Discussion of Water Management in Texas and Confined Aquifer Dynamics

PRESENTED BY

Gary Westbrook, General Manager, Post Oak Savannah GCD

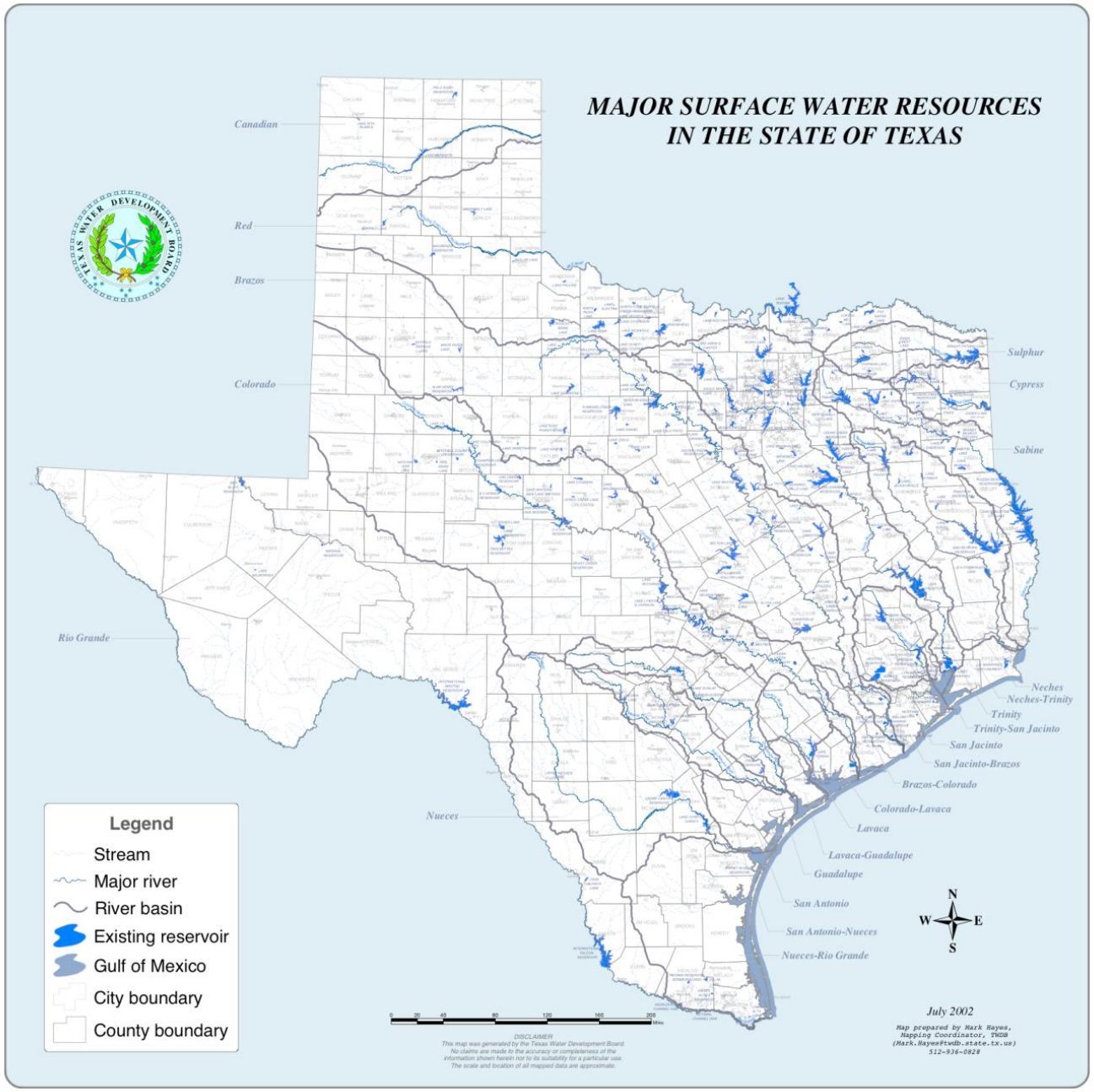
POSGCD Real Estate Seminar

June 27, 2023

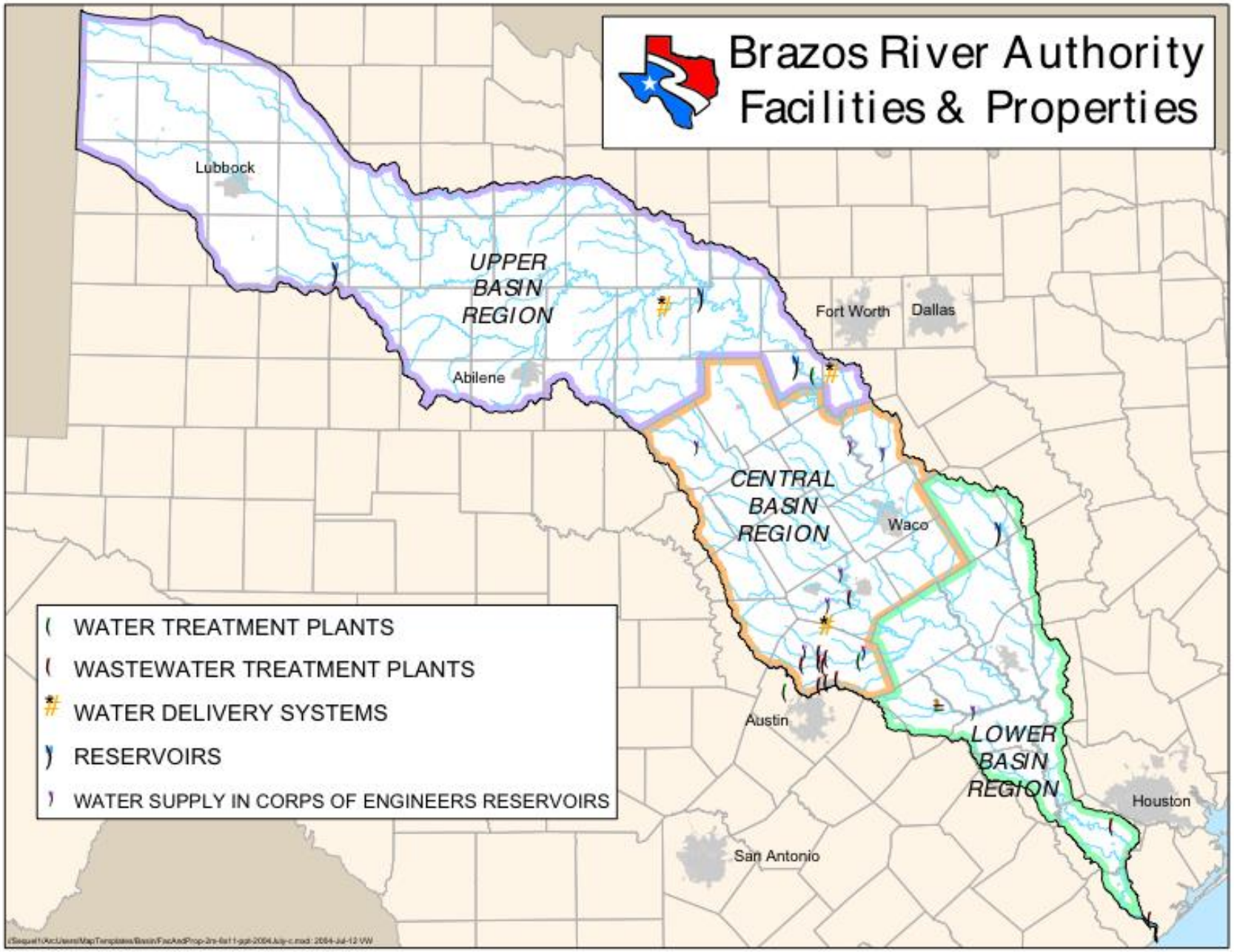
Texas Water Resources and Management

SURFACE WATER

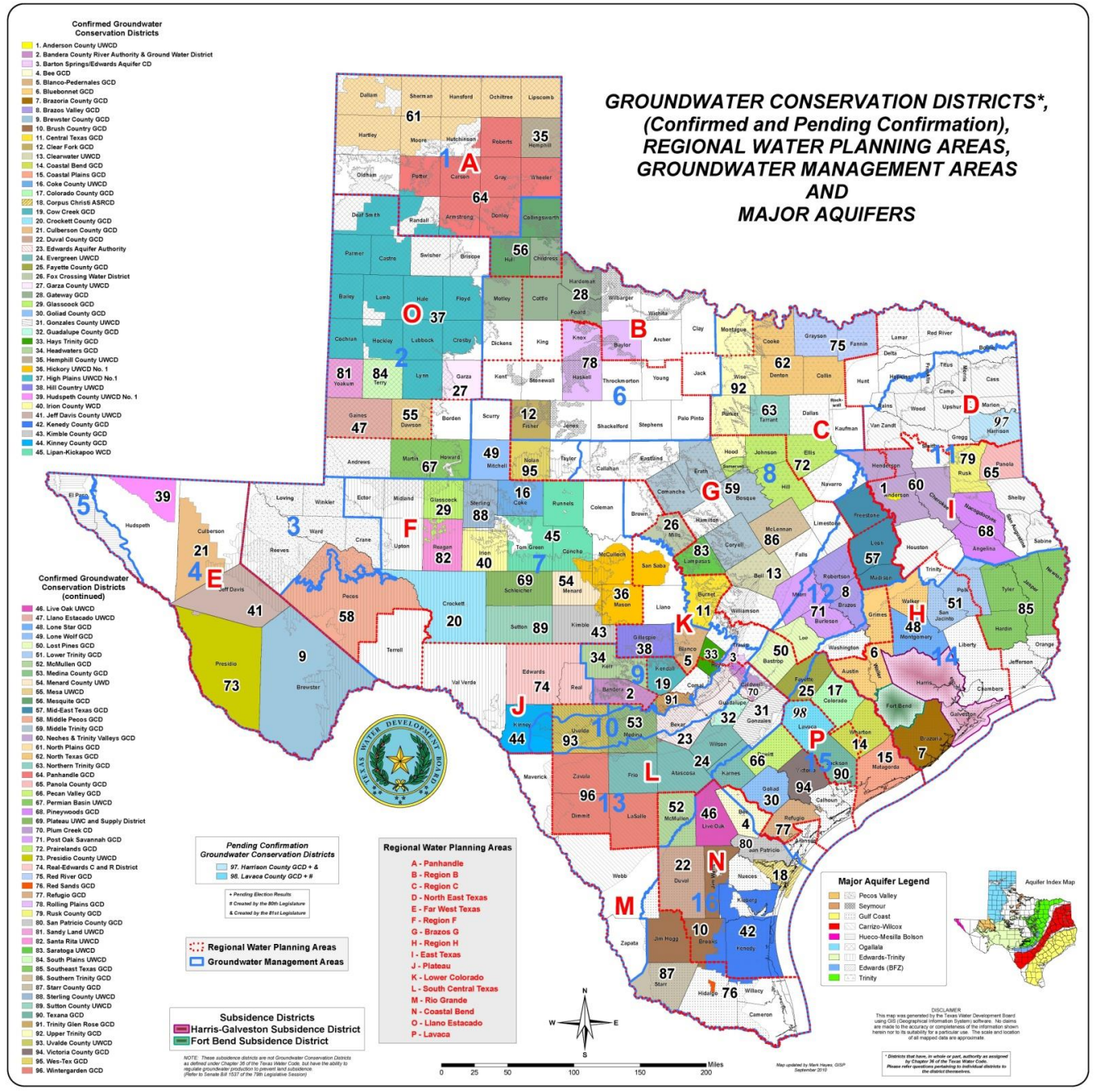
Owned by the State, Regulated by Texas Commission on Environmental Quality (TCEQ), & managed by River Authorities




Major River Basins
In Texas
Legend


Brazos River Authority
Facilities & Properties
Lubbock
UPPER
BASIN
REGION
Abilene
Fort Worth
Dallas
CENTRAL
BASIN
REGION
Waco
Austin
LOWER
BASIN
REGION
Houston
San Antonio
WATER TREATMENT PLANTS
WASTEWATER TREATMENT PLANTS
WATER DELIVERY SYSTEMS
RESERVOIRS
WATER SUPPLY IN CORPS OF ENGINEERS RESERVOIRS

Groundwater in Texas aquifers is privately owned & regulated by 99 Groundwater Conservation Districts (GCDs)

