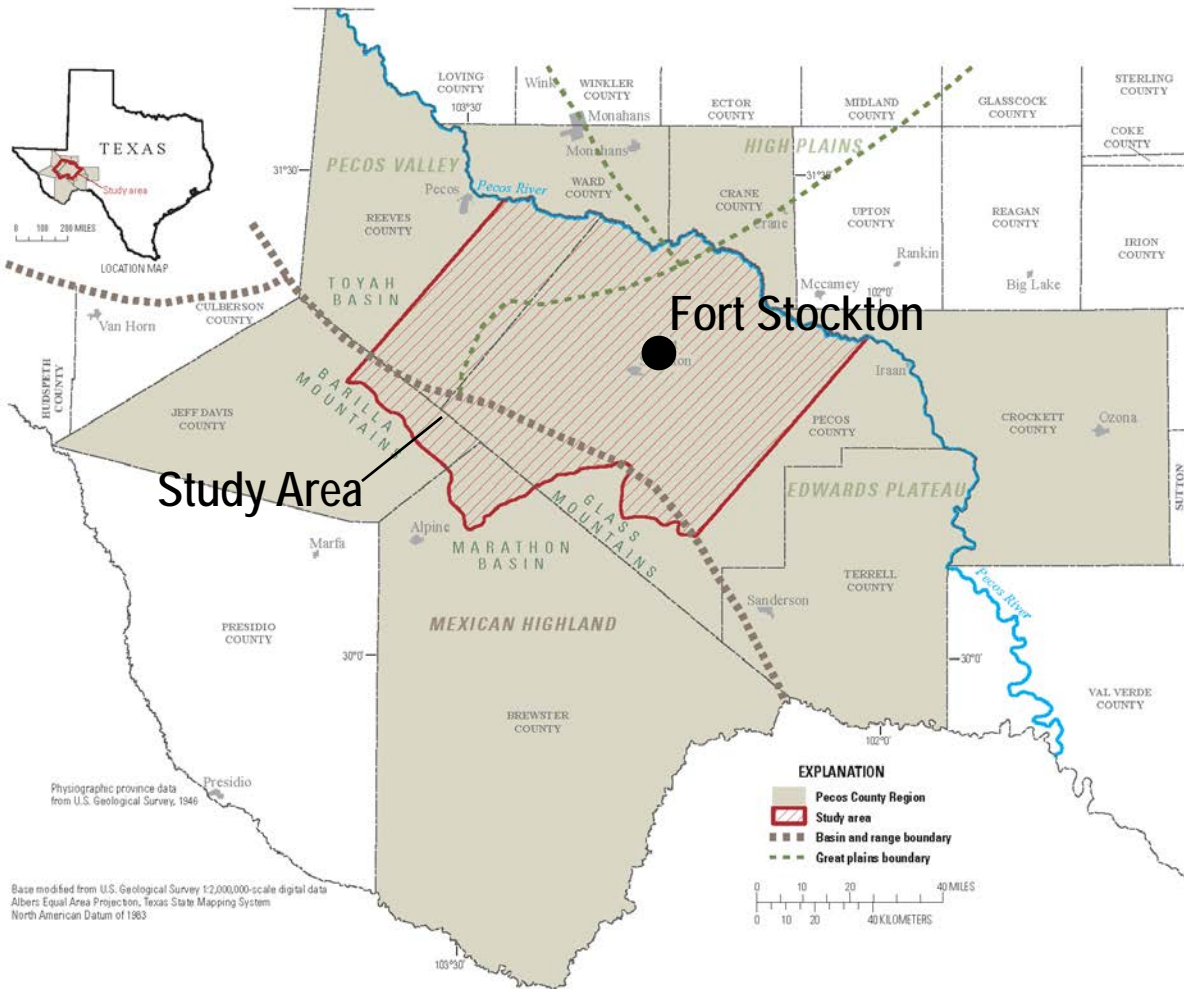
Background

- Study area includes parts of Pecos, Brewster, Jeff Davis, and Reeves Counties
- Edwards-Trinity is the principal aquifer
- Resource managers are concerned with future groundwater availability and the potential effects of withdrawal increases and/or redistribution
- Scale of the existing regional Groundwater Availability Model (GAM) is too coarse to adequately simulate the Edwards-Trinity aquifer in the study area

