USGS
Texas Water Science Center

Ground-water activities

Houston
San Antonio
Austin

Field office activities

- Approximately 35 SB1 wells
- Additional continuous record wells on individual projects
- All real time ground water data on public web site:

http://tx.usgs.gov/

Cooperator – TWDB

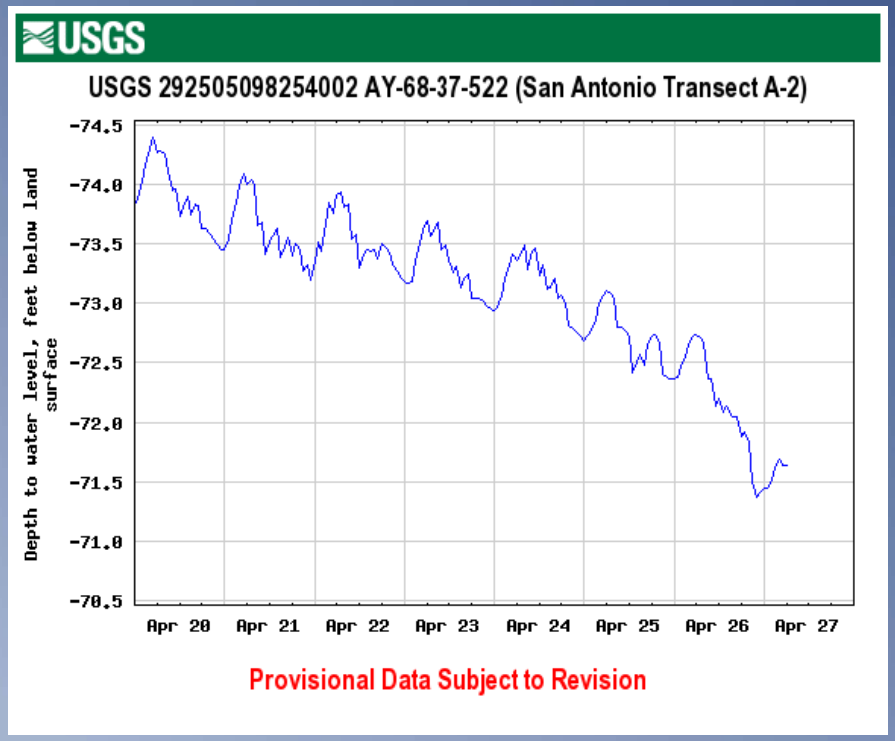
USGS

PROVISIONAL DATA SUBJECT TO REVISION

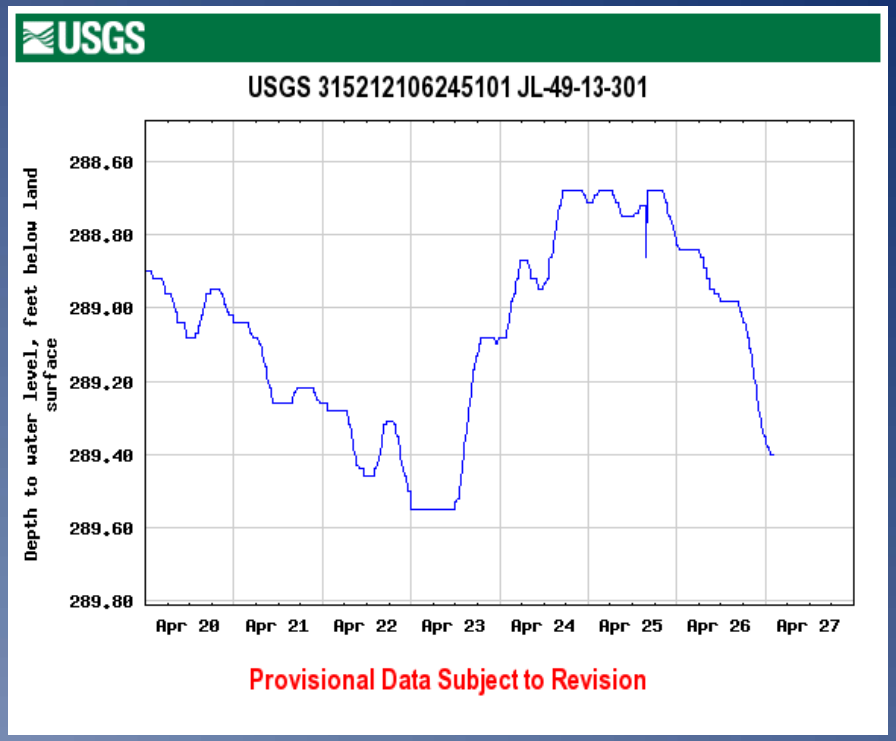
Updated 2005-04-27 08:33:03 US/Eastern

Real-Time Data for Texas: Ground Water -- 51 site(s) found

Bexar County



El Paso County



USGS

Edwards Aquifer

- 15 wells and springs sampled yearly
- Constituents include:
  - Major ions
  - Trace metals
  - VOCs
  - Pesticides

Cooperator – City of Austin

USGS

Evaluation of the Gulf Coast Aquifer System, Montgomery County, Texas

- Develop a water-level monitoring network that adequately defines the potentiometric surface of the Gulf Coast aquifer system in Montgomery County

- Monitor current and historical potentiometric changes in Gulf Coast aquifer system in Montgomery and adjacent counties

- Provide State, county, and local water managers and researchers information related to changes in water-level, land-surface subsidence, and water-quality issues

Cooperator – LSGWCD

USGS

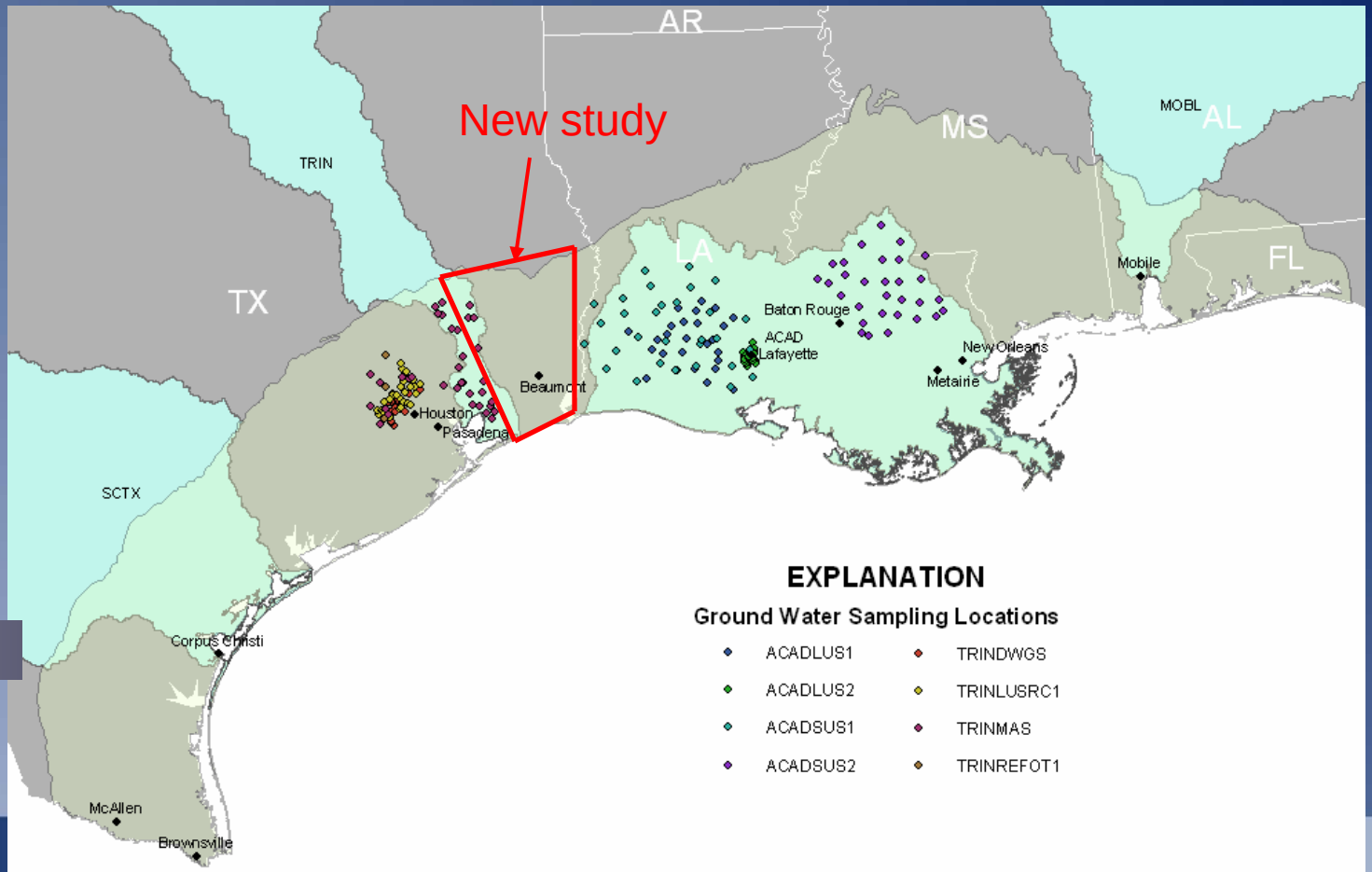
Water-Level Altitudes 2005 and Water-Level Changes in the Chicot, Evangeline, and Jasper Aquifers and Compaction 1973-2004 in the Chicot and Evangeline Aquifers, Houston-Galveston Region, Texas

Open-File Report 2005-1128

In cooperation with the
Harris-Galveston Coastal Subsidence District,
City of Houston,
Fort Bend Subsidence District, and
Lone Star Groundwater Conservation District

USGS

National Water Quality Assessment (NAWQA) GW Studies, Coastal Lowlands (Gulf Coast) Regional aquifer



Cooperator – TWDB

USGS

What Does NAWQA Sample for in Ground Water?