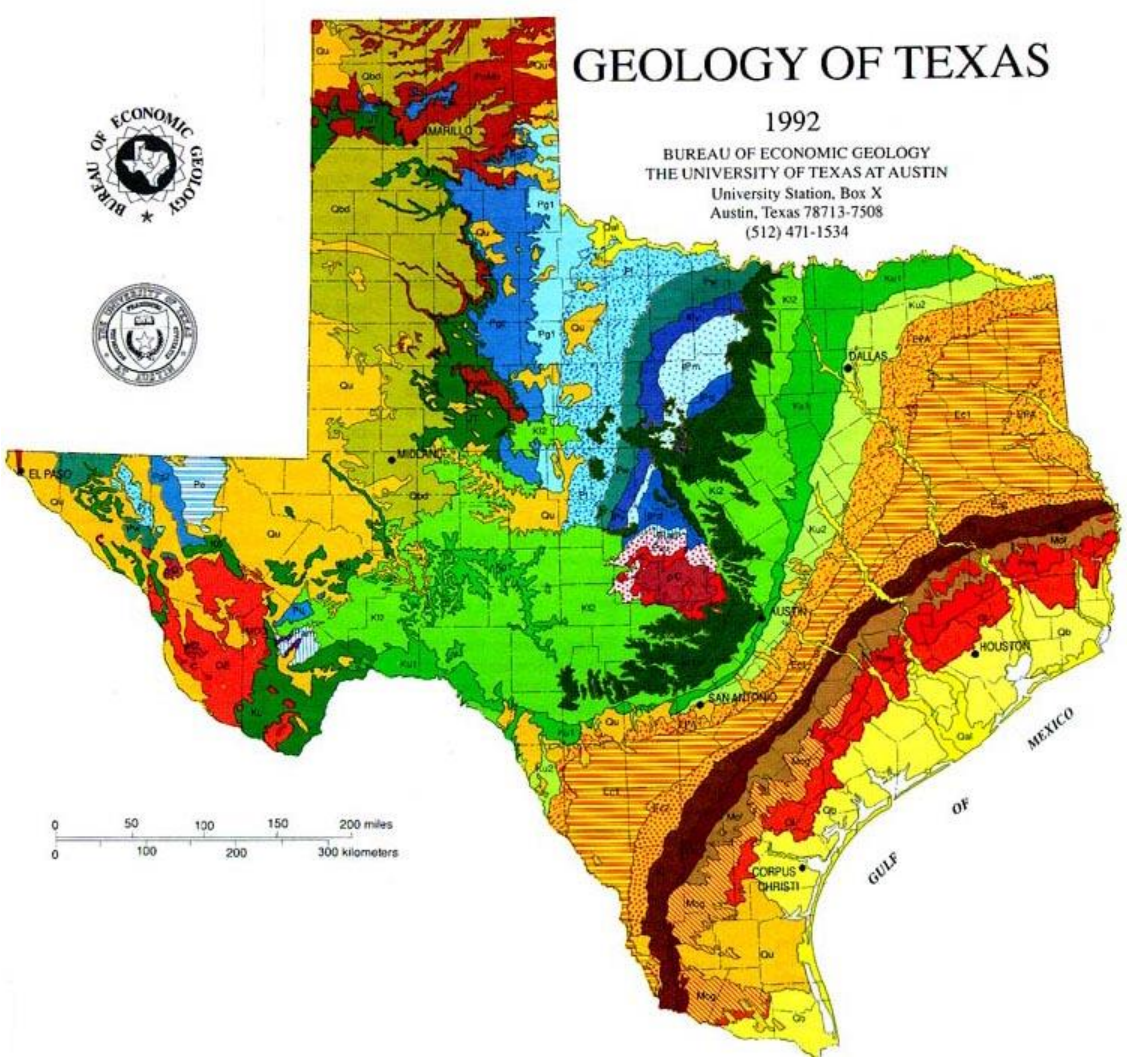


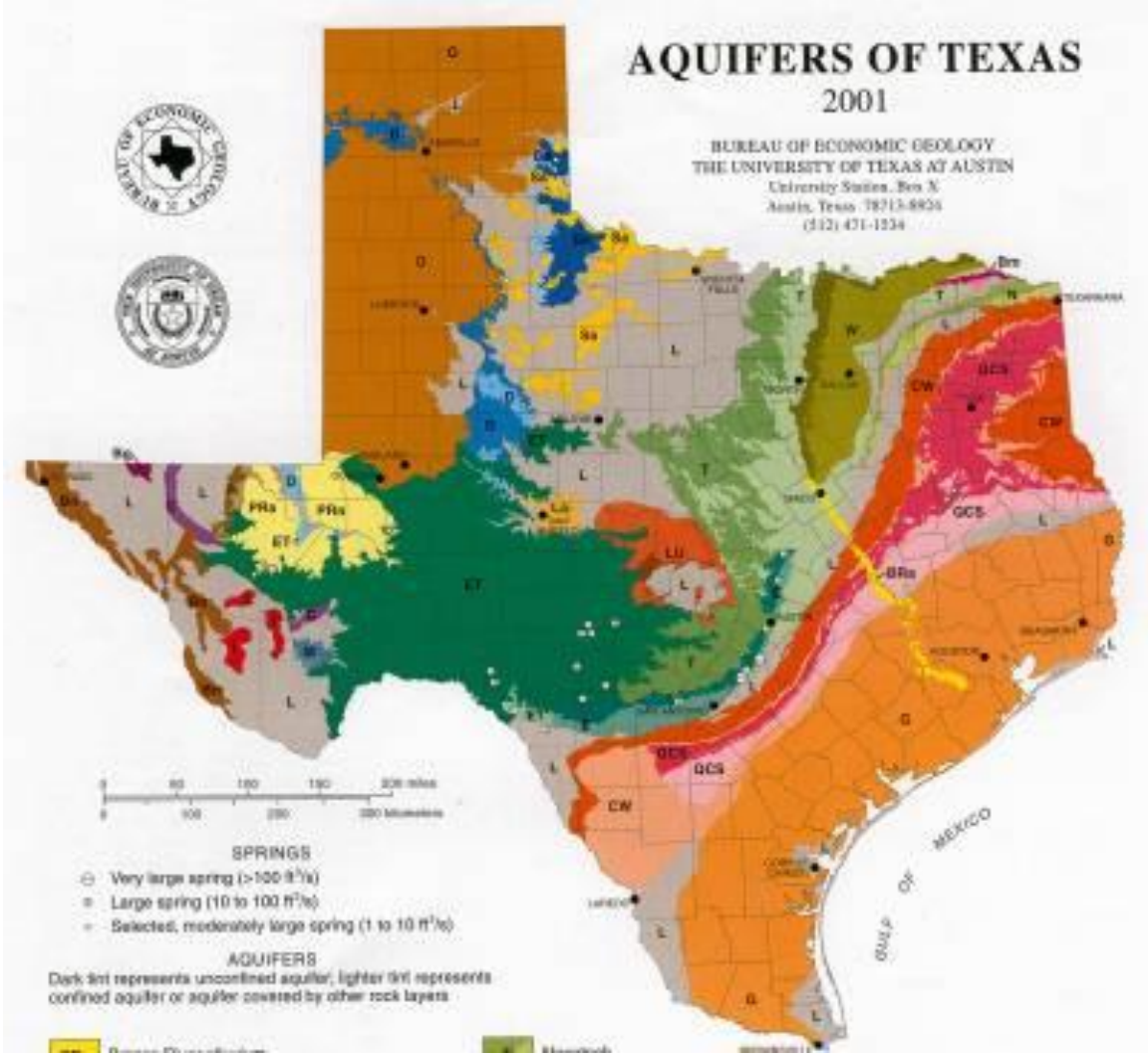
What is an aquifer?

Merriam-Webster: An aquifer is a water bearing stratum of permeable rock, sand, or gravel.

From TWDB (Mace and others): An aquifer is geologic media (rock, sand, gravel, silts, clays) that can yield economically usable amounts (depends on location and needs) of water.

Geology / Aquifers






We interrupt your previously scheduled program for this brief message!

Who is TAGD?

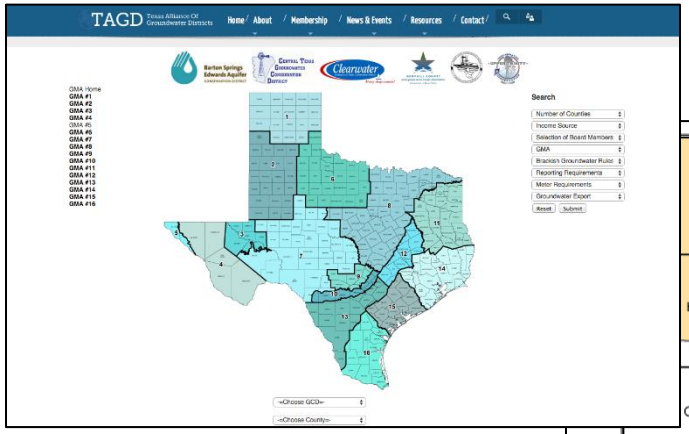
TAGD

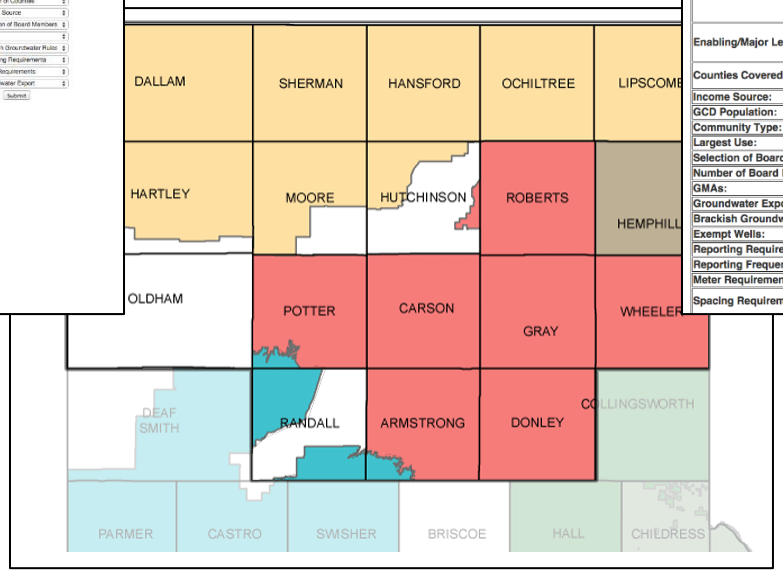
TEXAS ALLIANCE OF GROUNDWATER DISTRICTS

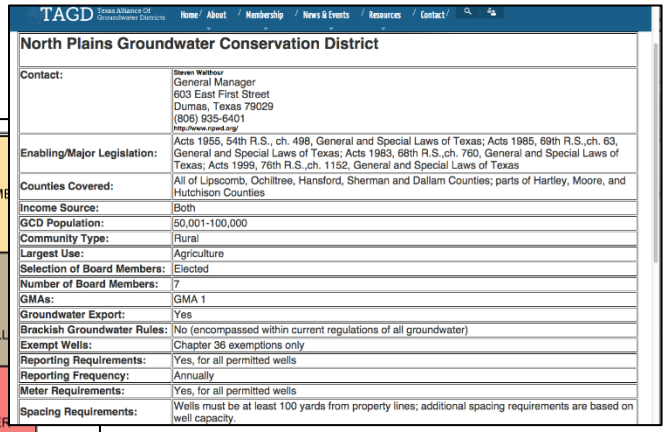
What does TAGD do?

- Conducts educational and technical training
- Tracks legislation, agency rulemaking, & policy discussions
- Serves as a resource for districts, the public, lawmakers, and state agencies
- Facilitates communication among GCDs
- Collects data on GCDs

TAGD's GCD Index







TAGD

North Plains Groundwater Conservation District

Contact:	Steven Walthour General Manager 603 East First Street Dumas, Texas 79029 (806) 935-6401 http://www.npwd.org/
Enabling/Major Legislation:	Acts 1955, 54th R.S., ch. 498, General and Special Laws of Texas; Acts 1985, 69th R.S.,ch. 63, General and Special Laws of Texas; Acts 1983, 68th R.S.,ch. 760, General and Special Laws of Texas; Acts 1999, 76th R.S.,ch. 1152, General and Special Laws of Texas
Counties Covered:	All of Lipscomb, Ochiltree, Hansford, Sherman and Dallam Counties; parts of Hartley, Moore, and Hutchison Counties
Income Source:	Both
GCD Population:	50,001-100,000
Community Type:	Rural
Largest Use:	Agriculture
Selection of Board Members:	Elected
Number of Board Members:	7
GMAs:	GMA 1
Groundwater Export:	Yes
Brackish Groundwater Rules:	No (encompassed within current regulations of all groundwater)
Exempt Wells:	Chapter 36 exemptions only
Reporting Requirements:	Yes, for all permitted wells
Reporting Frequency:	Annually
Meter Requirements:	Yes, for all permitted wells
Spacing Requirements:	Wells must be at least 100 yards from property lines; additional spacing requirements are based on well capacity.

www.texasgroundwater.org

Groundwater Conservation Districts

FAQs

What is a Groundwater Conservation District?

GCDs are political subdivisions of the state created to protect and balance private groundwater interests with the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and the control of subsidence caused by withdrawal.

What does a GCD do?

Establish rules for the spacing and drilling of all water wells
Consider and permit non-exempt water wells
Maintain records of non-exempt wells in a district
Submit management plans to Texas Water Development Board for approval
Collaborate regionally in joint planning for the establishment of DFCs
Collect water level and water quality data on aquifers
Educate stakeholders on water conservation
Work to prevent harm to the aquifer due to pumping or contamination

How do GCDs allocate their budgets?

Education & Outreach | Science & Research | Operations | Conservation | Regional Planning

How many GCDs are there in Texas?

Currently, there are **98** GCDs plus 2 subsidence districts.

What rules must a GCD follow?

GCDs are governed by Chapter 36 of the Texas Water Code. As political subdivisions of the state, they are also subject to Chapter 49 of the Texas Administrative Code. Based on the rules established by the State, each GCD creates policies to accomplish the goals of their District.

Do I have to register my well with my GCD?

Yes, state law requires all wells to be registered with the GCD. This does not mean that all wells require a permit. All domestic wells and livestock wells that produce less than 25,000 gallons per day are exempt from permits. A GCD has the ability to exempt others in their rules.

More GCD FAQs

What is a management plan?

A management plan outlines a GCD's goals and course of action to achieve those goals. The management plan is submitted to TWDB for approval, and rules necessary to implement the management plan are adopted by each district.

What is a Desired Future Condition?

The desired future condition is a metric that is established during the joint planning process by GCDs in a common Groundwater Management Area (GMA). The DFCs provide for consistency in groundwater management in the GMA and a balance between groundwater protection and production.

How are GCDs funded?

GCDs are funded through property taxes, permitting fees and/or usage fees.

Groundwater Terms

Aquifer

An underground geological formation able to store and yield water in useable amounts. Aquifers in Texas can consist of sand, gravel, limestone, granite, and many other rock types that have pores or spaces for water to pass through.

Aquitard

An aquitard, or confining layer, is a zone within the earth that restricts the flow of groundwater.

Total Dissolved Solids (TDS)

TDS refers to the total concentration of dissolved constituents in solution. A TDS level of less than 1000 ppm is often considered freshwater, although many Texans' drinking water has a higher TDS.

Cone of Depression

A cone of depression is a conically shaped area of decreased water level (or pressure) that occurs when water is withdrawn from an aquifer. If wells are too close to each other, these cones may overlap and cause interference resulting in abnormally low water levels in those wells. In areas that withdraw more water than is recharged or flows to that area, a semi-permanent regional cone of depression may occur.

Abandoned Wells & Water Quality

There is a high environmental risk associated with abandoned or deteriorated wells, as they are a direct conduit from the surface to our groundwater resources. Because of this risk, it is highly recommended to have abandoned or deteriorated wells plugged. Some GCDs have have established programs to assist landowners in plugging abandoned wells.

How often should I have my well water tested?

It is recommended that well owners have their water professionally tested annually or when an observed change in water quality occurs.

Who can disinfect my well water?

It is recommend to contact a licensed water well driller or a pump installer to professionally disinfect your well.

texasgroundwater.org


We now return
to your
previously
scheduled
program!

Groundwater Conservation Districts (GCDs)

What is a GCD?

