



# So Secret, Occult, and Concealed: An Overview of Groundwater Management in Texas

Robert E. Mace, Ph.D., P.G.  
Texas Water Development Board  
*presented to*  
The Houston Geological Society  
November 9, 2016; Houston, Texas

**Texas Water**  
Development Board



**data**

**planning**

**financing**

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.



*Discussing Water Rights, A Western Pastime*

Recipe For:  
Groundwater  
Pound Cake

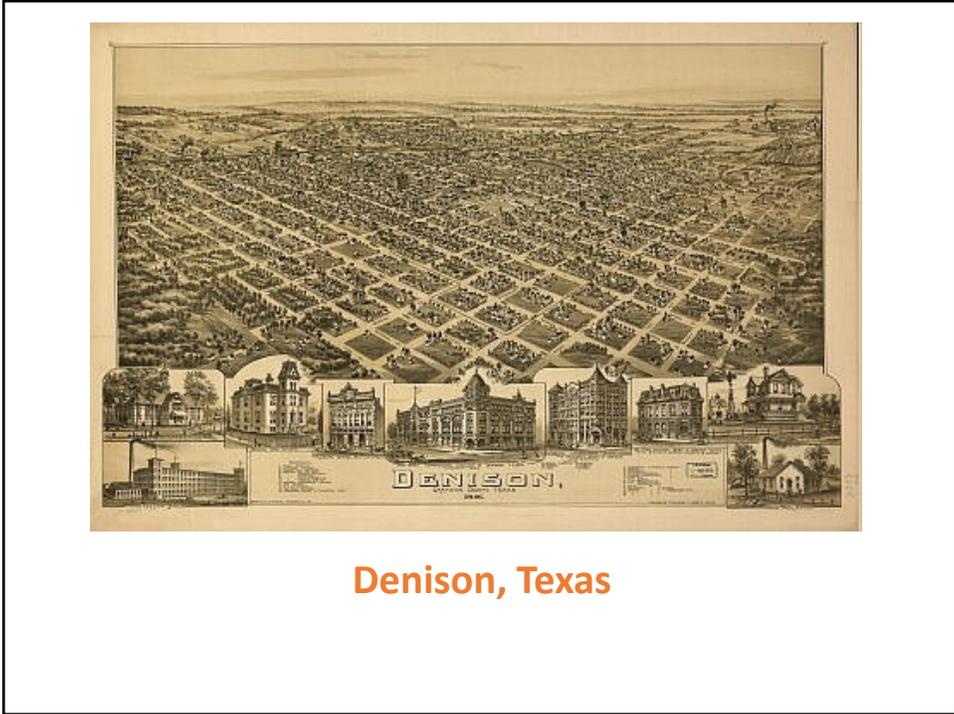
\* This could cost you  
some dough!

\*\* Add rum for flavor!

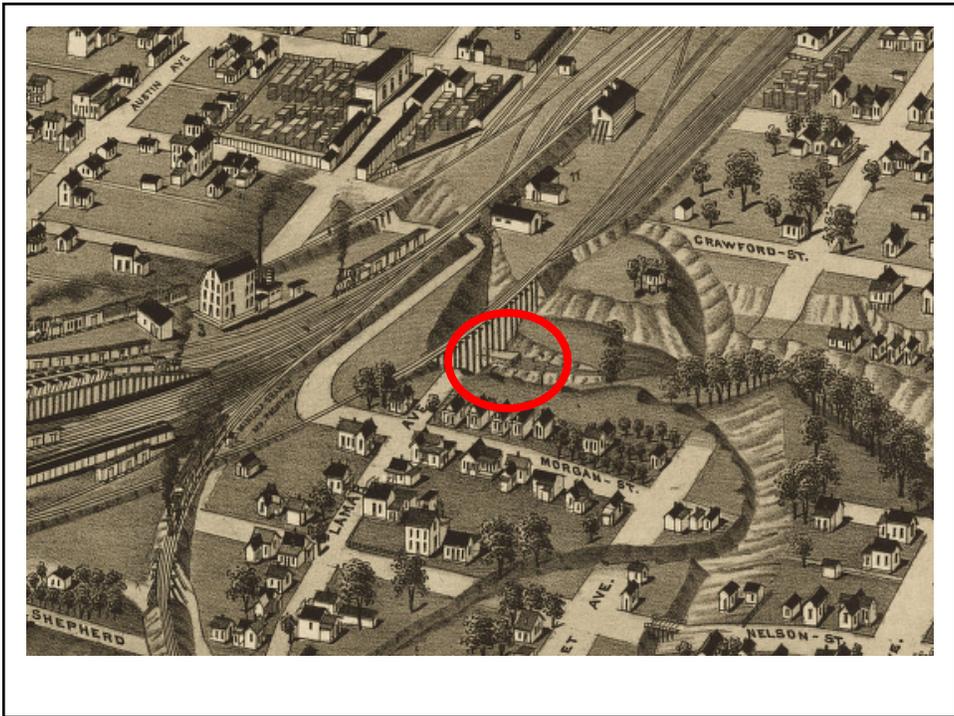
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3. If the answer is "yes", then you need to check with the district and/or authority (and city) to see what you can (or can't do).
4. Keep close tabs on new laws, rules, and court cases.