- Nutrients
- Major Ions
- Trace Elements
- Volatile Organic Compounds (VOCs)
- Pesticide Compounds
- Radionuclides
- Environmental Tracers
- Microbiology

USGS

Medina Lake Hydrologic Budget

- Quantify losses by calculating hydrologic budgets over a range in stage
- Determine the location of losses between Medina Dam and Haby Crossing
- Determine proportion of losses that enter the Edwards Aquifer

Cooperators – EAA & BMWD

USGS

Edwards Aquifer Model

- Improved understanding of the hydrogeologic characteristics of the Edwards aquifer

- Develop, calibrate, and maintain a ground-water flow model of the Edwards aquifer

Cooperators – EAA & DOD

Partner – BEG

USGS

Ground water In Webb County

- Define hydrogeologic framework and occurrence of water
- Quantify hydraulic properties and yields
- Characterize quality of ground water
- Determine chemical composition of water that results from mixing of waters

Cooperator – City of Laredo

USGS

Salinewater Transition zone Study

- Describe hydrogeologic framework of freshwater/saline-water interface
- Characterize hydrology of the interface using chemical, geochemical, and hydraulic information; and
- Determine flowpaths and mixing patterns along the interface.

Cooperator – SAWS

USGS

Edwards Aquifer Statistical Model

- Identify relations of springflow and groundwater levels to rainfall, streamflow, and recharge
- Study area includes Medina, Bexar, and Comal Counties traversed by the Western Medina and Eastern Medina flowpaths

Cooperator – SAWS

USGS

Assessment Carrizo Aquifer Recharge

- Characterize surface-water quantity and quality of representative Carrizo aquifer recharge-zone watersheds.
- Characterize ground-water quality of the Carrizo aquifer in the vicinity of the ASR study area.
- Calibrate a HSPF watershed model to simulate runoff, recharge, and streamflow water quality for the proposed watersheds.

Cooperator – SAWS

USGS

Paired Watershed Study

- Quantify changes in watershed yields caused by Ashe Juniper Control
- Protect existing watershed water quality
- Evaluate watersheds on Edwards aquifer and Middle Trinity aquifer outcrops

Cooperator – NRCS

USGS

North Medina Flowpath Study

- Refine the hydrogeologic setting
-
- Determine the hydraulic properties
- Define flowpaths

Cooperator – SAWS

USGS science for a changing world

South-Central Texas (SCTX) NAWQA new projects– Cycle II

- Edwards aquifer recharge zone, drill and sample urban land use monitor wells, Austin.
- SWQA (Source Water Quality Assessment)-- sampling raw and treated water from Edwards aquifer public supply wells, San Antonio.
- TANC (Transport of Anthropogenic and Natural Contaminants)-- multi year study, Edwards aquifer, San Antonio.
- Carrizo-Wilcox, sampling water from existing (primarily domestic) wells.

USGS

SCTX Cycle II NAWQA projects (resampling)

- Edwards aquifer recharge zone
  - Sampling water from existing (primarily domestic) wells, Hays to Kinney Co.
  - Sampling water from urban land use monitor wells drilled by USGS in the San Antonio Metropolitan area.

USGS

TANC - Transport of Anthropogenic and Natural Contaminants to Public Supply Wells

- What are the primary anthropogenic and natural contaminant sources, aquifer processes, and well characteristics that control the transport and transformation of contaminants along flowpaths to public supply wells in representative aquifers?

USGS

TANC Specific Objectives

- Characterize human activities, and geologic and hydrologic factors that are related to sources
- Determine hydrologic factors that affect transport
- Identify important chemical characteristics and transformation processes
- Evaluate effects of well characteristics and well-field management
- Determine factors that can be used for extrapolation & forecasting

USGS

Depth Dependent Sampling to be Performed in Selected Edwards Aquifer Public Supply Wells

- Flow measurements with depth provide:
  - Quantitative estimates of flow contribution or loss in specific zones
  - Estimates of hydraulic conductivity, specific conductance, and heat-pulse with depth
  - Information about the relative importance of fractures
- Water quality sampling with depth provide:
  - Information about contaminant occurrence with depth
  - The relative importance of flow and contaminant occurrence in transport
  - Information about water quality concerns and potential ways to improve water quality or avoid future problems

USGS

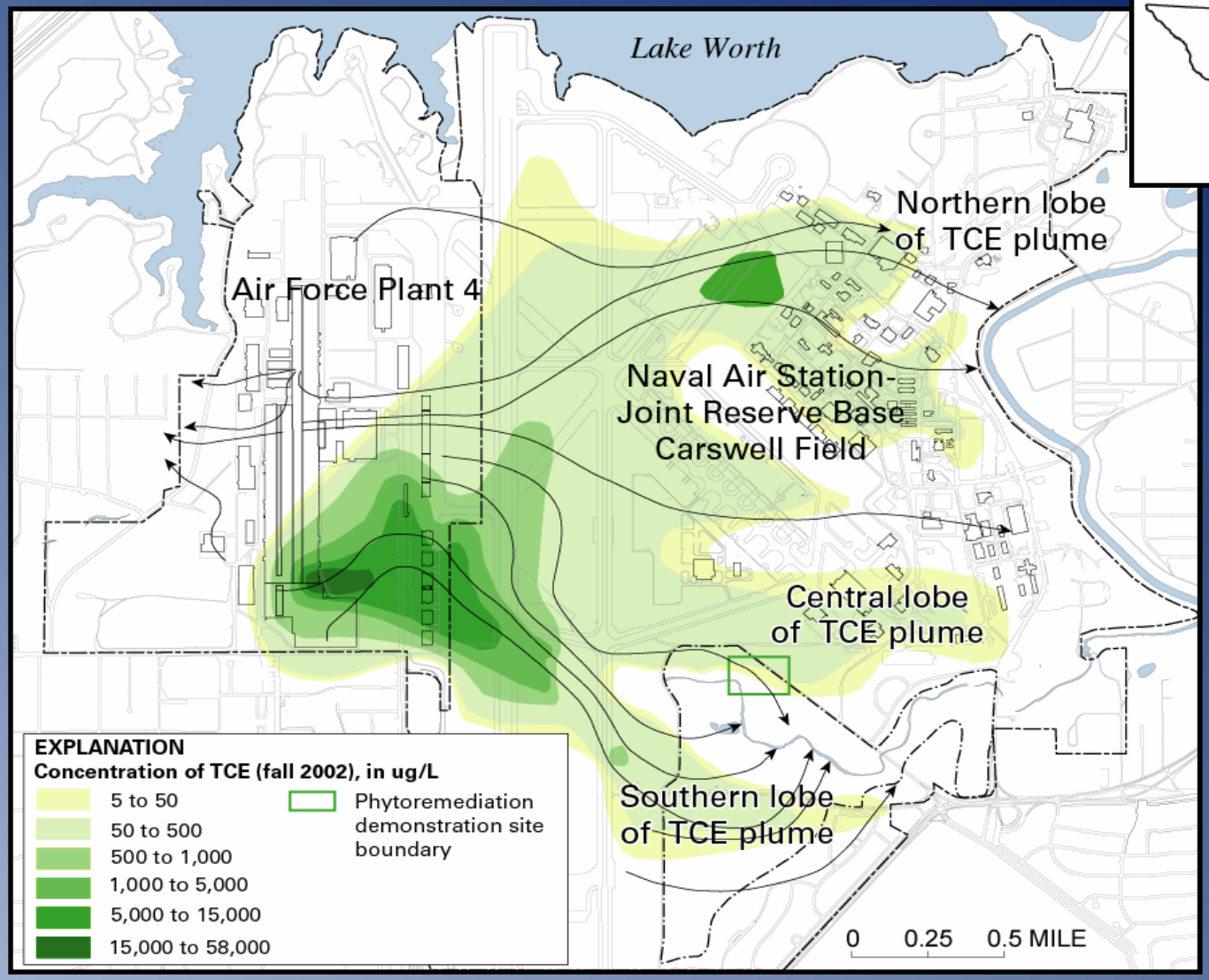
Source Water Quality Assessment

- Sample 39 PWS wells in Edwards Aquifer
  - Major Ions, Nutrients, Trace Elements
  - DOC, VOCs, Fuel Oxygenates
  - Pesticides, Organic Waste Contaminants
  - Microbiology
  - Perchlorate, archive isotope samples
- Resample selected wells for source and finished water

Overview of Project Activities at Air Force Plant 4 and Naval Air Station-Joint Reserve Base Carswell Field, Fort Worth, Texas

USGS

Sitemap



USGS

Background

- AFP4 has been in operation since 1942

- The facility has manufactured aircraft, radar units, missile components, etc.