Project Overview

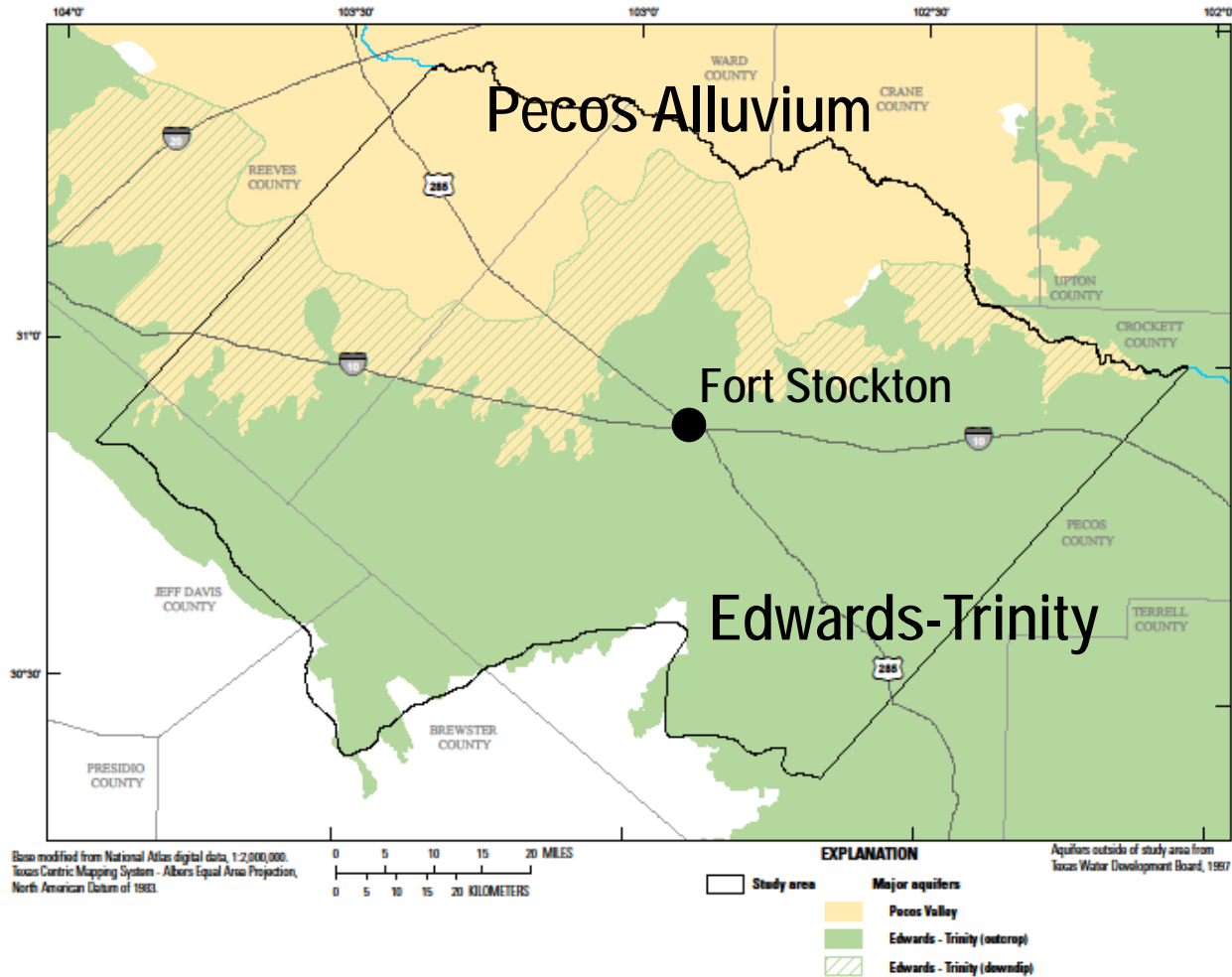
- Evaluate potential changes in groundwater withdrawals and distribution
- Evaluation is dependent upon the compilation and interpretation of existing data and new data collection
- Conceptual and numerical groundwater models will be developed
- Numerical model will be used to simulate the effects of possible pumping changes on the groundwater system