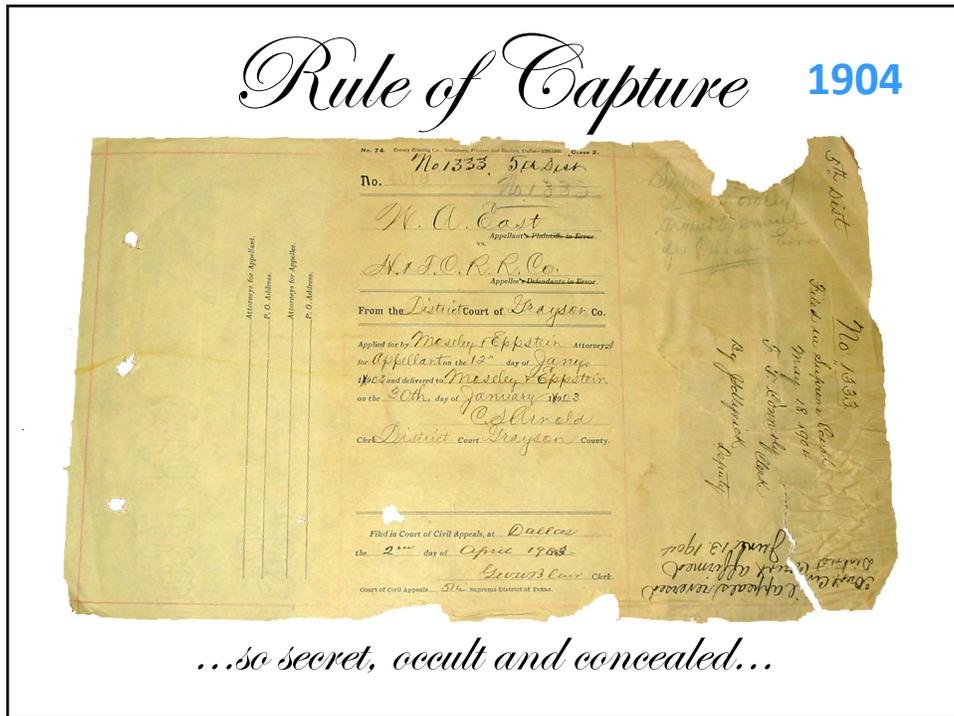
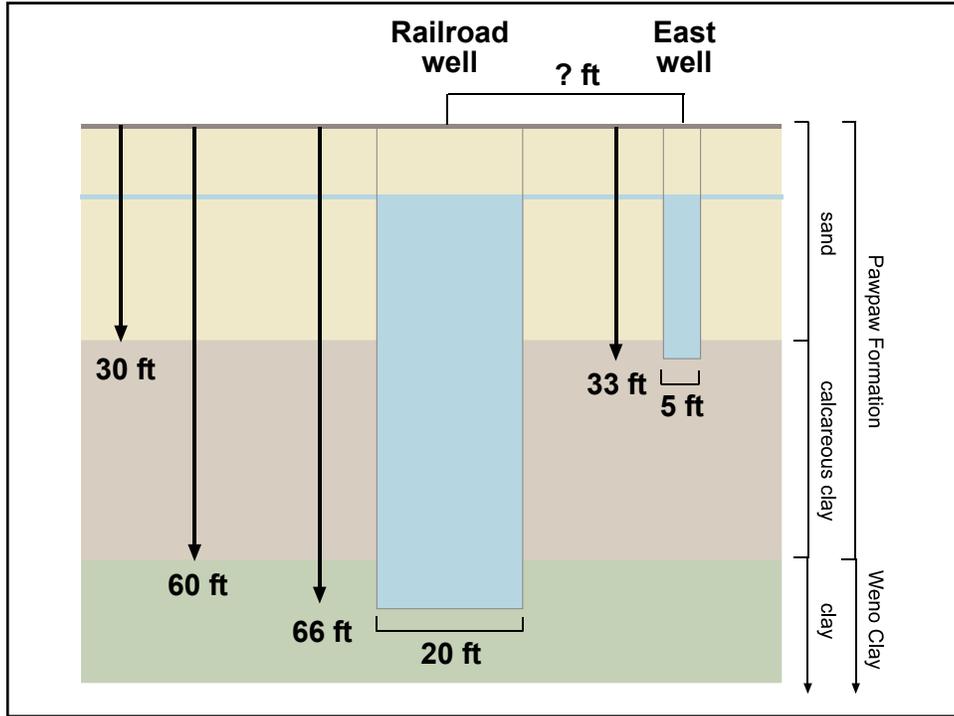
## *The Rule of the Land*