- The manufacture of these parts requires various types of hazardous chemicals, principally the solvent trichloroethylene (TCE)

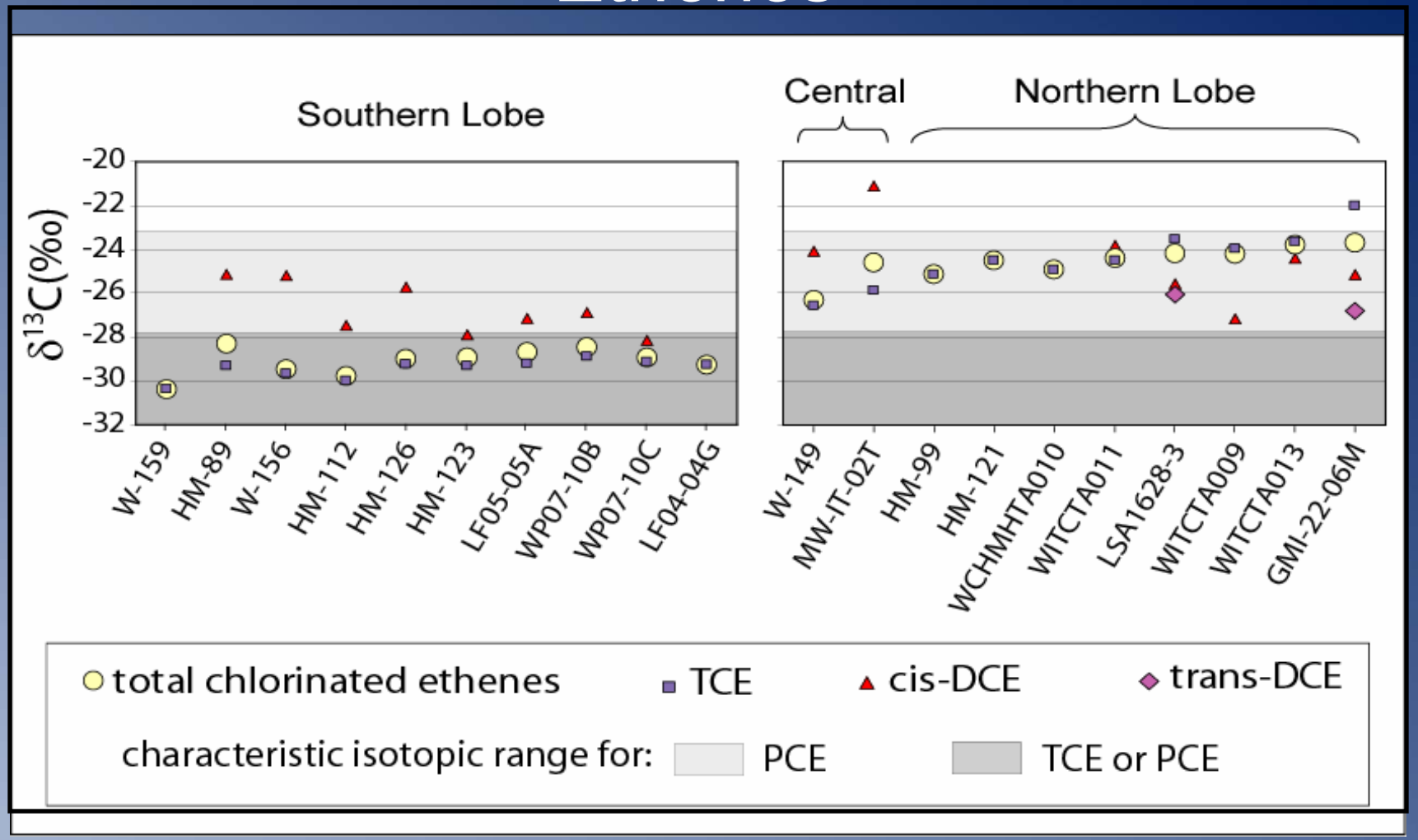
- Water from the contaminated surficial terrace alluvial aquifer has leaked into the upper portion of the Paluxy drinking-water aquifer within the boundaries of AFP4

Compound Specific Isotope Analysis (CSIA)

- Elements that make up chlorinated solvents (C, Cl, H) each contain two stable isotopes … one heavy and one light ($^{13}C/^{12}C$, $^{37}Cl/^{35}Cl$, $^{2}H/^{1}H$)
- Ratios of heavy to light isotopes are expressed as δ values… per mil (‰) differences of the ratios relative to a standard
- CSIA … determination of stable isotope ratios for individual compounds (PCE, TCE, DCE, VC, Ethene)
- CSIA was used at this site to fingerprint organic contaminants