Study Area: Location

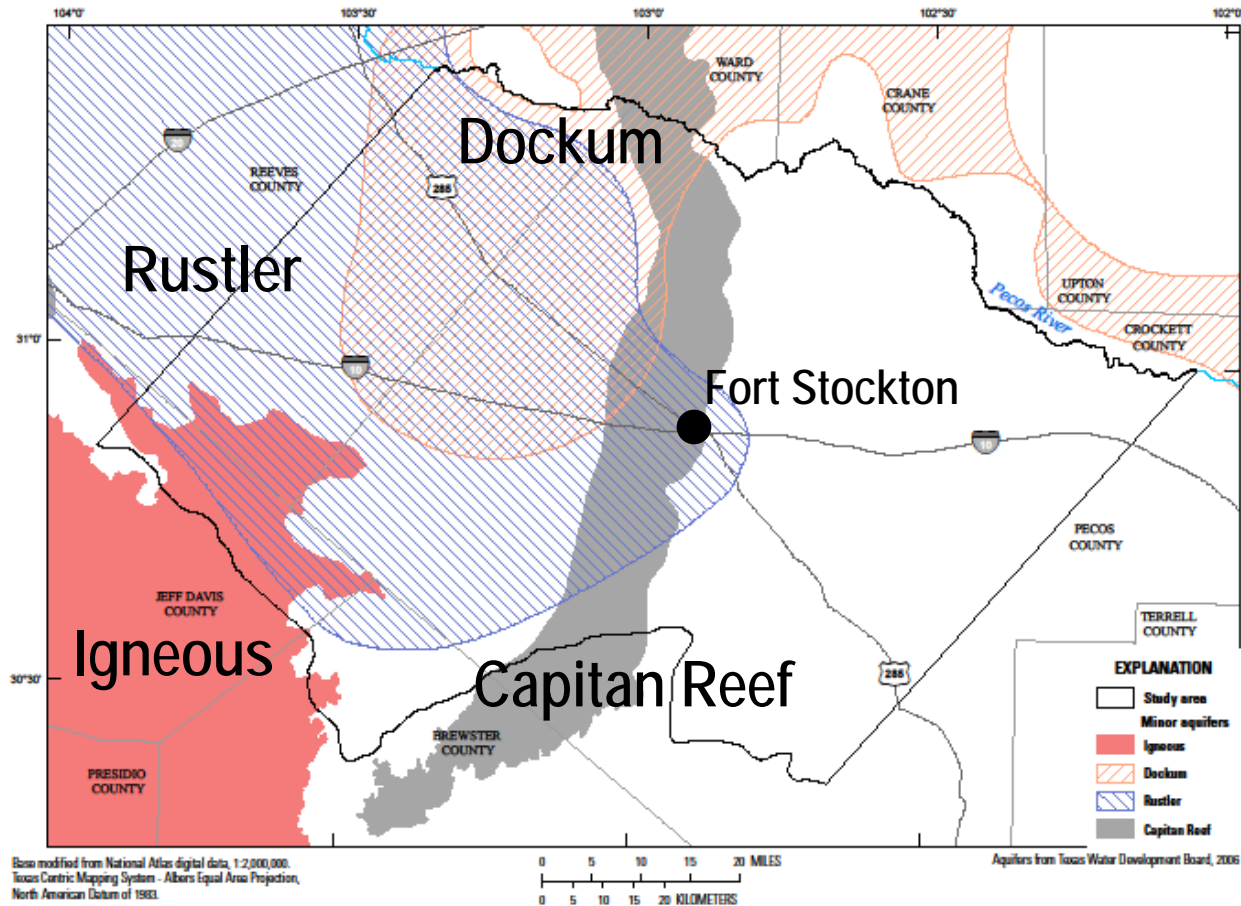


Approx. 2.5M Acres

Study Area: Major Aquifers



Study Area: Minor Aquifers



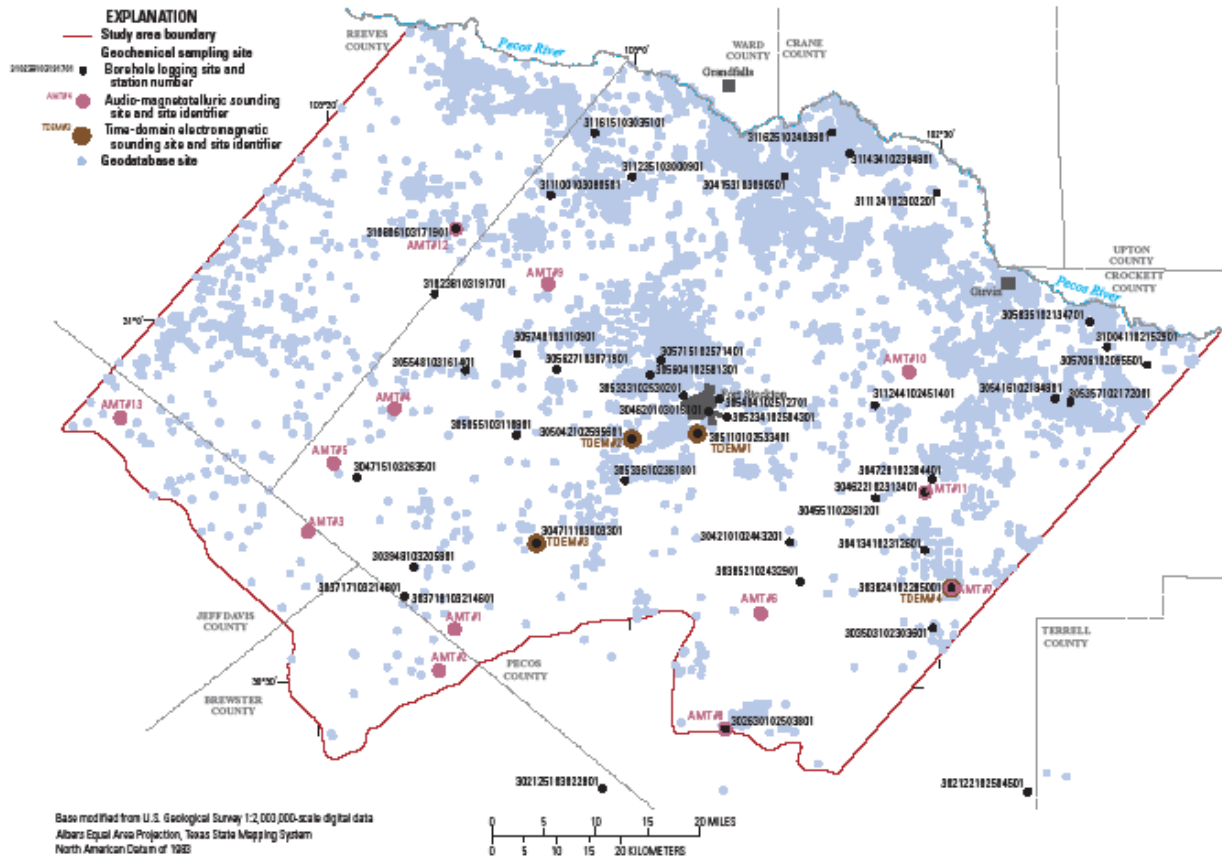
Phase I: Data Compilation

- Locate and compile existing scientific literature, analyses, and datasets
- More than 8,600 data points acquired from 10 sources: USGS, MPGCD, BCGCD, TWDB, TRRC, TCEQ, BEG, and Private firms
- Acquired information examples:
 - Basemap information
 - Well and spring locations
 - Geophysical and lithologic well logs
 - Aquifer properties
 - Water quality
 - Groundwater levels
- Data gap analysis

Phase I: Data Collection

- Borehole geophysics
 - Collected at 44 wells to supplement existing data
 - Resistivity, caliper, gamma, fluid resistivity, temperature, flowmeter, borehole imager
- Surface geophysics
 - Time-Domain Electromagnetics (TDEM) collected at four sites
 - Audiomagnetotelluric (AMT) Soundings collected at 13 sites
- Geochemical sampling
 - 44 sites: 38 wells, 4 springs, and 2 Pecos River samples
 - All 44 sites: Major ions, nutrients, trace elements, and isotopes
 - Select sites: Pesticides and environmental tracers
- Water levels