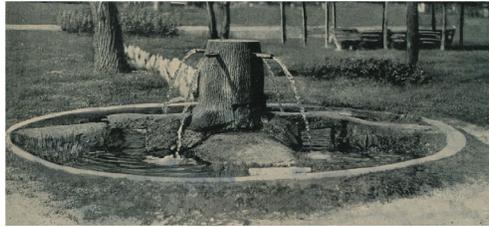


Denison, Texas

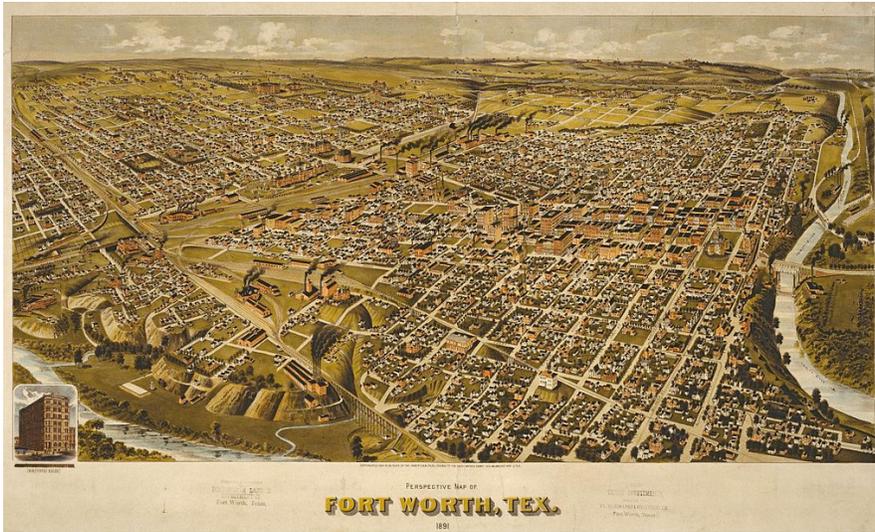


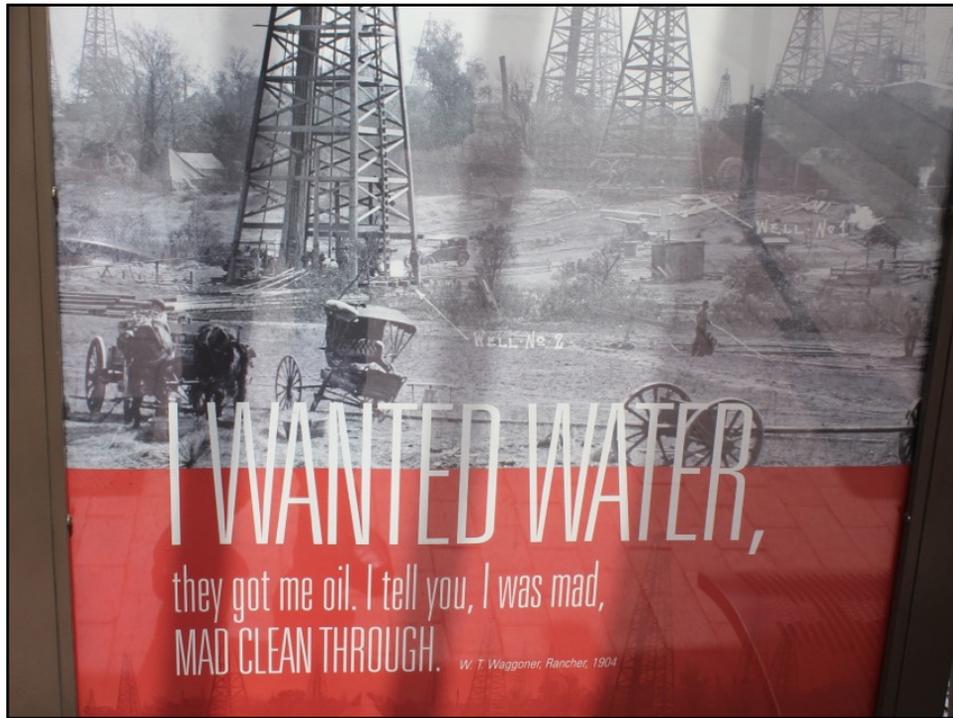


# *Waste Not, Want Not*



## Fort Worth: 1876

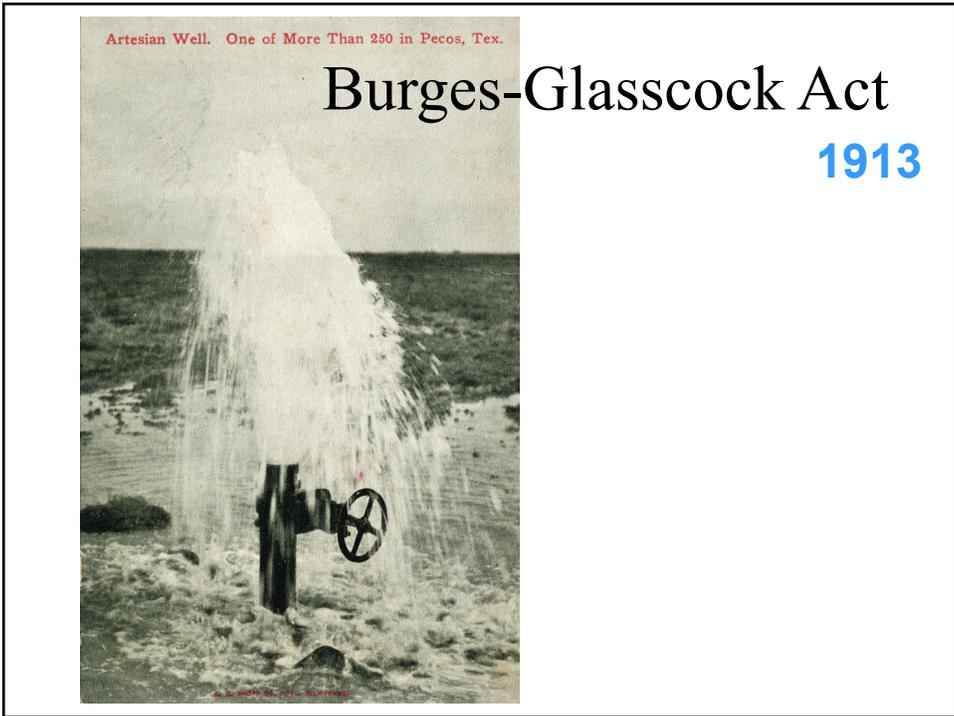
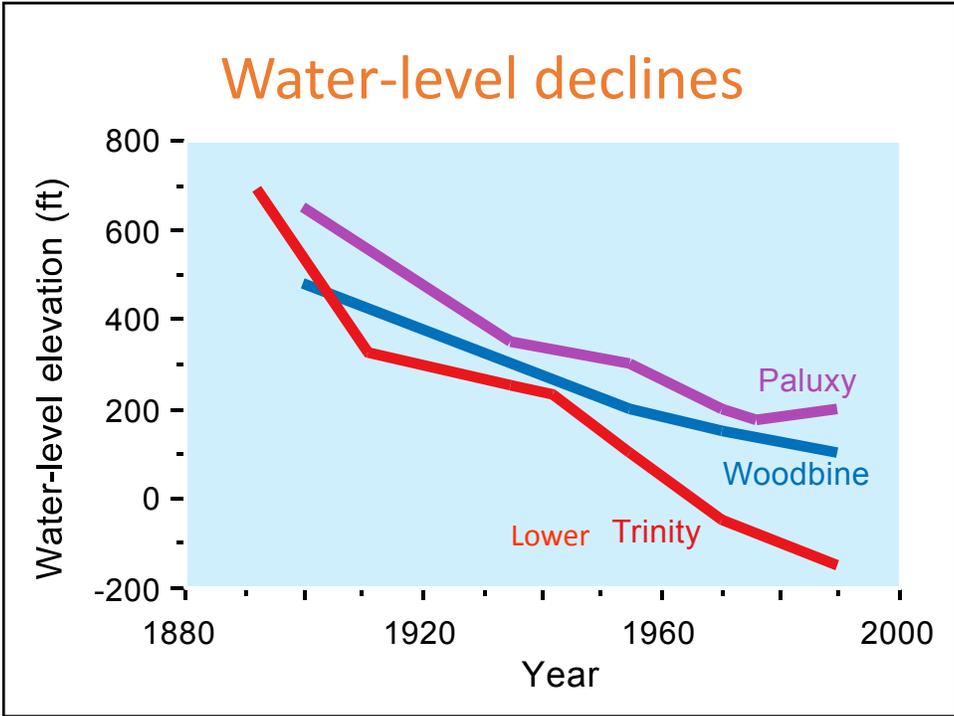




