

Can the Patchwork Work? Decentralized Groundwater Governance in Central Texas

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Committee

Dr. Carl Bauer (chair); Dr. Chris Scott; Dr. Edella Schlager

Outline

1. Setting and TX groundwater 101
2. Three Different Groundwater Districts
3. New pressures on water management;
rural-urban tensions

San Antonio growing more than others

Of the 10 most populous cities in the U.S., San Antonio had the highest rate of growth, 1.8 percent, from 2013 to 2014. Close behind were Dallas, Houston, San Diego and Phoenix, each with 1.6 percent growth.

All of the top 10 cities now exceed 1 million people, with San Jose being the latest to reach that milestone.

U.S. cities with a population of one million or more

In millions as of July 1, 2014

Percent increase since 2013

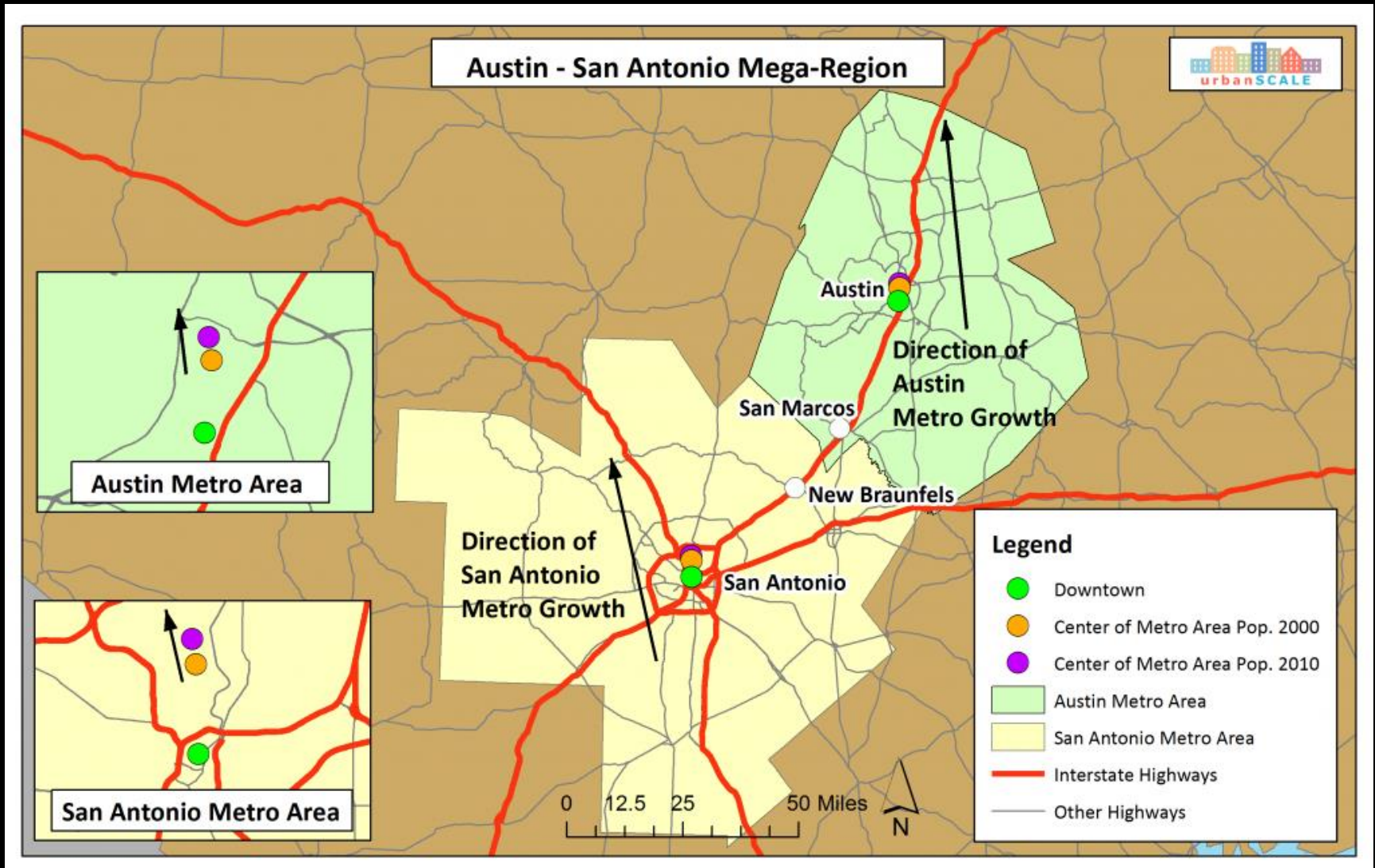
City	Population (Millions)	Percent Increase since 2013
New York	8.5	0.6%
Los Angeles	3.9	0.8
Chicago	2.7	0.003
Houston	2.2	1.6
Philadelphia	1.6	0.3
Phoenix	1.5	1.6
San Antonio	1.4	1.8
San Diego	1.4	1.6
Dallas	1.3	1.6
San Jose	1.0	1.2

Source: U.S. Census Bureau

San Antonio Express-News

<http://www.expressnews.com/news/local/article/San-Marcos-fastest-growing-city-in-the-U-S-for-6277231.php#photo-8021517>

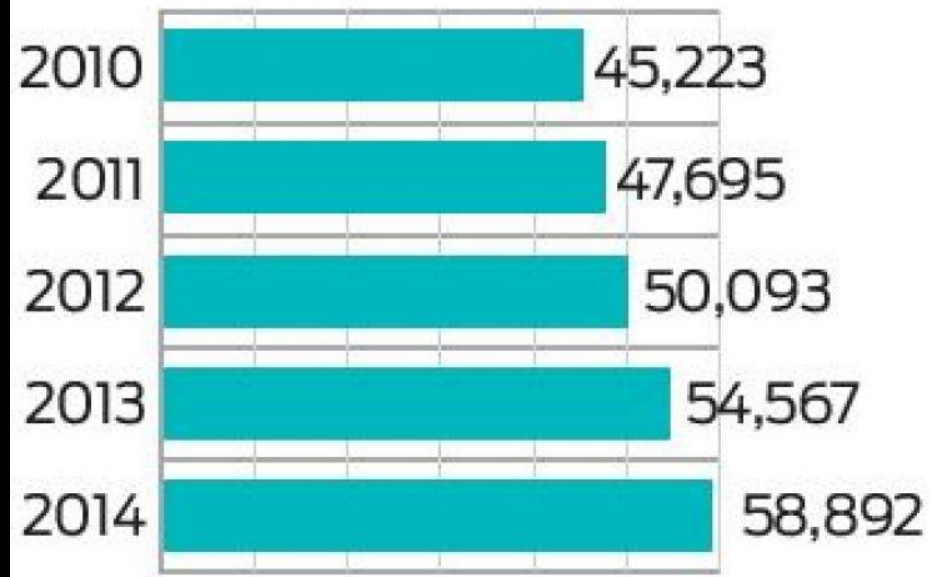
Growth in the “metro-zone” (Travis, 2007)



San Marcos still booming

For the third year in a row, San Marcos had the highest rate of growth of any city in the U.S.

Population increase



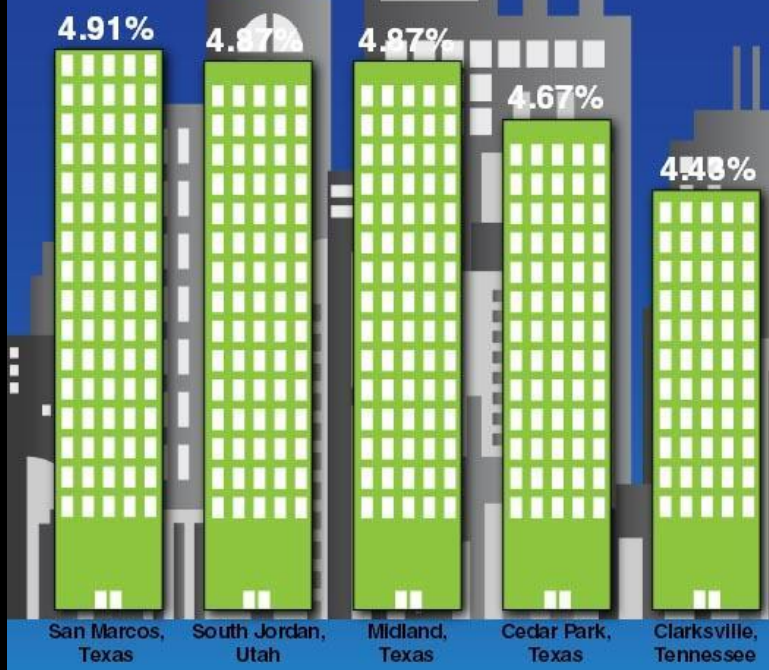
Source: U.S. Census Bureau

San Antonio Express-News

<http://www.expressnews.com/news/local/article/San-Marcos-fastest-growing-city-in-the-U-S-for-6277231.php#photo-8021517>