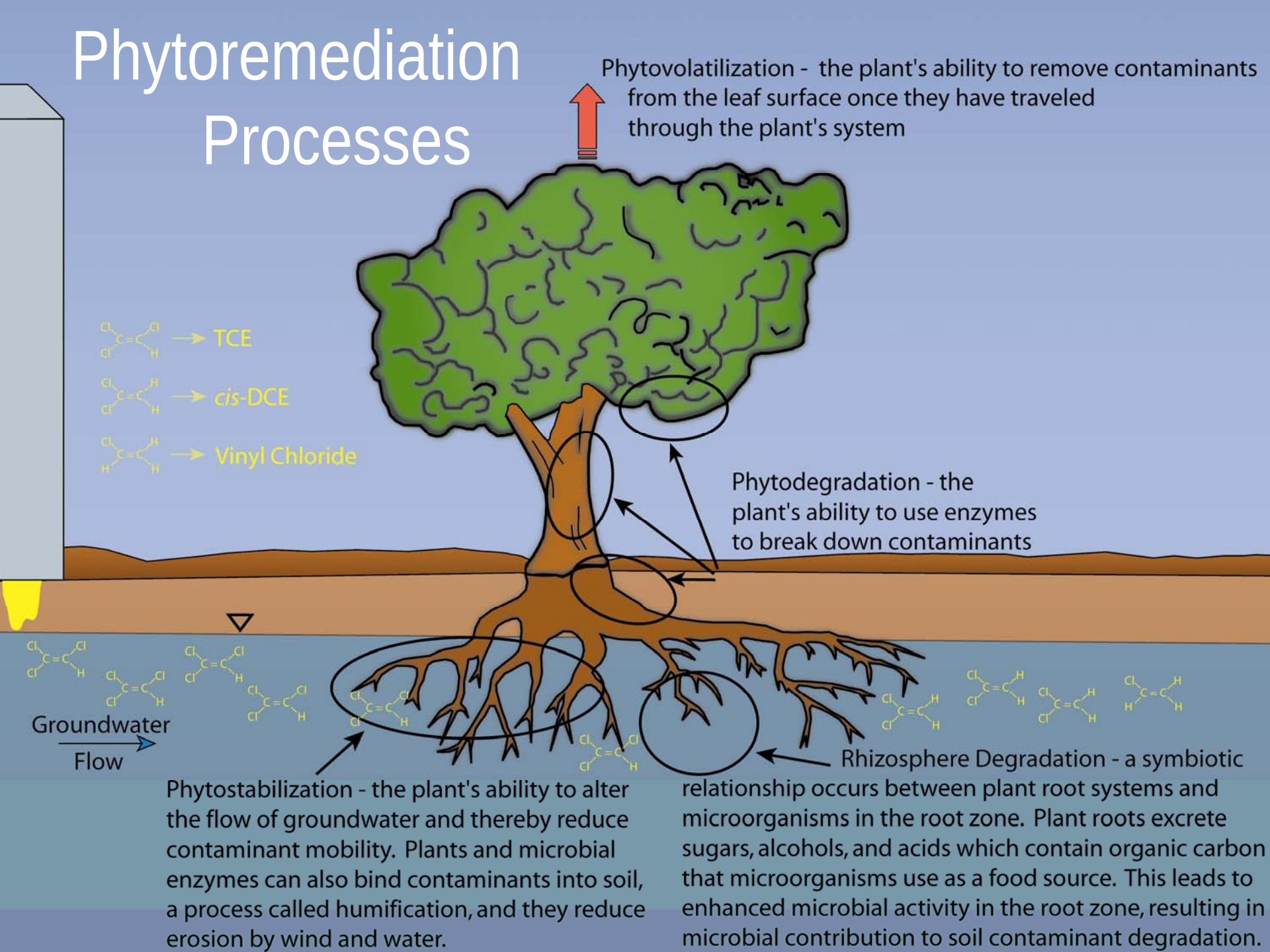
USGS

Results: δ13C (‰) of Chlorinated Ethenes

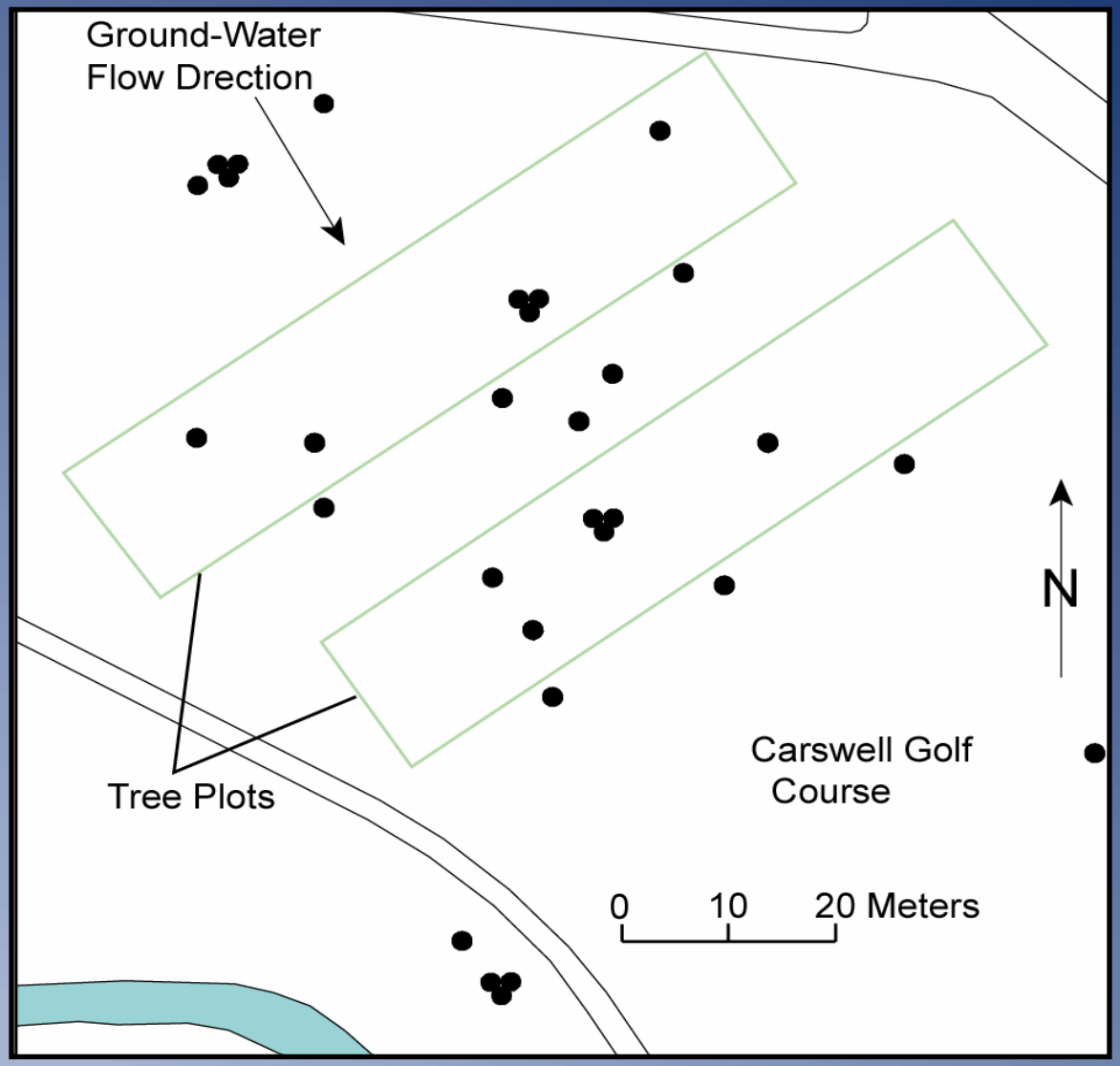


USGS

Phytoremediation Processes



Purpose and Scope



- **Geochemical data is collected from 30 to 40 wells**
- **Samples are collected twice a year, once during the growing season and once in the dormant season**
- **Sample results are analyzed to quantify the efficiency and extent of rhizosphere degradation at the site**

USGS

Laboratory and Field Analyses

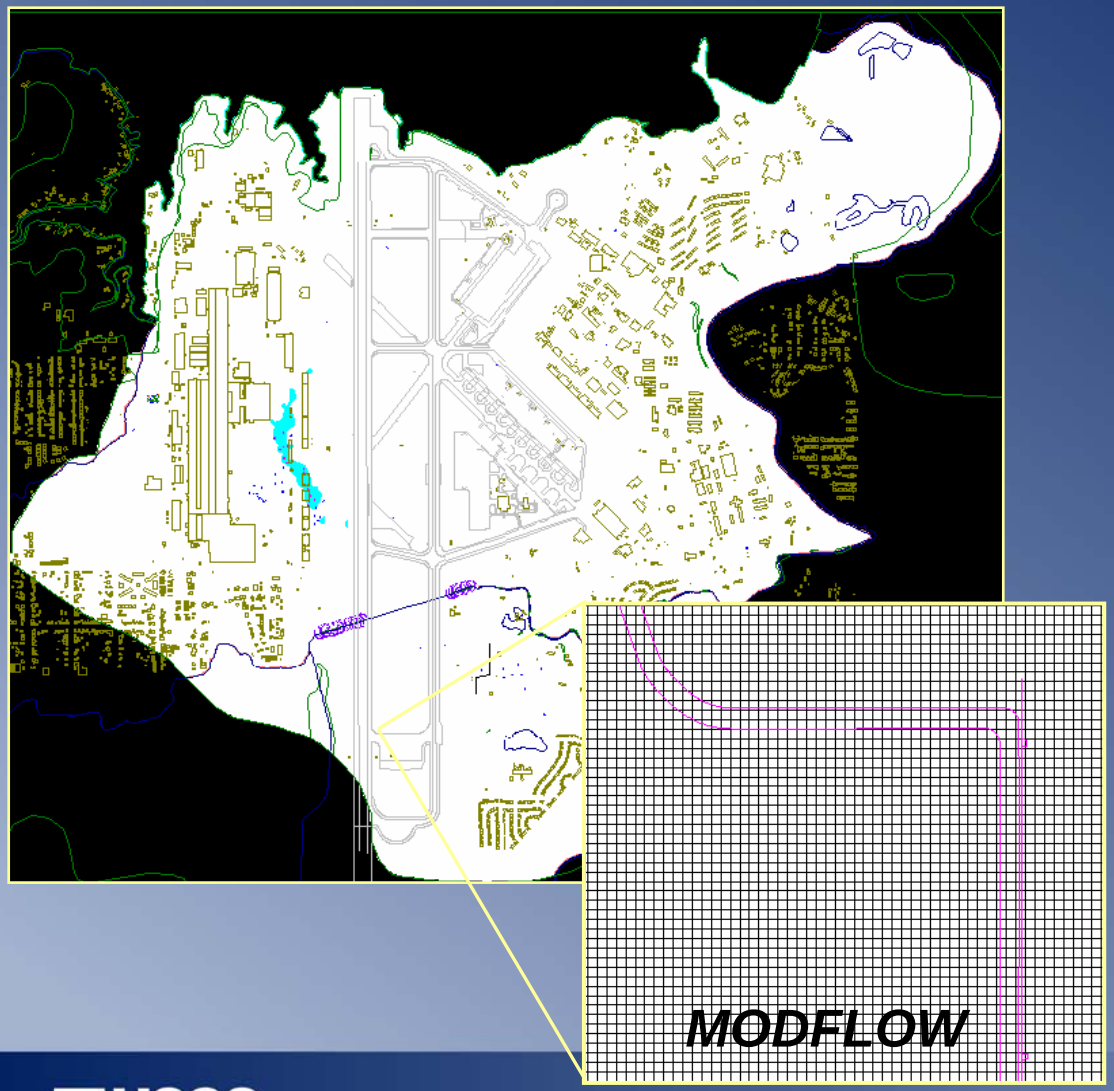
Lab analyses include

- VOCs
- Arsenic speciation
- Hexavalent/ Total Cr
- Ferrous/ Total Fe
- Genistein
- Uranium speciation
- Metals
- Nutrients
- DOC and TOC
- pH, Hardness, Specific Conductance

Field analyses include

- Hydrogen
- Carbon dioxide and Methane
- Dissolved oxygen
- Nitrate/Nitrite
- Ferrous/Total Fe
- Sulfate/Sulfide
- pH
- Alkalinity
- Specific conductance