Phase I: Geophysics Data Locations

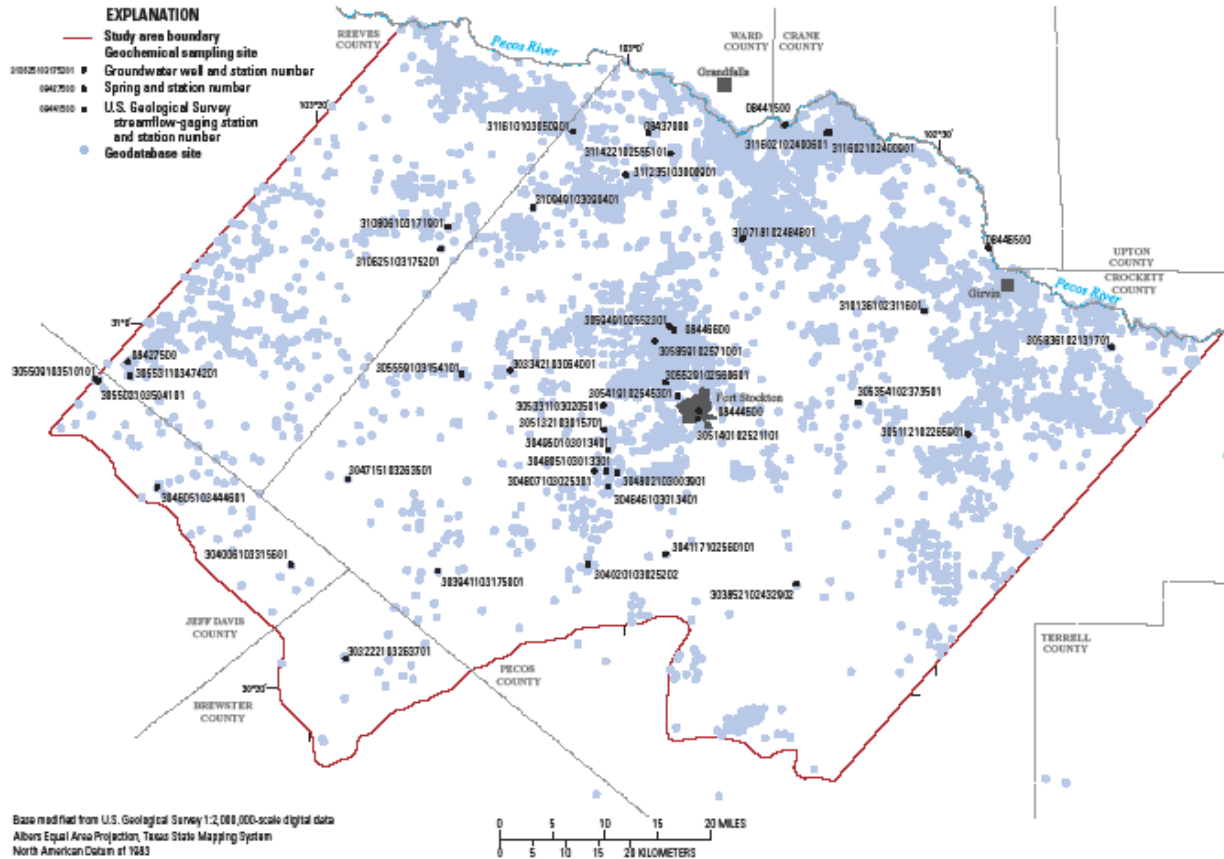


- Historical data location
- ● Geophysics data collection locations

Phase I: Geophysics Data Collection



Phase I: Geochemical Data Locations



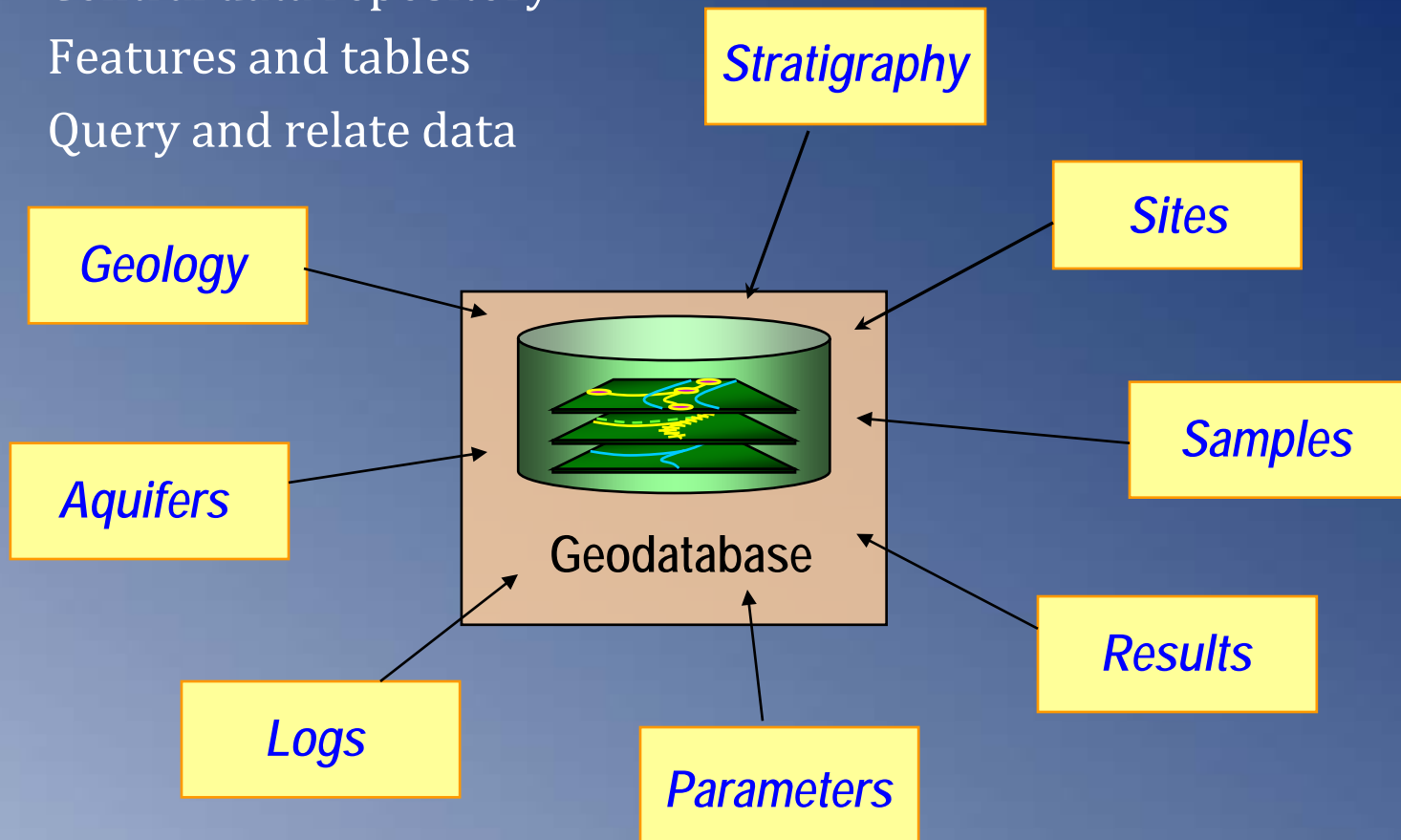
- Historical data location
- Geochemical data collection locations

Phase I: Geochemical Data Collection



