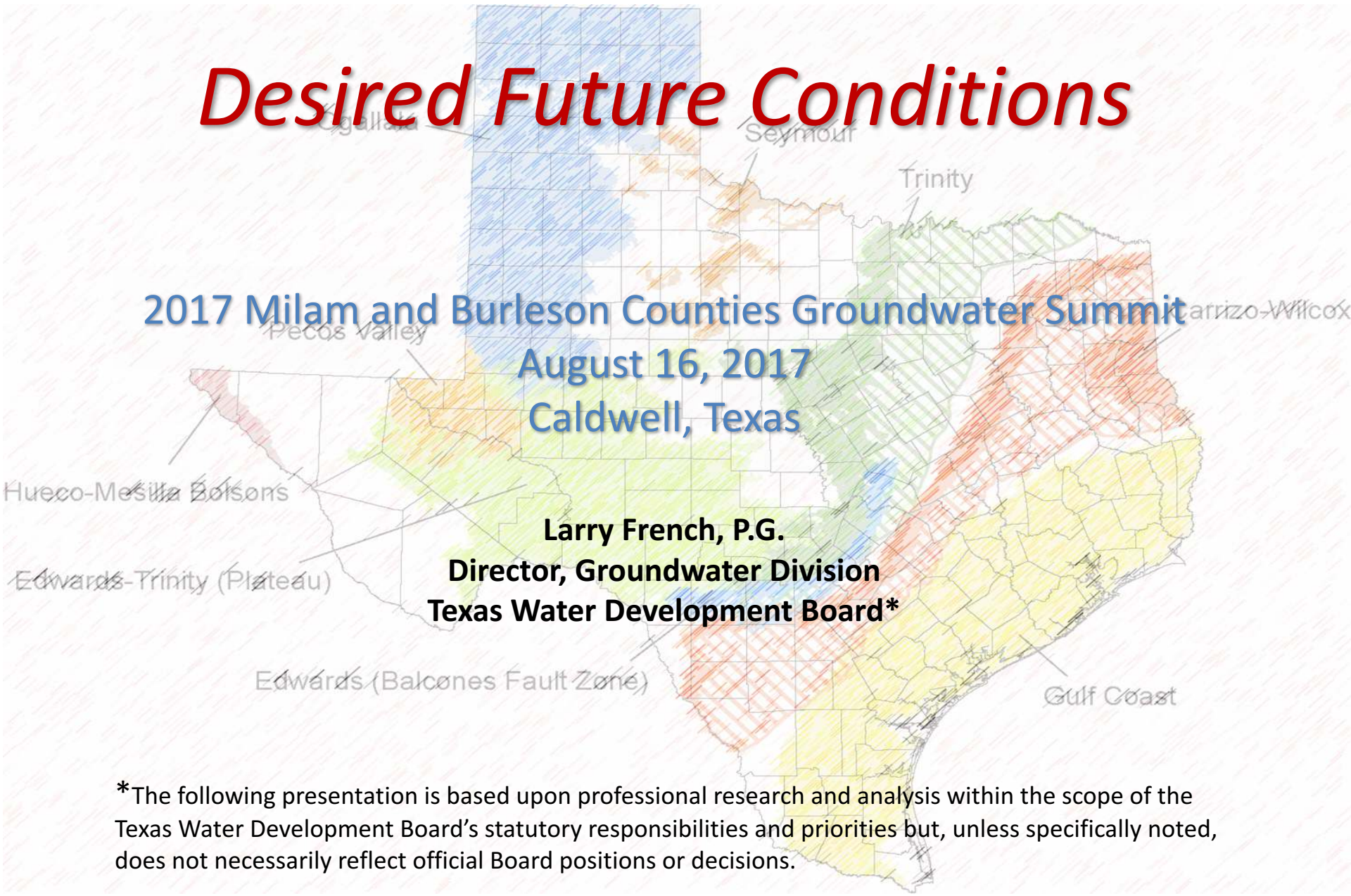
Desired Future Conditions



2017 Milam and Burleson Counties Groundwater Summit
August 16, 2017
Caldwell, Texas

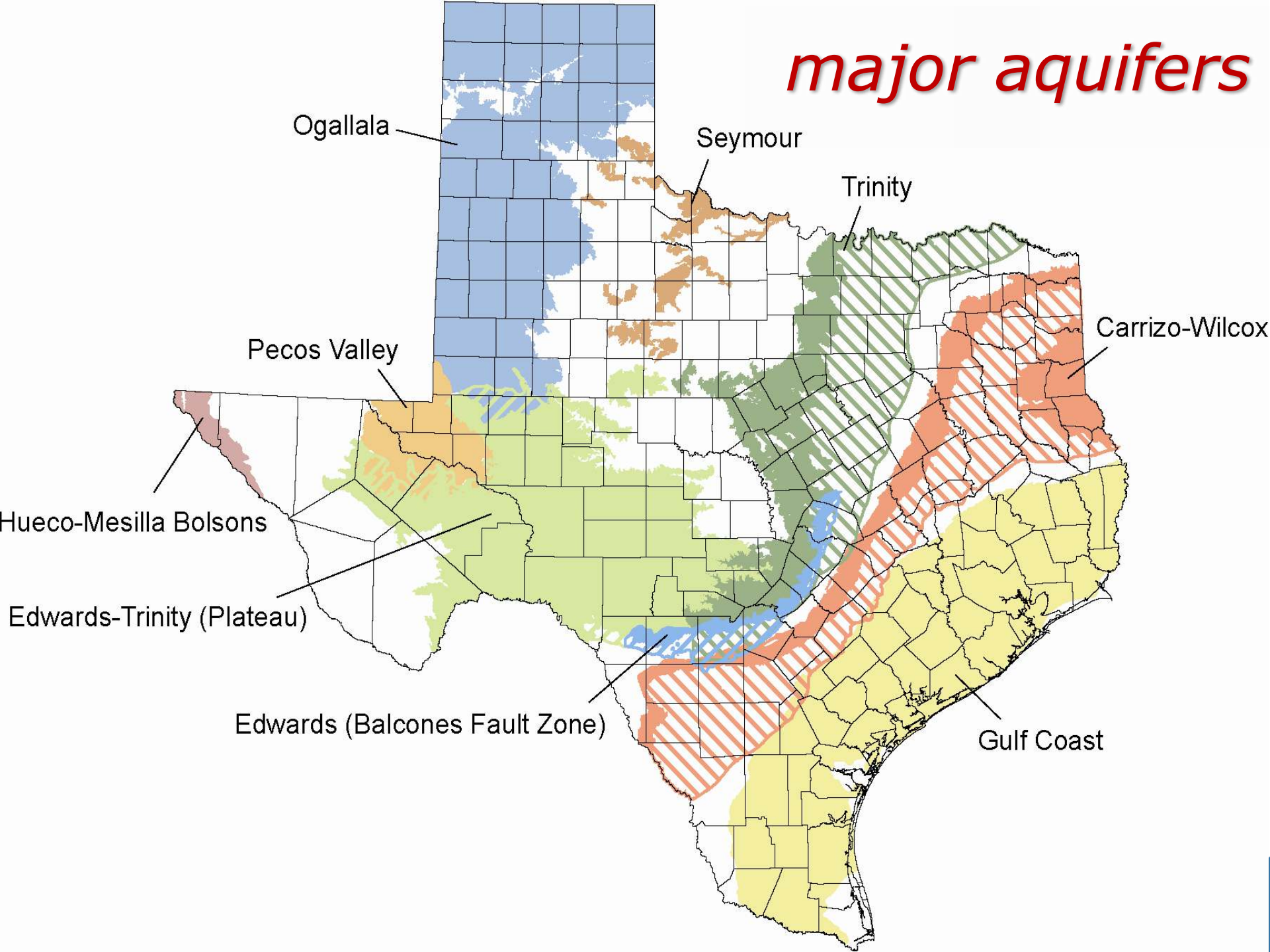
Larry French, P.G.
Director, Groundwater Division
Texas Water Development Board*

*The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board's statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.