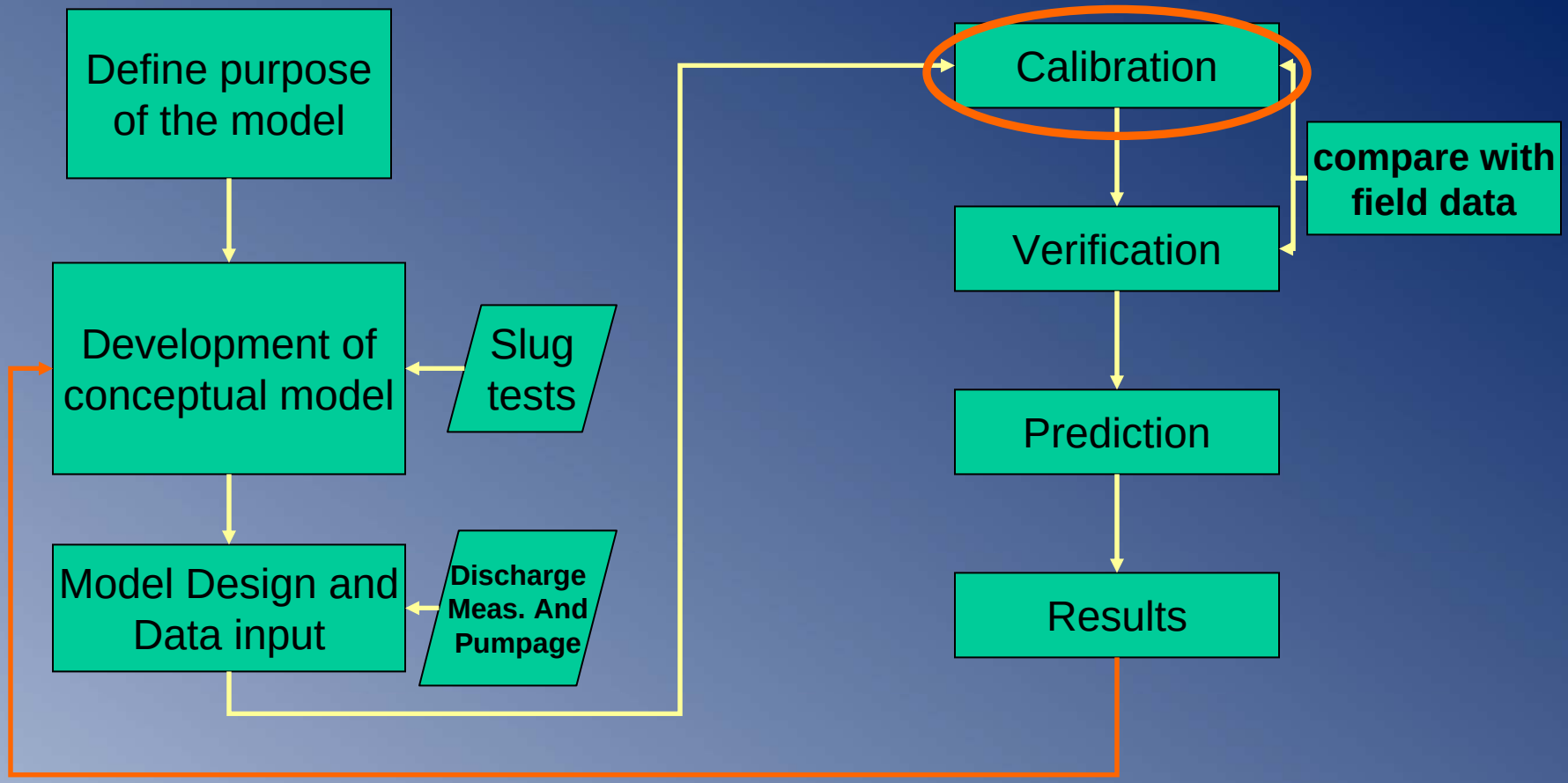
Ground-water Flow Model Characteristics



- **Cell size 20 ft (equally spaced)**
- **781 rows**
- **878 columns**
- **685,718 cells**
- **375,234 active**
- **1 layer**
- **No rotation**

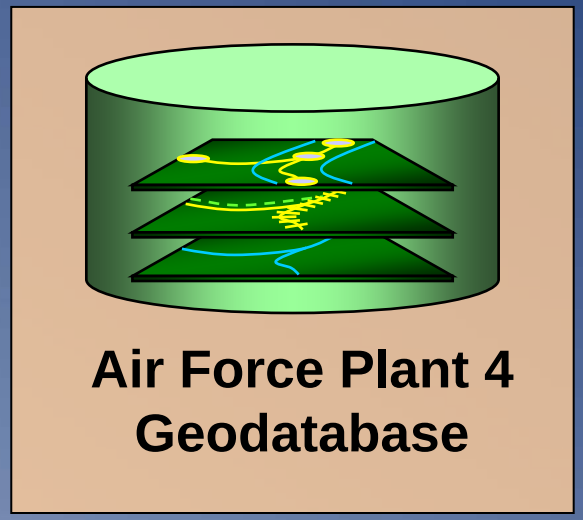
USGS

Ground-Water Flow Model Progress



USGS

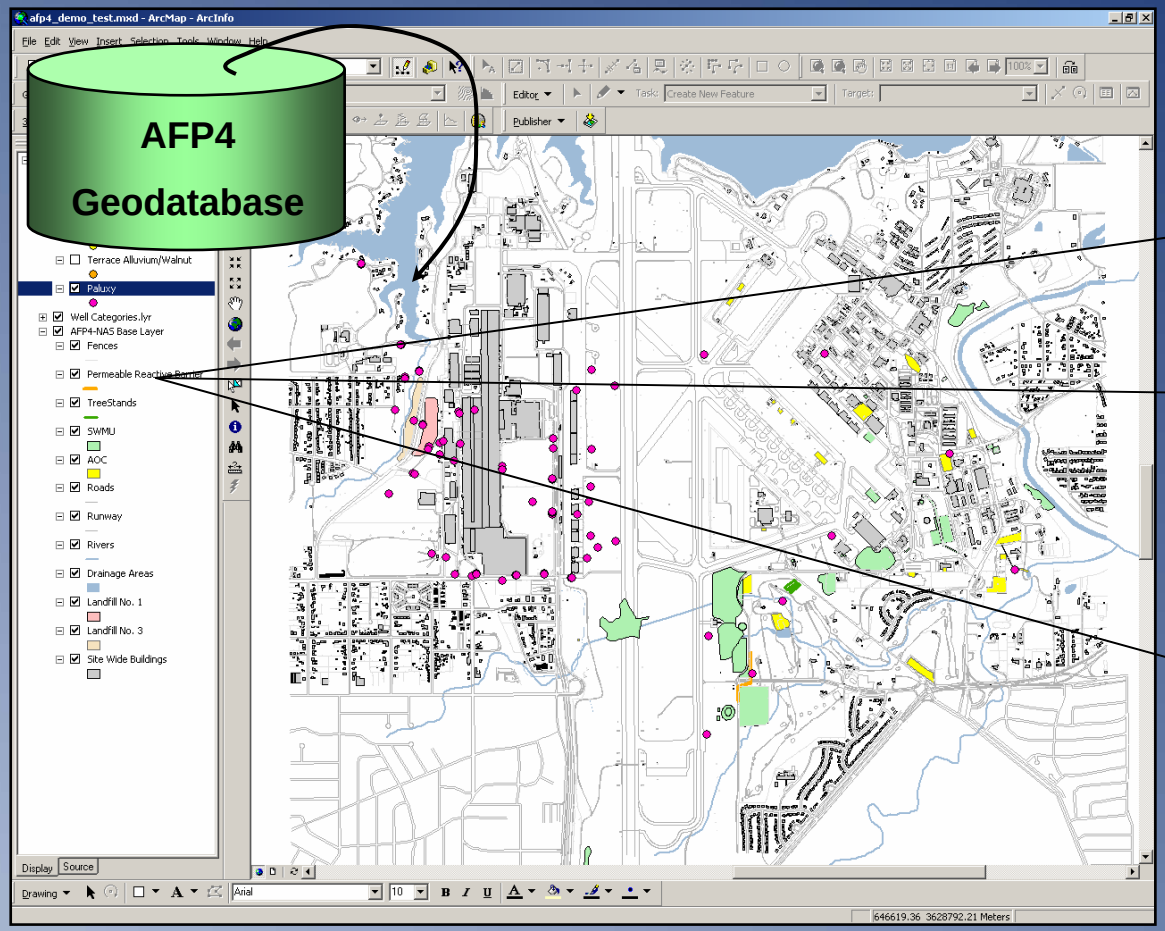
What does a Geodatabase need?