- Political subdivision of the State
- Creature of the Legislature with powers expressly granted
  - Chapter 36, Texas Water Code
  - Enabling Legislation
- Specific authority to manage groundwater
- Created to **protect and balance** private property interests in groundwater

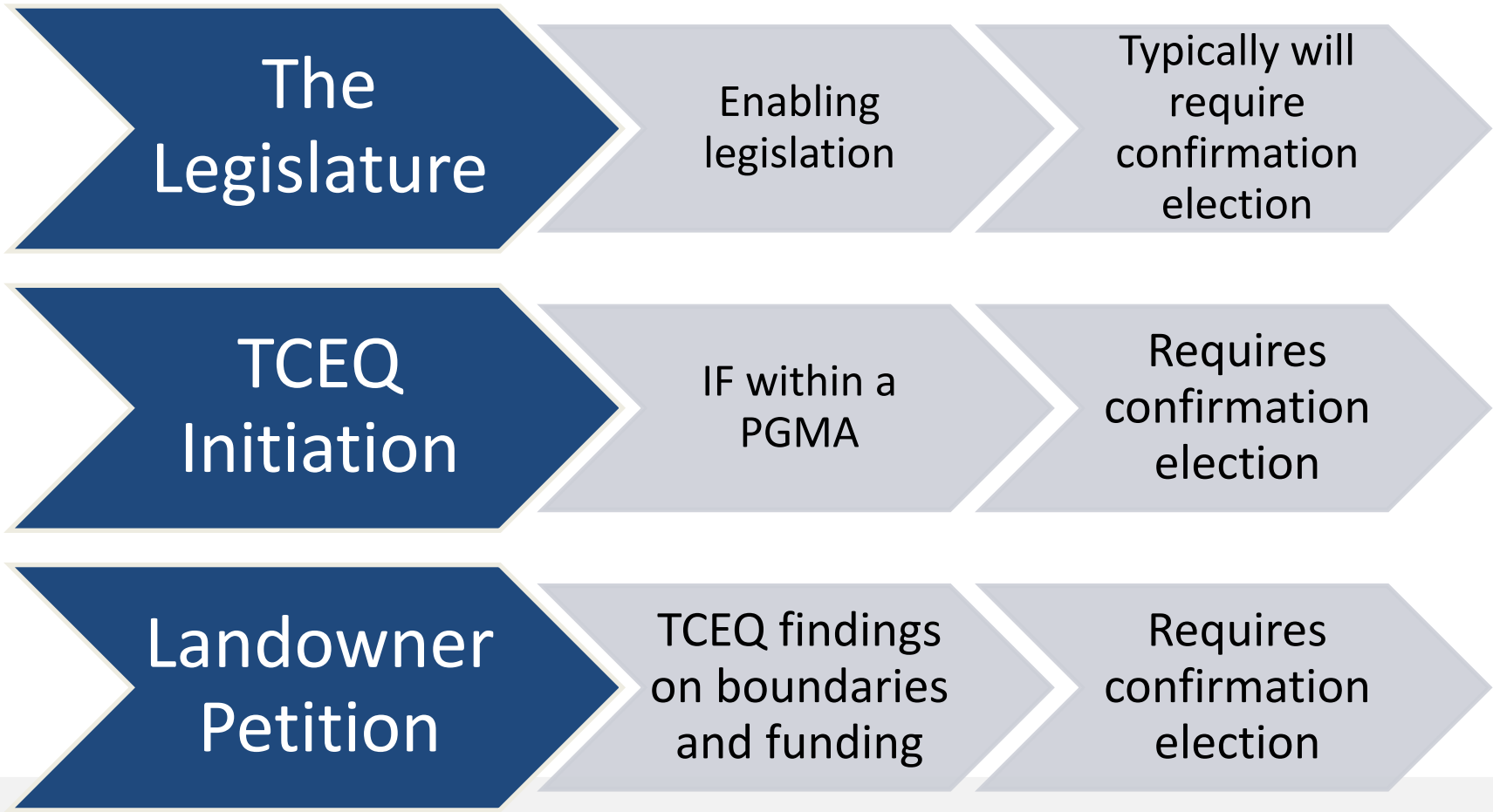
Ownership of Groundwater

TWC 36.002 states: The groundwater ownership and rights described by this section: (1) entitle the landowner,… to drill for and produce the groundwater below the surface of real property, subject to Subsection (d), without causing waste or malicious drainage of other property or negligently causing subsidence, but does not entitle a landowner,… to the right to capture a specific amount of groundwater below the surface of that landowner's land; and (2) do not affect the existence of **common law defenses** or other defenses to liability under the **rule of capture**.

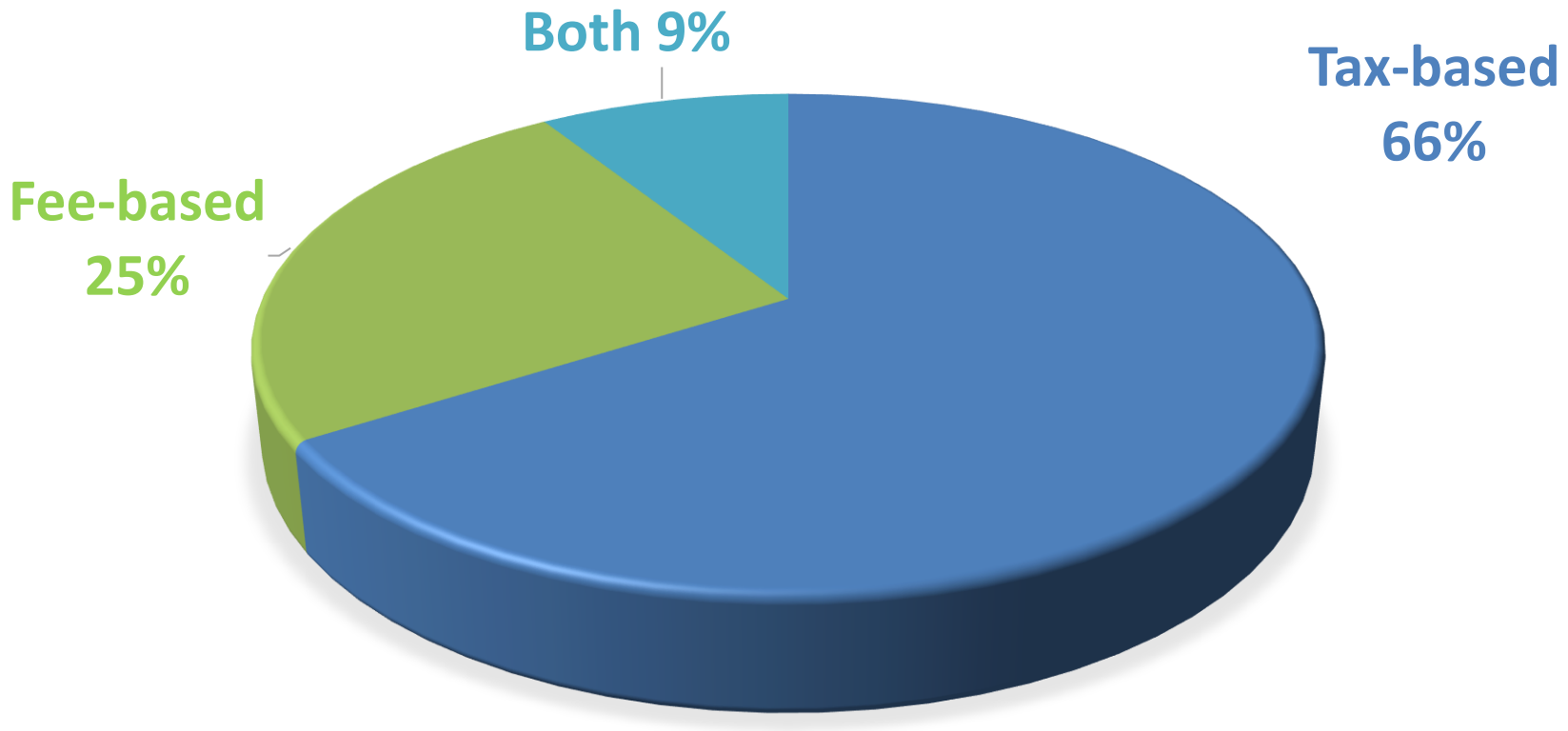
Subsection (d), mentioned above, states:

This section does not… prohibit a district from limiting or prohibiting the drilling of a well by a landowner for failure or inability to comply with minimum well spacing or tract size requirements adopted by the district,… (or) affect the ability of a district to regulate groundwater production as authorized… under this chapter…

How are GCDs created?

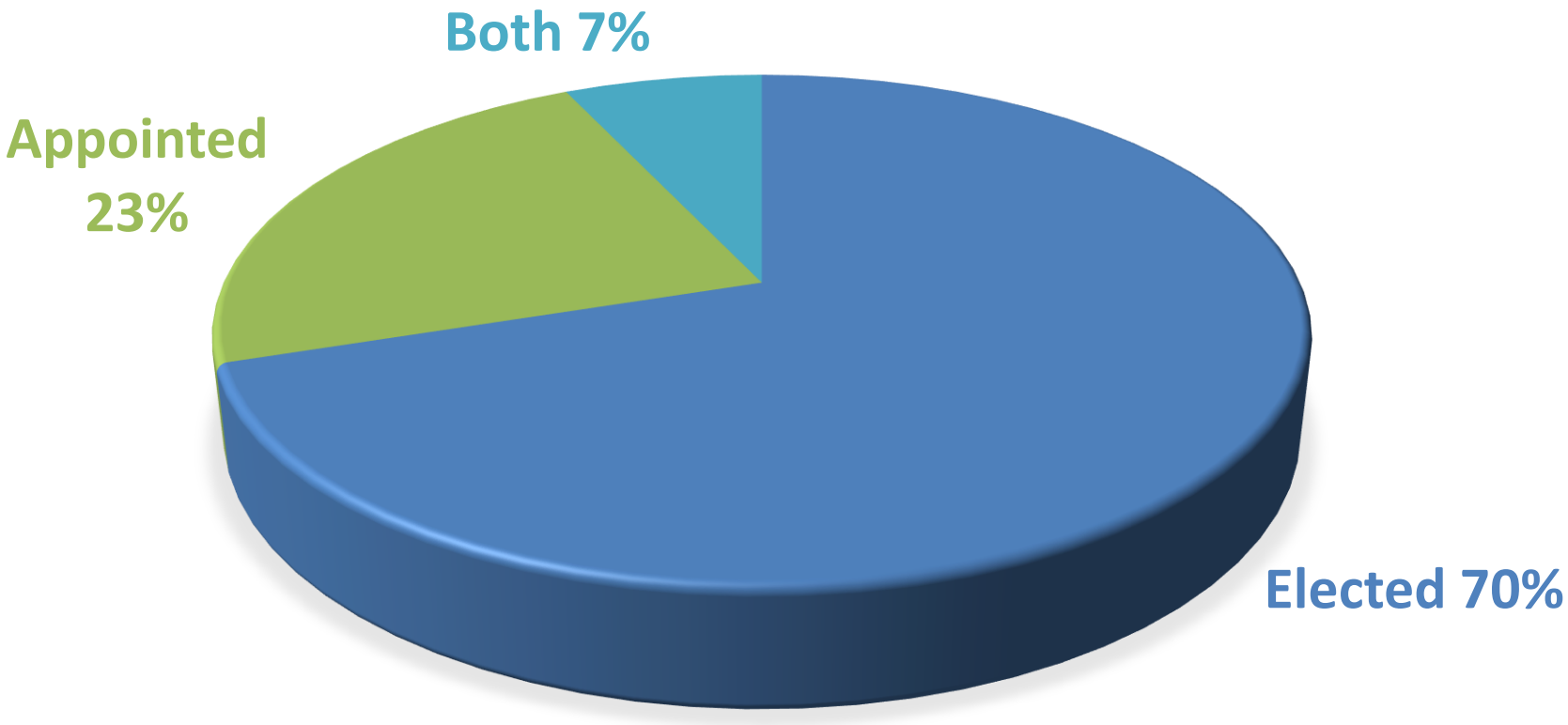


GCD Funding



GCD Governance

LOCAL BOARD OF DIRECTORS



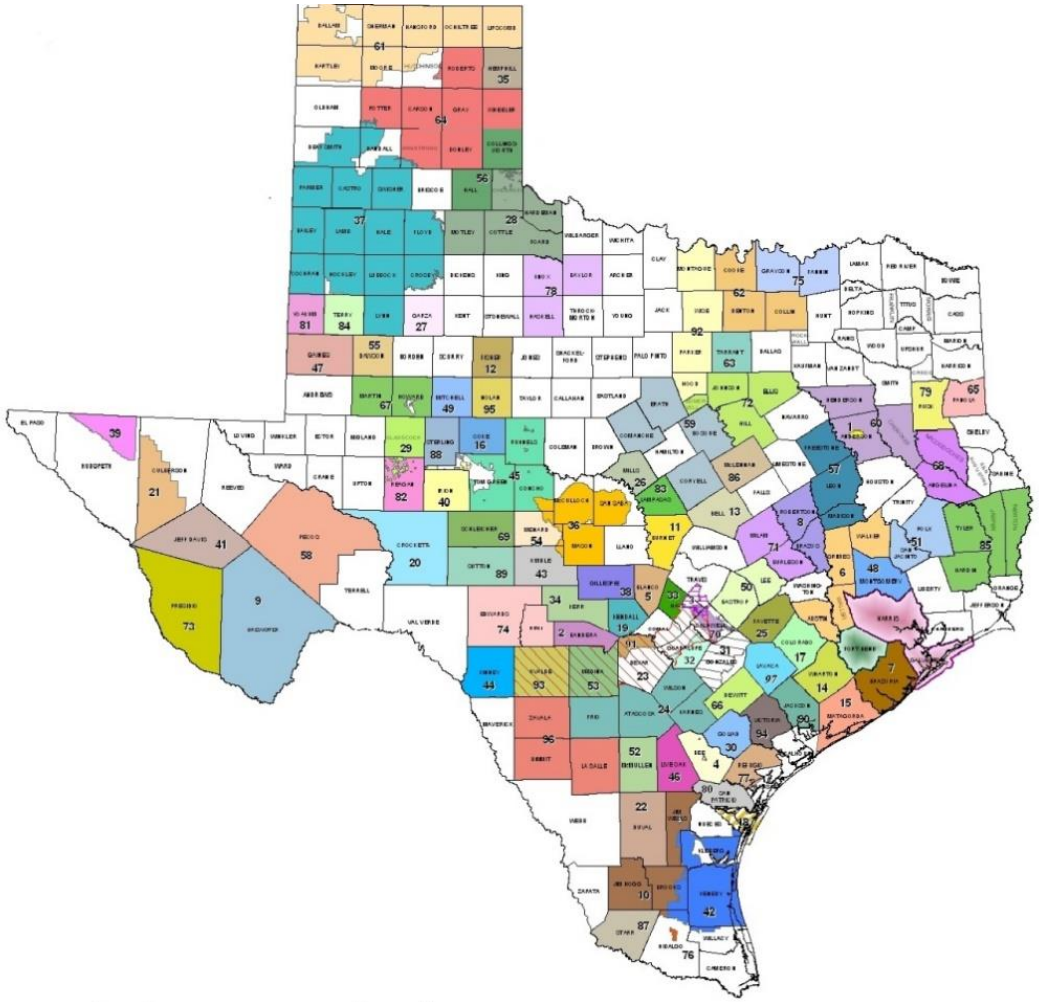
ADMINISTRATION

Section 36.051

POSGCD Directors
(appointed by Commissioner's Courts)

Milam County	Interest	Burleson County
Steven Wise	At Large	Becky Goetsch
Kit Worley	Agriculture	Jay Wilder
Ward Roddam	Municipal	Tommy Tietjen
John Redington	Industrial	Buster Evers
Bob Wilson	Rural Water	Ed Savage