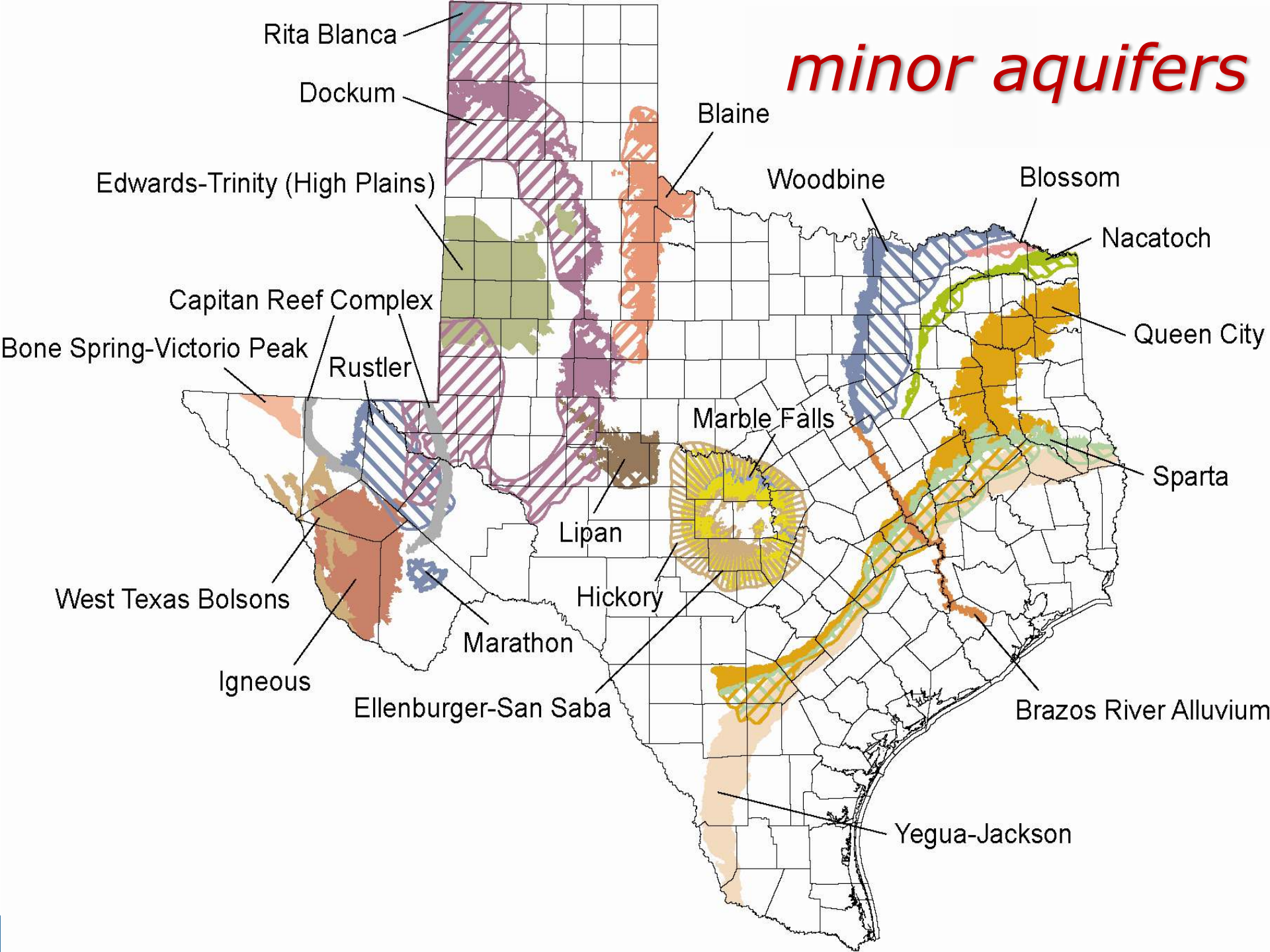
Preview

1. What are desired future conditions?
2. How are they developed?
3. Why are they important?
4. How are they used?

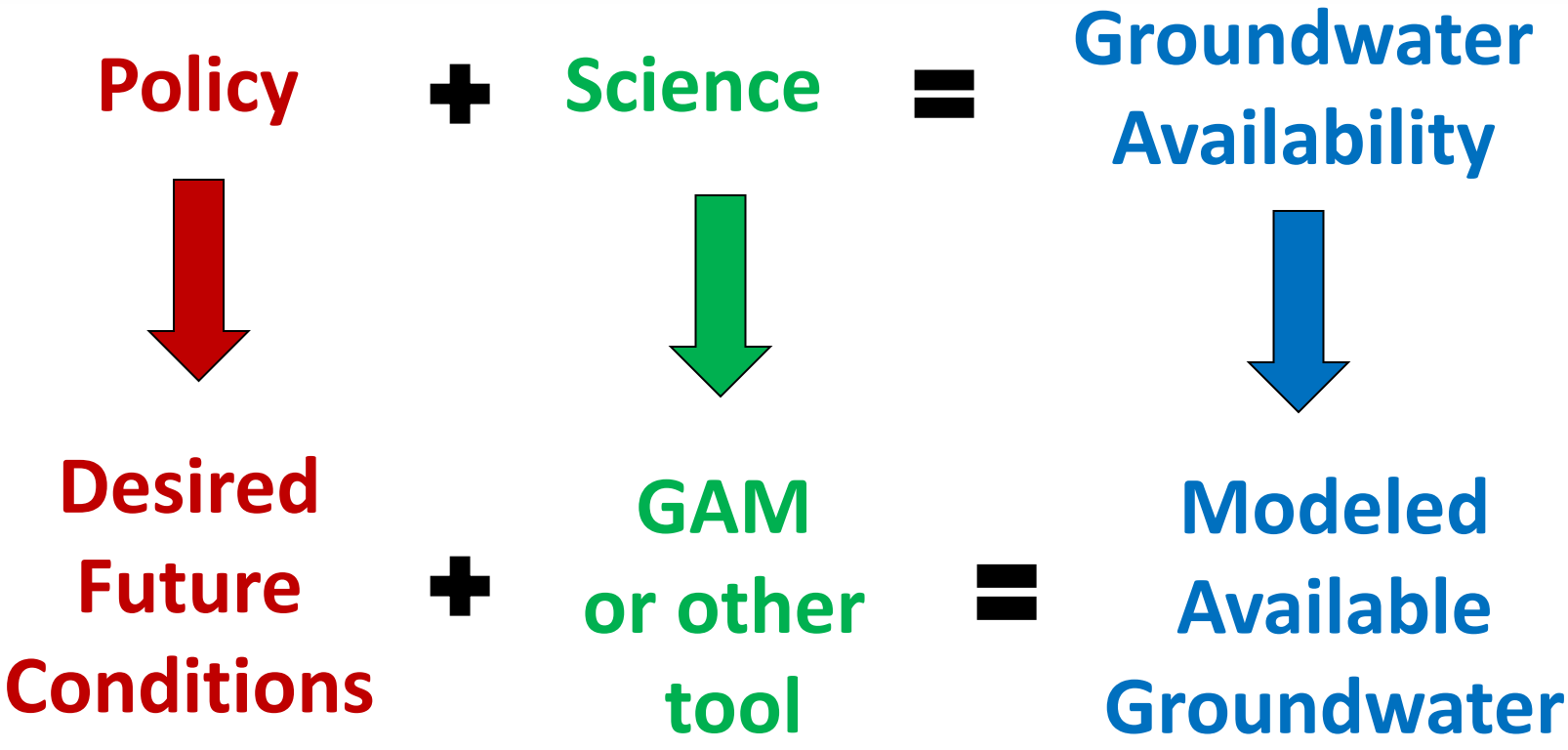
major aquifers



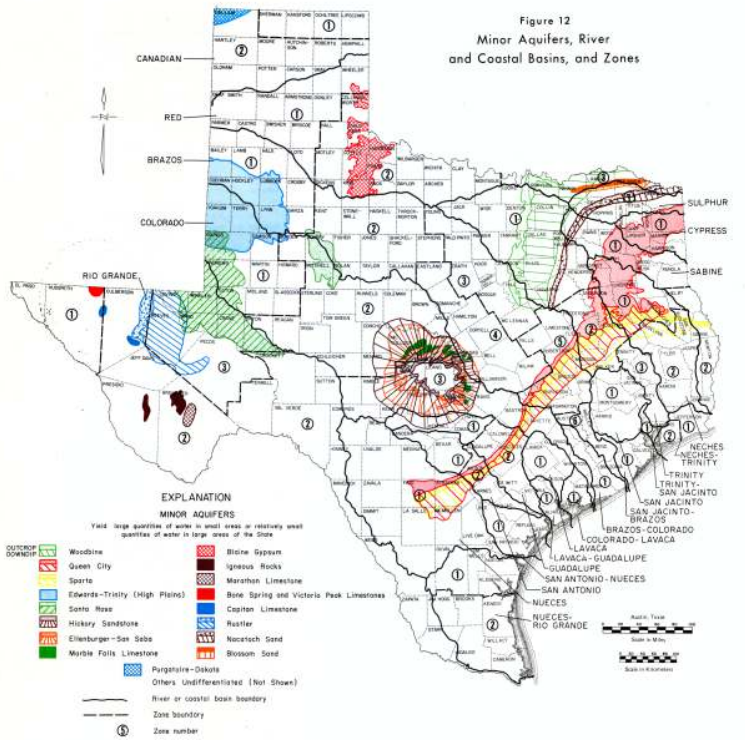
minor aquifers

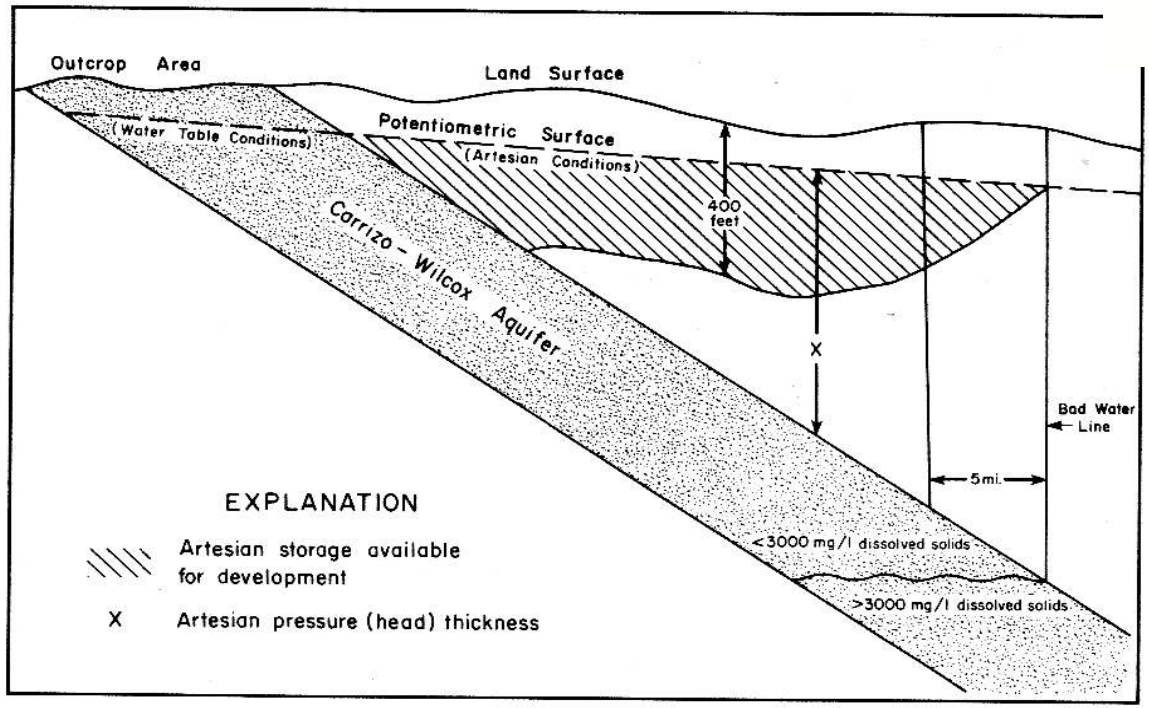


What is Groundwater Availability?