Big Growth

Fastest-Growing Large Cities:
July 1, 2011 to July 1, 2012



Source: U.S. Census Bureau,
2012 Populations Estimates for
Cities and Towns

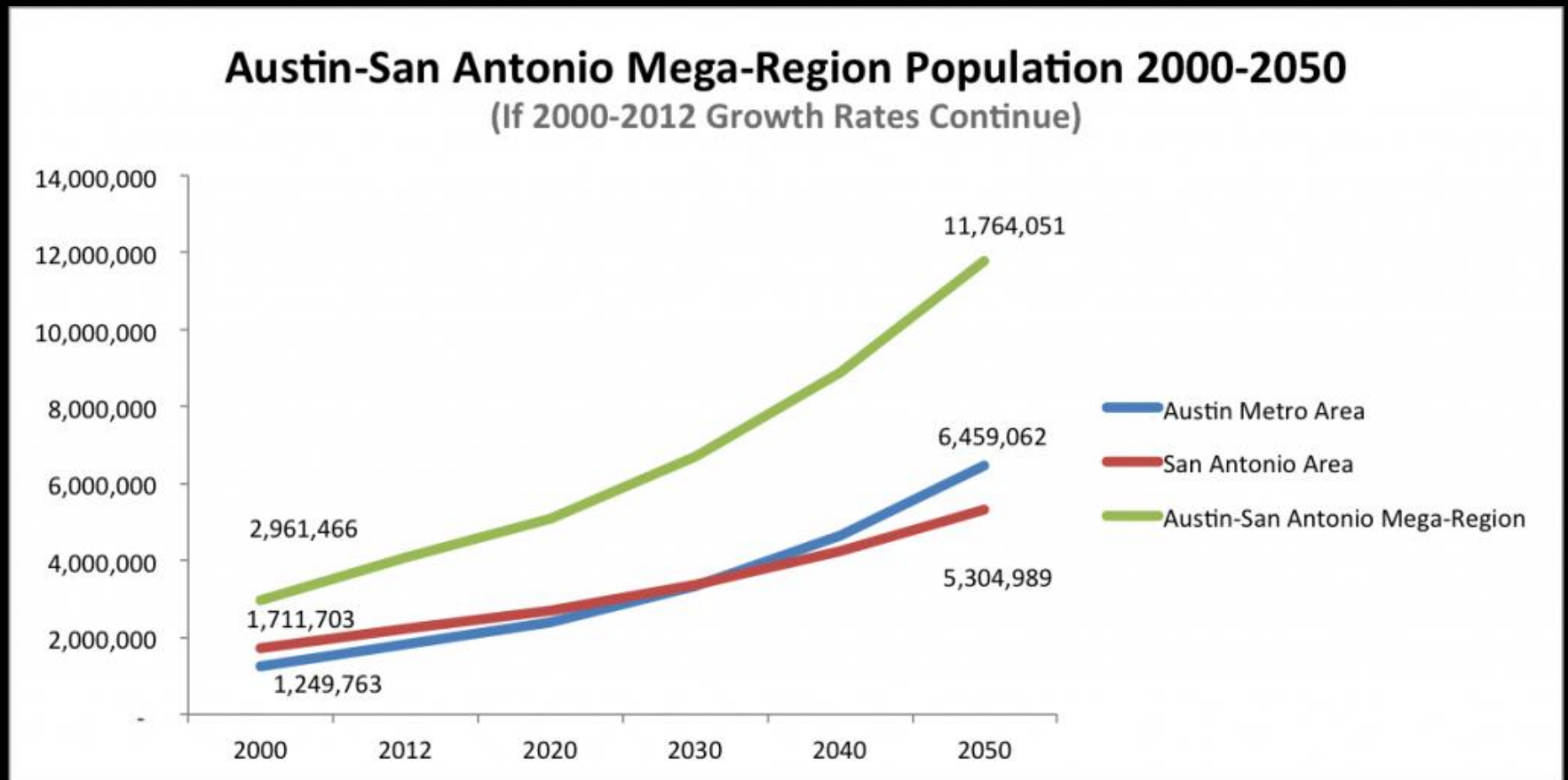


<http://tpr.org/post/san-marcos-rate-population-growth-leads-nation-why-its-booming#stream/0>

Central Texas Hill Country



- San Antonio's metro area population grew by 30.5% from 2000 to 2012.
- Projected to increase by more than 1 million by 2040



Setting

1. Monster growth in the South-central Texas “I-35 corridor” -> increase in water demand
(Austin -- San Marcos – San Antonio)
2. Surface water largely allocated
3. High reliance on groundwater
4. Groundwater often closely connected to surface water bodies

How is Water Allocated to Meet New Demands?

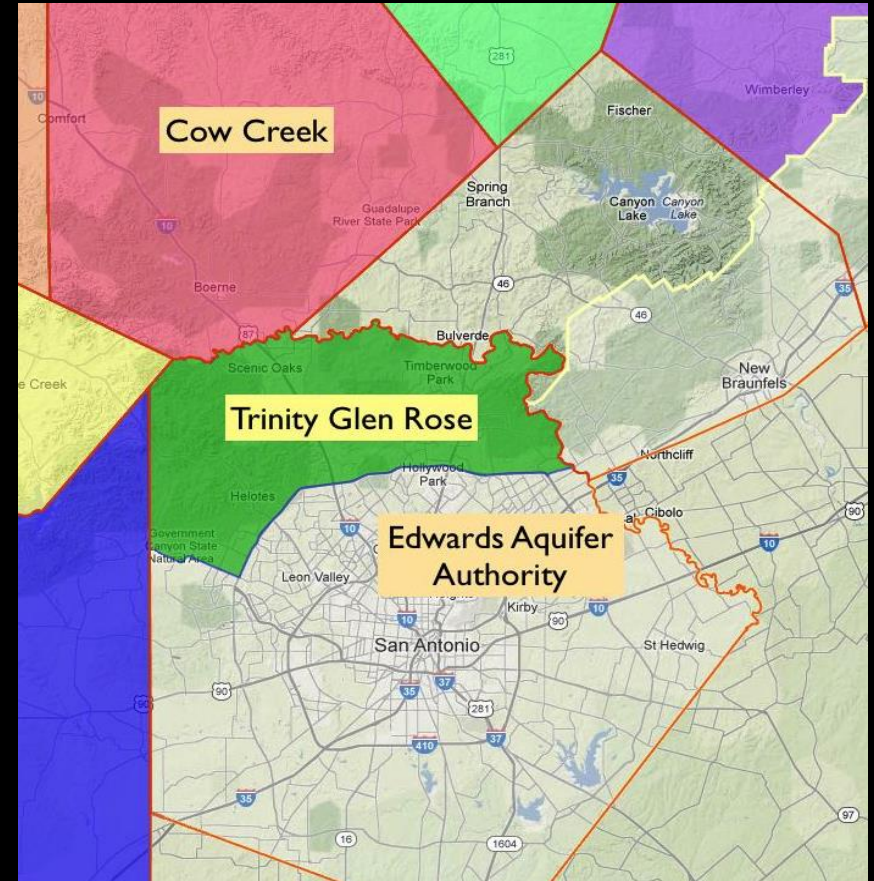
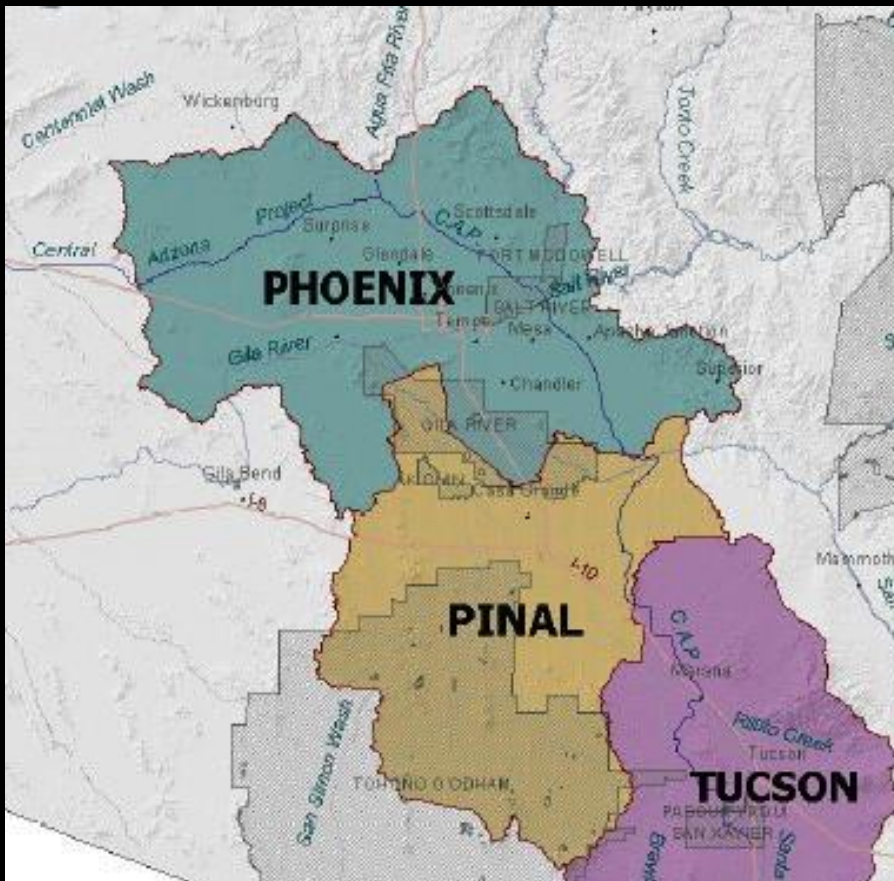
Governance and Organizational Form

- Traditional centralized approach: Arizona, New Mexico
- Decentralized: California, Nebraska, Texas

“The fragmented nature of water and land use at the state level, due in part to the lack of integration between land use and water laws, is leading to a new paradigm in water planning and management which focuses on a “bottom-up” approach instead of the traditional “top-down” approach. Different “scales” of groundwater governance and management have evolved since 2000.”

- Dr. Todd Jarvis, *The Water Report* #137

Study Sites: Groundwater governance in metro Phoenix and San Antonio



Texas Water in a Nutshell

- Surface and groundwater legally separate
- “Percolating water” (groundwater) is private property subject to rule of capture (*Houston & T.C. Ry. Co. v East, 1904*) and owned in place (*Edwards Aquifer Authority v. Day and McDaniel, 2012*)
- However, the state is obligated to conserve it (Conservation Amendment 1917)
- Decentralized, local approach (Groundwater Conservation Act of 1949); but voluntary

“Groundwater conservation districts...are the state's preferred method of groundwater management through rules developed, adopted, and promulgated by a district in accordance with the provisions of this chapter.”