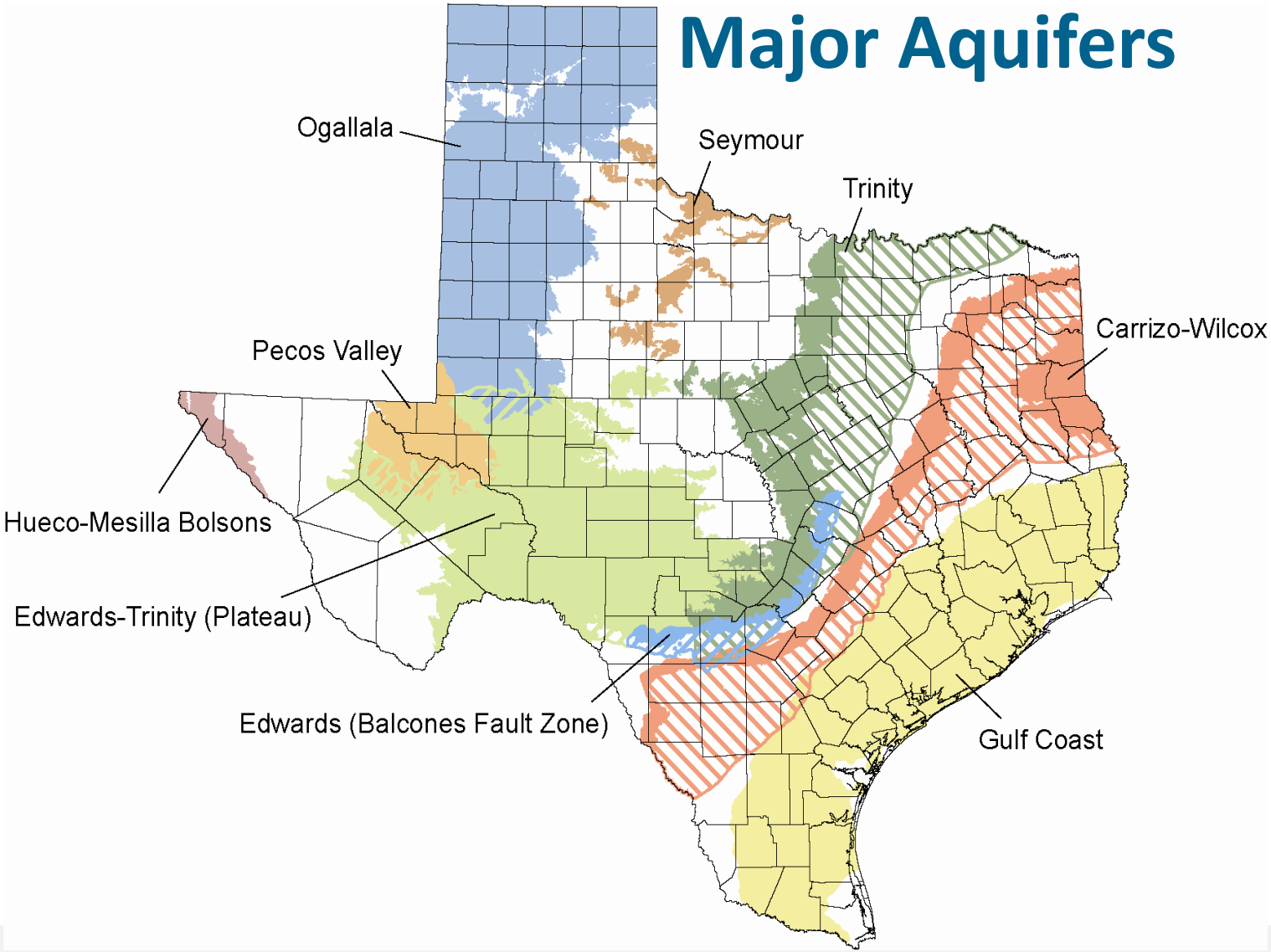
Groundwater Conservation Districts



GCDs Cover 174 of 254 Counties

TAGD
TEXAS ALLIANCE OF GROUNDWATER DISTRICTS

GCDs overlie 72% of major and minor aquifers



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TEXAS ALLIANCE OF GROUNDWATER DISTRICTS

GCD Powers & Duties

Powers and Duties

Develop & adopt a Management Plan

Participate in Joint Planning & establish Desired Future Conditions (DFC)

Develop Rules to implement Management Plan & achieve a DFC (20 day notice)

Use Chapter 36 Toolbox to determine well spacing, permitting structure, production limits on wells, etc.

Issue permits, register wells, and ensure proper drilling completion

The GCD Balancing Act

Rights of Landowners and the highest practicable level of groundwater production

Conservation, preservation, protection, recharging and prevention of waste of groundwater

GCDs Can Require

	Registration	Construction	Spacing	Reporting	Permitting	Production Limits
Exempt Wells (Dom./Lvstck)	●	●	●			●
Exempt O&G Wells	●	●	●	●		
Exempt Mining Wells	●	●		●		
Other Exempt Wells	●	●	●	●		
Non-Exempt Wells	●	●	●	●	●	●

EXEMPTIONS

Section 36.117

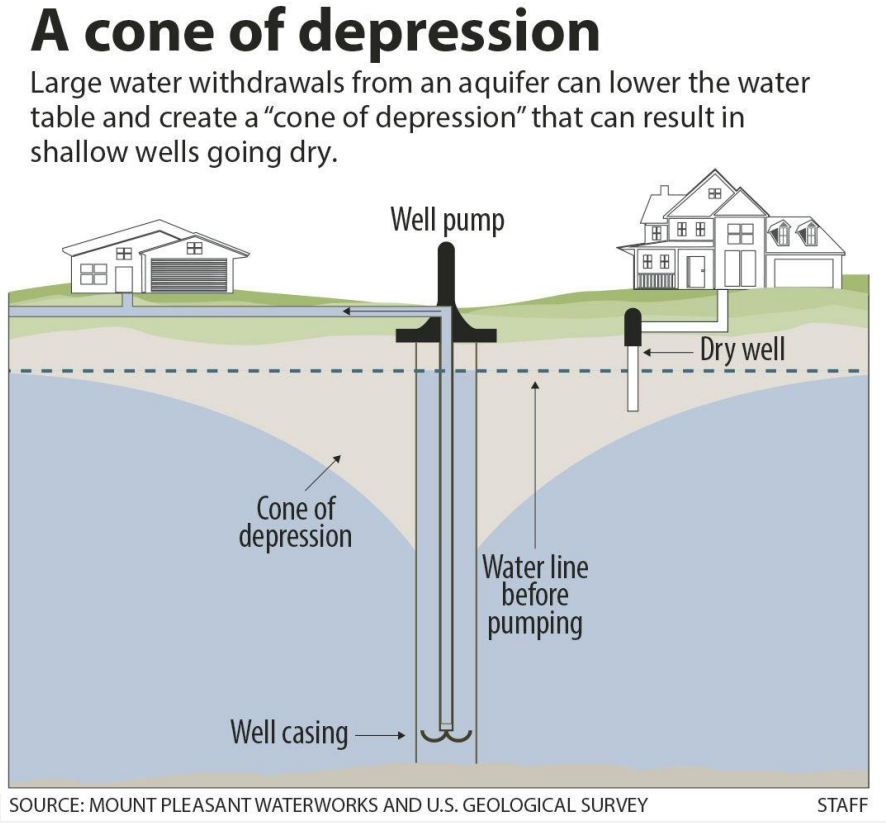
A district may not require any permit issued by the district for:

- *a well used solely for domestic use or for providing water for livestock or poultry on a tract of land larger than 10 acres that is either drilled, completed, or equipped so that it is incapable of producing more than 25,000 gallons of groundwater a day*

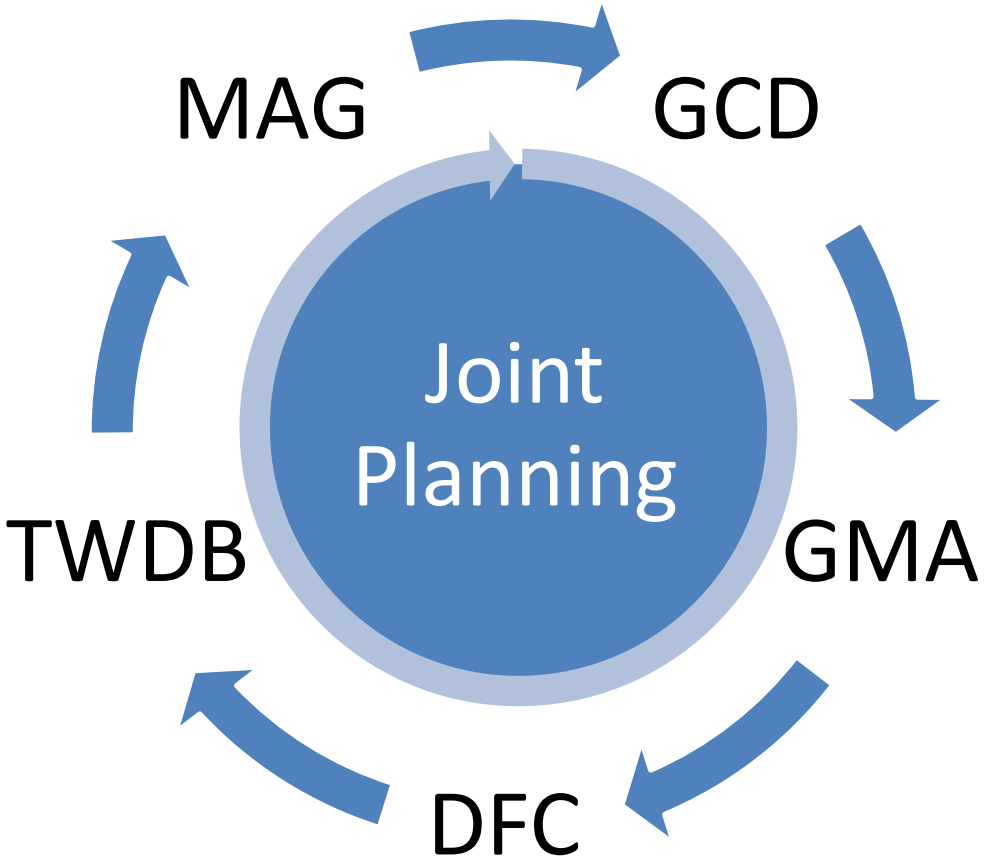
Well Spacing Requirements

A district **may require** compliance with the district's well spacing rules for the drilling of any well that is not exempted

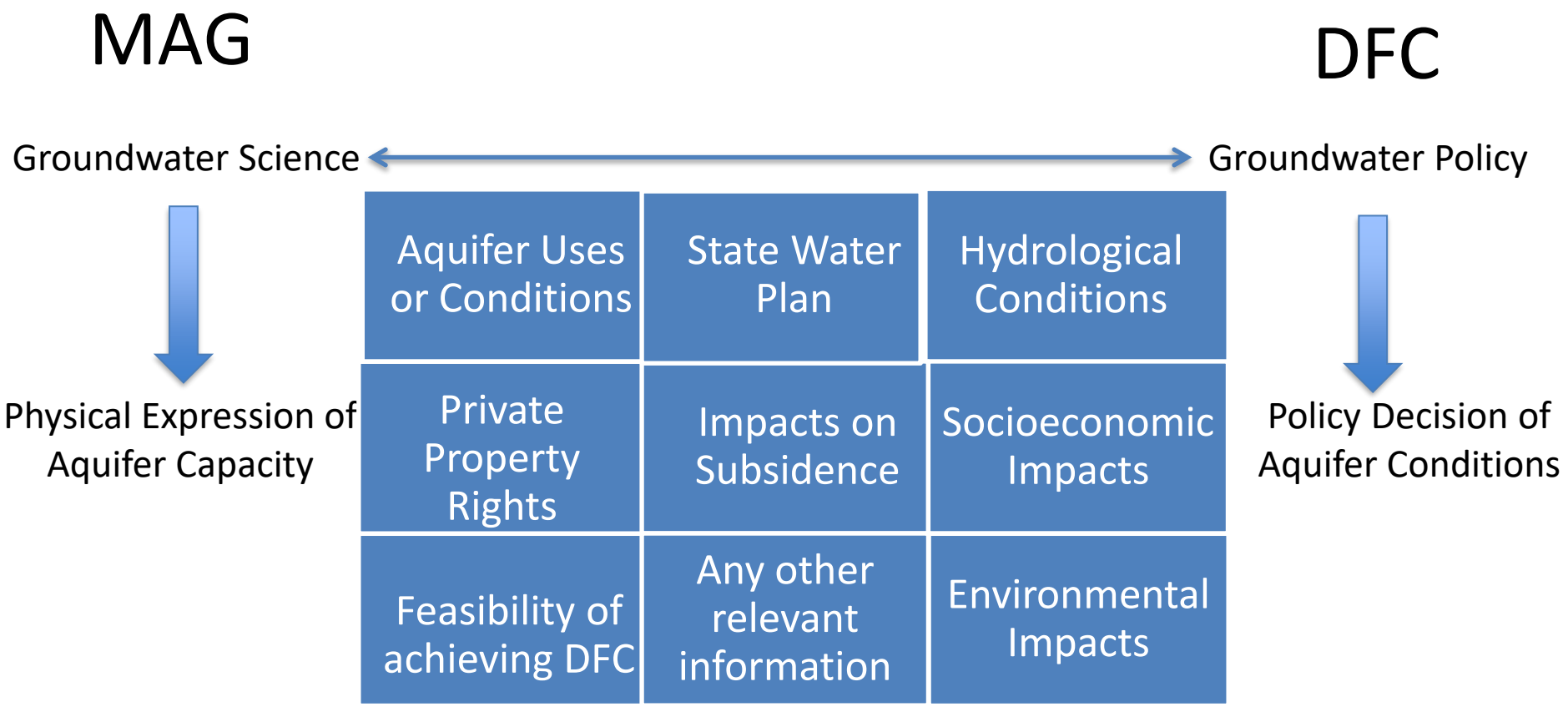
- From property lines
- From other wells
- Capacity and size-based
- Combination of the above