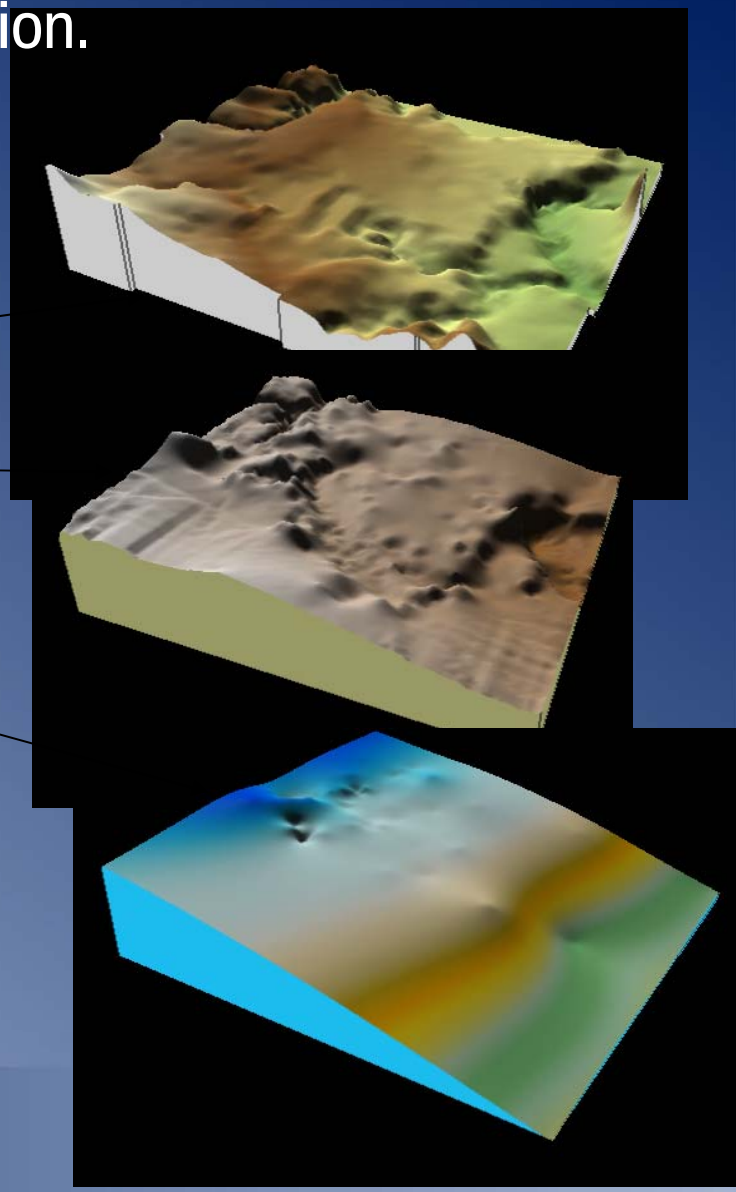


USGS

Site-wide Three-Dimensional Model

- Geodatabase is framework for 3-D creation.





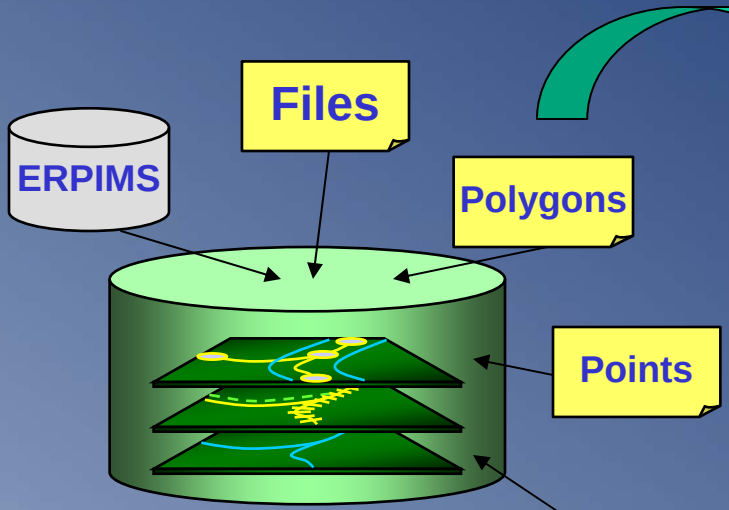
USGS

How does this help our cause?

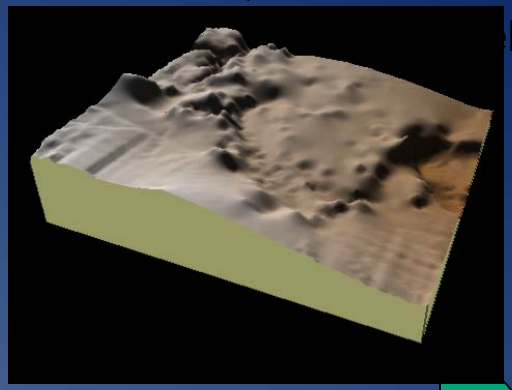
- Facilitates 3-dimensional visualization of the geologic, hydrologic, and water-quality features of the AFP4.

USGS

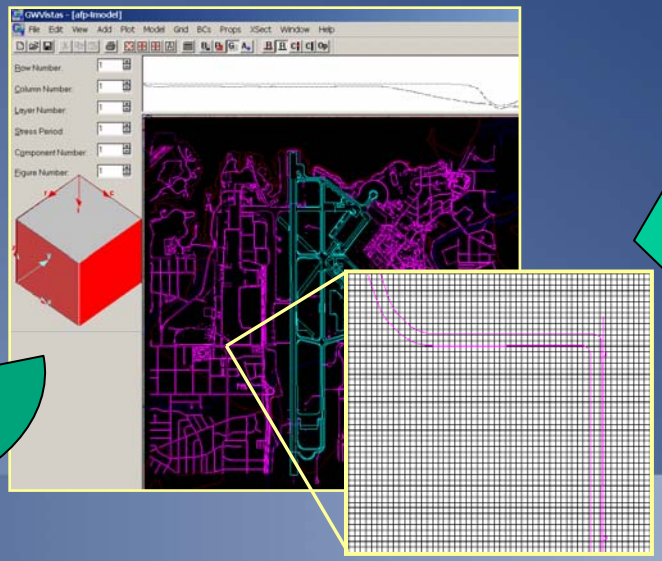
Geodatabase & Modeling



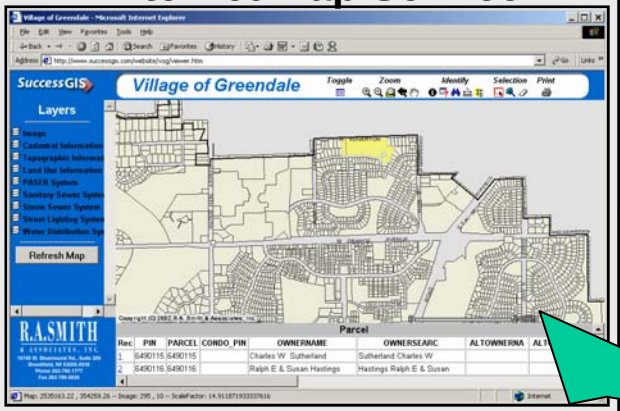
Geodatabase Services



Ground-water Modeling



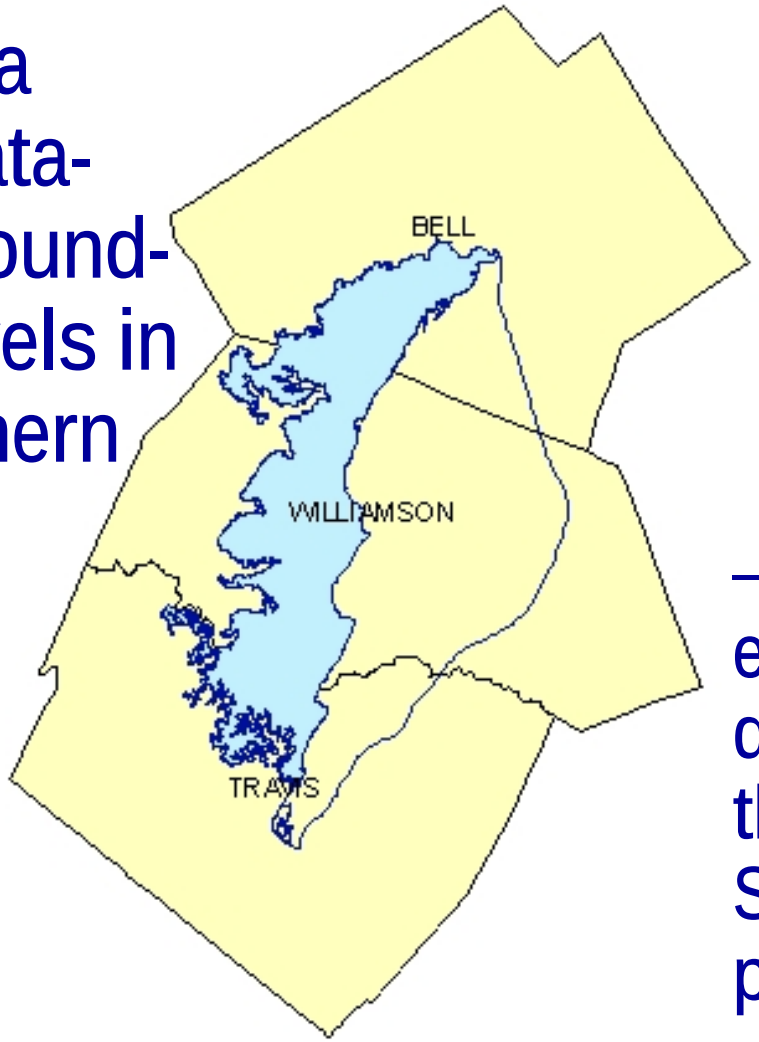
Internet Map Service



USGS

Northern Edwards aquifer water levels

- Develop a digital data-set of ground-water levels in the Northern Edwards Aquifer