Texas Water Code, Sec. 36.0015



Swearing in of Board of Directors at public meeting of Cow Creek District, 3/10/14. Photo by author.

Groundwater Conservation Districts

- Typically created by acts of legislature
 - Funding mechanism, election procedures, temporary directors, etc.
- Usually based on political boundaries
- Must balance private rights and public interests (conservation, sustainable use)
- Rules and regs vary (like snowflakes)
- Obligated to develop management plans

Recent Changes / Alphabet Soup

- 2001: SB 2
 - Groups **GCDs** into Groundwater Management Areas (**GMA**) for coordinated planning
- 2005: HB 1763
 - Requires joint goal-setting (“Desired Future Conditions” (**DFCs**))
 - 5-year basis
 - Modeled Available Groundwater (**MAG**)
- Reforms -> more cohesive planning and mgmt for both groundwater and surface water
 - But still a complex patchwork of jurisdictions

- Confirmed Groundwater Conservation Districts**
1. Anderson County UWCD
 2. Bandera County River Authority & Ground Water District
 3. Barton Springs/Edwards Aquifer CD
 4. Bee GCD
 5. Blanco-Pedernales GCD
 6. Bluebonnet GCD
 7. Brazoria County GCD
 8. Brazos Valley GCD
 9. Brewster County GCD
 10. Brush Country GCD
 11. Central Texas GCD
 12. Clear Fork GCD
 13. Clearwater UWCD
 14. Coastal Bend GCD
 15. Coastal Plains GCD
 16. Coke County UWCD
 17. Colorado County GCD
 18. Corpus Christi ASRCD
 19. Cow Creek GCD
 20. Crockett County GCD
 21. Culberson County GCD
 22. Duval County GCD
 23. Edwards Aquifer Authority
 24. Evergreen UWCD
 25. Fayette County GCD
 26. Fox Crossing Water District
 27. Garza County UWCD
 28. Gateway GCD
 29. Glasscock GCD
 30. Goliad County GCD
 31. Gonzales County UWCD
 32. Guadalupe County GCD
 33. Hays Trinity GCD
 34. Headwaters GCD
 35. Hemphill County UWCD
 36. Hickory UWCD No. 1
 37. High Plains UWCD No.1
 38. Hill Country UWCD
 39. Hudspeth County UWCD No. 1
 40. Iron County WCD
 41. Jeff Davis County UWCD
 42. Kenney County GCD
 43. Kimble County GCD
 44. Kinney County GCD
 45. Lipan-Kickapoo WCD

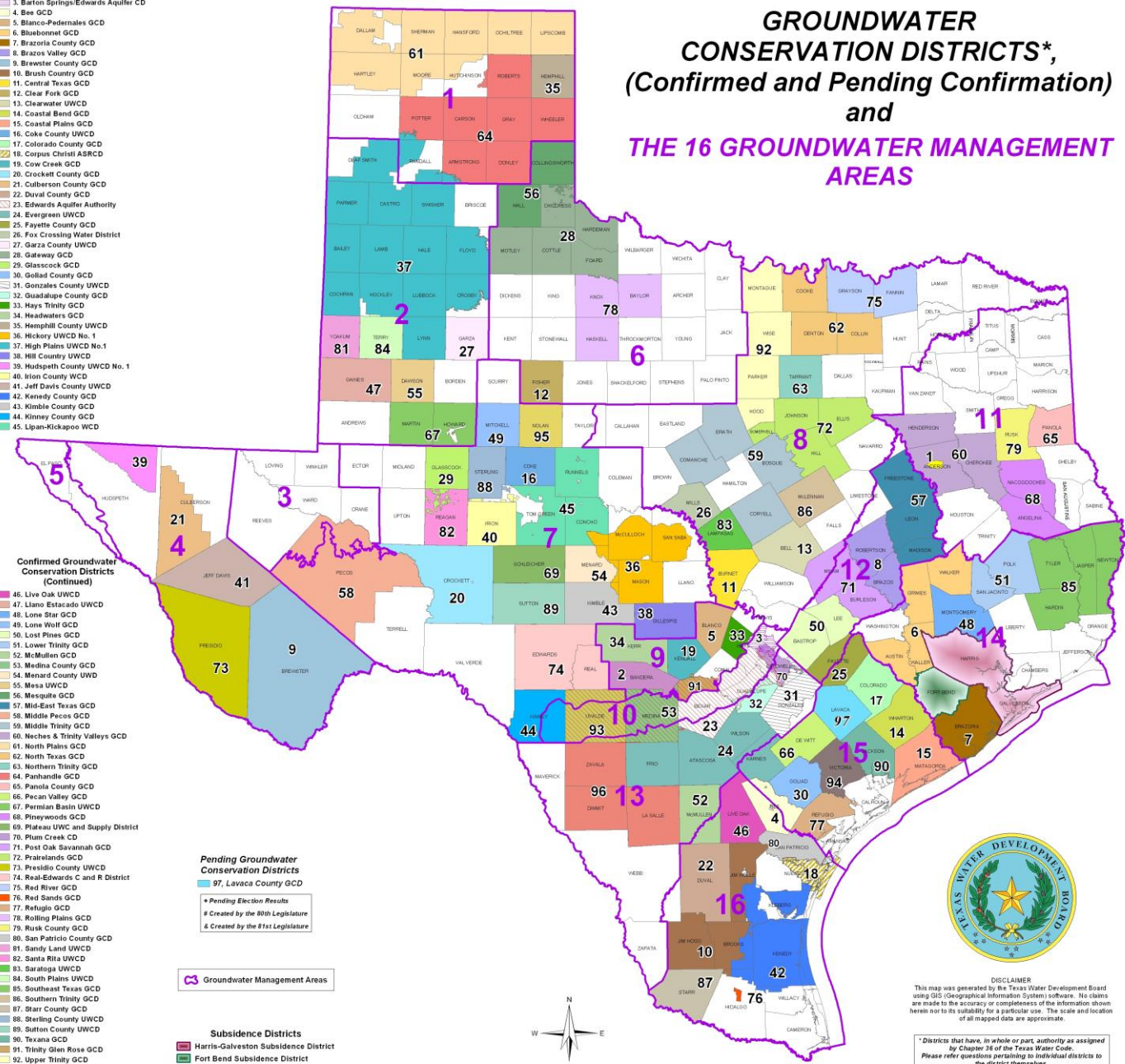
- Confirmed Groundwater Conservation Districts (Continued)**
46. Live Oak UWCD
 47. Llano Estacado UWCD
 48. Lone Star GCD
 49. Lone Wolf GCD
 50. Lost River GCD
 51. Lower Trinity GCD
 52. McMullen GCD
 53. Medina County GCD
 54. Menard County UWCD
 55. Mesa UWCD
 56. Mesquite GCD
 57. Mid-East Texas GCD
 58. Middle Pecos GCD
 59. Middle Trinity GCD
 60. Neches & Trinity Valleys GCD
 61. North Plains GCD
 62. North Texas GCD
 63. Northern Trinity GCD
 64. Panhandle GCD
 65. Panola County GCD
 66. Pecan Valley GCD
 67. Permian Basin UWCD
 68. Pineywoods GCD
 69. Plateau UWC and Supply District
 70. Plum Creek CD
 71. Post Oak Savannah GCD
 72. Prairielands GCD
 73. Presidio County UWCD
 74. Real-Edwards C and R District
 75. Red River GCD
 76. Red Sands GCD
 77. Refugio GCD
 78. Rolling Plains GCD
 79. Rusak County GCD
 80. San Patricio County GCD
 81. Sandy Land UWCD
 82. Santa Rita UWCD
 83. Saratoga UWCD
 84. South Plains UWCD
 85. Southeast Texas GCD
 86. Southern Trinity GCD
 87. Starr County GCD
 88. Sterling County UWCD
 89. Sutton County UWCD
 90. Texana GCD
 91. Trinity Glen Rose GCD
 92. Upper Trinity GCD
 93. Uvalde County UWCD
 94. Victoria County GCD
 95. Wes-Tex GCD
 96. Wintergarden GCD

- Pending Groundwater Conservation Districts**
- 97. Lavaca County GCD

- Subsidence Districts**
- Harris-Galveston Subsidence District
 - Fort Bend Subsidence District

NOTE: These subsidence districts are not Groundwater Conservation Districts as defined under Chapter 36 of the Texas Water Code, but have the ability to regulate groundwater production to prevent land subsidence. (Refer to Senate Bill 1337 of the 76th Legislative Session)

GROUNDWATER CONSERVATION DISTRICTS*, (Confirmed and Pending Confirmation) and THE 16 GROUNDWATER MANAGEMENT AREAS