Joint Planning & DFC adoption



Science & Policy



DFC Adoption Process

Meet and review groundwater conditions

Vote to propose desired future conditions

Not later than **May 1, 2026**

Comment period and public hearings

Vote to adopt desired future conditions

Not later than **January 5, 2027 and every 5 years thereafter**

Receives desired future conditions and explanatory report

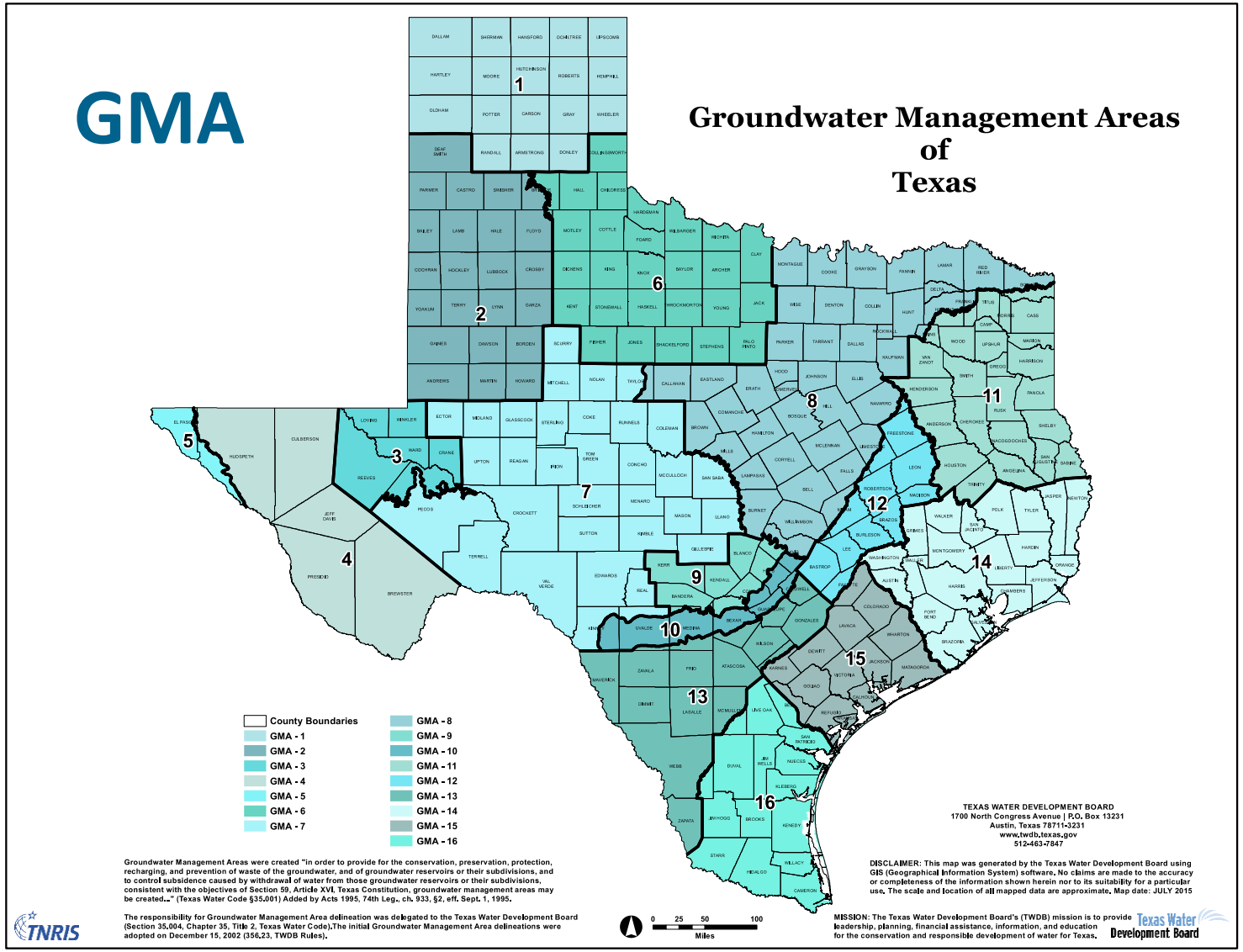
Adopt desired future conditions

District representatives in groundwater management area

Individual districts

Texas Water Development Board

GMA



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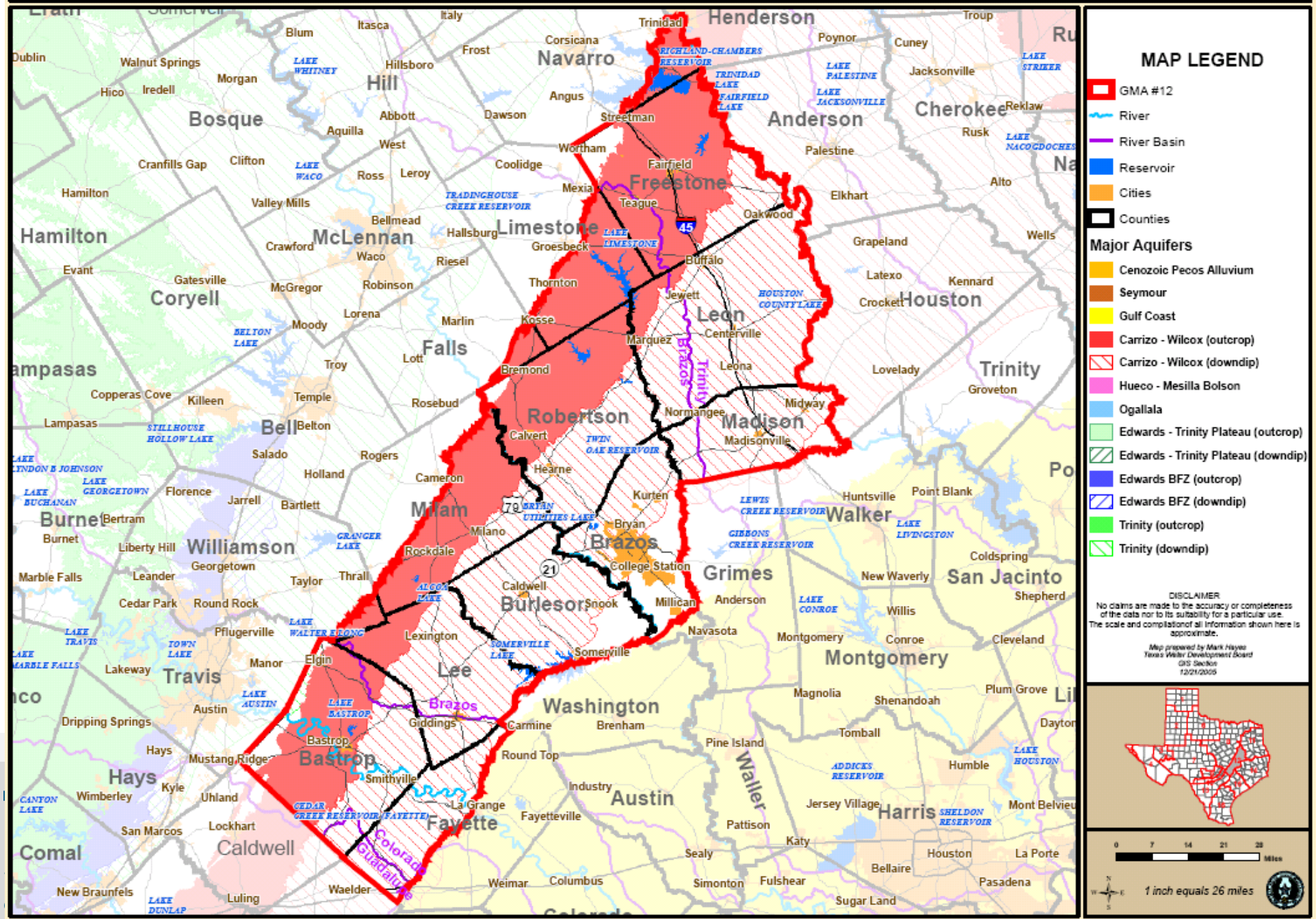
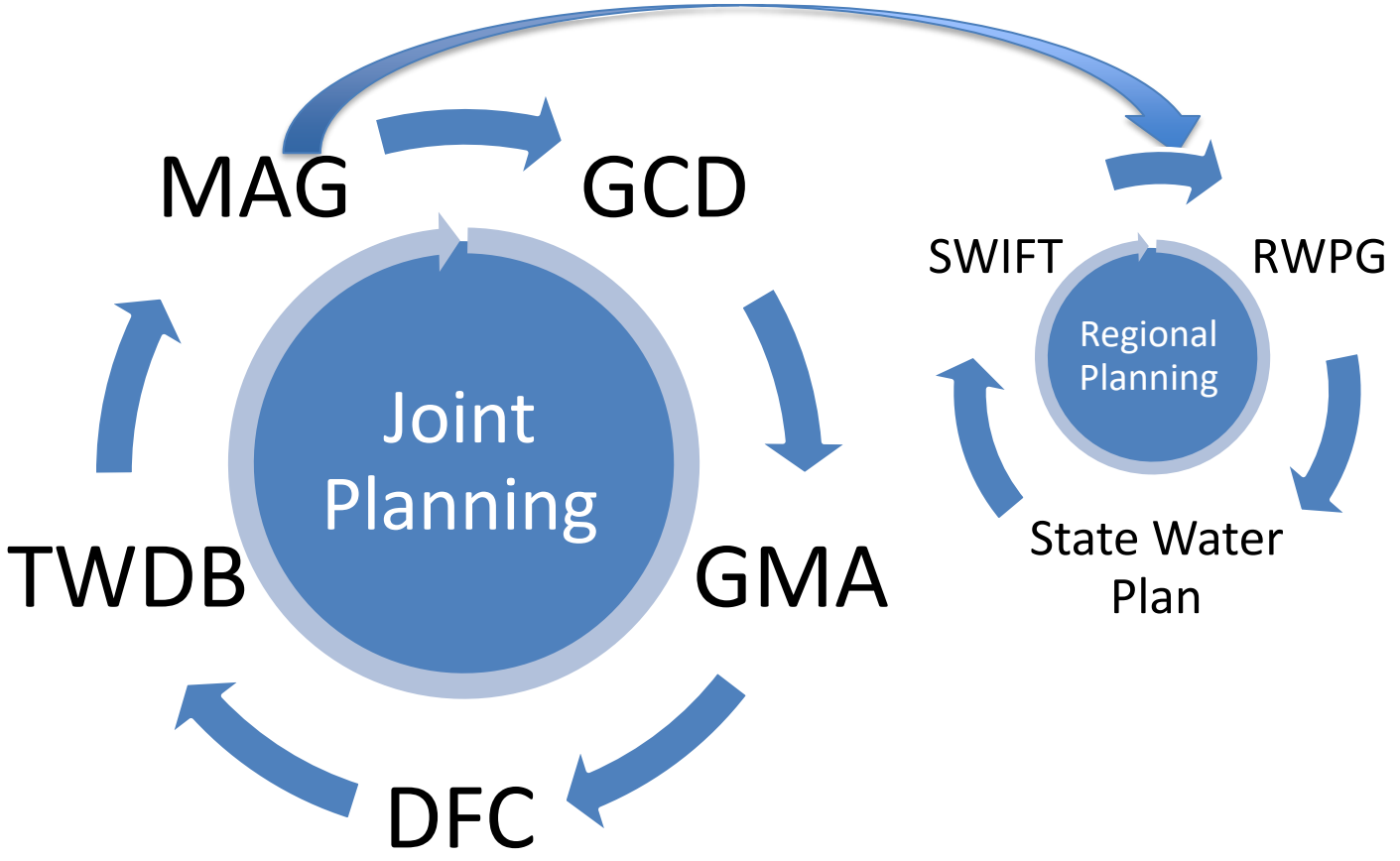
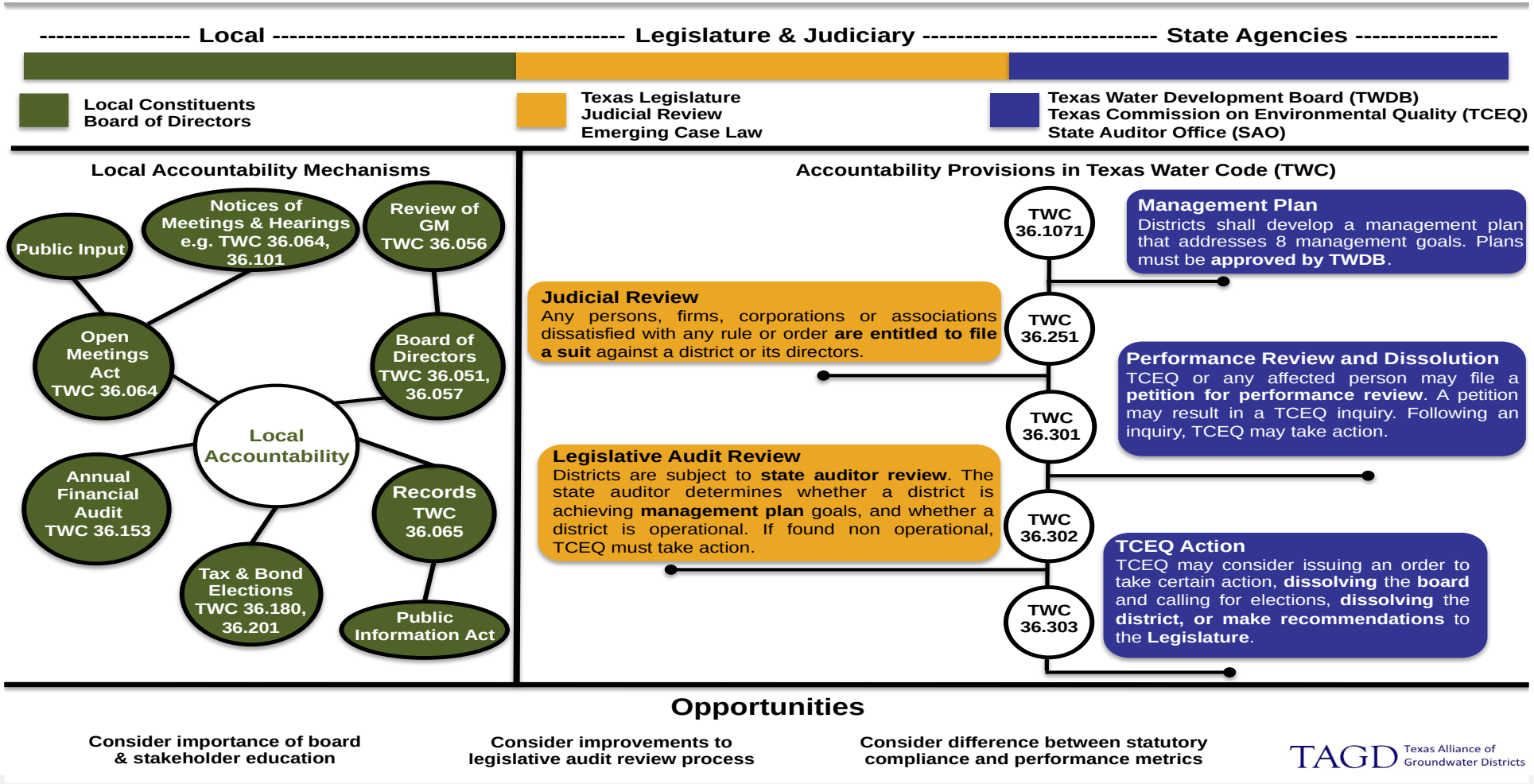
Groundwater Management Area #12



Joint & Regional Planning



Oversight of GCDs



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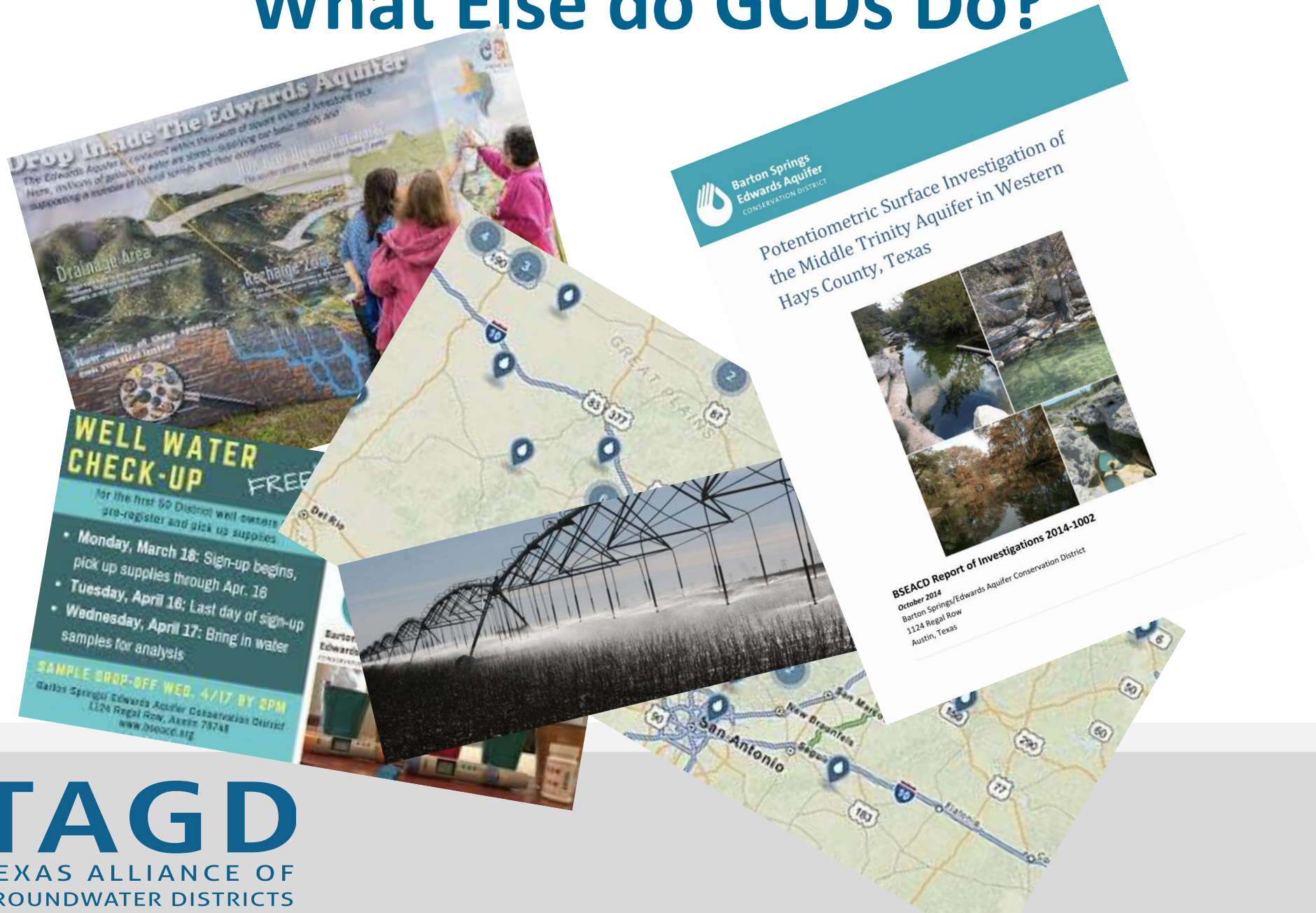
What Else do GCDs Do?