Goal: informed decision-making



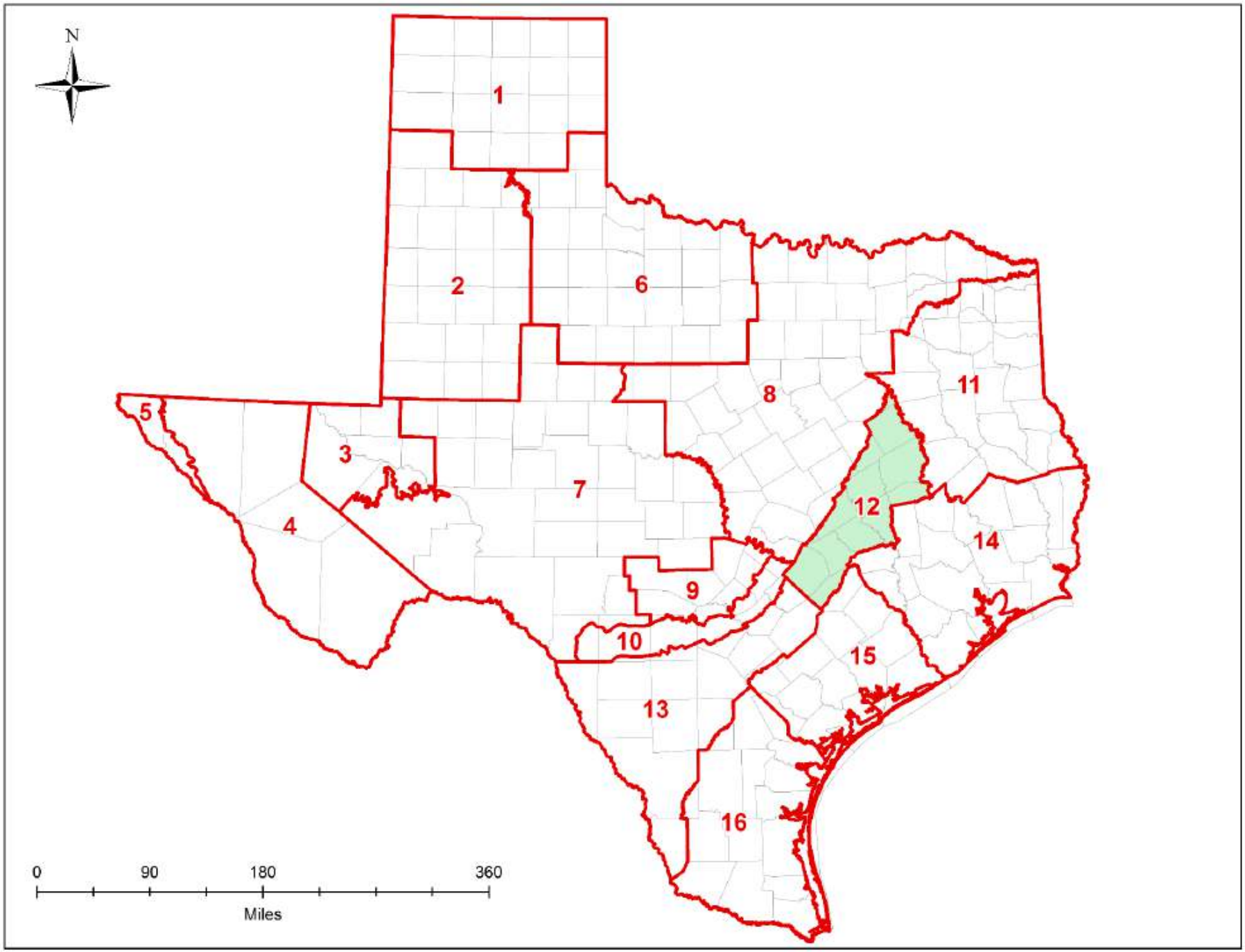


A. Carrizo - Wilcox Aquifer

Texas Water Development Board

Groundwater Joint Planning

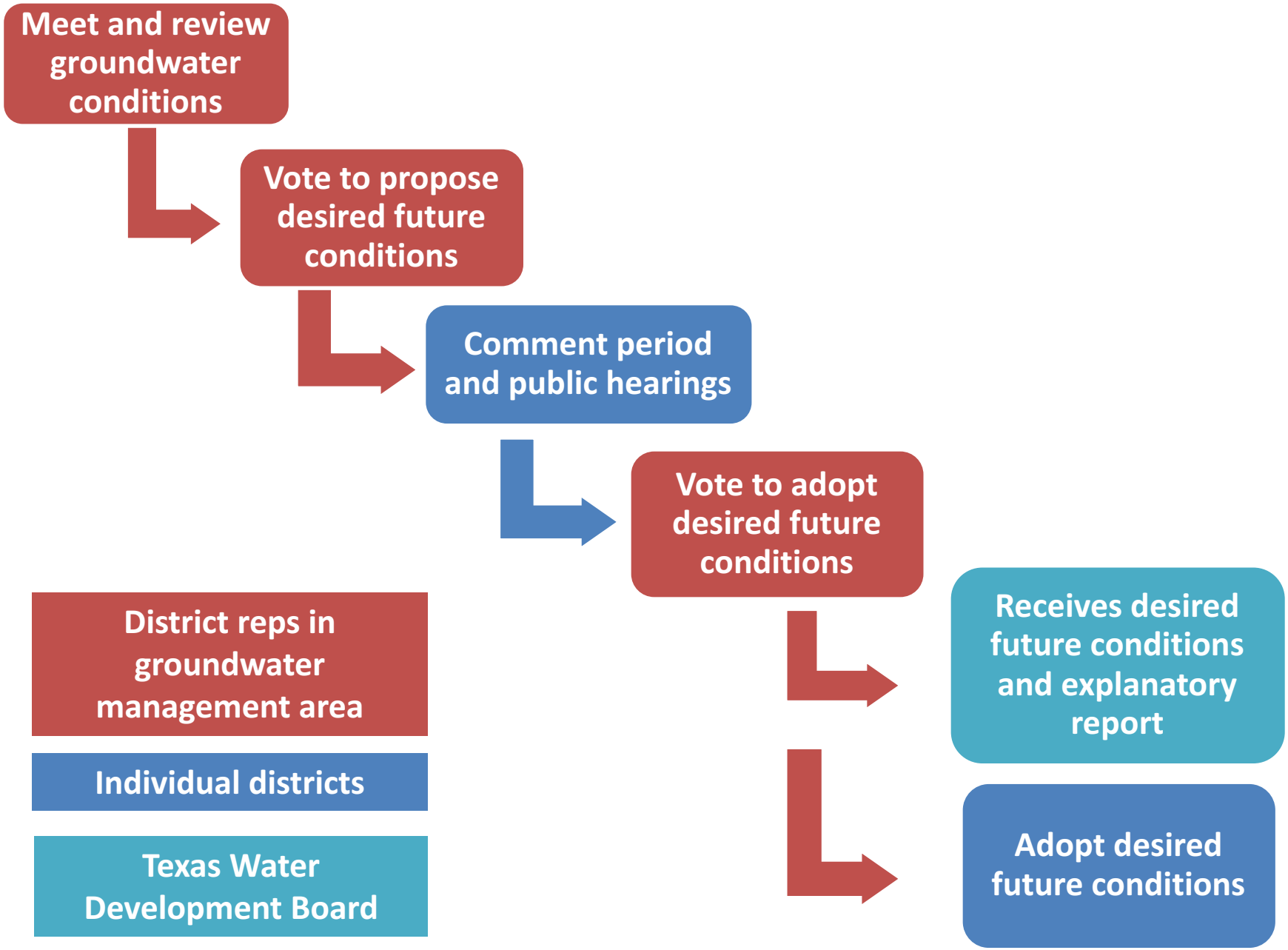
Groundwater conservation districts within a groundwater management area shall meet at least annually to conduct joint planning with the other districts in the management area and to review the management plans and accomplishments for the management area


N
1
2
6
8
11
5
3
7
12
14
4
9
10
15
13
16
0
90
180
360
Miles

Desired Future Condition

- The desired, quantified condition of groundwater resources (such as water levels, water quality, spring flows, or volumes) at a specified time or times in the future or in perpetuity.
- For “relevant” aquifers
- Broad Policy Goal
  - Drawdown (most)
  - Spring flow (a few)
  - Storage volumes (High Plains)
- Updated at least every 5 years (propose by May 2021, final adoption by January 5, 2022)

DESIRED FUTURE CONDITIONS: PROCESS TO ADOPT



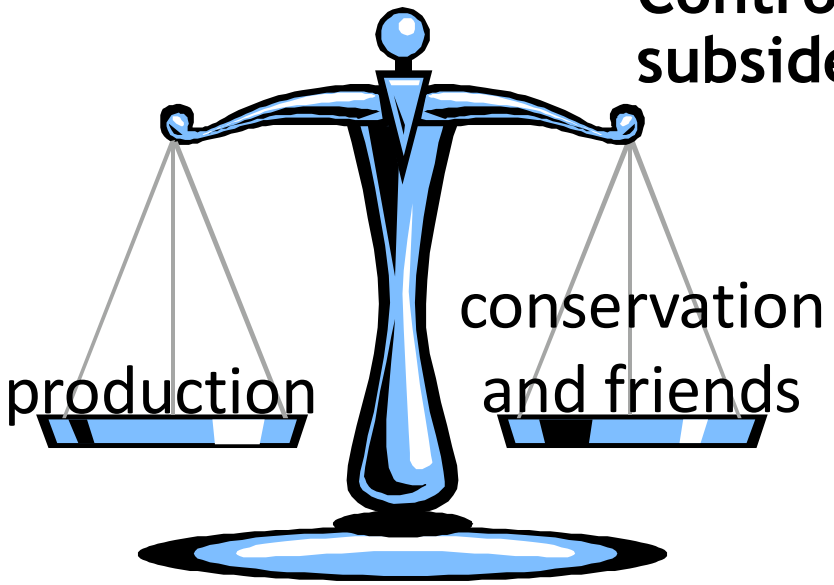
The "Factors"