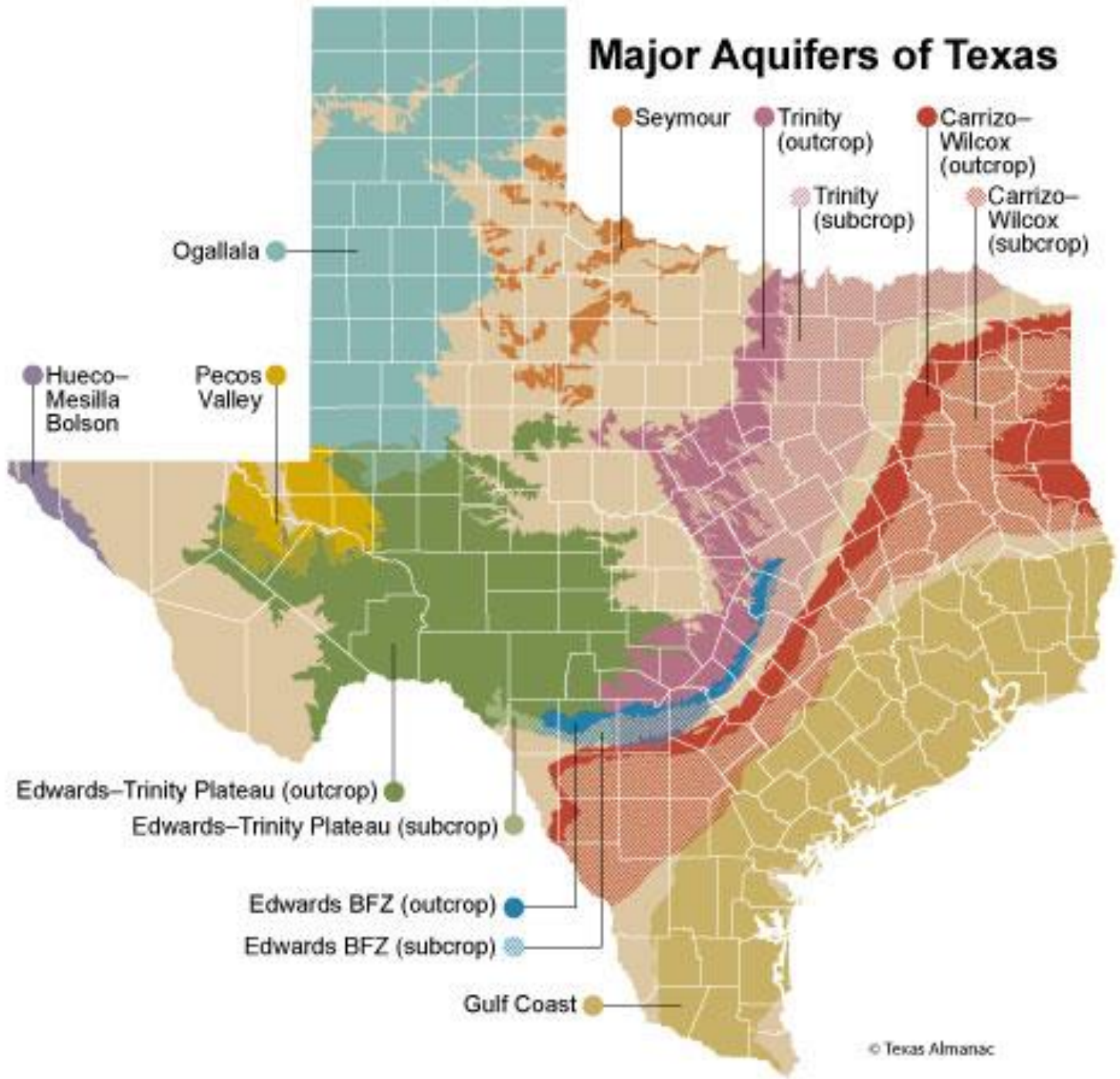


DISCLAIMER
This map was generated by the Texas Water Development Board using GIS (Geographical Information System) software. No claims are made to the accuracy or completeness of the information shown herein nor to its suitability for a particular use. The scale and location of all mapped data are approximate.

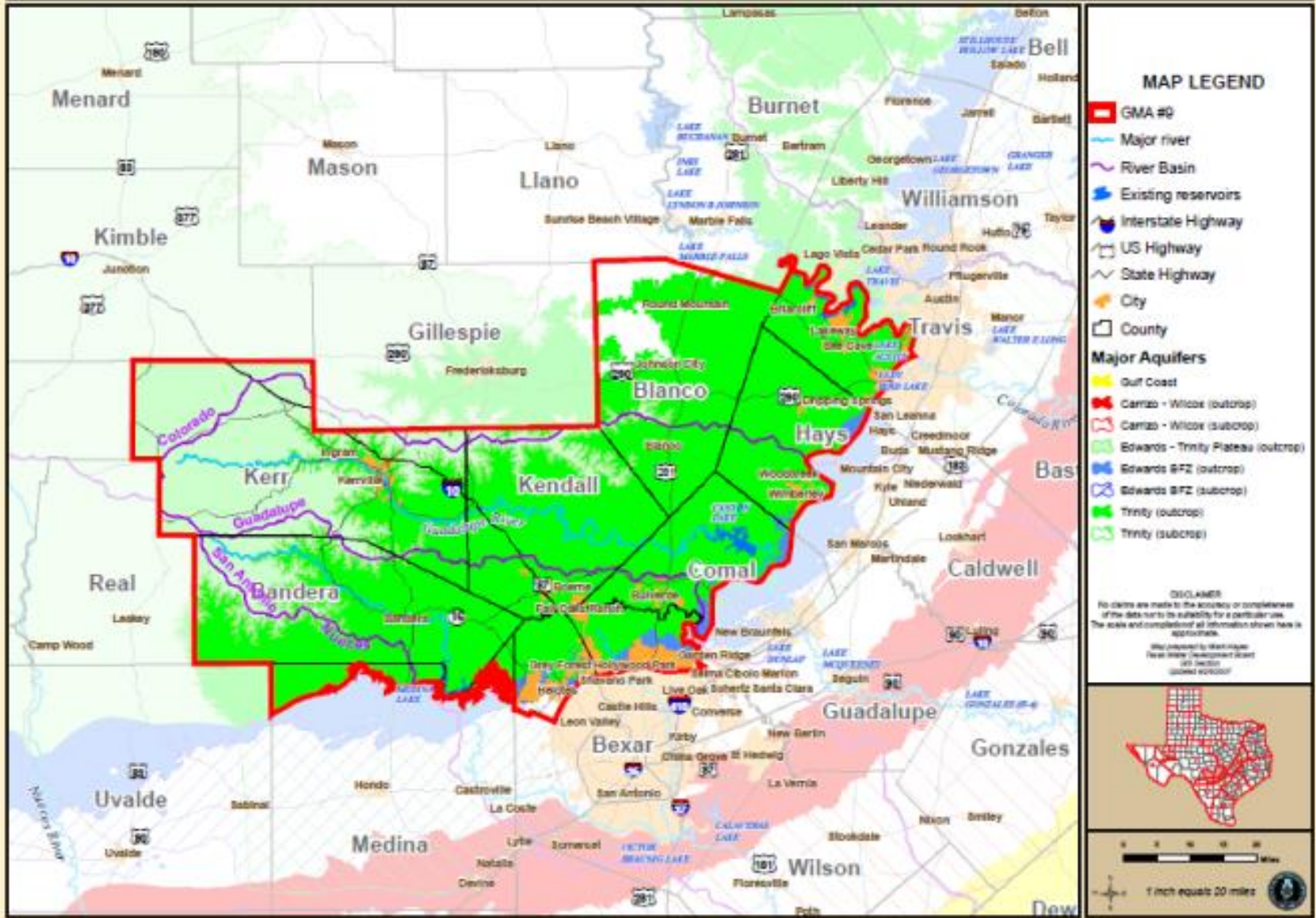
* Districts that have, in whole or part, authority as assigned by Chapter 36 of the Texas Water Code. Please refer questions pertaining to individual districts to the district themselves.

Map updated by Erik O'Brian
Interim TWDB GIS Mapping Coordinator
November 2016

Major Aquifers of Texas

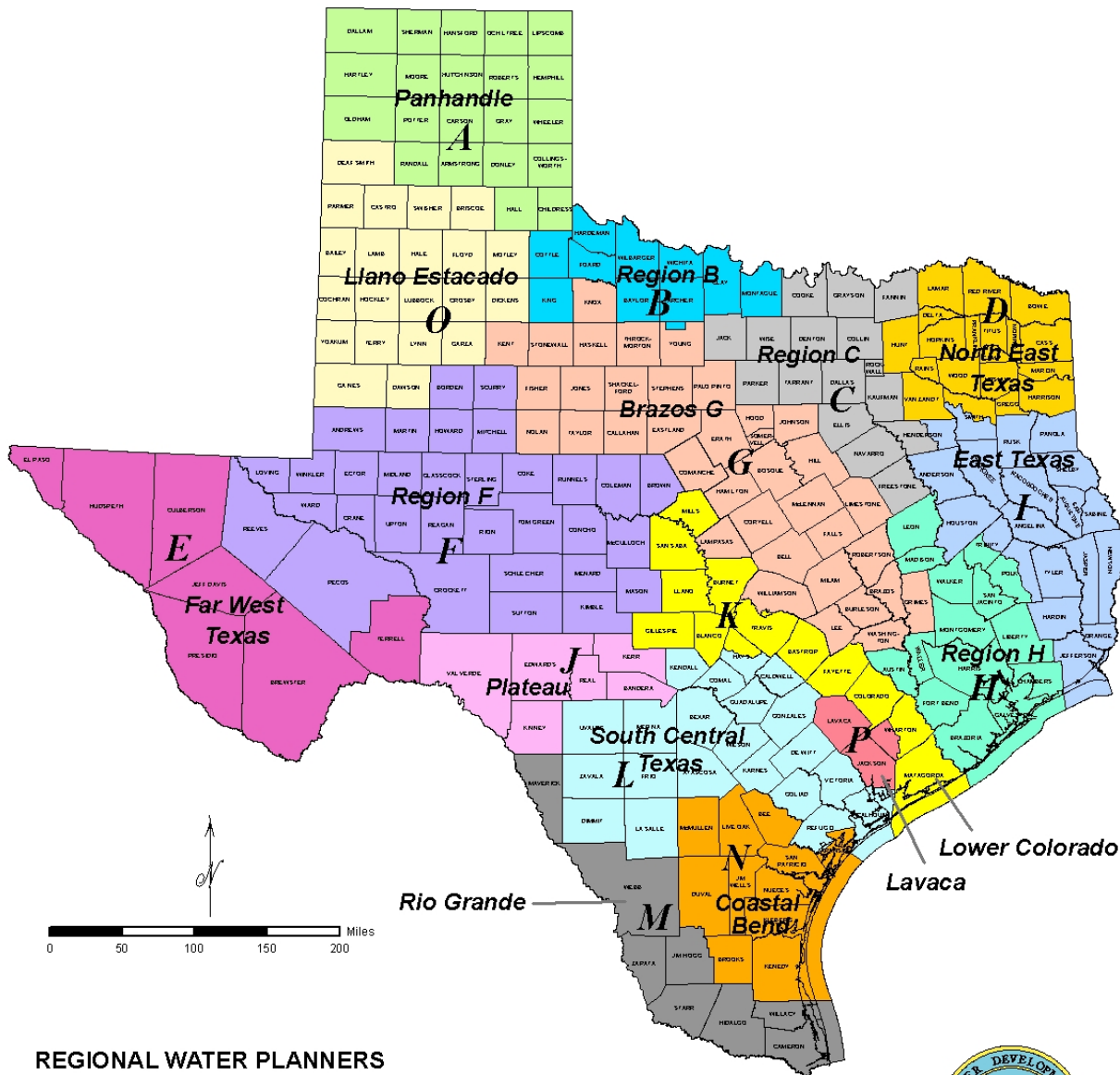


Groundwater Management Area #9



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Regional Water Planning Areas