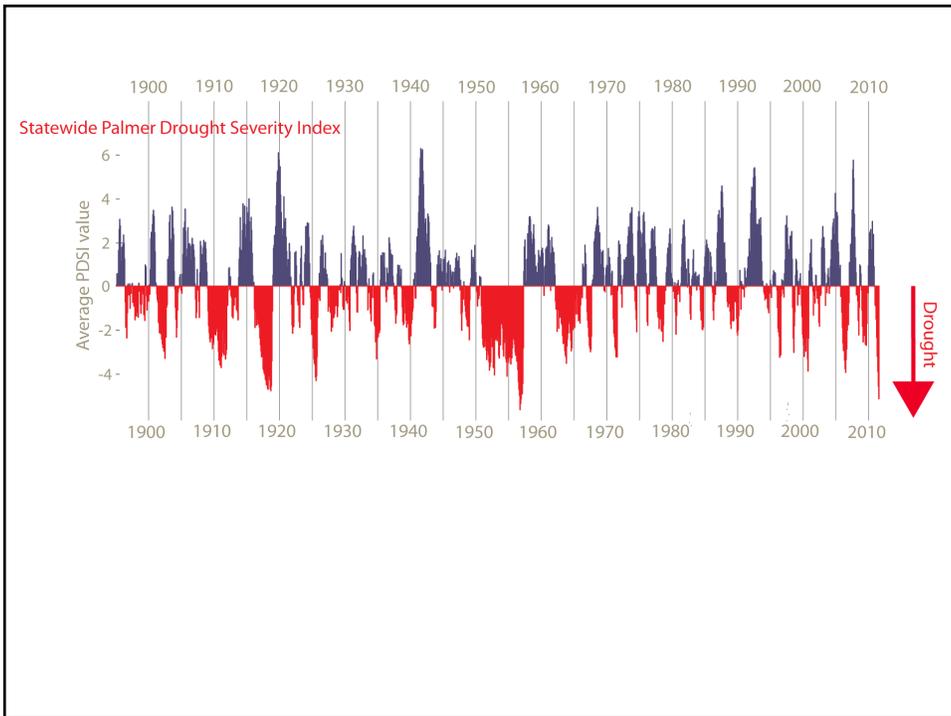
## Dallas

- Drilled first well in 1887
- The "Dallas Geyser": 1,000,000 gallons per day
- "Well, I swar: I'd rather go to see that than a hanging!"
- Folks proposed drilling 270 wells to turn Big D into a seaport town

A historical map of Dallas, Texas, showing a grid of streets and numerous small buildings. The map is titled "DALLAS TEXAS" at the bottom center. There are several legends and labels on the map, including "DALLAS TEXAS" and "DALLAS TEXAS" in different fonts and sizes. The map is framed by a thin black border.



# *We Shall Conserve*



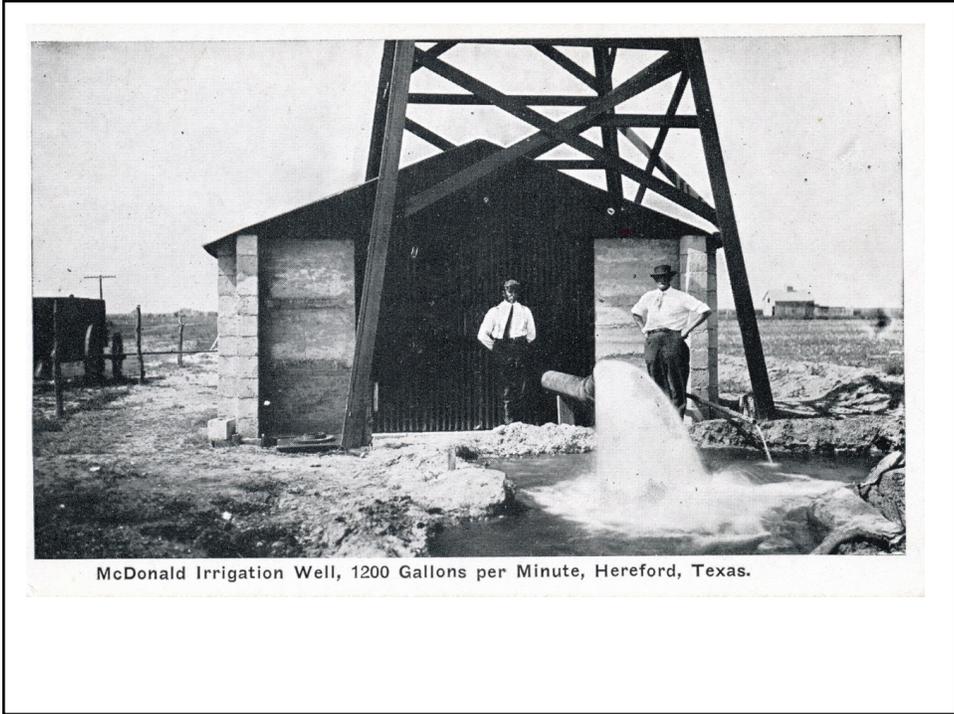
# Conservation Amendment

1917



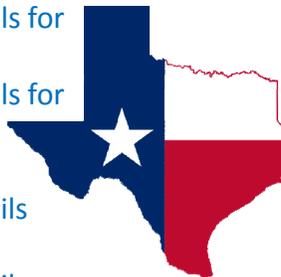
*We Will Somehow Manage*





## State control of groundwater?

- 1934: Texas Board Water Engineers calls for state control of groundwater
- 1937: Texas Board Water Engineers calls for state control of groundwater
- 1937: Legislation introduced for state control of groundwater; fails
- 1941: Legislation introduced for state control of groundwater; fails
- 1947: Legislation introduced for state control of groundwater; fails
- 1948: Texas Water Conservation Association develops bill language for state control of groundwater



Ag producers: **irrigators were “Carthaginians defending their city against the Roman onslaught.”**

## Groundwater conservation districts **1949**



Ag producers: **“We wrote our own ticket”**  
**“West Texans can consider the water their own—to use or waste as they please.”**

## Powers of a groundwater conservation district

### In general, districts:

- Register wells
- May regulate well spacing
- May regulate pumping
- Can't regulate exempt uses
- Can't prohibit export