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Get to know your local GCD

TAGD
TEXAS ALLIANCE OF GROUNDWATER DISTRICTS

Why Post Oak Savannah Groundwater Conservation District in Burleson and Milam Counties?

POSGCD created by 77th Legislature, HB1784, 2001

POSGCD Background
and Reasons for creation (2001)

I. Resources + Location + Growth =

>35,000 acres water rights leased by 2000

II. Local Concerns

a. Existing Area Users (100% Burl. Co., 90% Milam Co.- us)

Municipal, Industrial, Agricultural

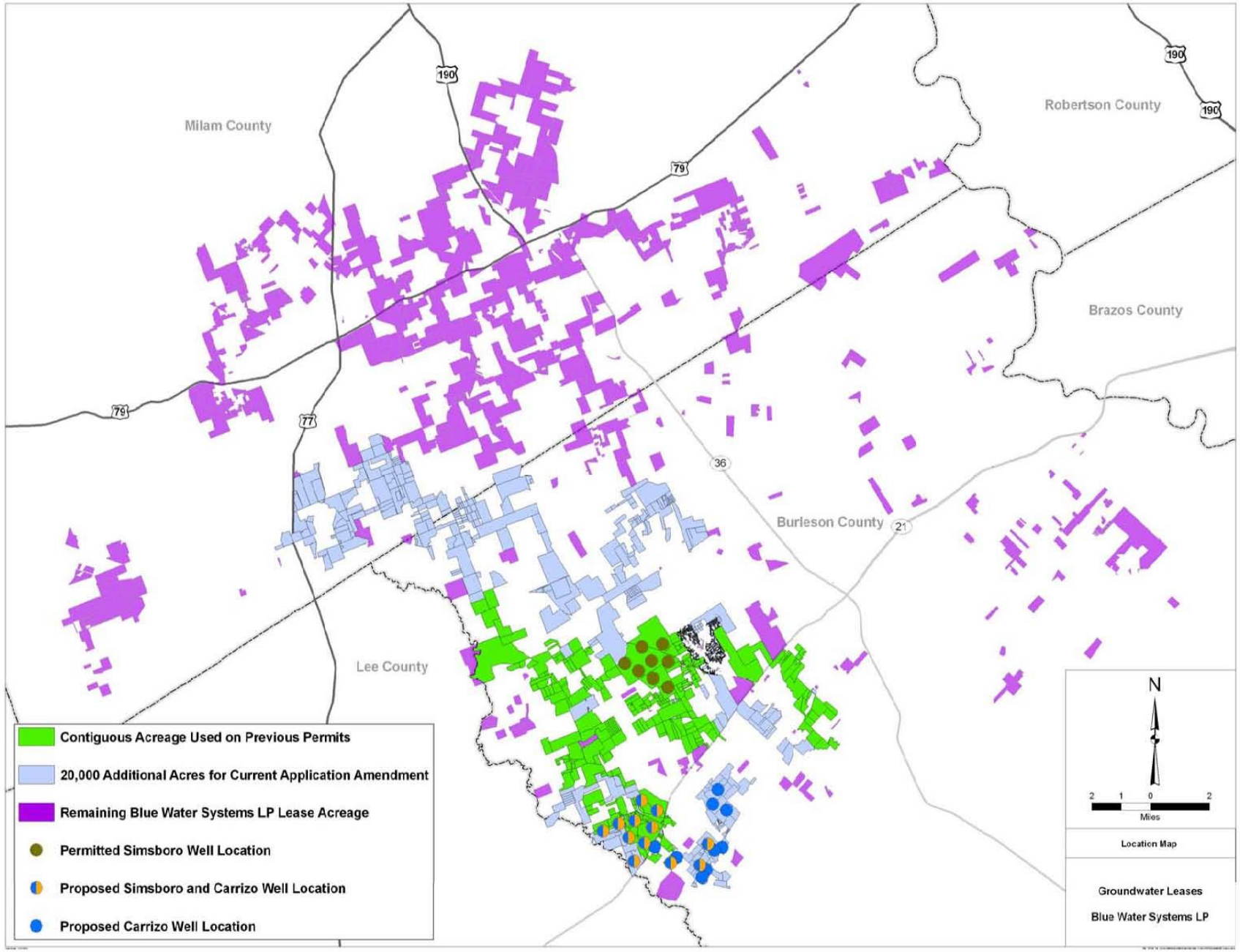
b. Future Growth

c. Reasonableness of Management Strategies

d. Insufficient Science (GAMs developed for different purposes)

e. Unknown area future projects (in and out of District)

f. Property Rights


Milam County
Robertson County
Brazos County
Burleson County
Lee County
190
79
77
36
21
Contiguous Acreage Used on Previous Permits
20,000 Additional Acres for Current Application Amendment
Remaining Blue Water Systems LP Lease Acreage
Permitted Simsboro Well Location
Proposed Simsboro and Carrizo Well Location
Proposed Carrizo Well Location
N
2 1 0 2
Miles
Location Map
Groundwater Leases
Blue Water Systems LP

POSGCD- Vista Ridge History

May 2004- First POSGCD Management Plan and Rules Adopted

Sept 2004- First Permits issued to Layne Water Development of Texas

2005- 2008- Permits transferred to Blue Water Systems and increased to total of 70,993 Acre Feet per year

2014- Permit bifurcated into BWS I-130 Project 20,000 Acre Feet per year and Vista Ridge Project 50,993 Acre Feet per year

2019- Vista Ridge Permits increased to 55,835 Acre Feet per year

April 2020- Vista Ridge comes online to deliver water San Antonio Water Systems

Jan. 2019- POSGCD Groundwater Well Assistance Program Adopted

Fall 2020- First POSGCD GWAP Actions initiated

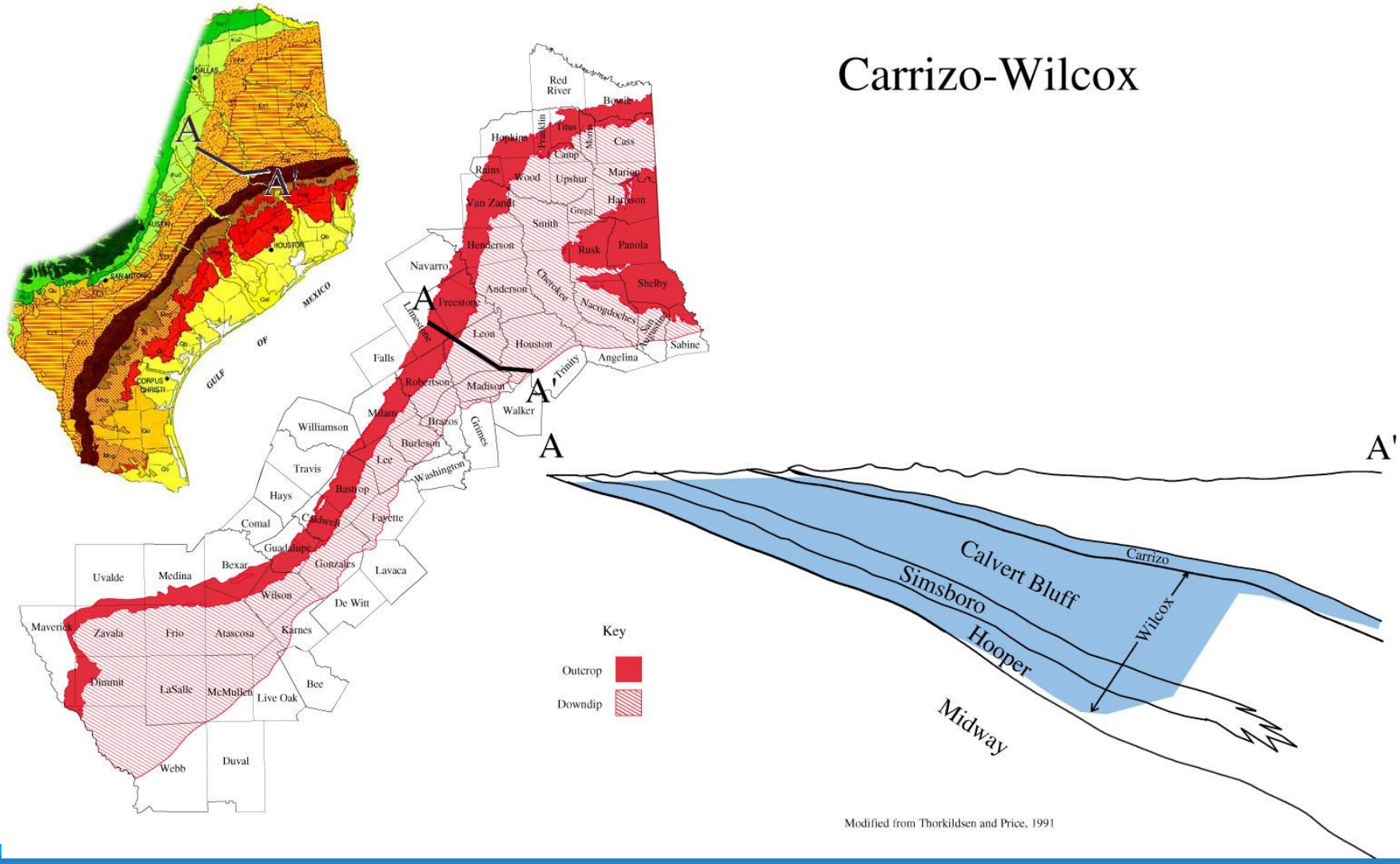
Vista Ridge Project

Water Source- Carrizo-Wilcox Aquifer, Burleson County, Texas

Permitted Amounts:
Carrizo Aquifer-15,000 Acre Feet per Year
Simsboro Aquifer 40,835 Acre Feet per Year

Currently: Temporary Permit Amendment in place intended to reduce production from Carrizo Aquifer