REGIONAL WATER PLANNERS

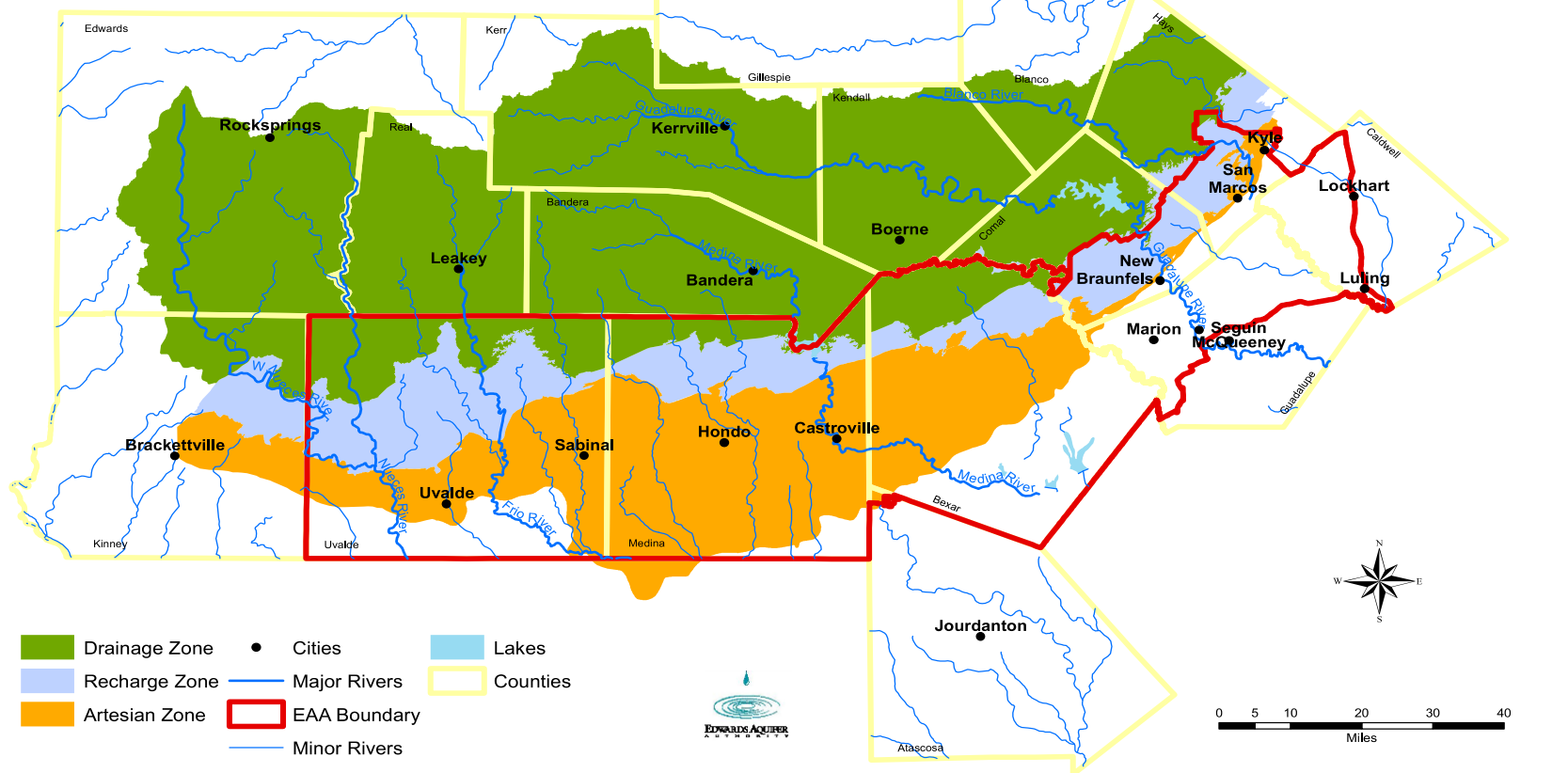
- Lann Bookout (512) 936 - 9439 - Regions G, I & P
- Angela Kennedy (512) 463 - 1437 - Regions C, F & O
- Temple McKinnon (512) 475 - 2057 - Regions D & H
- David Meesey (512) 936 - 0852 - Region K
- Matt Nelson (512) 936 - 3550 - Regions L
- Virginia Sabia (512) 936 - 9363 - Regions A, B & N
- Connie Townsend (512) 463 - 8290 - Regions E, J & M



Updated by Mark Hayes, GISP
 Mapping Coordinator
 GIS Section
 2/1/2010

A Special District: The Edwards Aquifer Authority

Edwards Aquifer Region



Karst geology and sinkholes

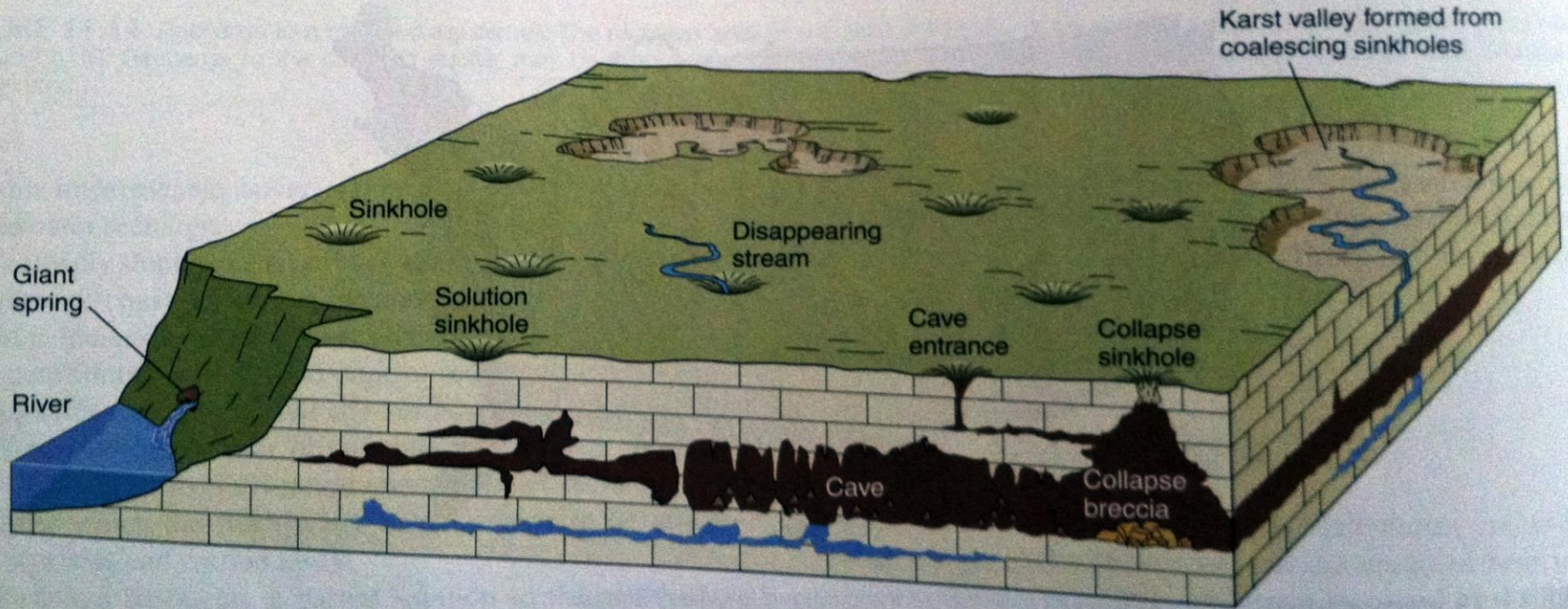


FIGURE 11.17 Dissolution of soluble rocks underground creates large voids below the surface and, often, leads to surface subsidence above.

- Largest springs in Texas
- Cities and towns







<http://www.edwardsaquifer.net>

Texas blind salamander exists
nowhere else on earth.

SPRING FLOW IS 154 C.F.S.

154

C.F.S.

FLOW IS CUBIC FT. SEC.

AVERAGE FLOW IS 300 C.F.S.

AQUIFER LEVEL IS 622.66

622.66

PARKS & REC. DEPT. & N.B.U.