### To know the powers:

- Chapter 36, Texas Water Code
- enabling legislation
- amendments to enabling legislation
- rules



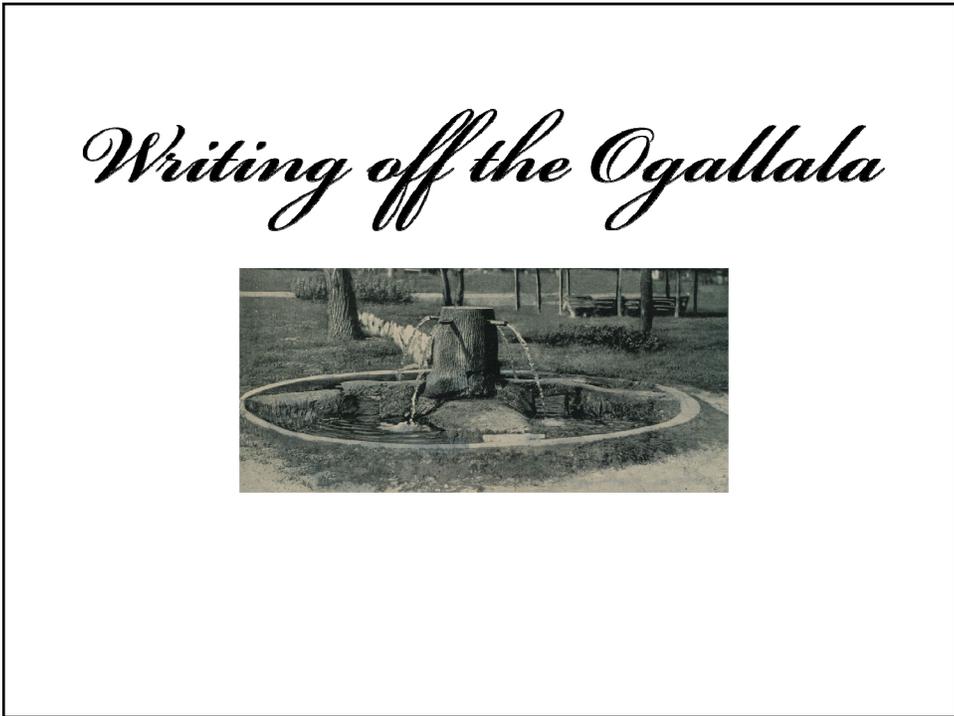
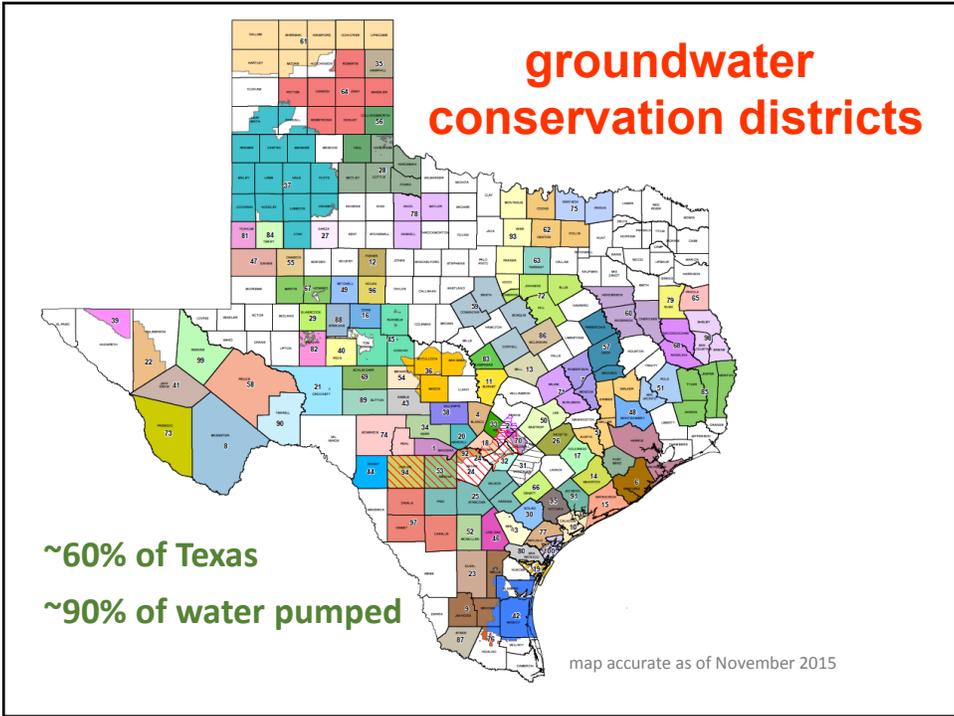
**modifies  
the rule  
of capture!**