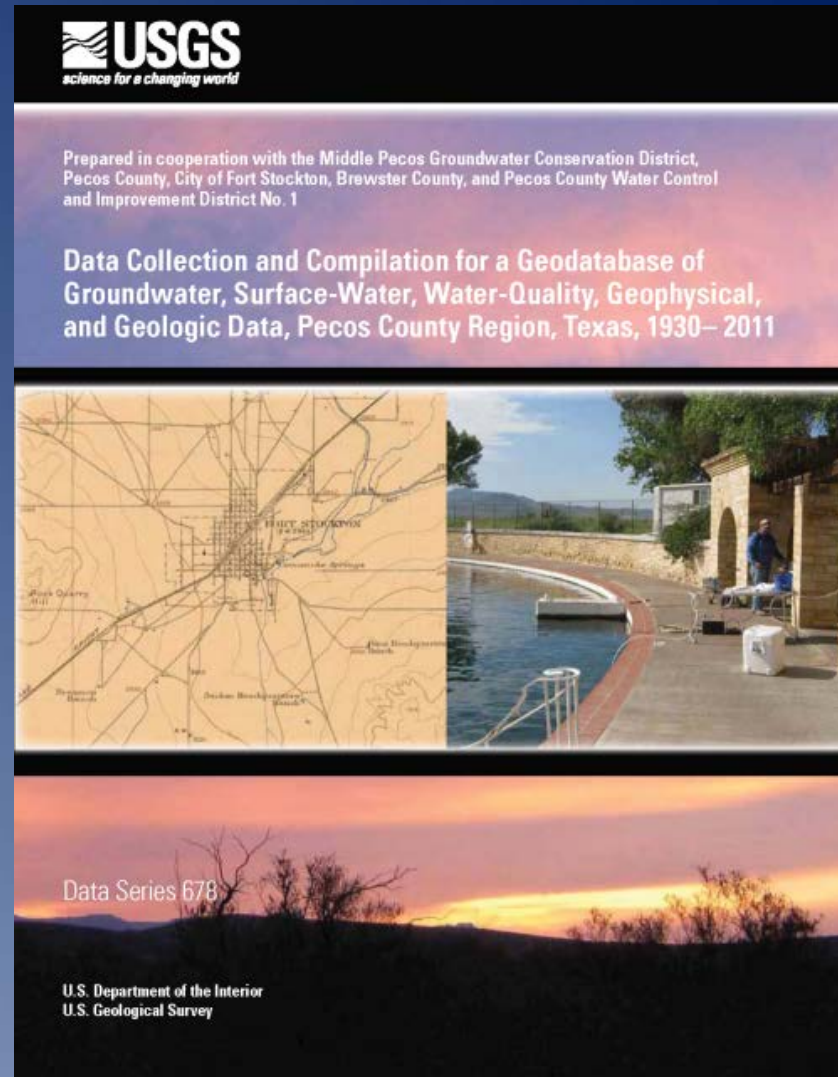
Phase I: Data Management

- Geodatabase development
 - Central data repository
 - Features and tables
 - Query and relate data



Phase I: Data Series Report

- USGS Data Series Report 678
- Released 3/20/2012
- Describes
 - Data sources
 - Data collection methods
 - Geodatabase development
- <http://pubs.usgs.gov/ds/678>