Carrizo-Wilcox Aquifer



Vista Ridge Project

Photo from ariasinc.com

Vista Ridge Project

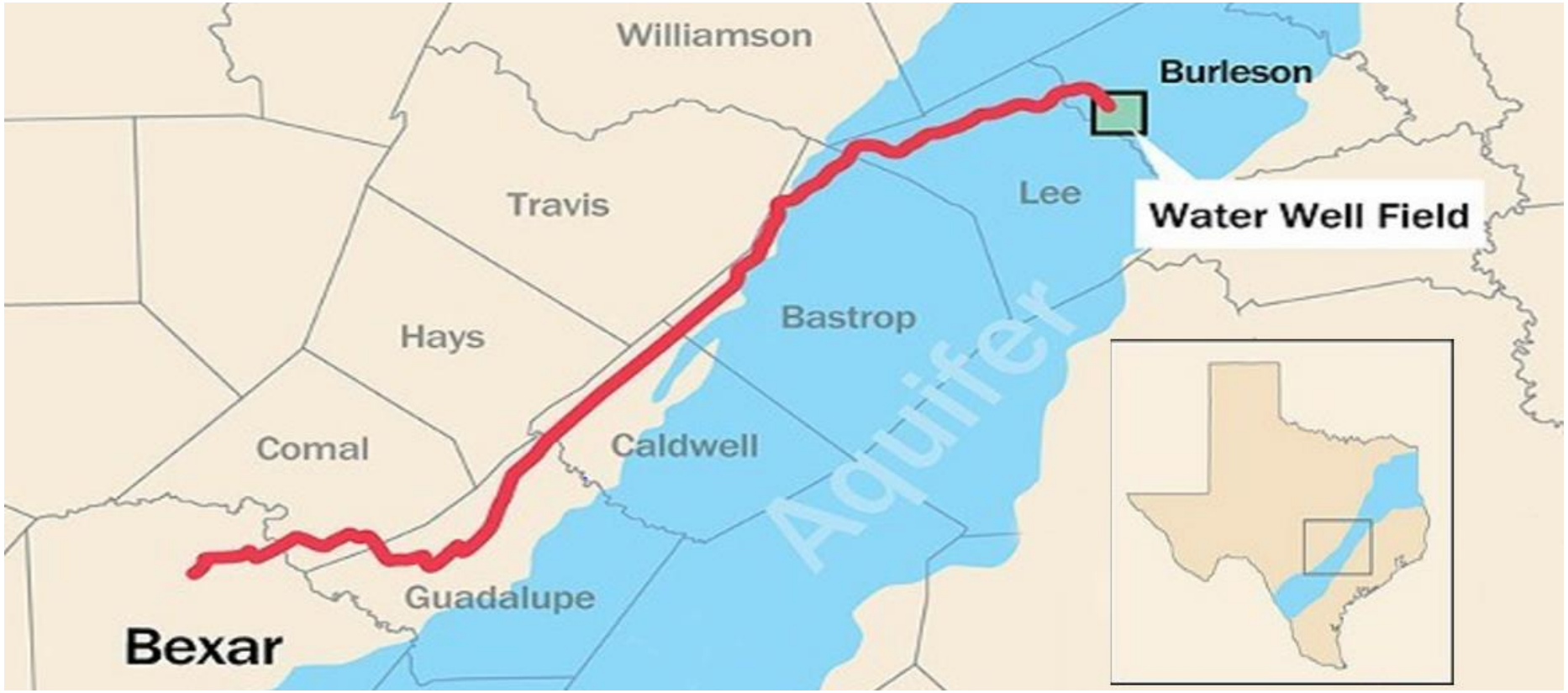
Photo from ariasinc.com

Vista Ridge Project

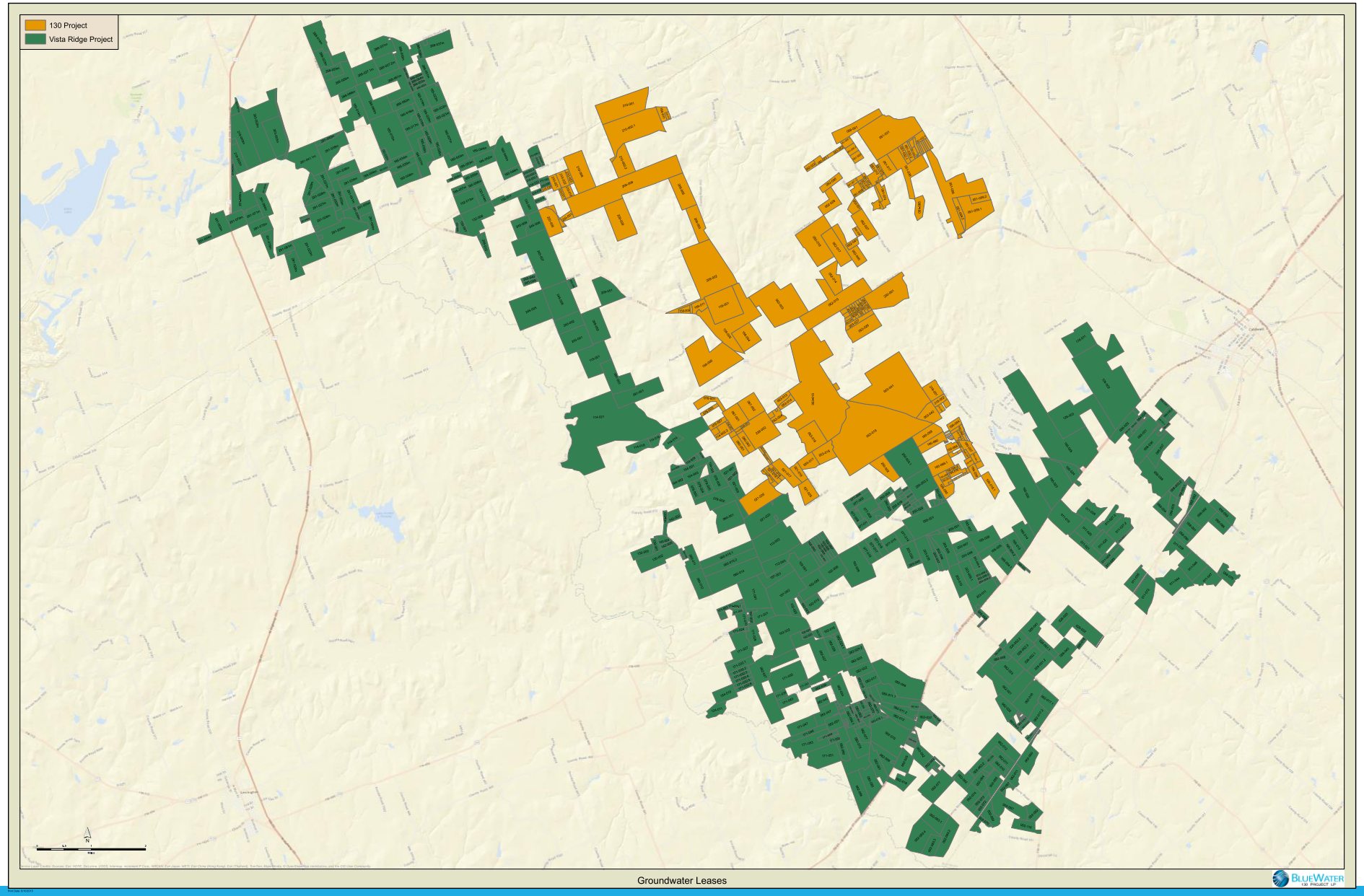
Photo from ariasinc.com

Vista Ridge Project

142 Mile long, 60 inch Pipeline



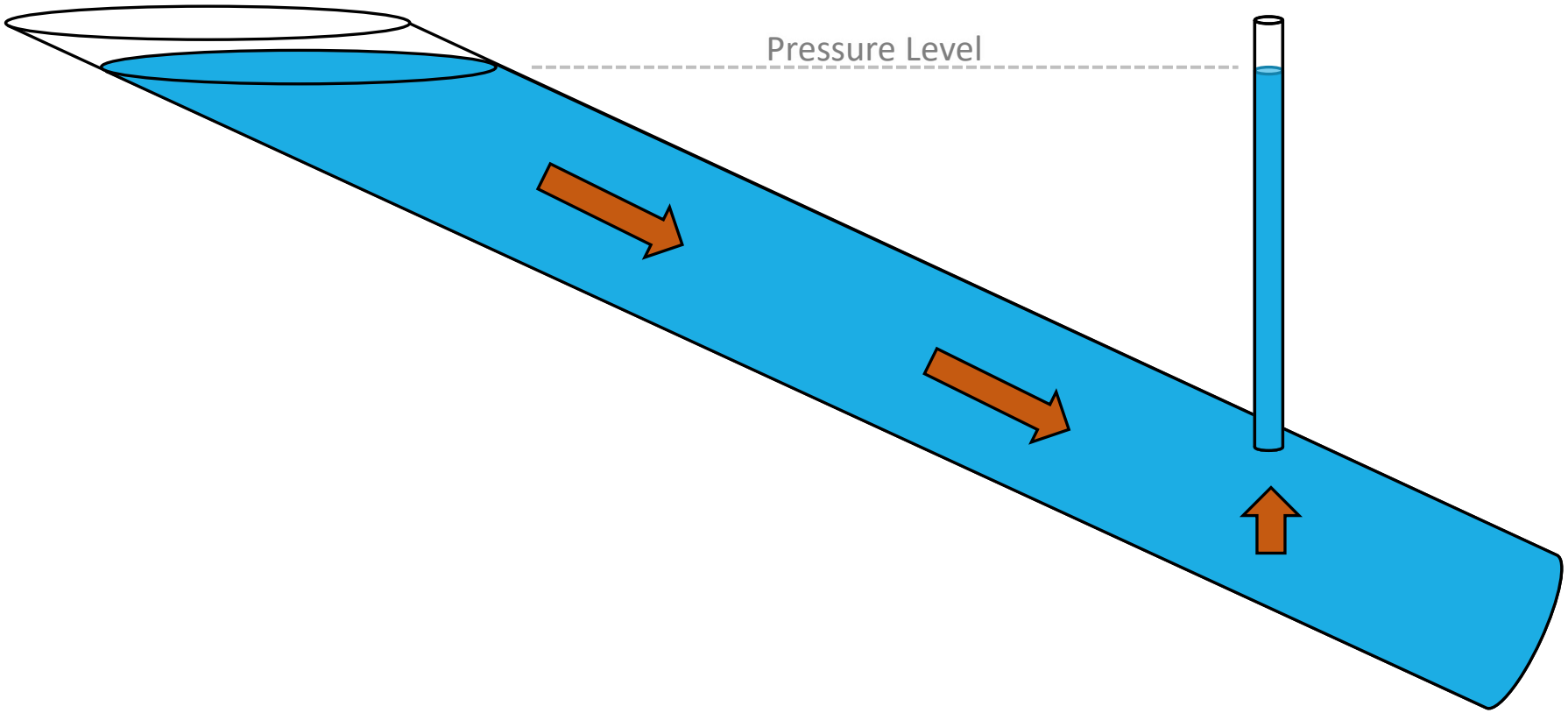
Map from Texas Tribune story

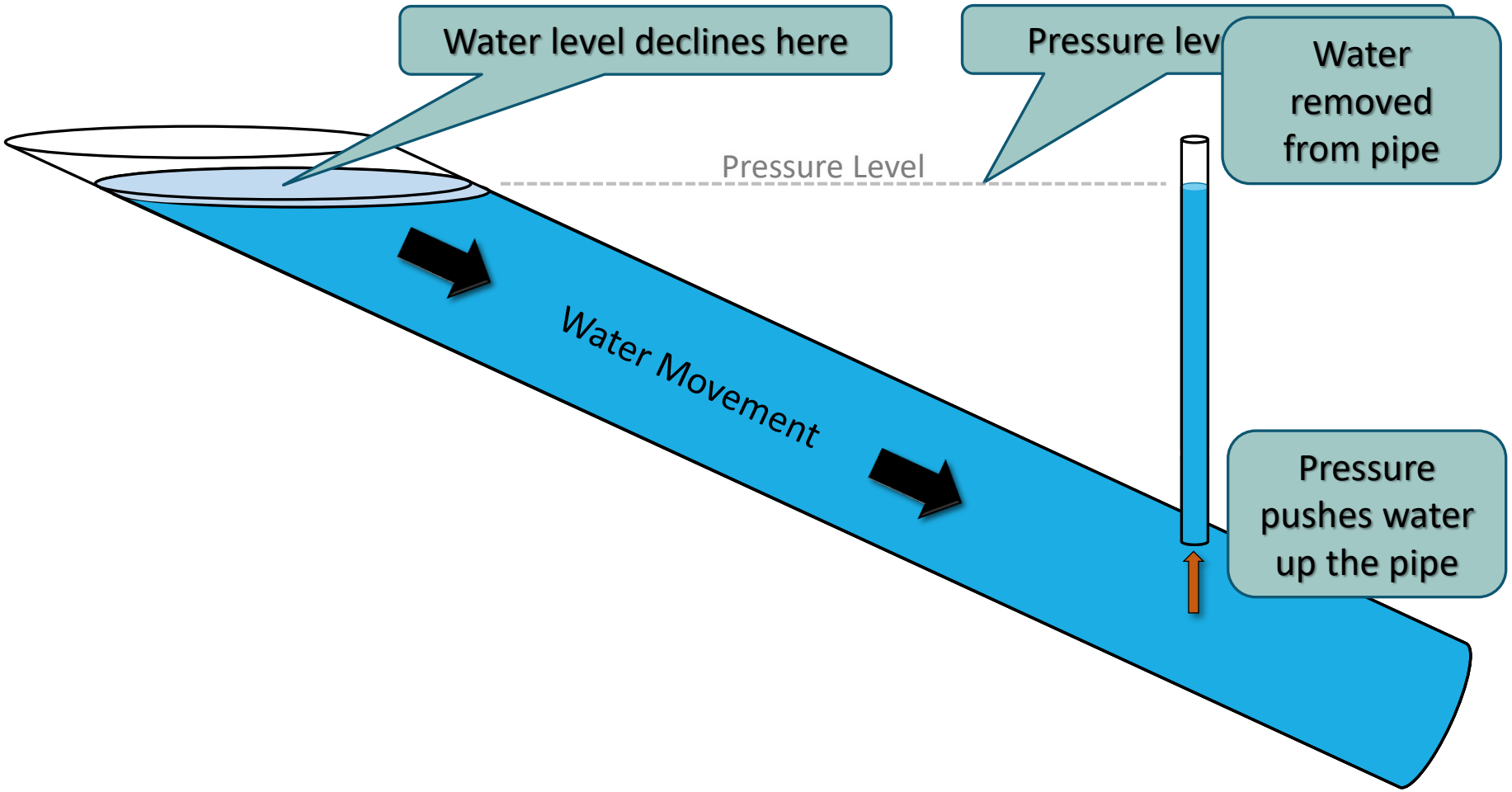


Groundwater Leases

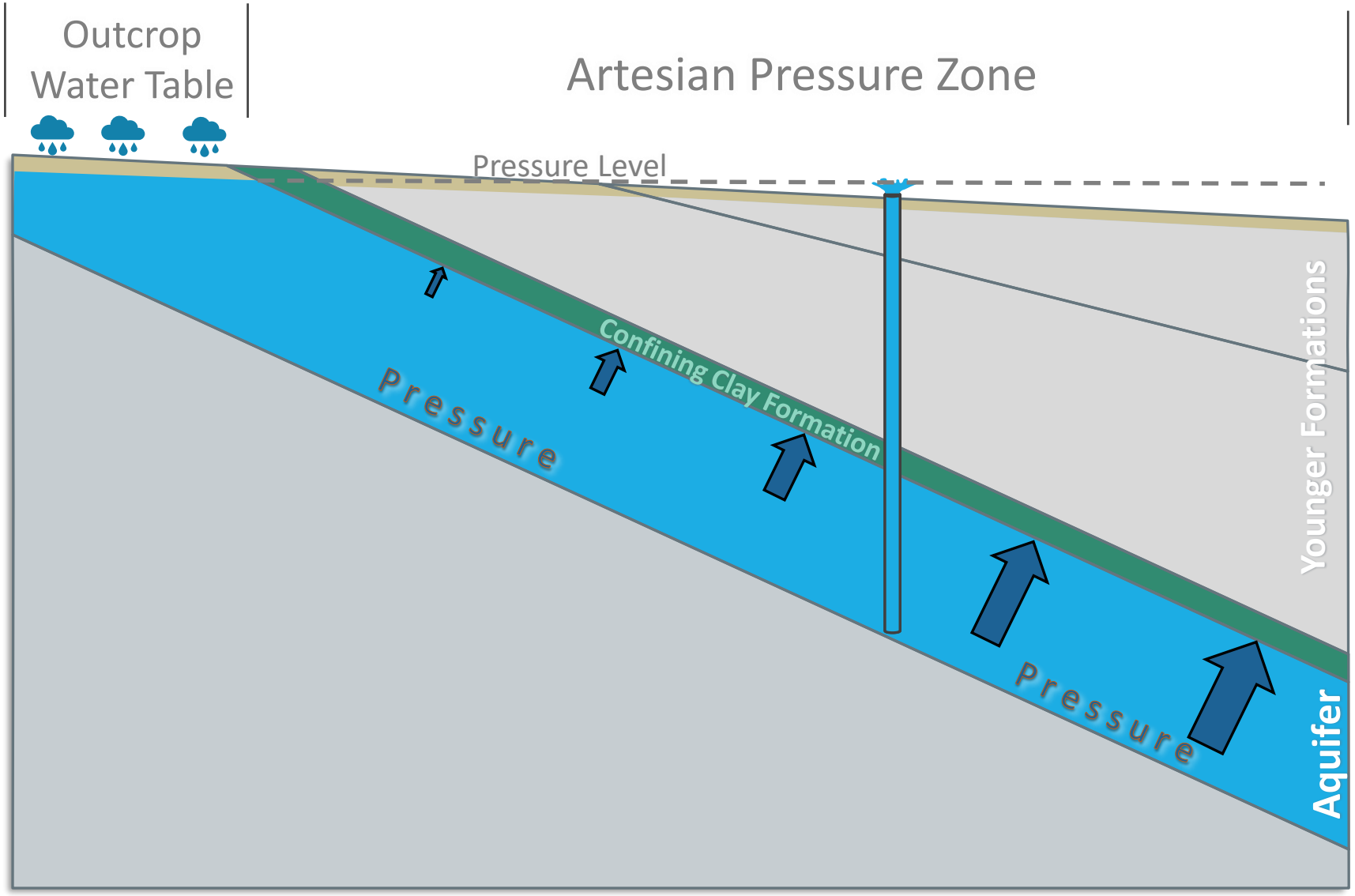
Challenges of balancing development with protection of aquifers