- Uses & conditions
- State water plan
- Hydrologic conditions
- Environmental impacts
- Land subsidence
- Socioeconomics
- Property rights
- Feasibility
- Anything else

A balancing act

- Highest practicable level of groundwater production

- Conservation
- Preservation
- Protection
- Recharging
- Prevention of waste
- Control of subsidence



Total Estimated Recoverable Storage

- **Texas Administrative Code Rule §356.10**
  - ***The estimated amount of groundwater within an aquifer that accounts for recovery scenarios that range between 25 percent and 75 percent of the porosity-adjusted aquifer volume.***
- **Caution:**
  - ***It is only a volume of water without considering any consequences of withdrawing it (e.g., subsidence, economics, water quality, etc.)***

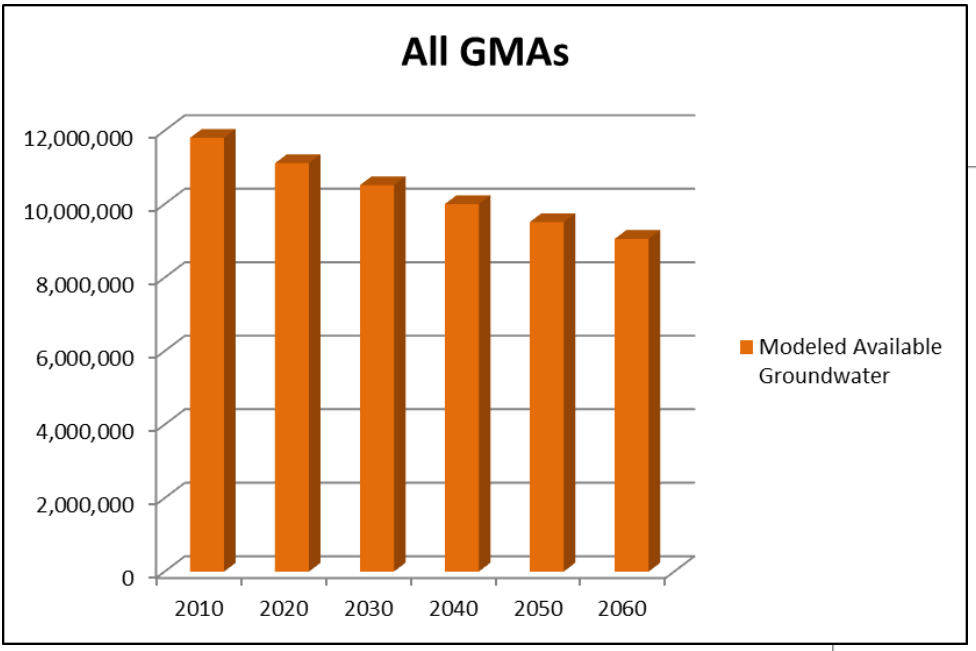
Total Estimated Recoverable Storage

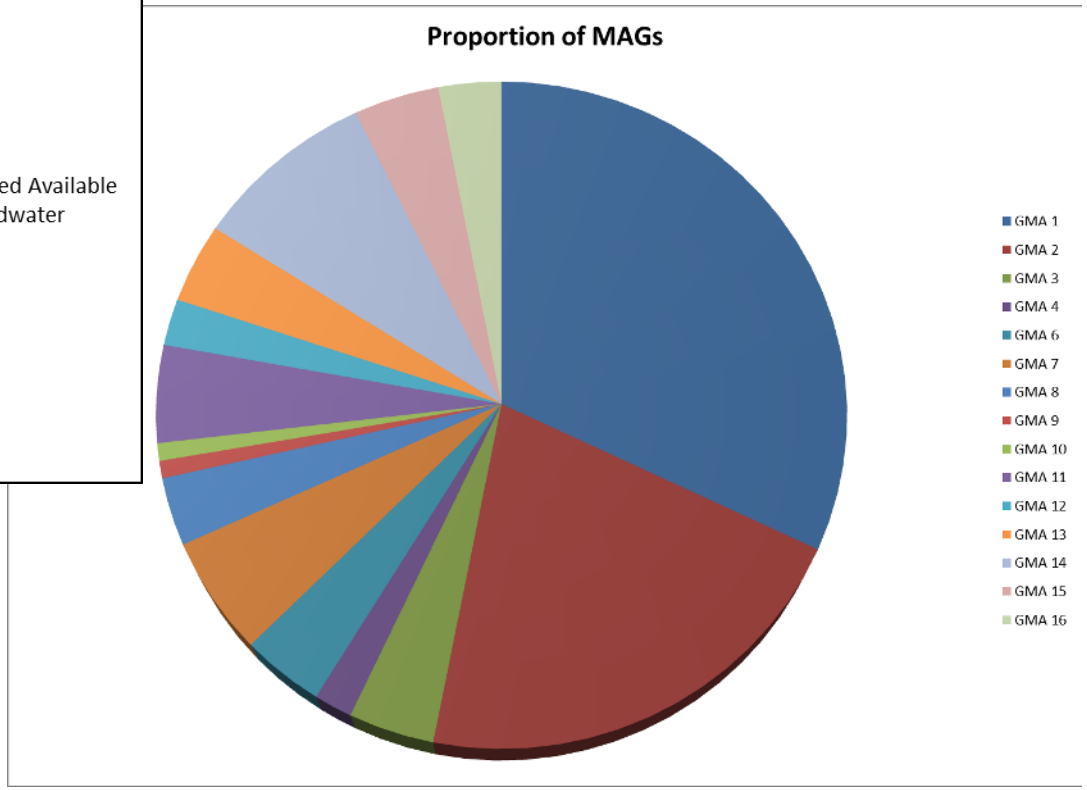
County	Trinity	Carrizo-Wilcox	Queen City	Sparta	Yegua-Jackson	Gulf Coast	Brazos River Alluvium
Bastrop	9,000,000	98,000,000	9,500,000	2,500,000	290,000	--	--
Brazos	--	69,000,000	25,000,000	4,250,000	30,000,000	450,000	290,000
Burleson	--	120,000,000	29,000,000	4,000,000	27,000,000	--	450,000
Falls	--	820,000	--	--	--	--	140
Fayette	--	95,000,000	4,750,000	12,000,000	27,000,000	--	--
Freestone	--	46,000,000	290,000	--	--	--	--
Lee	500,000	130,000,000	23,000,000	10,000,000	10,000,000	--	--
Leon	--	180,000,000	25,000,000	4,600,000	76,000	--	--
Limestone	--	12,000,000	--	--	--	--	--
Madison	--	110,000,000	20,000,000	16,000,000	15,000,000	--	--
Milam	--	47,000,000	650,000	--	--	--	28,000
Navarro	--	1,000,000	--	--	--	--	--
Robertson	--	110,000,000	8,800,000	1,300,000	--	--	270,000
Williamson	1,600,000	500,000	--	--	--	--	--
TOTAL	**11,100,000**	**1,019,320,000**	**160,240,000**	**79,400,000**	**109,366,000**	**450,000**	**1,038,140**

Modeled Available Groundwater

- Modeled available groundwater represents the total amount of groundwater, including both permitted and exempt uses, that can be produced from the aquifer in an average year, that achieves a "desired future condition."
- It is expressed as a rate – generally in acre-feet per year.

Some facts about modeled available groundwater…





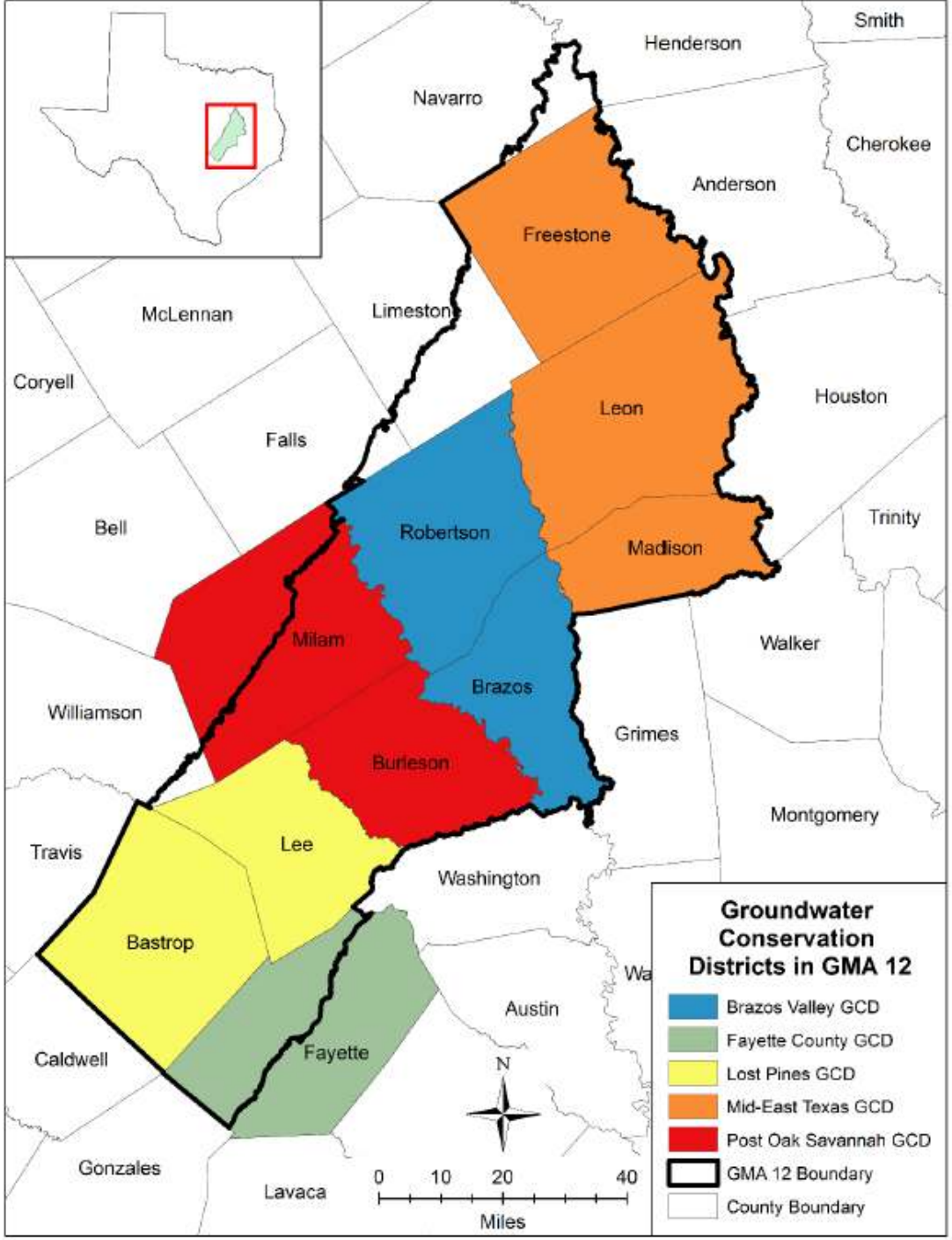
Modeled Available Groundwater and Permits (1 of 2)