Phase II: Conceptual Model

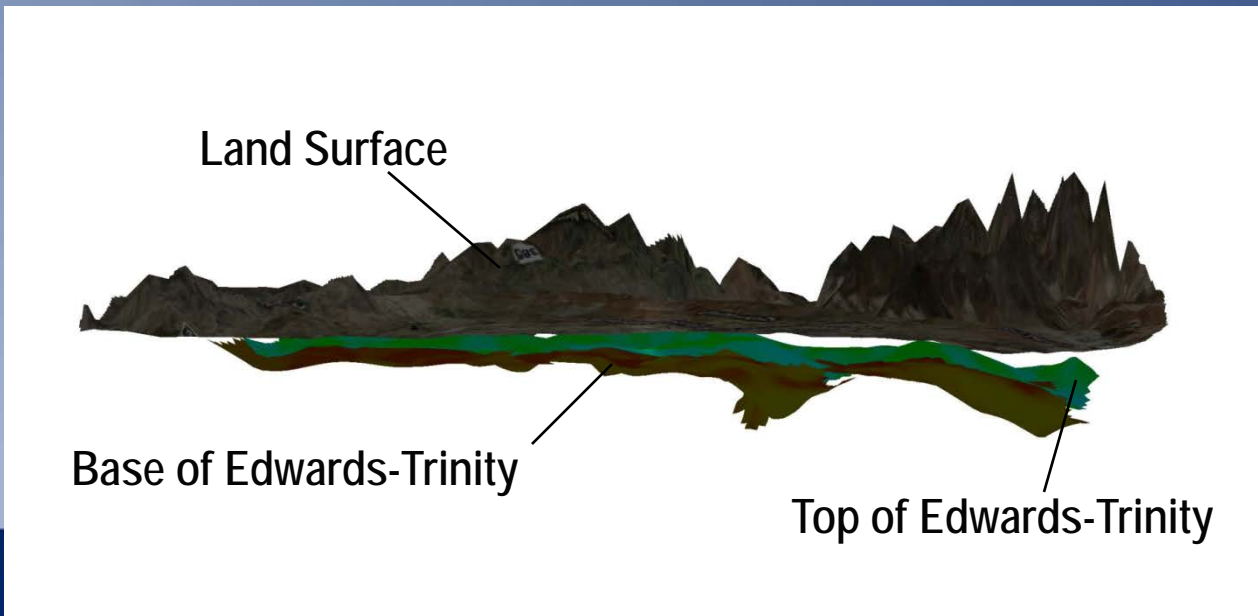
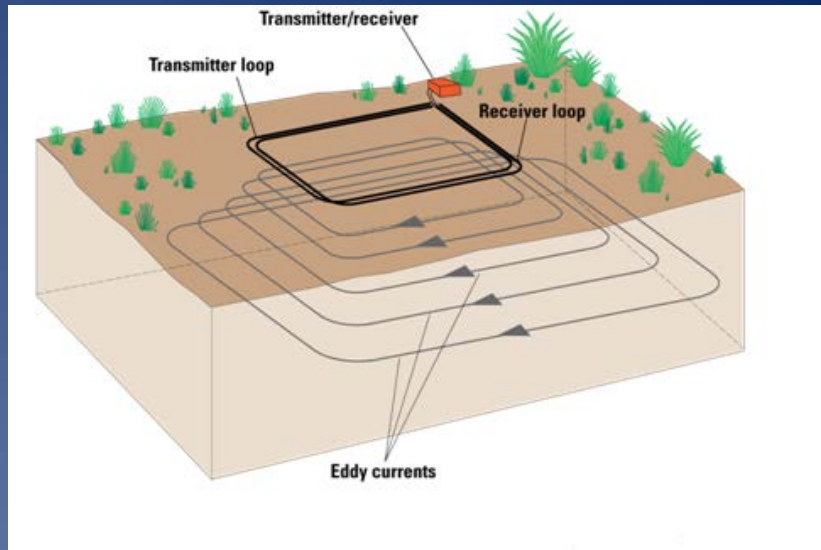
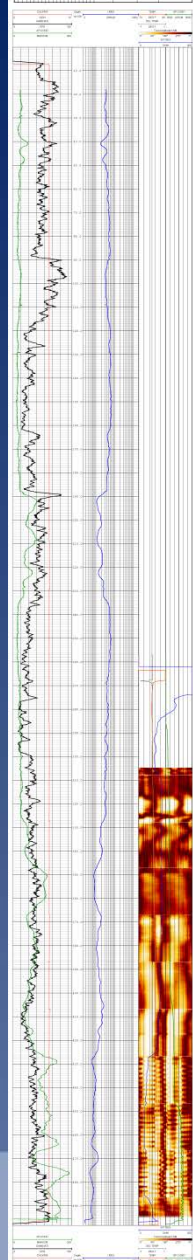
- Data synthesis and interpretation
- Hydrogeologic framework
 - Hydrostratigraphy
 - Structure
 - Aquifer properties
- Geochemistry
- Groundwater-flow system
 - Regional trends
 - Recharge
 - Groundwater mixing and discharge
- USGS Scientific Investigations Report planned for 2012

Phase II: Hydrogeologic framework

- Hydrostratigraphy
 - Geophysical and lithologic logs
 - Determine tops and bases of hydrostratigraphic units
- Structure
 - Interpolate picks to create surfaces
 - Unit thicknesses
 - Fault zones
- Aquifer properties
 - Historical pump-test data
 - Aquifer transmissivities