PLEASE CONSERVE WATER

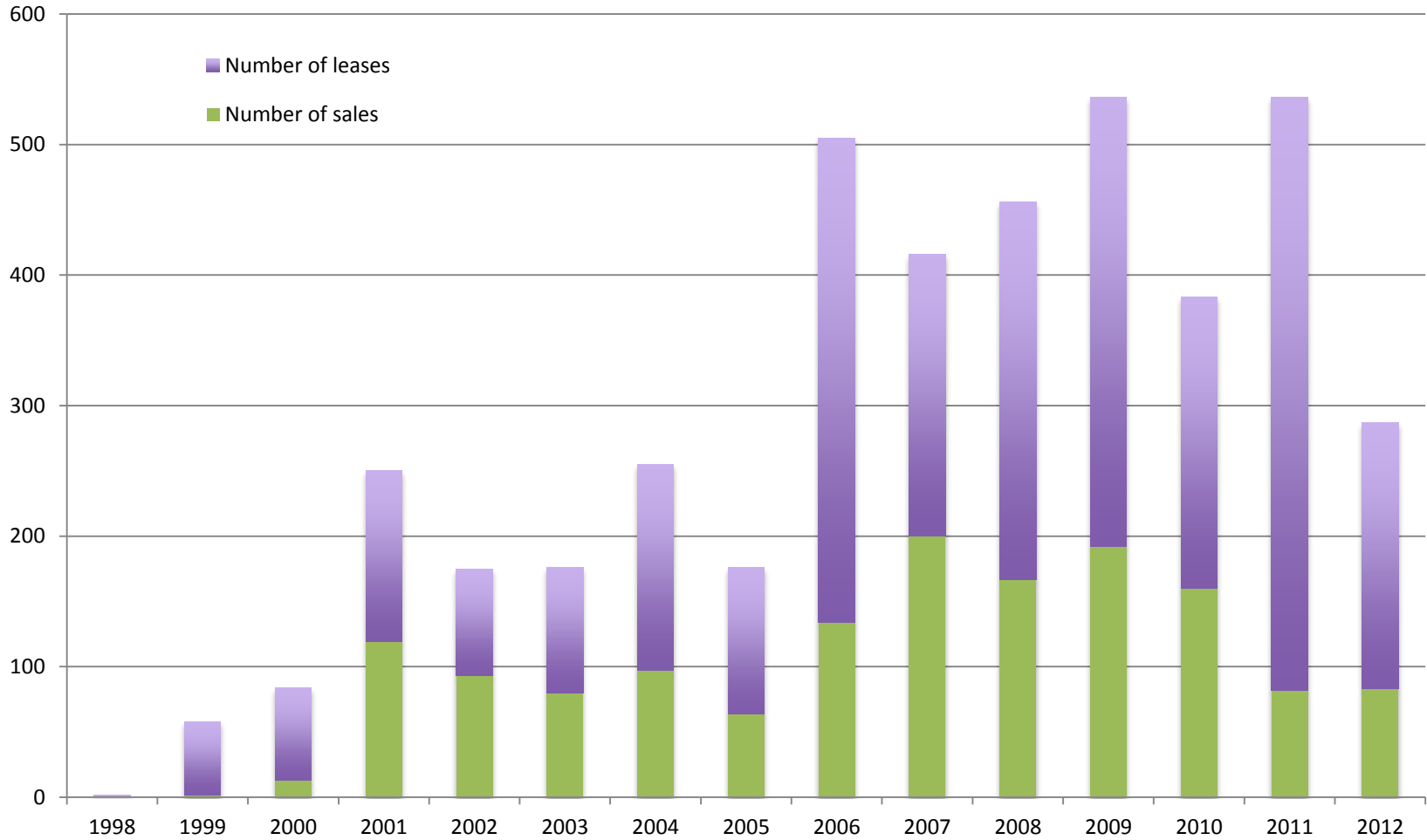


Comal Springs, New Braunfels, TX

1993 Edwards Aquifer Authority Act

- Replaced “unlimited” pumping rights under rule of capture with a permit system
- Created the Edwards Aquifer Authority; \$35 million budget
- Fees on permit holders
 - \$47.00 / af municipal; \$2.00 agricultural
- Capped withdrawals: currently 572,000 ac-ft of permits
- San Antonio Water System ~52% (295,000 ac-ft)
- Approves sales and leases of groundwater rights

Edwards Aquifer Transfer Frequencies, 1998-2012

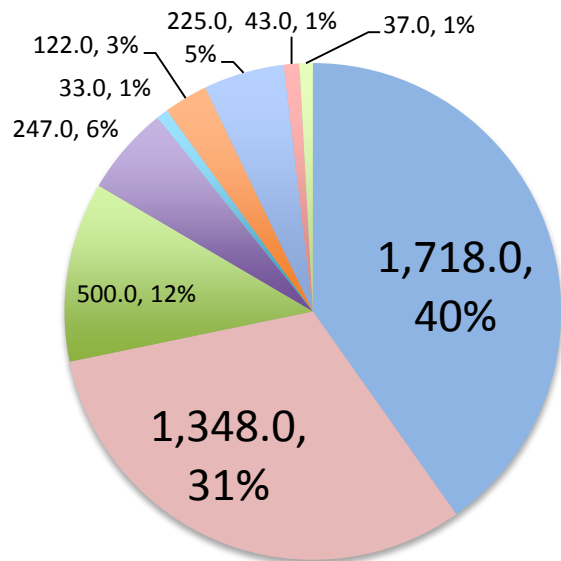


Transfers by Type of Use: 1998-2012

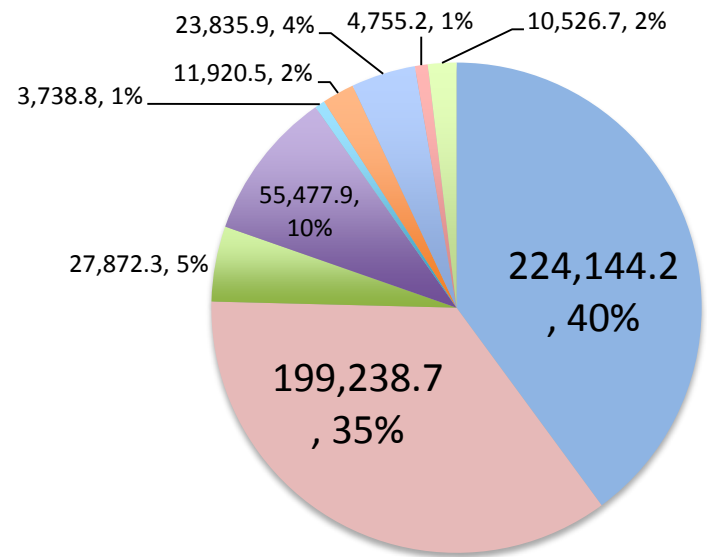
(a) frequency

(b) quantity (ac-ft)

(a)



(b)



Now what?

- 50% of Edwards ag water cannot be transferred to M&I
- Edwards groundwater rights now selling for \$5,500-6,000 per AF
- San Antonio is diversifying its supplies
 - Seeking new Edwards rights (~10,900 AF)
 - (\$2.2 - \$65 million)
- Cities and counties are looking elsewhere for new supplies
 - Groundwater farming in other aquifers

Brackish Desalination, Wilcox Aquifer (Eventually 30k AF/yr...use your imagination)



Recycling Wastewater



Largest system in the U.S.: 130 miles of purple pipe; Industrial users and San Antonio River Walk

Aquifer Storage and Recovery



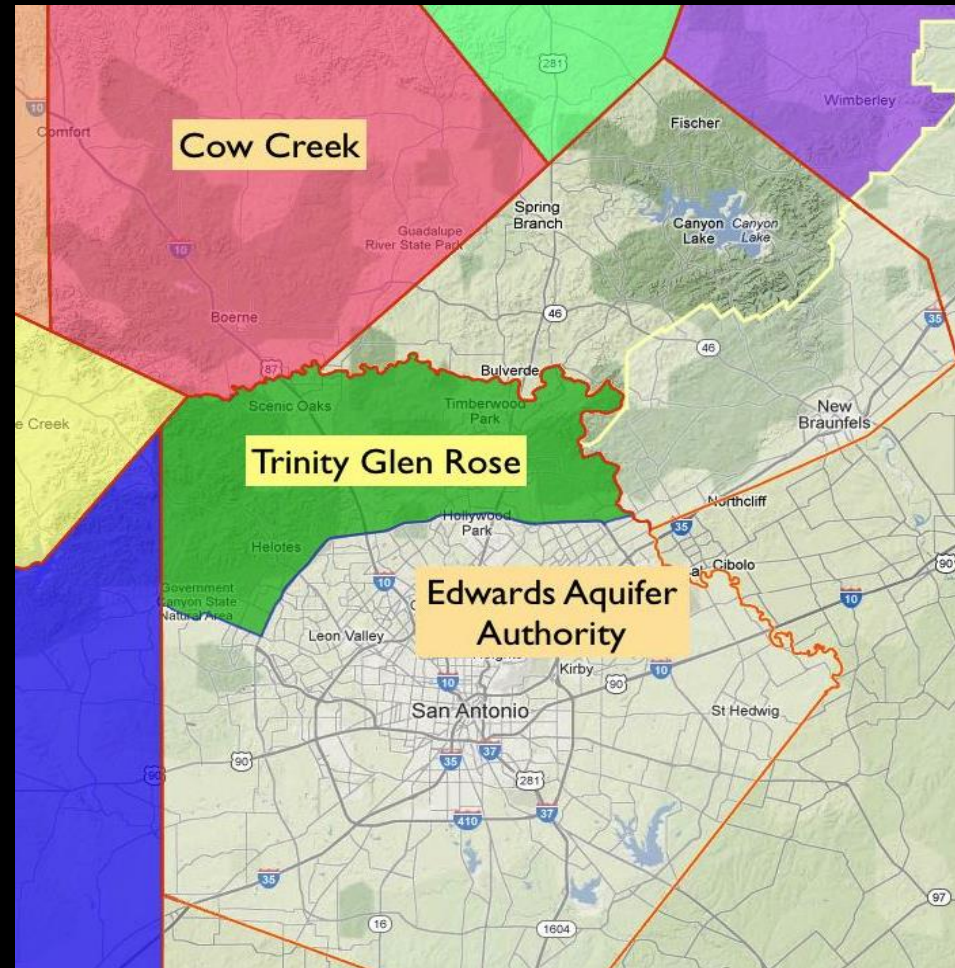
91,000 AF of Edwards
groundwater stored as of
2012



“Cascade Aerator”

A Tale of Two Districts

- Different well spacing requirements
- Different degrees of authority (most wells in TGR are exempt from regulation)
- Cow Creek known as conservation-minded
 - Permitting
 - Pushing for stricter DFCs
- Cow Creek has more funding & full time staff



City of Fair Oaks Ranch Annexation Controversy

Cow Creek: 1 well per 4-acre tract for developments using only groundwater; only **86** residential tracts would be allowed on the 365 acres; **635** were proposed

“...anytime Fair Oaks annexes land within Kendall County, that land is subsequently removed from our District and added to the Trinity Glen Rose GCD (H.B. 1518, 81st Texas” Legislature).”