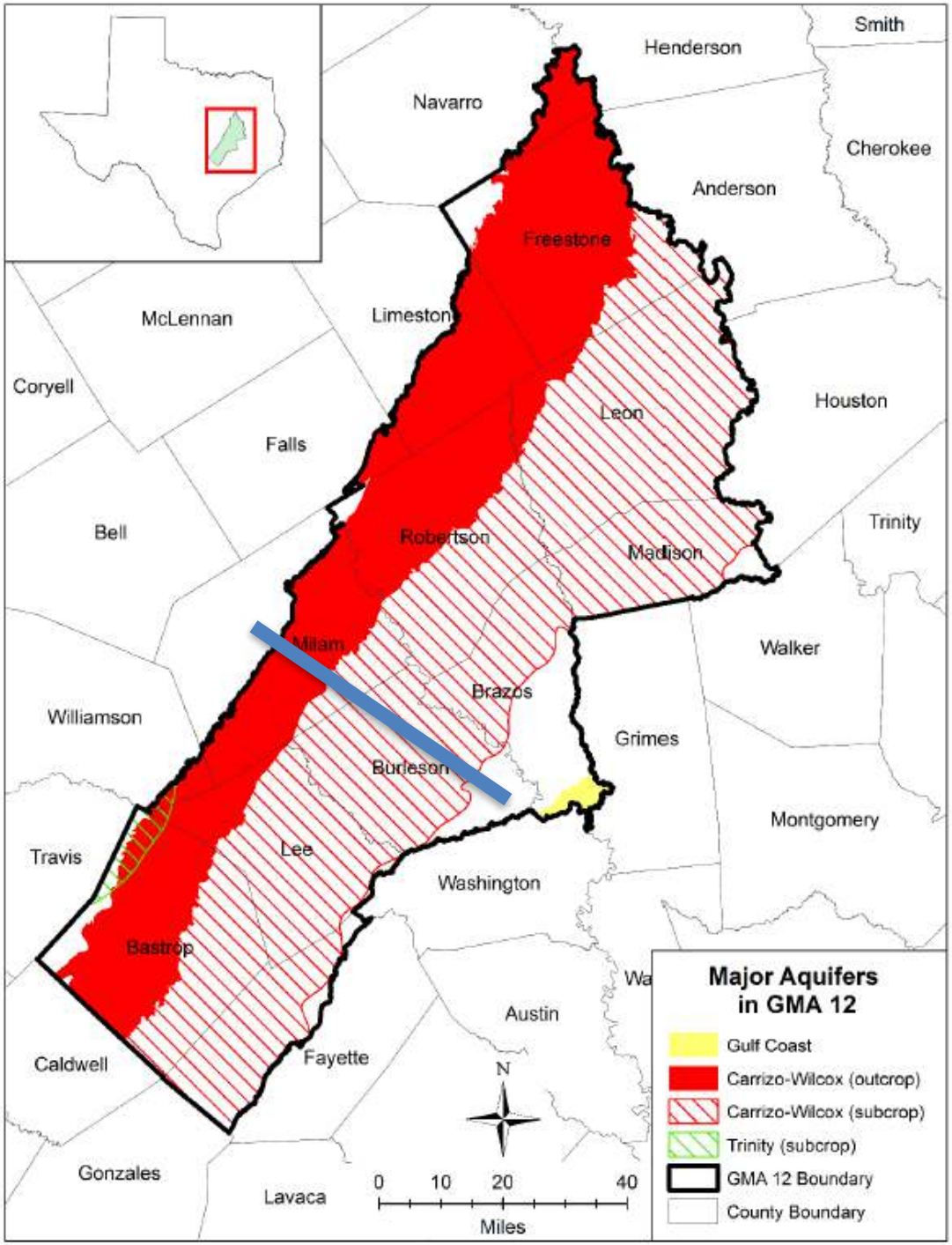
- The amount of water may be produced on an average annual basis to achieve a desired future condition.
- Districts, to the extent possible, shall issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition.
- But also….not so simple! (next page)

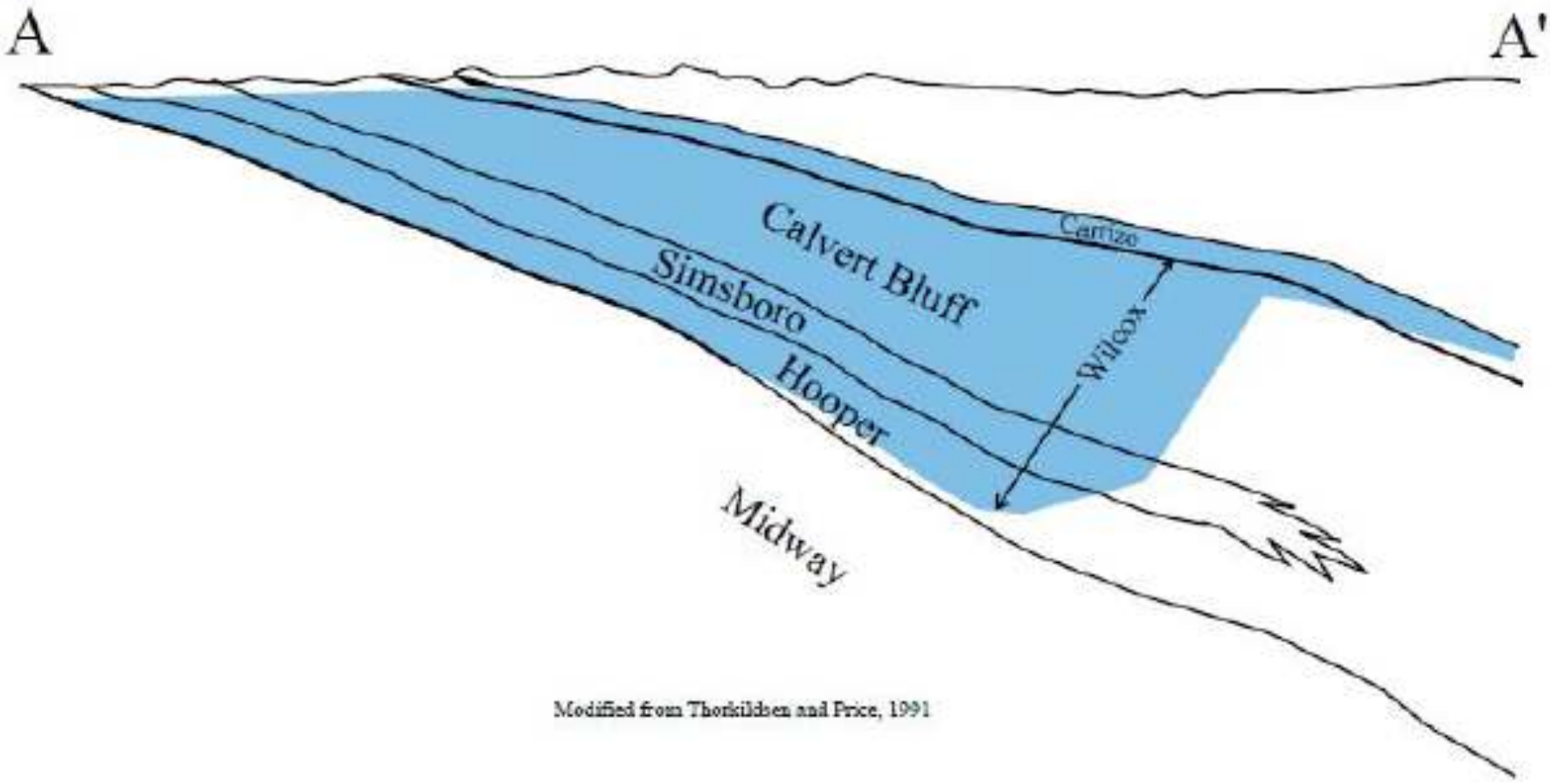
Modeled Available Groundwater and Permits (2 of 2)

- The district shall manage total groundwater production on a long-term basis to achieve an applicable desired future condition and consider:
  - Modeled available groundwater
  - Groundwater produced under exemptions
  - Amount of groundwater previously permitted
  - Estimate of permitted groundwater that is actually produced
  - Yearly rainfall and groundwater production patterns.