–To enhance the data set for the TCEQ SWAP program

Cooperator – TCEQ

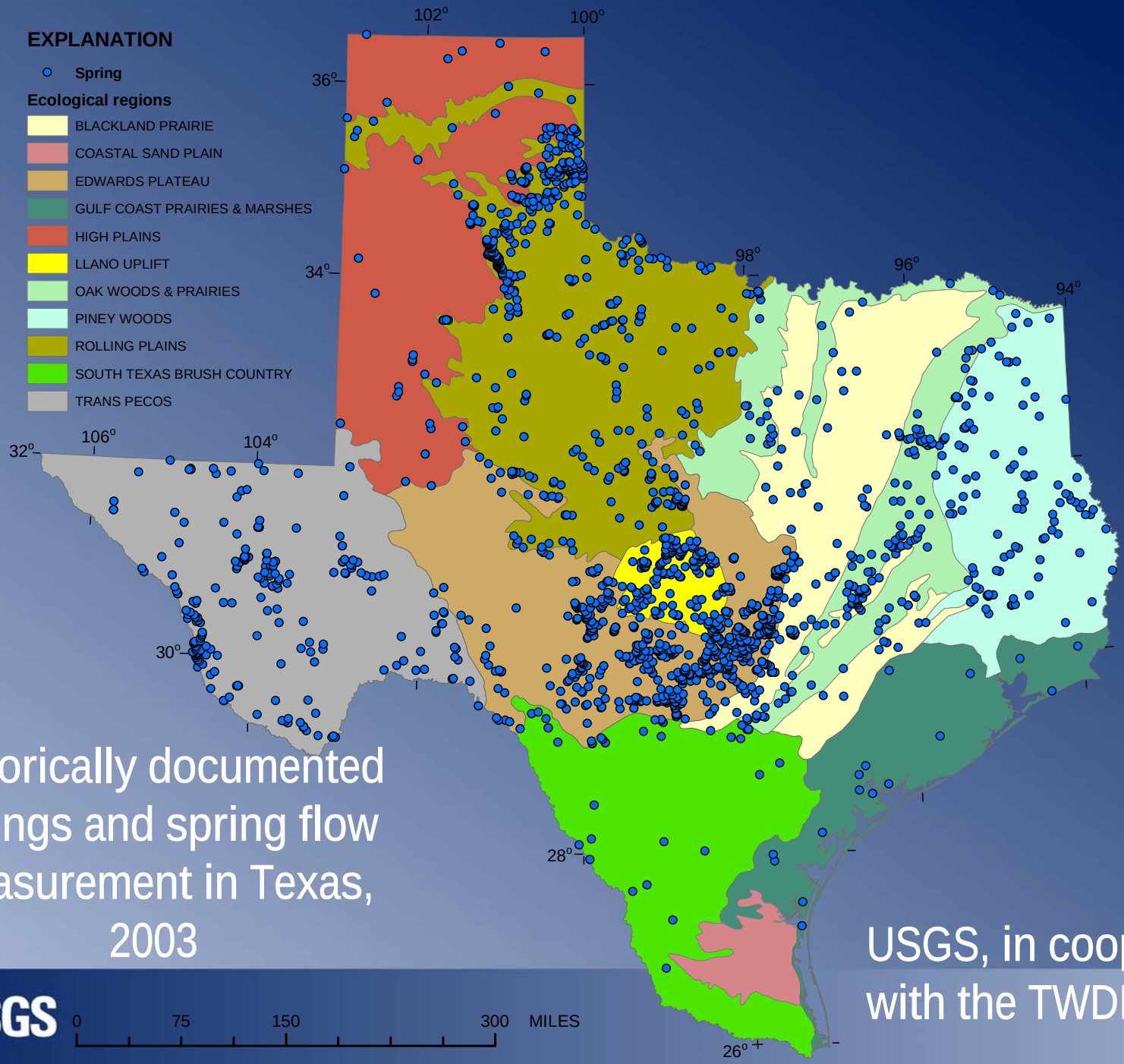
USGS

Assessment Of Available Flow And Water-Quality Data For Selected Major Springs In Texas

- Select major springs on the basis of provided criteria
- Create a database representing the quantity and quality of spring flow for each major spring
- Assess the data for each spring and document the data needed to derive spatial and temporal trends in the quantity and quality of spring flow for each spring; thereby determining a field-sampling strategy for future data collection

Cooperator – TPWD

USGS



Historically documented springs and spring flow measurement in Texas, 2003

USGS

USGS, in cooperation with the TWDB

Characterizing water quality in the Barton Springs/Edwards Aquifer

Continuous physical and chemical parameters

pH, temperature, SC, turbidity, DO

Baseflow

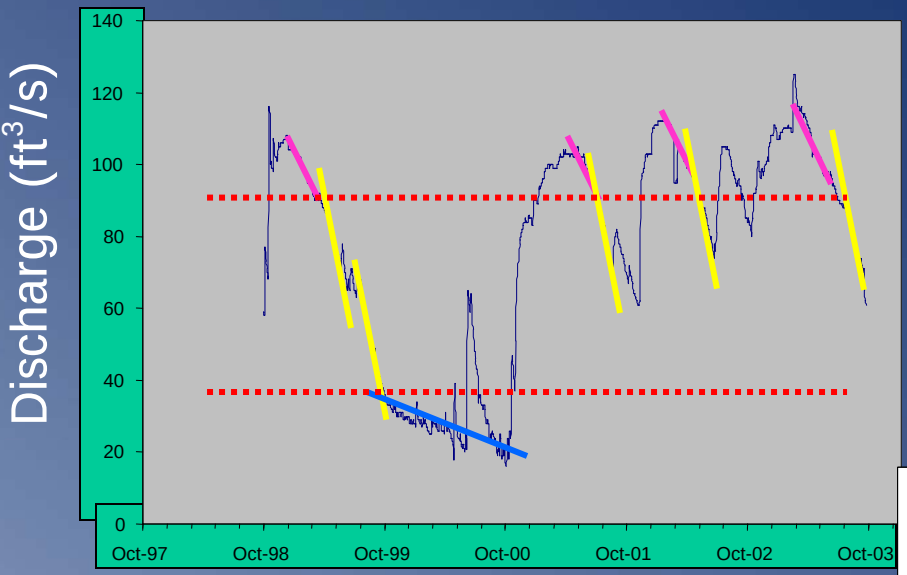
Major ions, nutrients, anthropogenic compounds

Stormflow

Major ions, nutrients, anthropogenic compounds

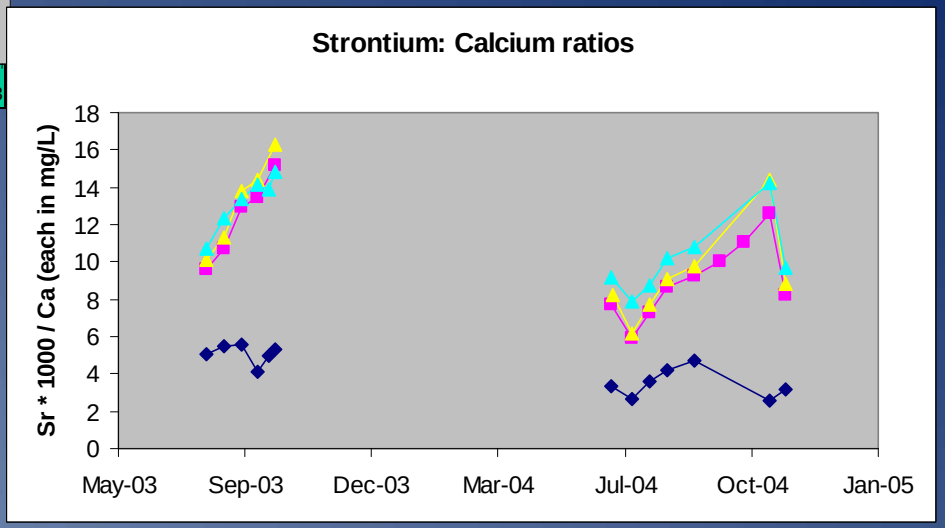
Cooperator – TCEQ

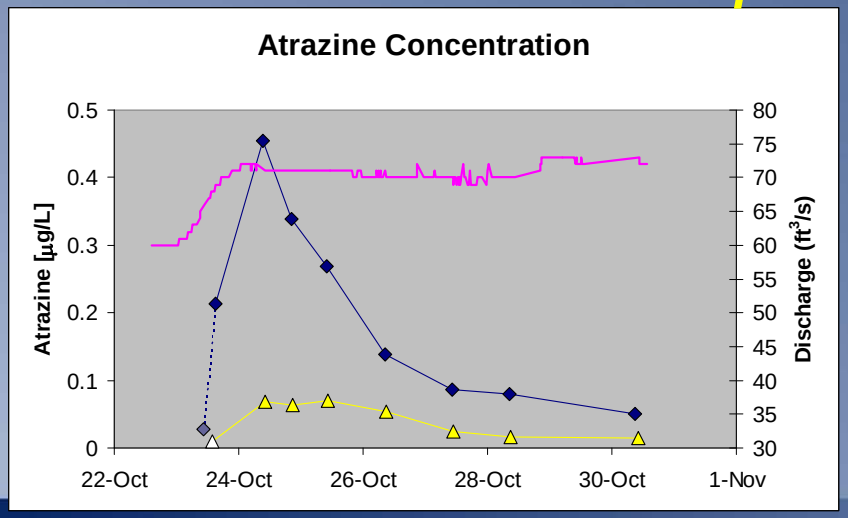
USGS



Long-term continuous data give us information about aquifer structure

Baseflow data on major ions give us information about residence time and flow paths