“As currently vetted and proposed our Board is not in favor of this development. (...)“Our concern is that most of the existing domestic wells in the immediate area, including private wells located in our District, would be negatively impacted ... This will result in unreasonable interference with other wells within our District.”

- Official statement, Cow Creek GCD, March 20, 2014

Some key challenges for local groundwater governance

- Funding limitations at the district level
 - Trinity Glen Rose: ~200,000
 - Cow Creek: ~\$400,000 revenue
- Current lack of technical capacity at the Texas Water Development Board
- Threat of lawsuits over permitting decisions

Problem 1: District funding mechanisms

Ad valorem (property-based) revenue limited by:

- Political opposition to taxation (however small)
- Small tax base (i.e. rural areas)
- Low rates (\$0.005 - \$0.035/\$100 valuation)

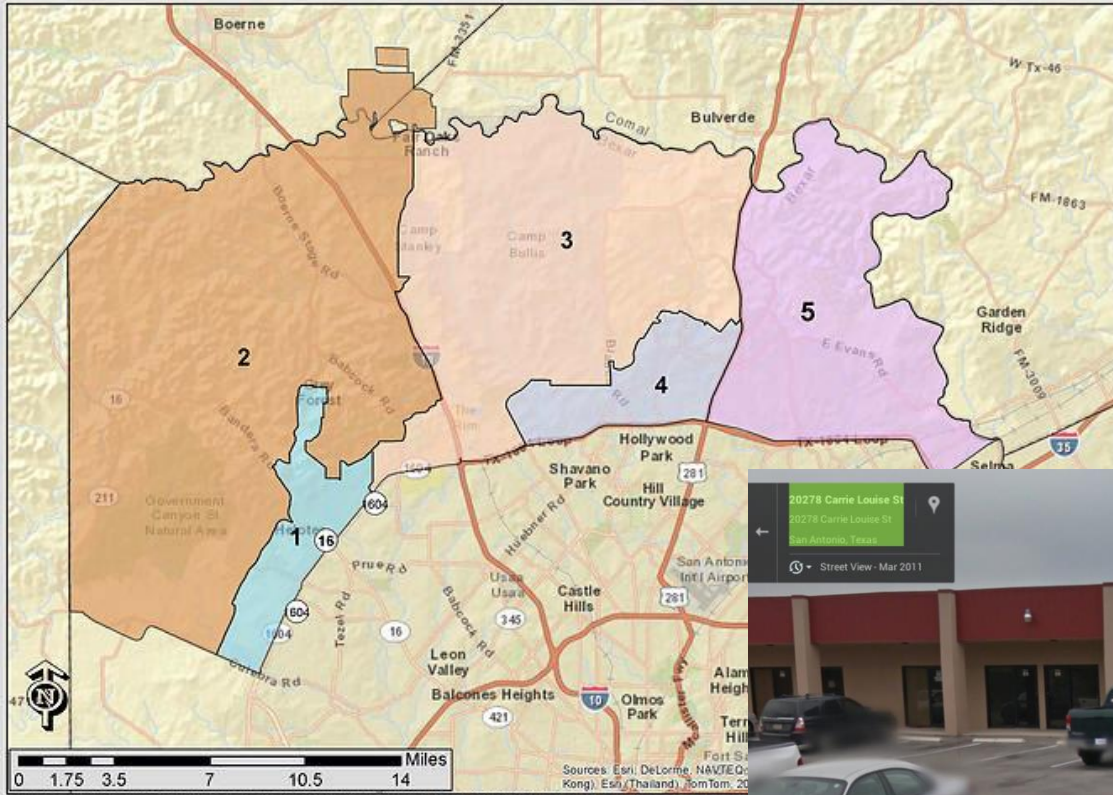
Fee-based issues:

- Low ceilings on rates compared to surface water
- Many exempt wells
- Fees based on pumping can create disincentive to limit use

Result: little capacity for non-administrative duties and activities; wide variation in budgets, governance only nominal in some cases

Example: "Hamstrung" Trinity Glen Rose GCD

Trinity Glen Rose Groundwater Conservation District



Problem 2: New (well-intentioned) mandates...

“The ... 82nd Legislature, Regular Session, 2011, made significant changes to the process by which groundwater conservation districts (GCDs) in groundwater management areas (GMAs) adopt desired future conditions (DFCs) for relevant aquifers.

A few examples of new requirements that GMAs must follow when adopting DFCs:

- consideration of the total estimated recoverable storage; environmental impacts;
- impacts on subsidence;
- socioeconomic impacts reasonably expected to occur;
- and the impact on the interests and rights in private property....

<http://www.legis.state.tx.us/tlodocs/83R/analysis/html/SB01282H.HTM>

...but a lack of funds and capacity

Senate Committee Report, continued:

“Furthermore, budget cuts enacted by the legislature to the TWDB groundwater availability modeling program in 2011, resulted in a significant reduction in the level of technical support that the agency will be able to provide to the GMAs during the current round of DFC evaluations and adoption. As such, all GMAs must now develop alternative approaches to the evaluation of DFCs under consideration.”

Problem 3: What is a “reasonable” limitation of groundwater use?

Texas Water Code Sec. 36.002

(c) Nothing in this code shall be construed as granting the authority to deprive or divest a landowner, including a landowner's lessees, heirs, or assigns, of the groundwater ownership and rights described by this section.

[However...]

(d) This section does not:

(1) 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;

(2) affect the ability of a district to regulate groundwater production as authorized under Section 36.113, 36.116, or 36.122 or otherwise under this chapter or a special law governing a district

New Pressures

- Cities and counties within the Edwards zone are looking elsewhere for new supplies instead of buying water rights on the market
- This diverts pressure for very large permits onto local district boards where regulatory authority and data are weaker than the EAA
- This fuels emerging rural-urban tensions over “water farms”
- Some in rural communities see GCDs as a last line of defense against the cities.

Conflict



“The Chamber supports additional checks and balances in local groundwater district laws and regulations, including regulatory consistency, long-term stability in permitting and a meaningful development and appeals process for desired future conditions (DFC) and local management plan decisions.”

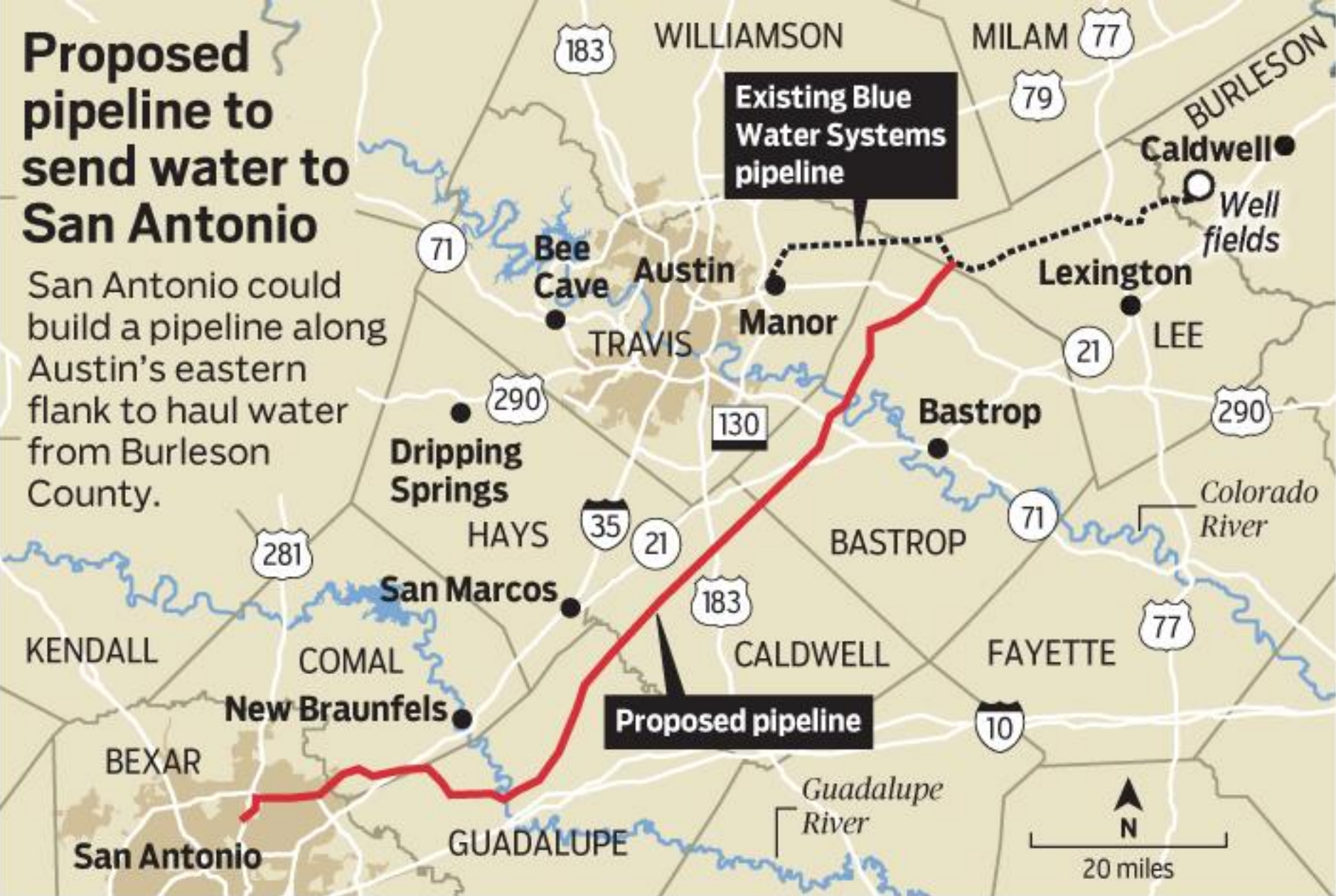
- 2013 Legislative Agenda, San Antonio Chamber of Commerce