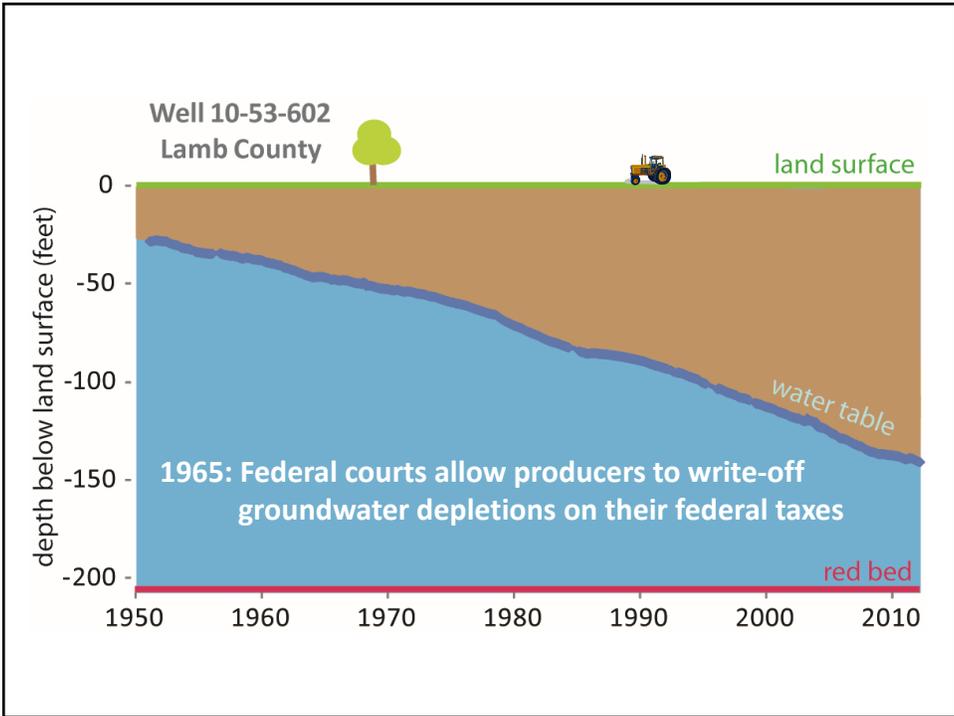
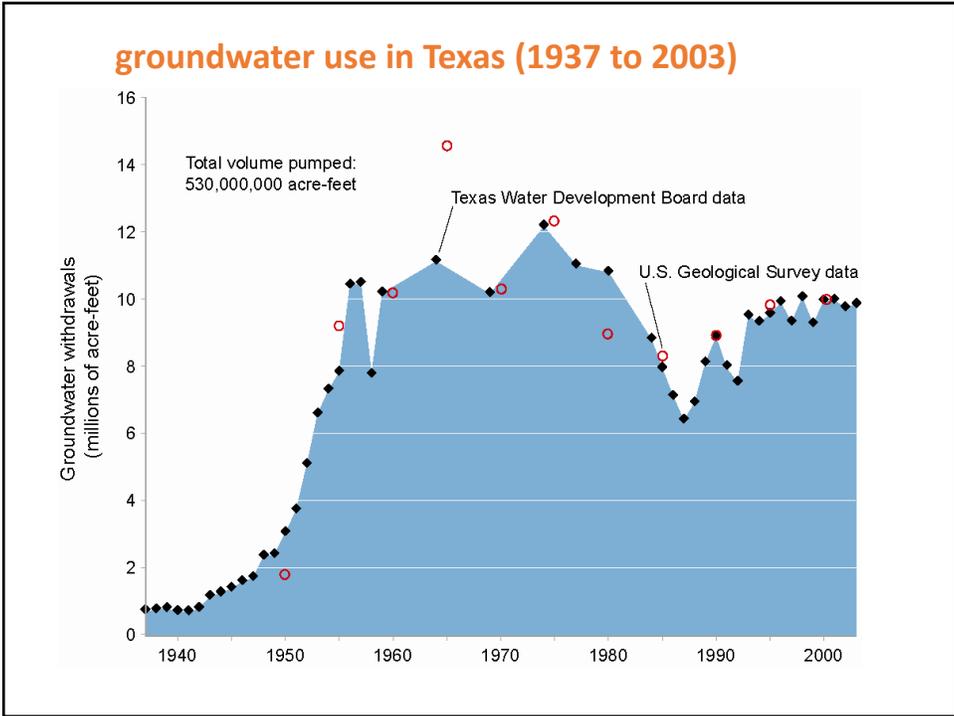
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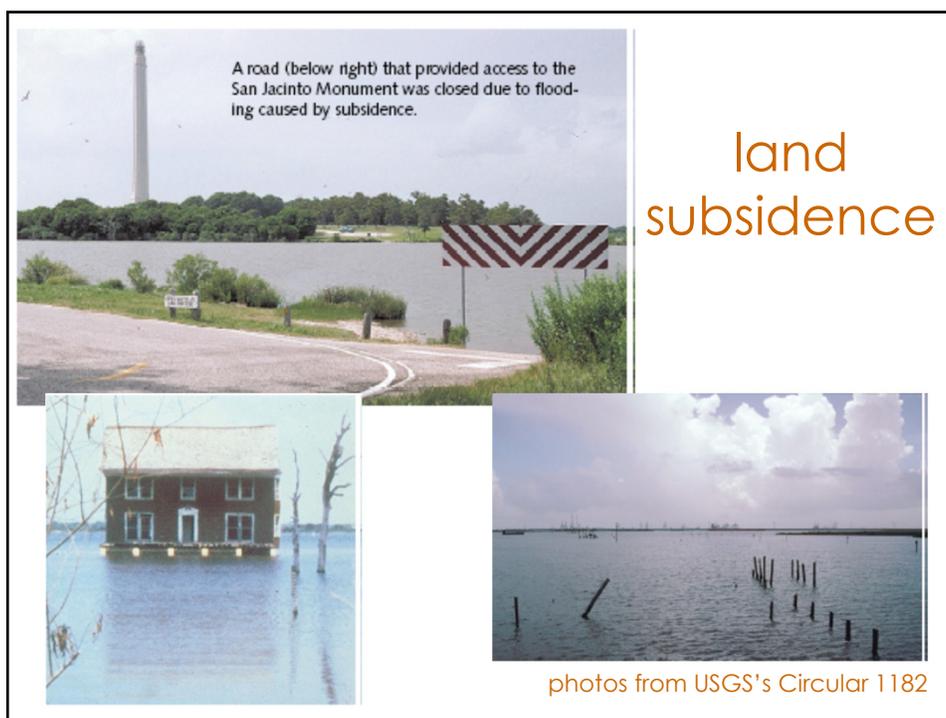






# *A Sinking Feeling*

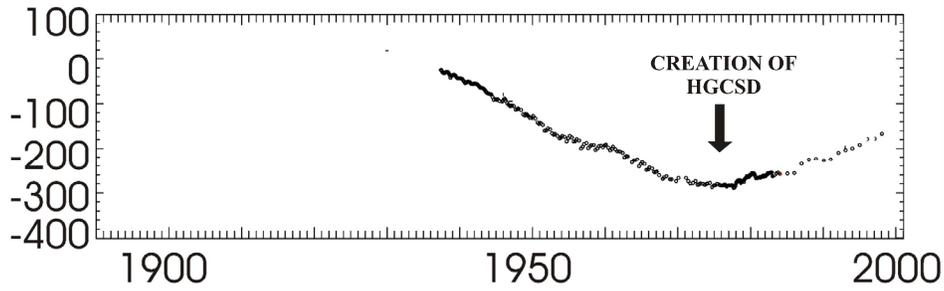




## EXXON Friendswood Development Company v. 1978 Smith-Southwest Industries, Inc.

- Up to 325 feet of water-level declines
- Up to 7.5 feet of land subsidence in Pasadena
- Texas Supremes ruled for Friendswood, citing the Rule of Capture; however,
- the court said that future pumpers that caused land subsidence would be liable for damages.
- The legislature created the Harris-Galveston Coastal Subsidence District in 1975.