ENTERING
CARRIZO/WILCOX
AQUIFER
RECHARGE ZONE
Levasseur 2010


Smith
Henderson
Navarro
Cherokee
Anderson
Freestone
McLennan
Limestone
Coryell
Houston
Leon
Falls
Bell
Robertson
Trinity
Madison
Milam
Walker
Brazos
Williamson
Grimes
Burleson
Montgomery
Travis
Lee
Washington
Bastrop
Austin
Fayette
Caldwell
N
Gonzales
Lavaca
0 10 20 40
Miles
Groundwater Conservation Districts in GMA 12
Brazos Valley GCD
Fayette County GCD
Lost Pines GCD
Mid-East Texas GCD
Post Oak Savannah GCD
GMA 12 Boundary
County Boundary


Smith
Henderson
Navarro
Cherokee
Anderson
Freestone
McLennan
Limestone
Coryell
Houston
Leon
Falls
Bell
Robertson
Madison
Trinity
Milam
Walker
Brazos
Williamson
Grimes
Burleson
Montgomery
Travis
Lee
Washington
Bastrop
Austin
Caldwell
Fayette
N
Gonzales
Lavaca
0 10 20 40
Miles
Major Aquifers in GMA 12
Gulf Coast
Carrizo-Wilcox (outcrop)
Carrizo-Wilcox (subcrop)
Trinity (subcrop)
GMA 12 Boundary
County Boundary



Modified from Thorkildsen and Price, 1991

Comparison of Adopted Desired Future Conditions* for Carrizo-Wilcox, Queen City, and Sparta Aquifers

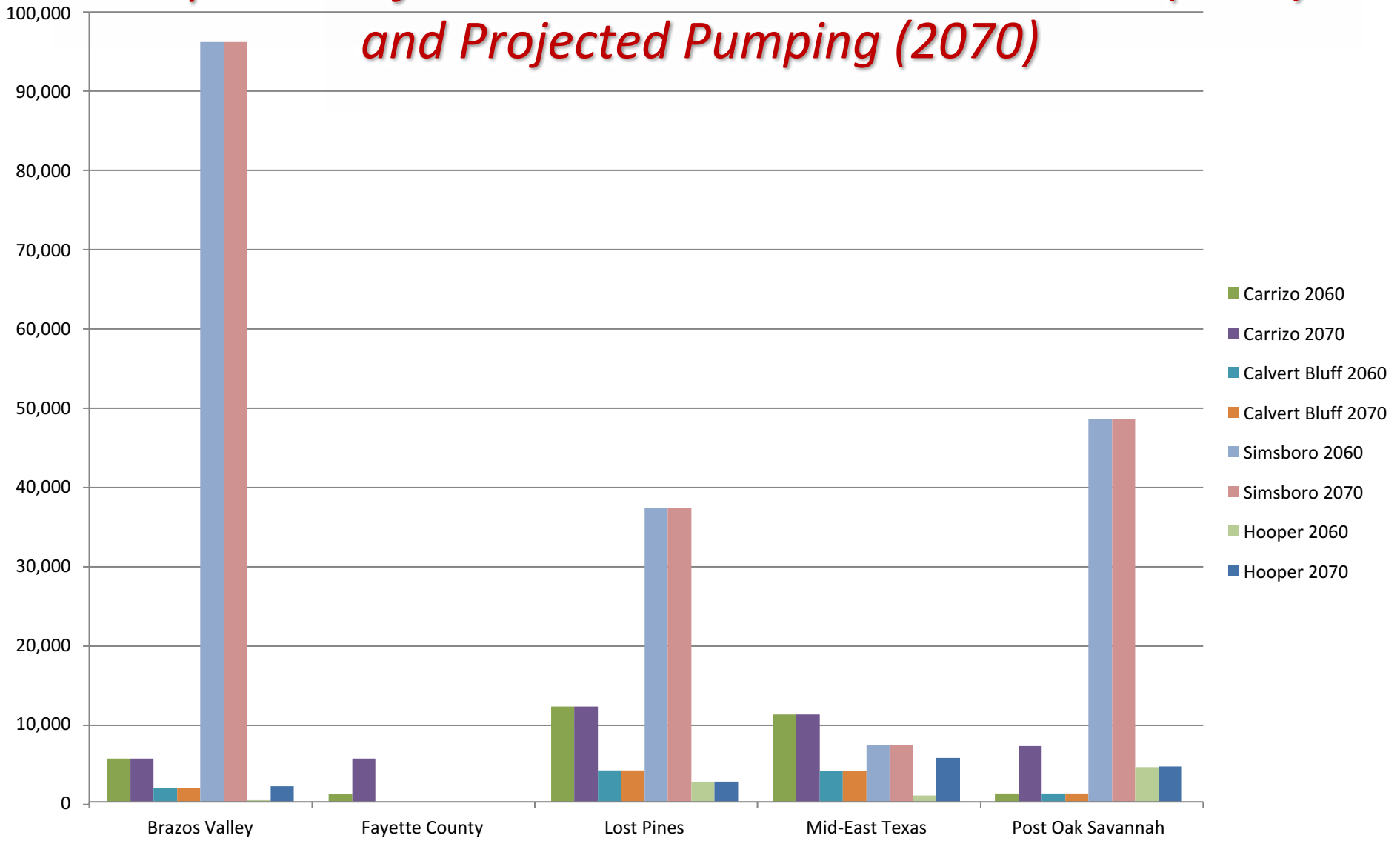
Groundwater Conservation District	Desired Future Condition - Average Aquifer Drawdown (feet)											
	Sparta		Queen City		Carrizo		Calvert Bluff		Simsboro		Hooper	
	2010	2017	2010	2017	2010	2017	2010	2017	2010	2017	2010	2017
Brazos Valley	15	12	12	12	47	61	106	125	270	295	170	207
Fayette County	60	47	60	64	60	110	--	--	--	--	--	--
Lost Pines	7	5	13	15	47	62	99	100	237	240	129	165
Mid-East Texas	0	5	0	2	55	80	70	90	115	138	95	125
Post Oak Savannah	30	28	30	30	65	67	140	149	300	318	180	205

*Note: there are tolerance criteria applied. See next page

Tolerance Criteria

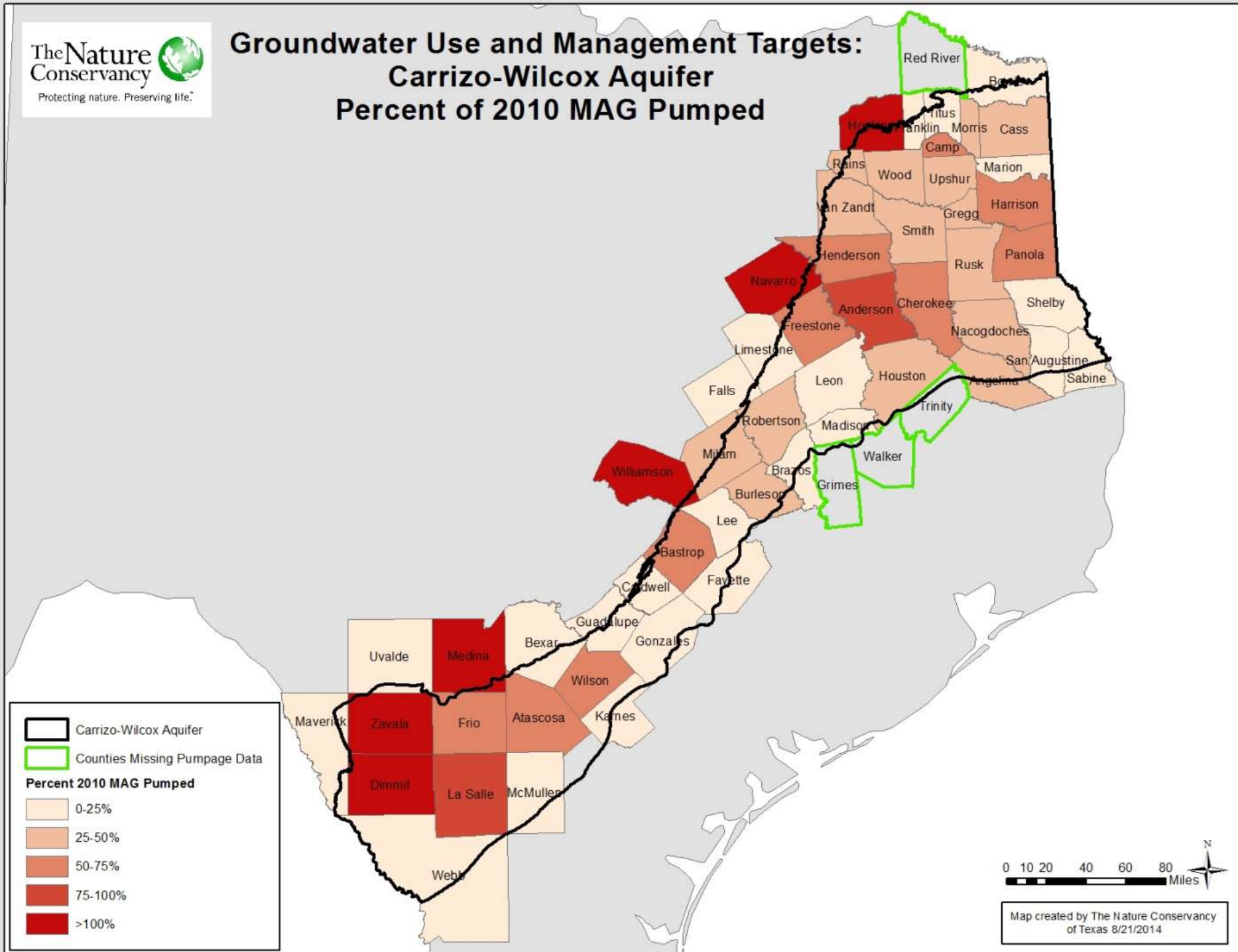
- Because these are model-generated values, it is reasonable to apply tolerance criteria.
- 10 percent or 5 feet for all aquifers except Simsboro.
- 5 percent or 5 feet for the Simsboro.
- Based on model calibration results and statistics, information used to calibrate the GAM, recent data on aquifer and recharge, sensitive of the model to changes in parameters.