“We must balance our state's municipal, agricultural, industrial and recreational water demands based on availability, rather than perceived regional jurisdictional entitlements. The bottom line is that water must be transported from the water-rich areas of the state to the water-insecure communities, if we intend to meet the increased need triggered by the exponential population growth our state is experiencing. The only way this will be achieved is if we can begin looking at our state's water challenges from 50,000 feet, rather than continuing to enable the current myopic process.”

Rep. Lyle Larson (R – San Antonio), *Express-News* March 28, 2014

Proposed pipeline to send water to San Antonio

San Antonio could build a pipeline along Austin's eastern flank to haul water from Burleson County.



Source: WTC PUA; BlueWater Systems

LINDA SCOTT, ROBERT CALZADA / STAFF

Over-permitted?

"Our groundwater district has approved permits for much more Simsboro groundwater pumping than the modeled available groundwater," ... "There can be no question that if all of the permitted and planned pumping occurs, the Simsboro will be depleted rapidly."

– Dr. Curtis Chubb, Central Texas Aquifers Coalition

Independent study: pumping will exceed the **MAG**, reduce flows in Colorado and Guadalupe Rivers during dry years.

SAWS President: the report is "a joke"



Photo By JERRY LARA / San Antonio Express-News



<http://www.mysanantonio.com/news/local/article/San-Antonio-City-Council-approves-pipeline-to-5858756.php#photo-7052896>

“Milam County rancher Bill Graham worries that the area's water supply has been overpermitted. ‘I want my son and grandson to carry on what I do. I'm worried about our future,’ he said.”

Conclusions

- A more regionalized, polycentric approach could leverage strengths of both decentralized and centralized governance
- Edwards Aquifer Authority is a good blueprint
 - Funding is adequate
 - Adaptive, conjunctive management
- Potentially applicable for covering Arizona's non-AMA "white space"?

Thank you!

zsugg@email.arizona.edu



Preliminary lessons

- Can it work?
- Well, maybe...
 - Reforms are a major step in the right direction; potentially reap the benefits of both local and regional management and planning
 - Several key problems need to be addressed:

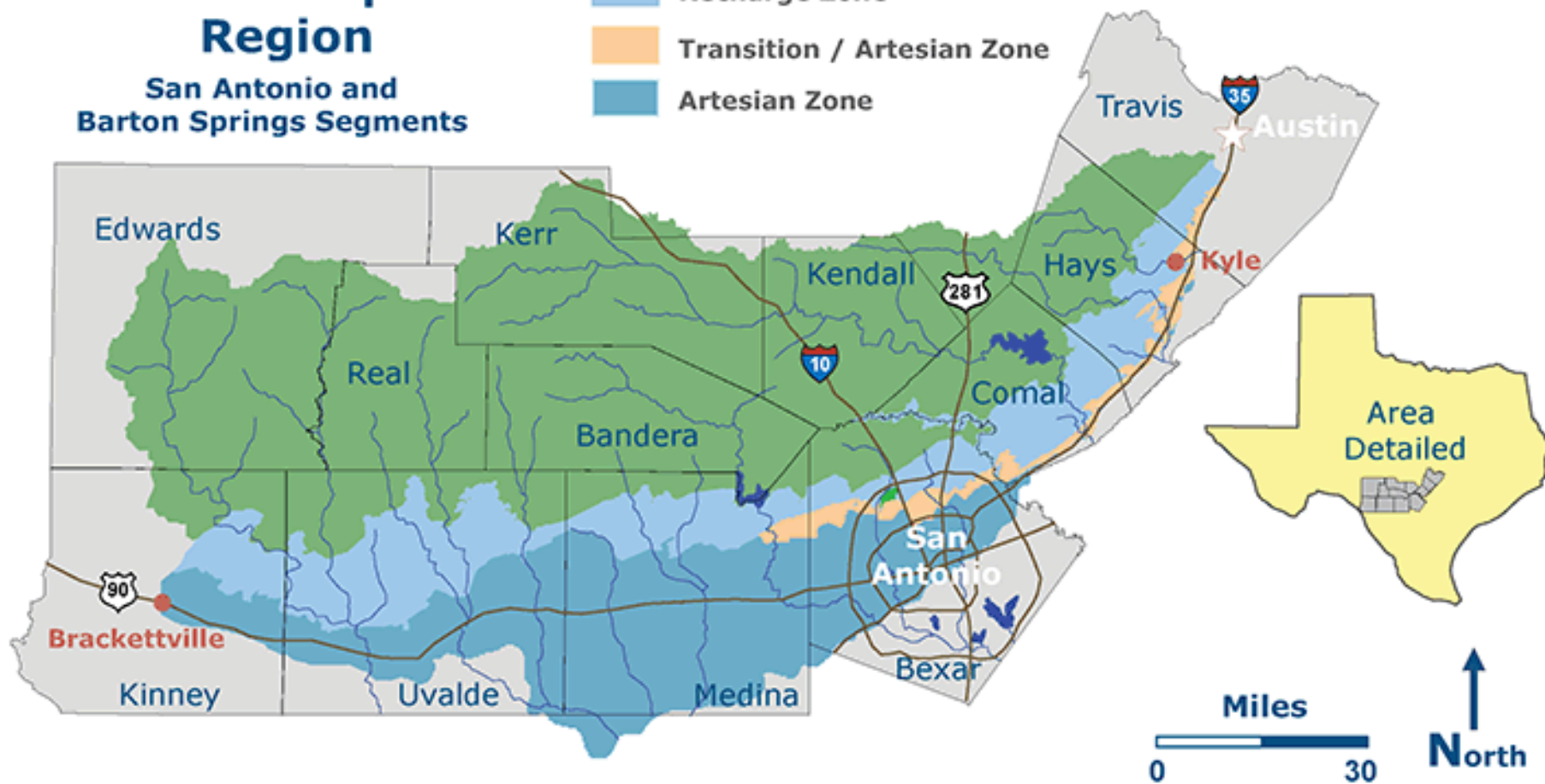
Lessons for AZ?

- AZ has avoided the kinds of litigation occurring in TX
- Both AZ and TX suffer from inadequate funding
- AZ made a gesture to local communities by having AMA offices, but these were shuttered.
- TX may be more flexible in terms of setting and revising regional/aquifer mgmt goals; allows a greater degree of localized mgmt
- Provides some “protection” for rural communities
- However cities prefer a more uniform set of rules

The Edwards Aquifer Region

San Antonio and Barton Springs Segments

- Contributing Zone
- Recharge Zone
- Transition / Artesian Zone
- Artesian Zone



The Edwards Aquifer Habitat Conservation Plan: An end to the conflict?

http://www.eahcp.org/index.php/eahcp_video

[Cow Creek info]



“The Texas Water Development Board (TWDB) ... will not be able to update the Groundwater Availability Model (GAM) The GAM will need to be updated in order to update the DFCs. ... Without adequate data, issuing pumping limits will be almost impossible.

President Daniel explained that ... all 12 districts recognize that an additional five years was gained to readopt DFCs, but the GAM needs to have much better data. If the District does not take action, [it] could be faced with significant legal expenses in the future.”

Source: minutes of North Texas GCD Board of Directors’ work session, 9-13-2011

http://northtexasgcd.org/uploads/20110913_Minutes.pdf

“President Daniel stated that he spoke with districts in GMA 8 to create a model and will take approximately 2 years and \$200,000 per district per year. Board Member Collins ... spoke with a board member from Upper Trinity GCD who stated that the Upper Trinity GCD estimated spending approximately \$150,000 on a law suit because of a denied [sic] well permit. With the data from the model, the law suit would not have happened.”

Source: minutes of North Texas GCD Board of Directors’ work session

http://northtexasgcd.org/uploads/20110913_Minutes.pdf

Problem 4: Lack of Participation

Voter turnout for GCD board members and attendance at meetings is very low

“Too much democracy”?

‘You’ve got to have uniform rules that we’re all going to operate under,’ - Sen. Troy Fraser, R-Horseshoe Bay, Chairman, Senate Natural Resources Committee.

“‘The notion that [groundwater planning and management] can be done by 100 different, locally elected, county-based groundwater districts simply no longer makes sense,’ said Steve Kosub, a lawyer for the San Antonio Water System. He said the state must play a greater role in groundwater planning and regulation so cities like San Antonio have a chance at finding new water resources.”

N. Satija, “For Groundwater, Political Boundaries Trump Natural Ones.” Texas Tribune, 12/4/2013.