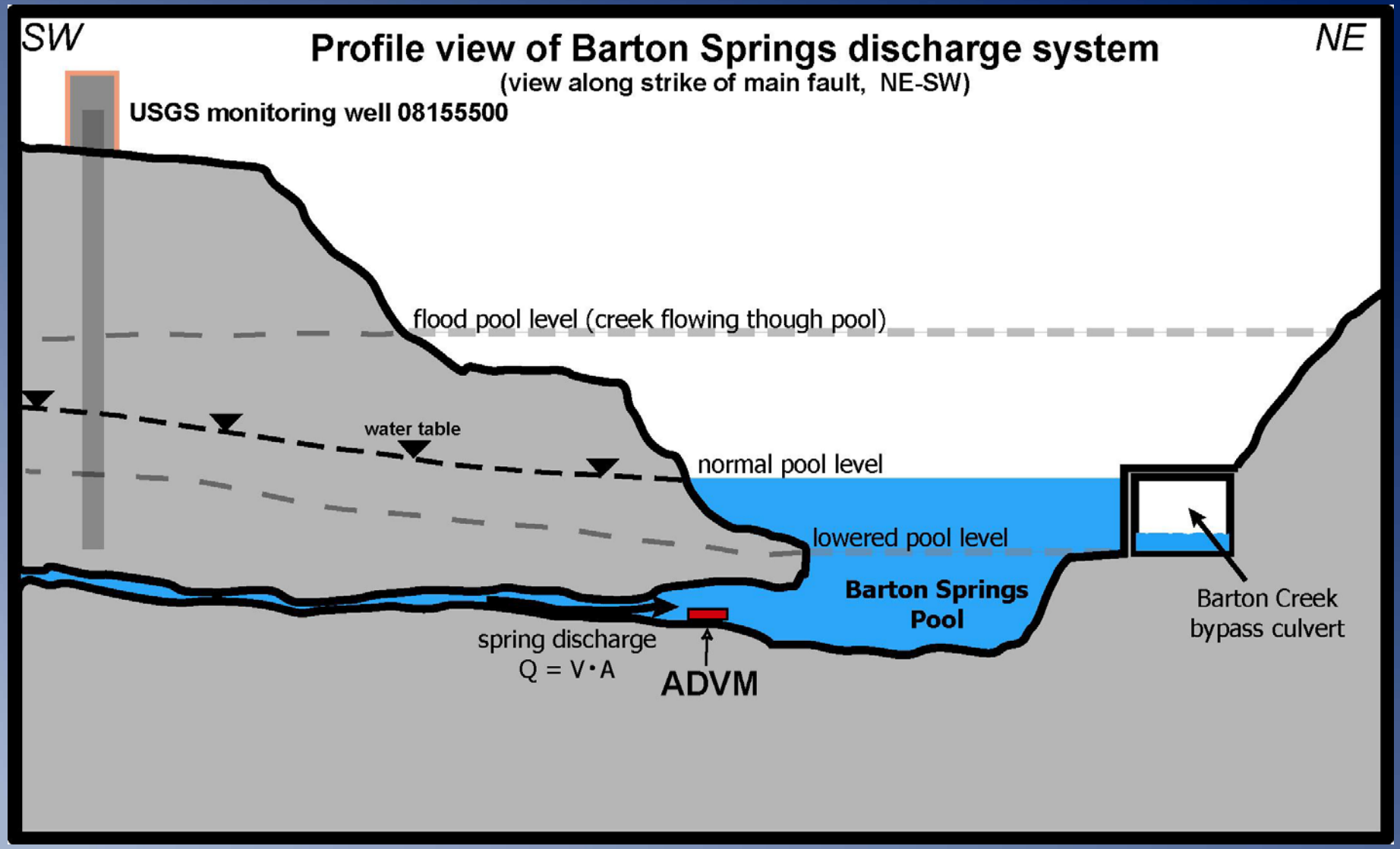




Stormflow breakthrough curves tell us about peak concentrations, time of travel, and potential sources

USGS

Barton Springs



Monitoring Springs in Karst Aquifers: Continuous data for ground water analysis

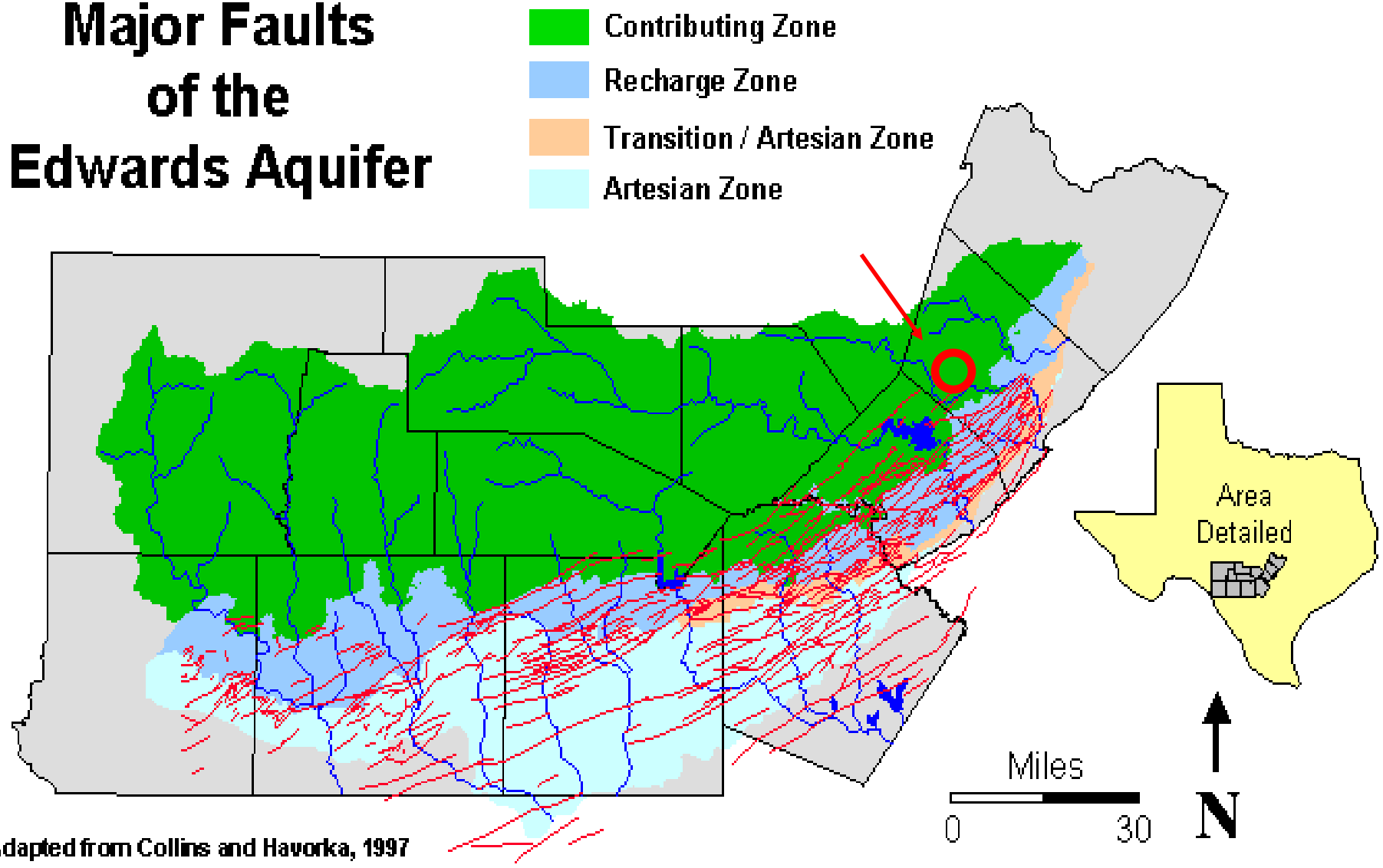
Barton Springs – A model for spring monitoring…in real time!

Acoustic Doppler Velocity measurements: new method for quantifying continuous spring discharge.

Jacob's Well – applying continuous data collection in other karst ground water systems.

USGS

Jacob's Well


Major Faults of the Edwards Aquifer
Contributing Zone
Recharge Zone
Transition / Artesian Zone
Artesian Zone
Area Detailed
Miles
0
30
N
Adapted from Collins and Havorka, 1997

Continuous monitor in Jacob's Well

PARAMETERS:

- Stage
- X, Y, and Z velocity (point)
- Temperature
- Dissolved Oxygen
- Specific Conductance
- pH
- Turbidity
- Depth
- Discharge (rating pending)

Cooperator – HTGCD

USGS

Contact information

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