Comparison of Modeled Available Groundwater (2060) and Projected Pumping (2070)

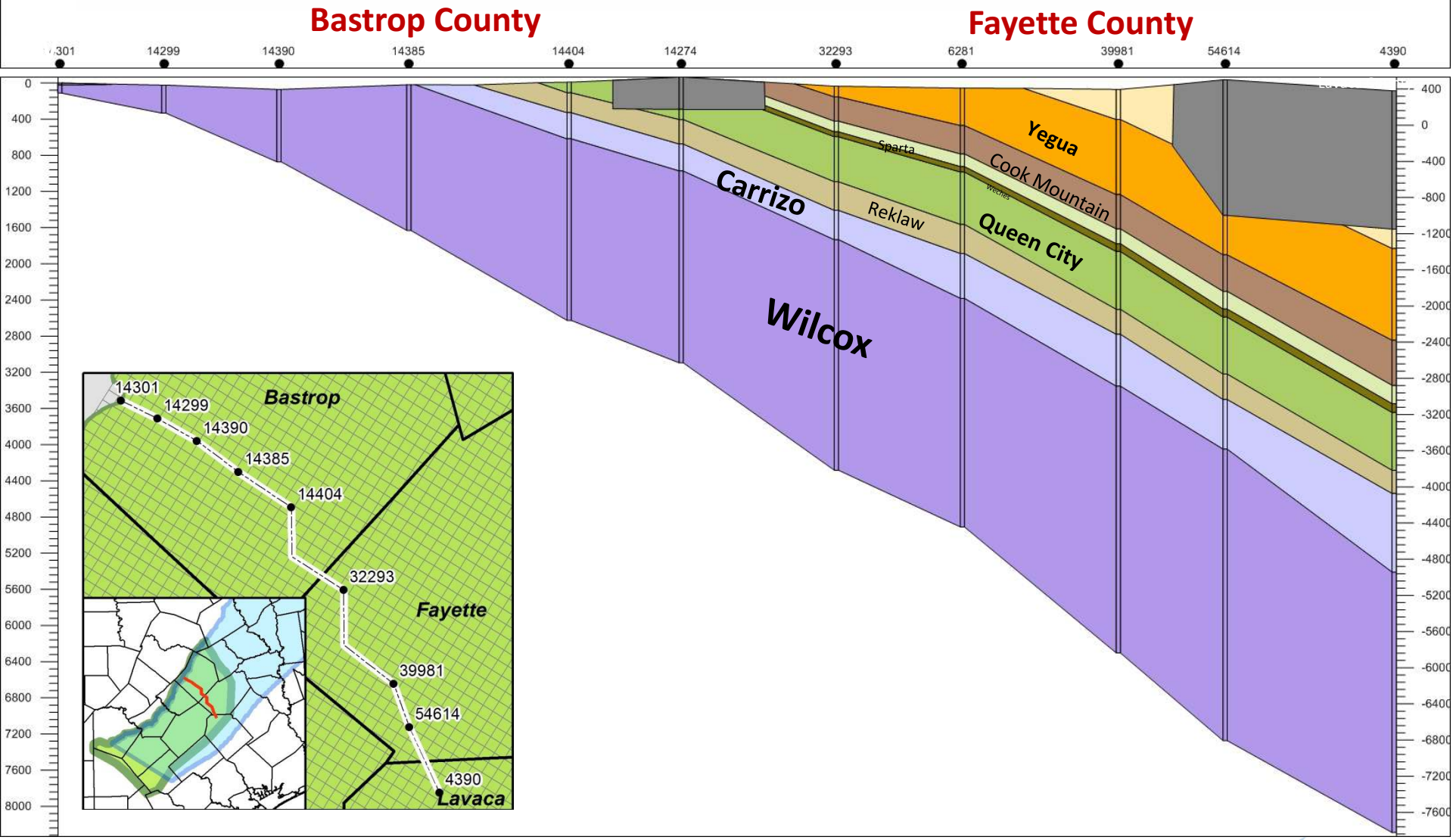


The Nature Conservancy
Protecting nature. Preserving life.

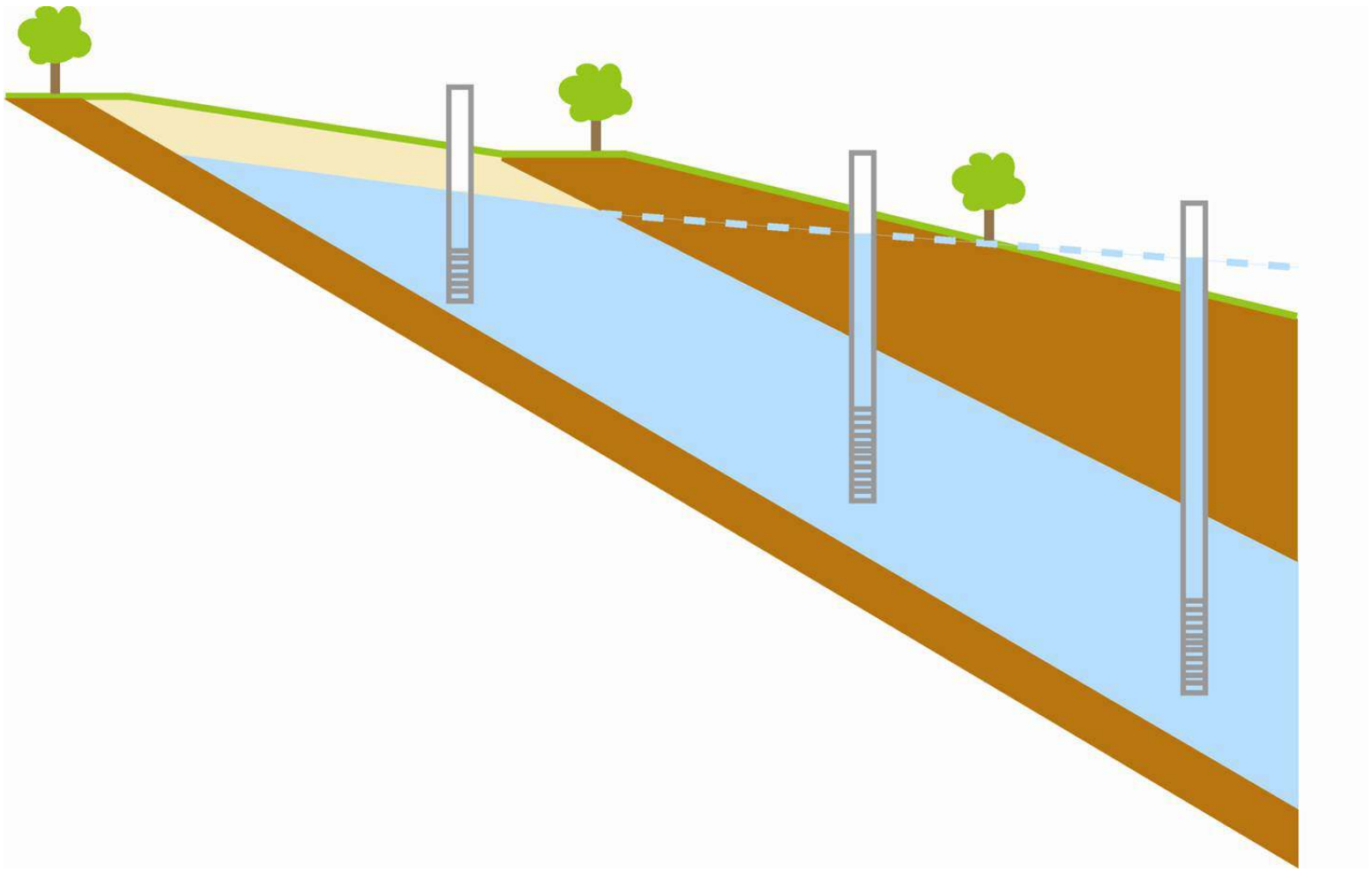
Groundwater Use and Management Targets: Carrizo-Wilcox Aquifer Percent of 2010 MAG Pumped



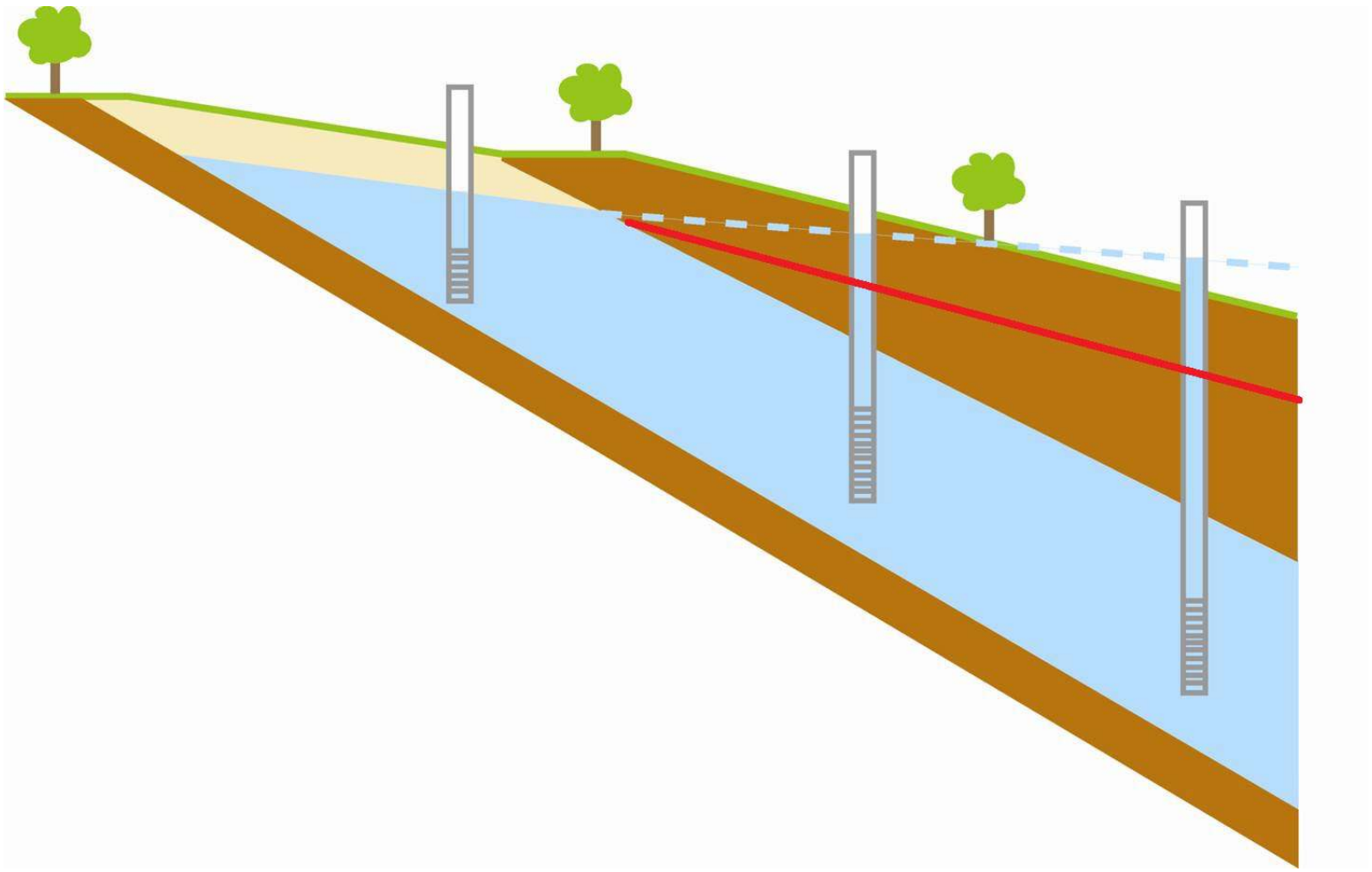
Monitoring desired future conditions isn't easy