Pressure Example

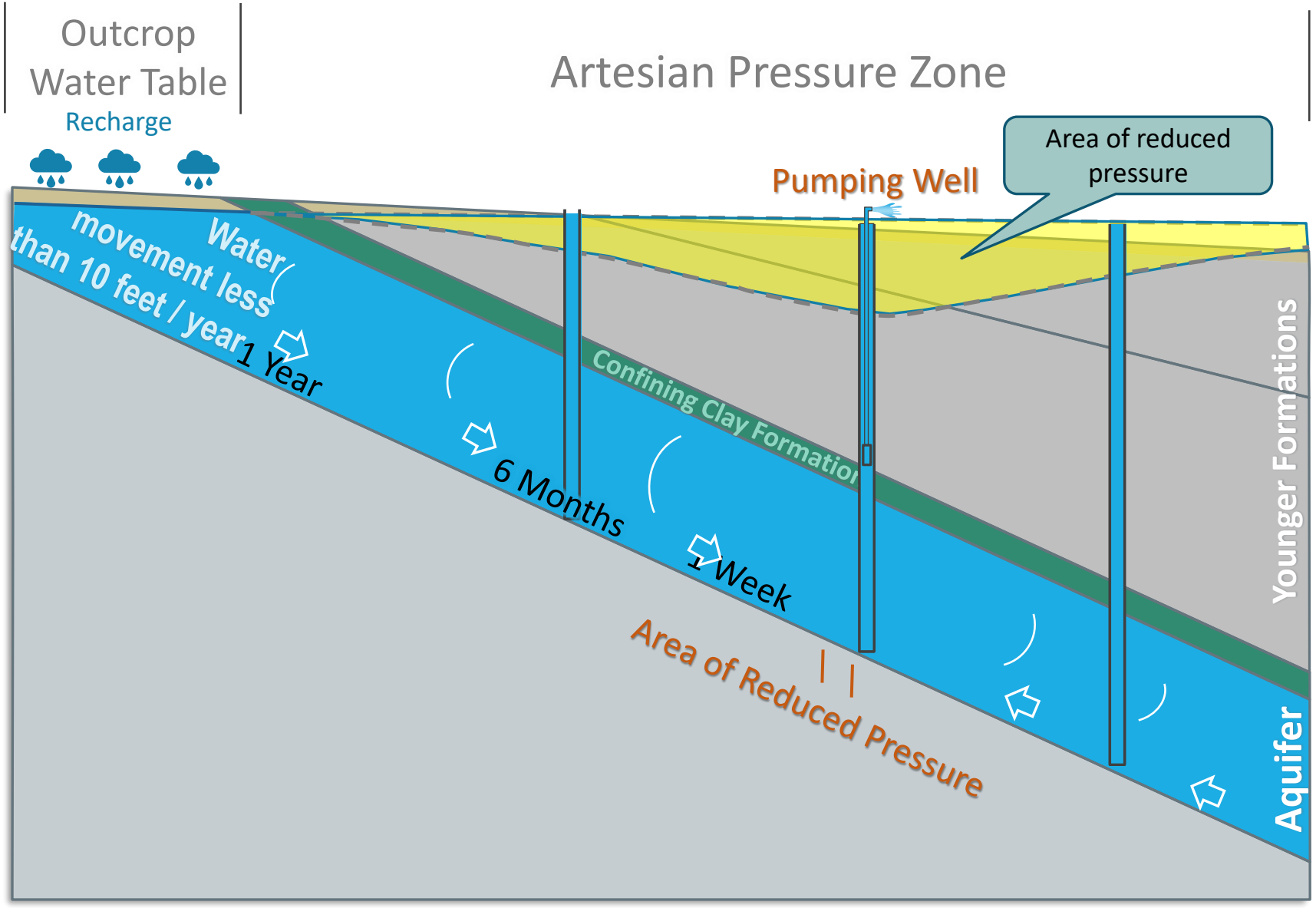



Water level declines here
Pressure lev
Water removed from pipe
Pressure Level
Water Movement
Pressure pushes water up the pipe

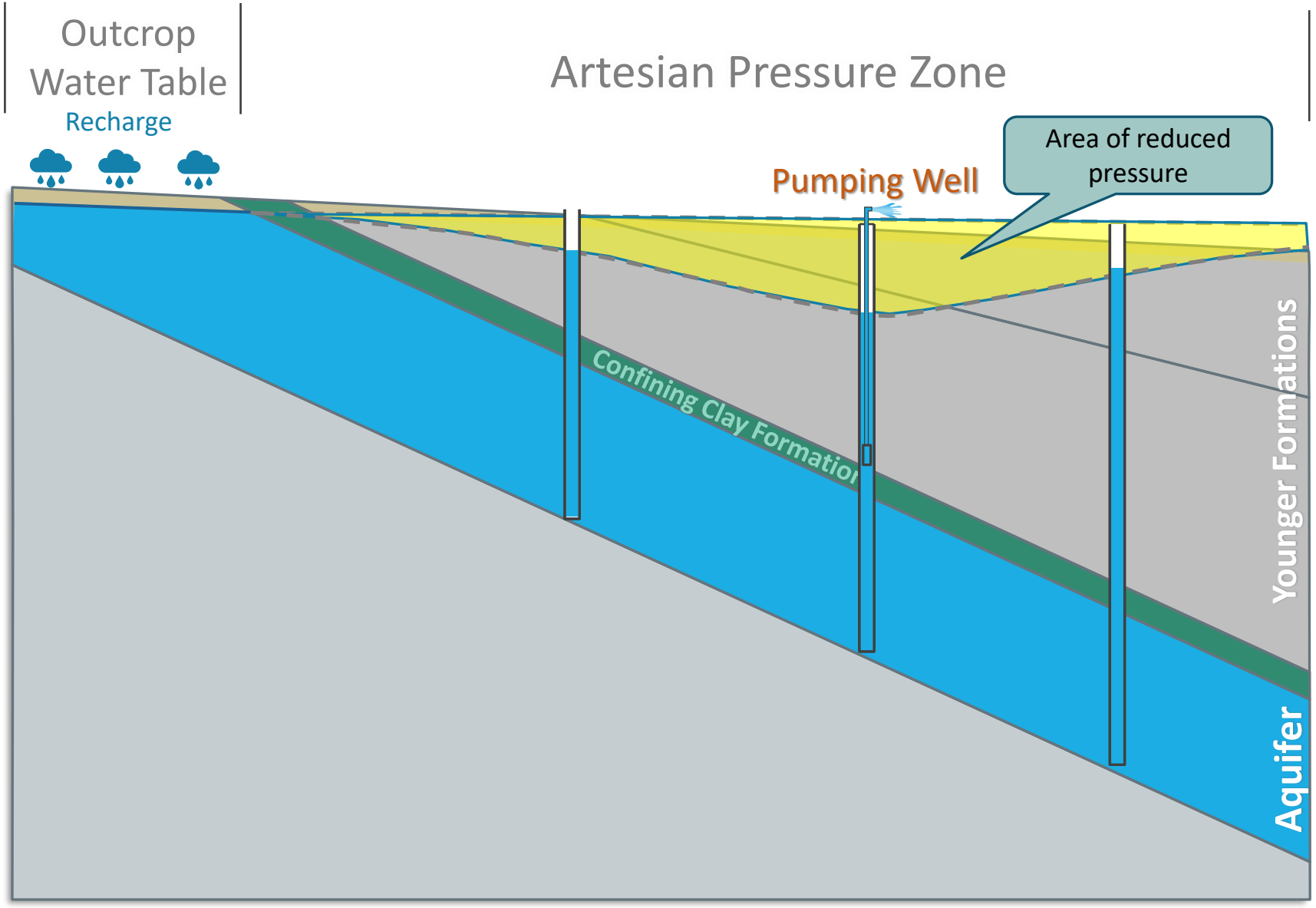
Idealized Dipping Artesian Aquifer



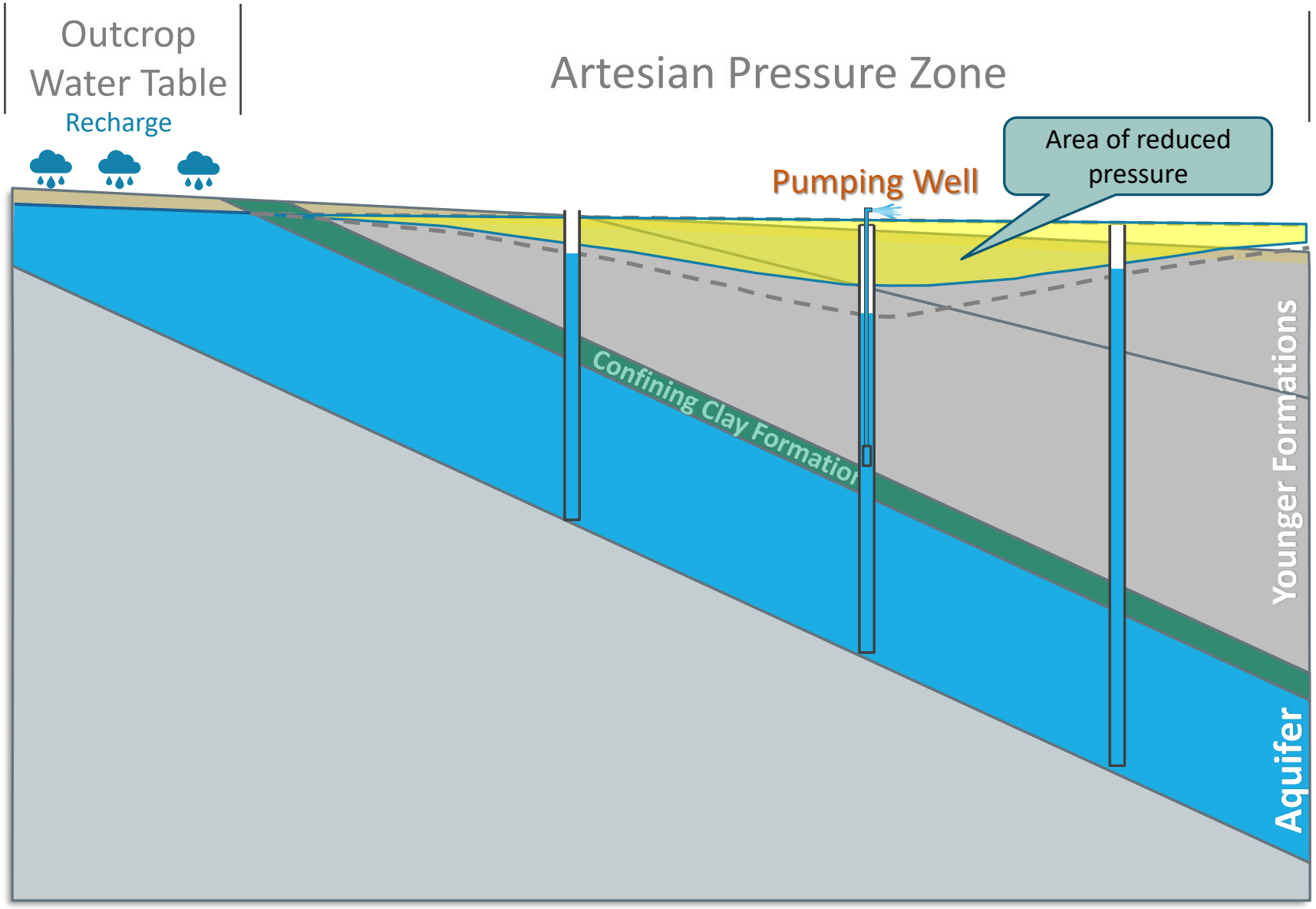
Pressure Reduction due to Pumping



Pressure Reduction due to Pumping



Pressure Rise with Decrease in Pumping



Questions?

Contact info:

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General Manager

Post Oak Savannah GCD

Phone: 512-455-9900

Fax: 512-455-9909

Email: gwestbrook@posgcd.org

Website: www.posgcd.org

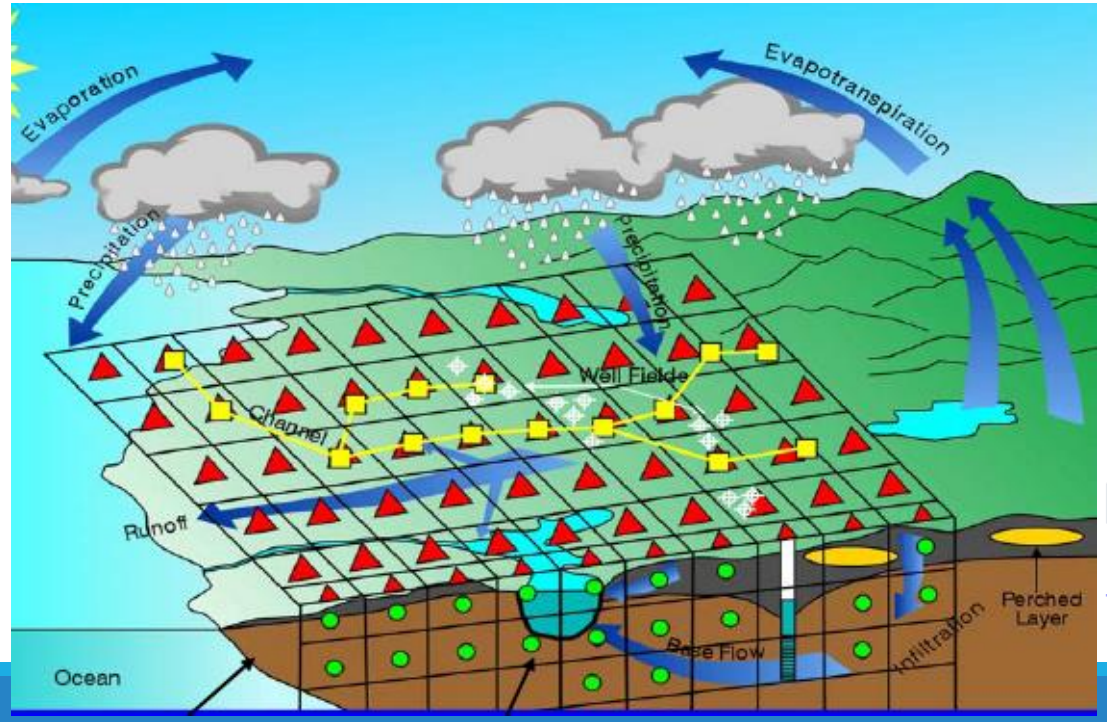
Serving the Citizens of Milam and Burleson Counties

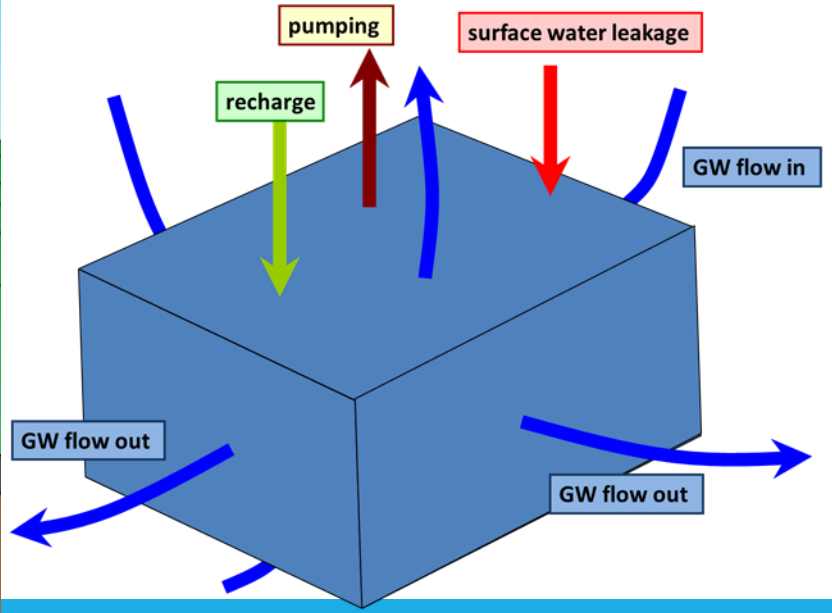
Groundwater Availability Model (GAM)

a tool that integrates data and hydrology to predict groundwater flow

the tool acts like a big 3-D Excel spreadsheet where grid cells physically represent "blocks" of aquifer material

water levels are predicted by solving for a water balance at each block using equations describing groundwater flow





Note: Schematic from MODHMS MODFLOW Manual