## Water Level Trend in Houston area

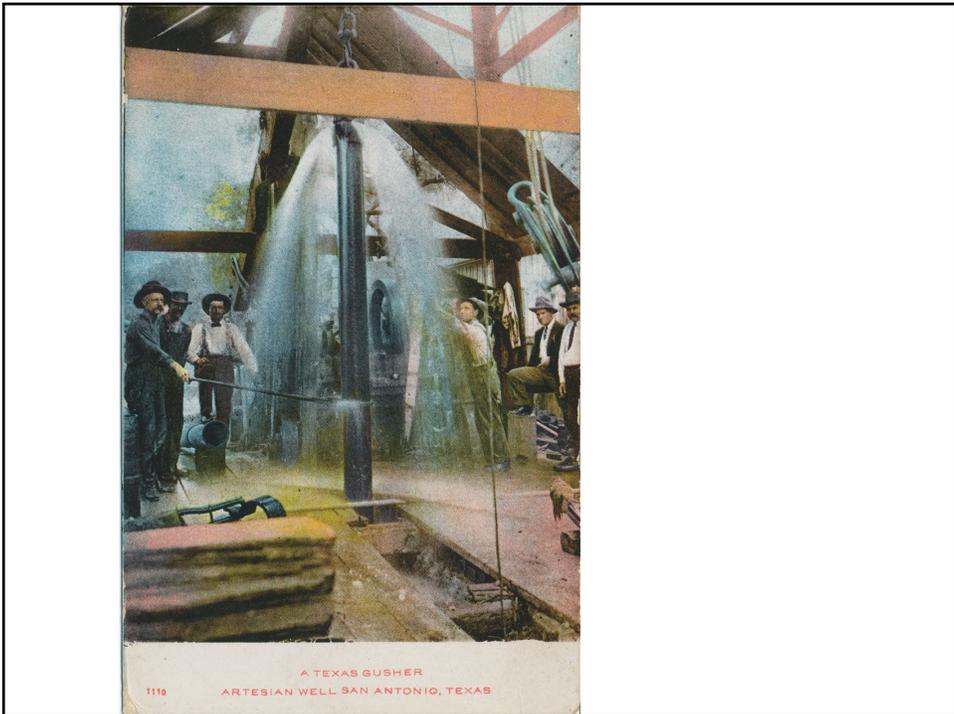


HGCSO = Harris-Galveston Coastal Subsidence District

from U.S. Geological Survey

*A River Runs Through It*





- By 1980: U.S. Fish and Wildlife had listed four endangered species in the springs
- 1991: A catfish farm drills Ave Maria No. 1
  - 40 million gallons a day (a million barrels a day)
  - District and river authority sued
  - Attorney General opined that the Water Commission could regulate groundwater (and then rescinded that opinion mere months later)
  - Sierra Club files a lawsuit against Fish and Wildlife
- 1992: Water Commission declares aquifer to be an underground river and develops regulations
  - Irrigators sue the Commission
  - District court throws out Commission's regulations
- 1993: Federal Judge Lucious Bunton rules in favor of Sierra Club, instructs the state to develop a plan to protect springflow or the "blunt axes of Federal intervention have to be dropped"
- 1993: Legislature creates the Edwards Aquifer Authority



## catfish farm well Edwards aquifer

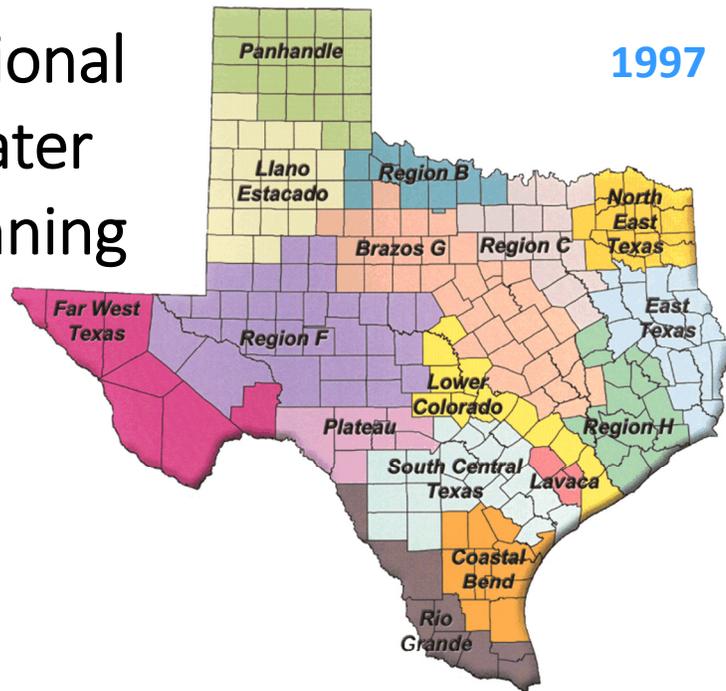
- flowing well at 40,000 gpm
- 1/4 of San Antonio's use
- 9% of Annual Recharge
- world's largest artesian well