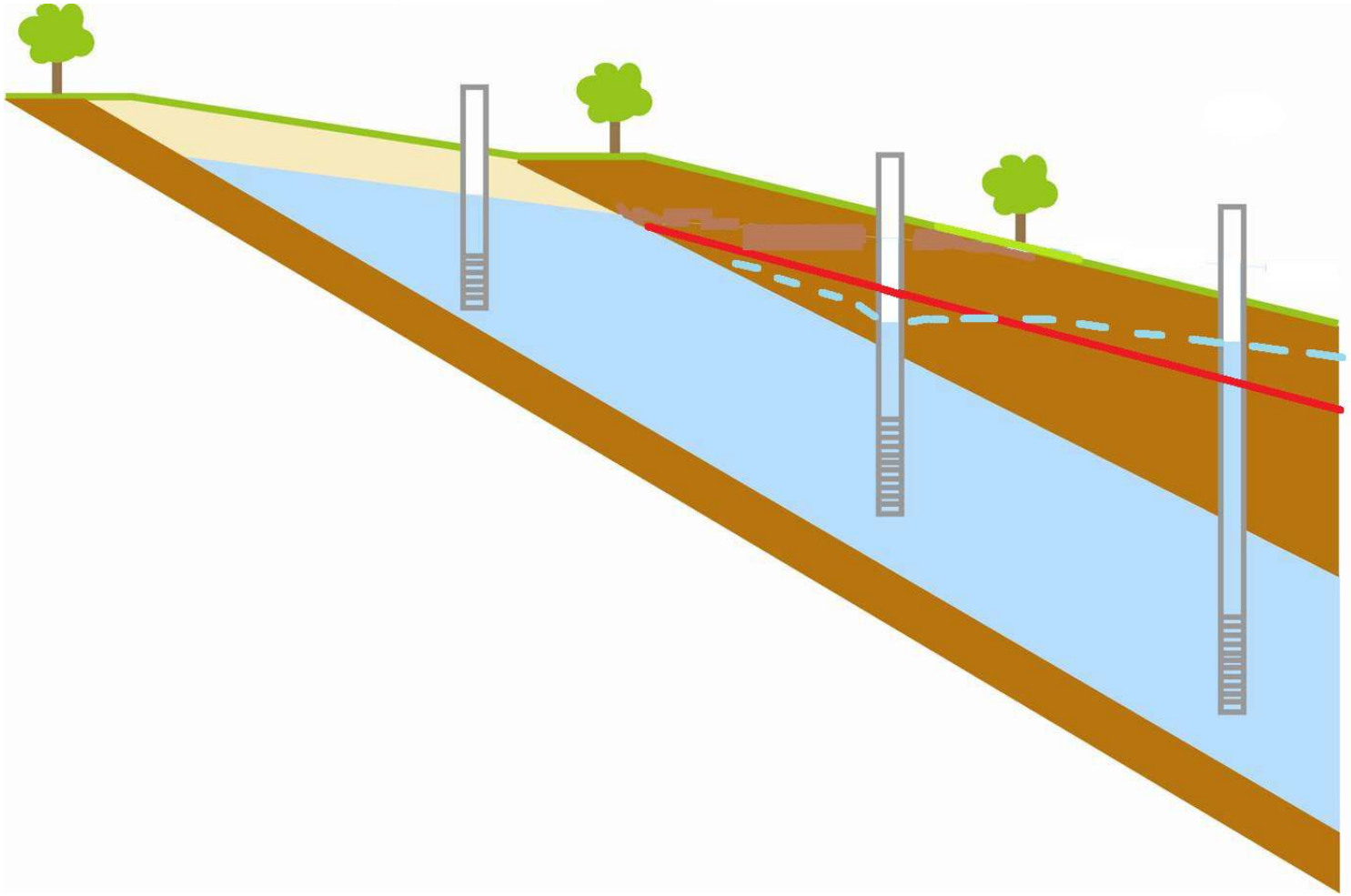
Before desired future conditions…



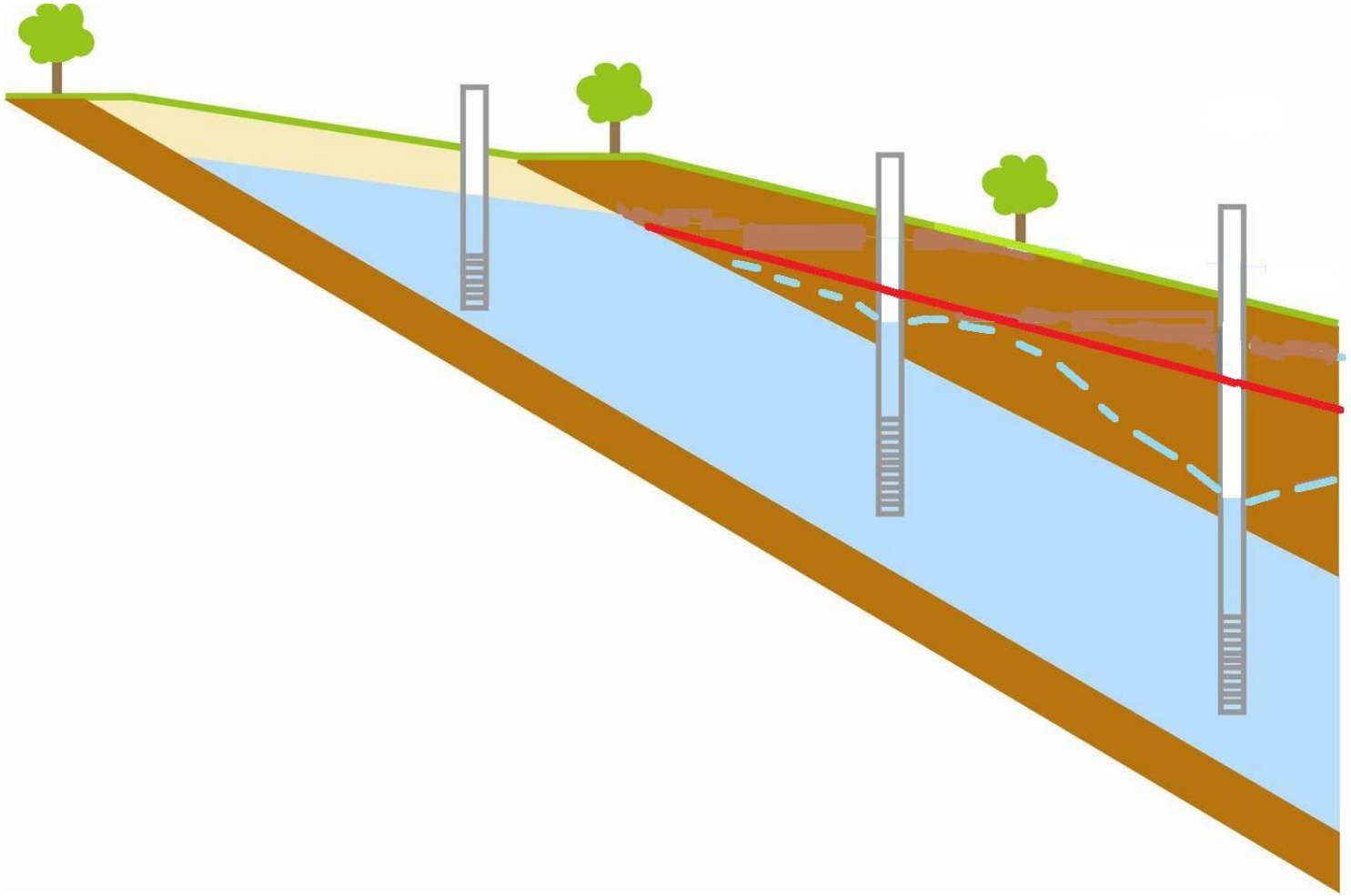
Now, a desired future condition…



Groundwater development meets a desired future condition.



Groundwater development meets a desired future condition. Again.



Three points to consider:

1. Desired future conditions are an expression of local groundwater management.
2. Desired future conditions are not set in stone; they can and are modified to address improvements in data/science and changing groundwater usage.
3. Districts are responsible for managing the groundwater resource to achieve the desired future condition.

Thank you!

Larry French, P.G.
Director, Groundwater Division
Texas Water Development Board
1700 N. Congress Avenue
Austin, Texas 78711
512-463-5067