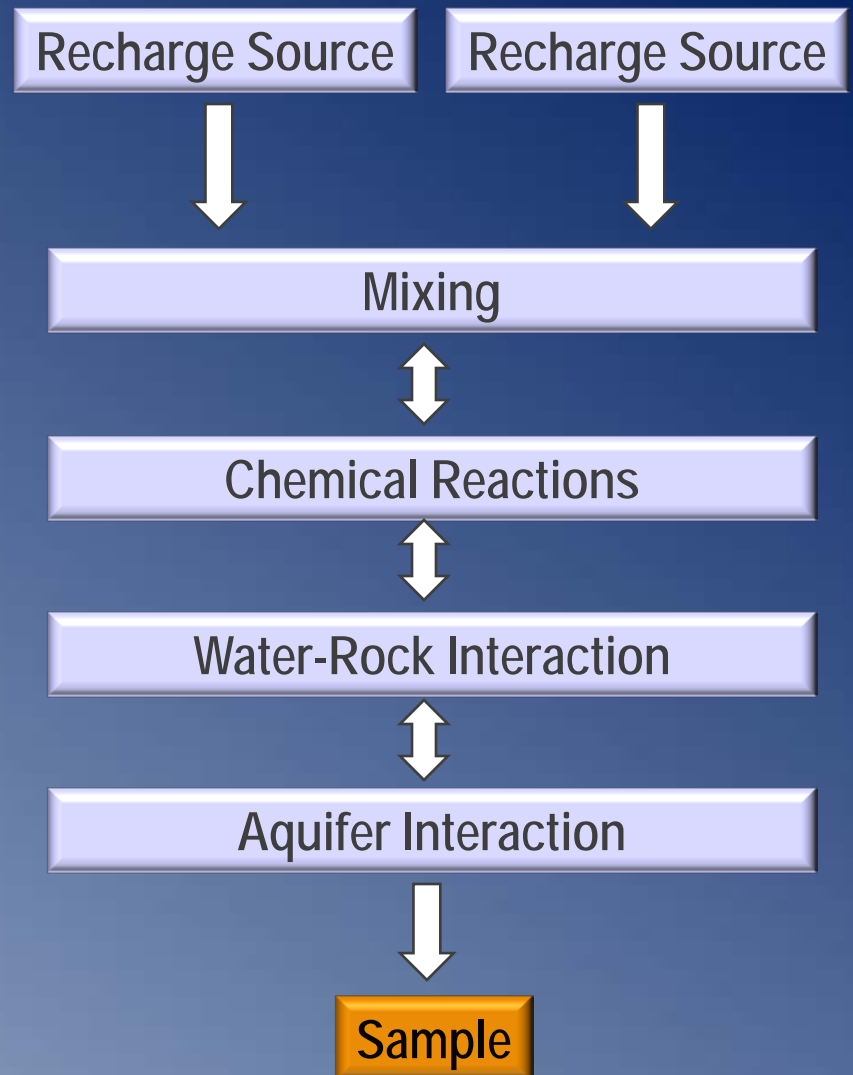
Phase II: Hydrogeologic framework

USGS logo and a data table with multiple columns and rows of text, likely representing survey parameters or station information.



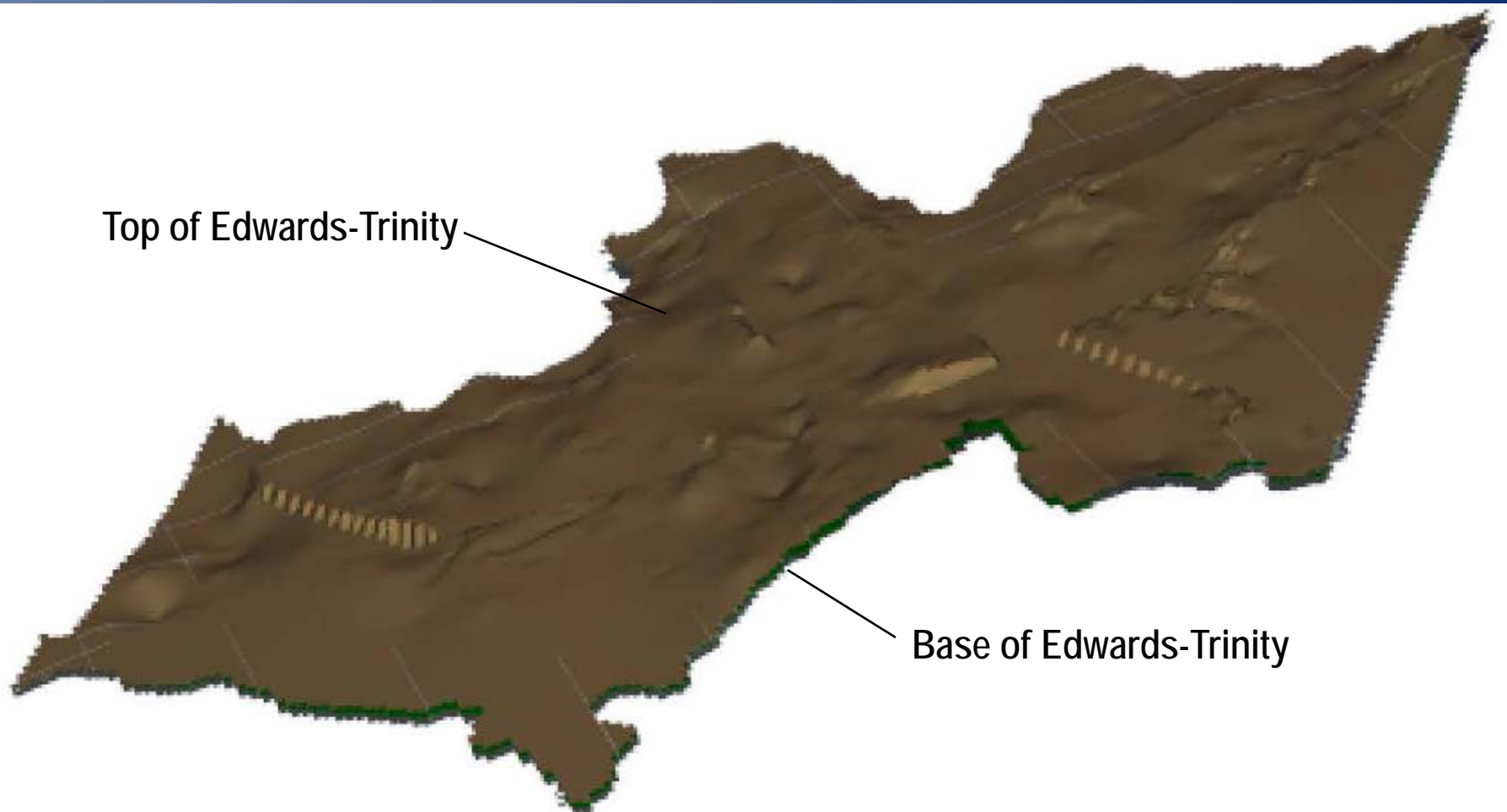
Phase II: Geochemistry

- Groundwater quality
- Distinct chemical characteristics of water from different sources and different aquifers
- Flow paths
- Potential recharge sources
- Mixing pathways



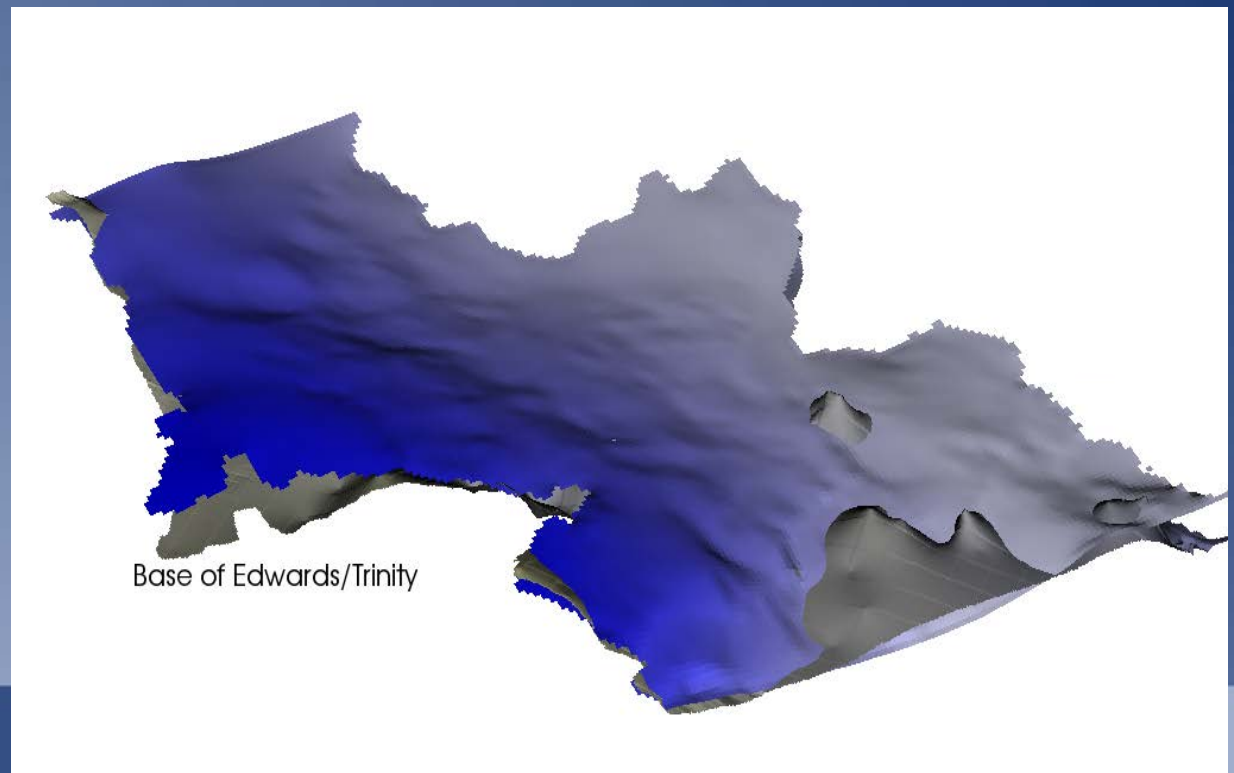
Phase II: Groundwater-Flow System

- Groundwater-level and geochemical interpretations used in context with the hydrogeologic framework



Phase III: Numerical Model

- Quantitative data analysis and interpretation
- MODFLOW 3D finite-difference groundwater flow model
- Model development
- Sensitivity and uncertainty analyses
- Calibration
- Simulations



Summary

- Phase I – Complete
 - Data Compilation
 - Data Collection
 - Data Management
- Phase II: Conceptual Model – In Progress
 - Hydrogeologic framework
 - Geochemistry
 - Groundwater-flow system
- Phase III: Numerical Model – In Progress
 - Development
 - Sensitivity and uncertainty
 - Calibration
 - Simulations



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Questions?