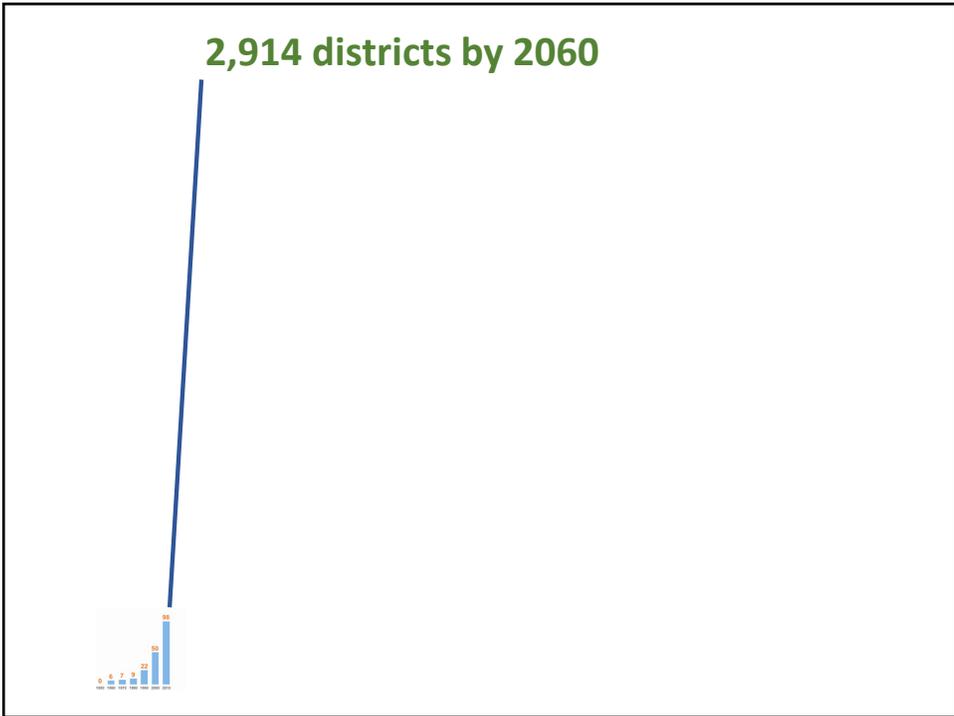
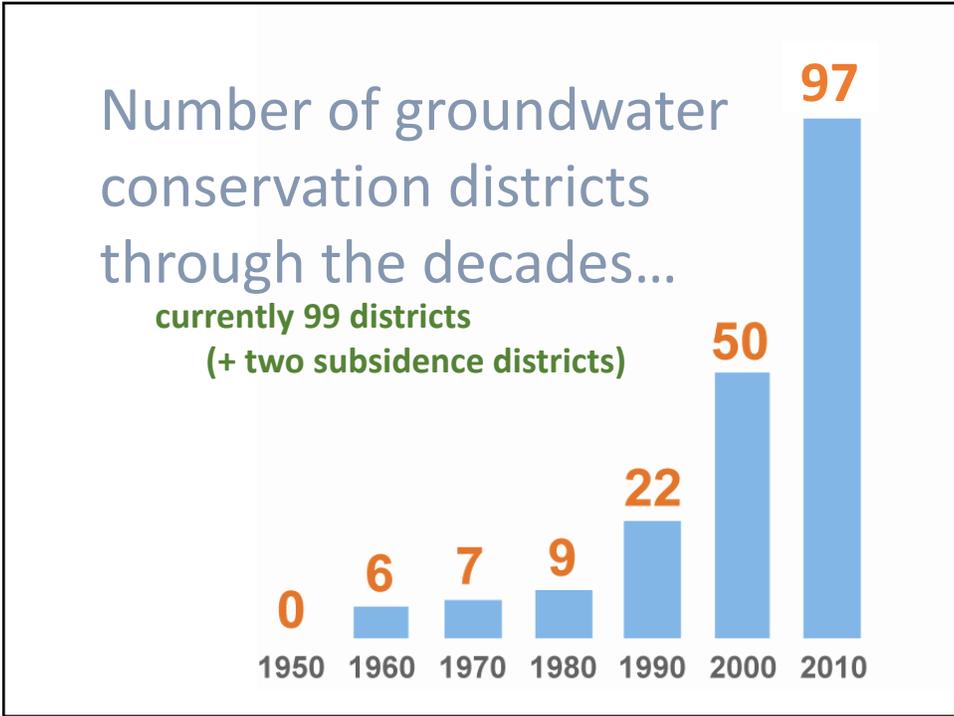
National Geographic (1993)

# *We've Got a Plan*



## Regional Water Planning





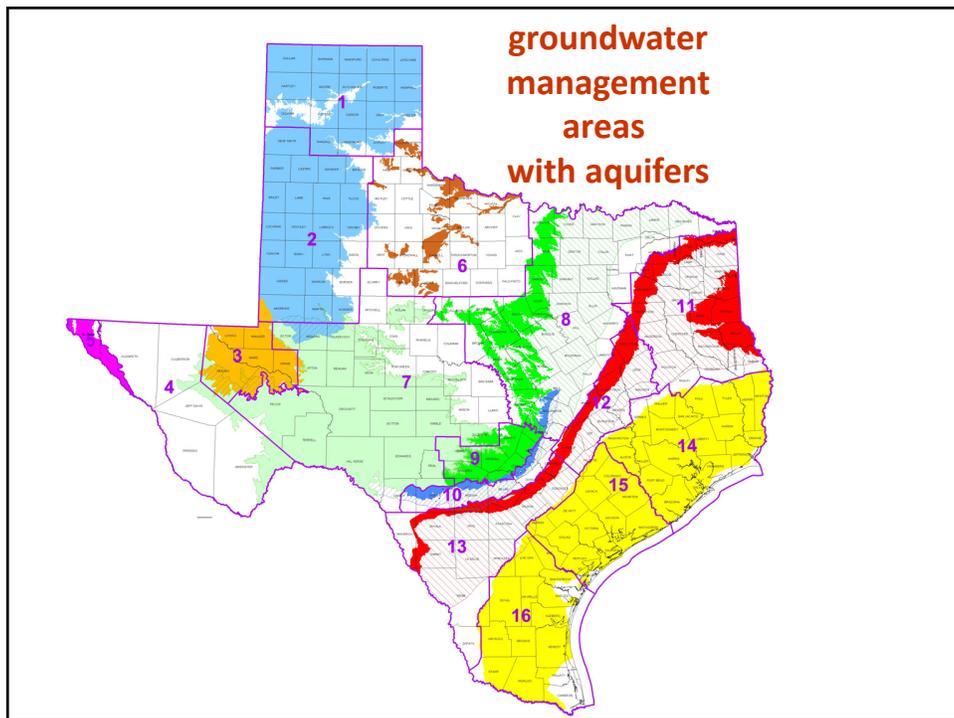
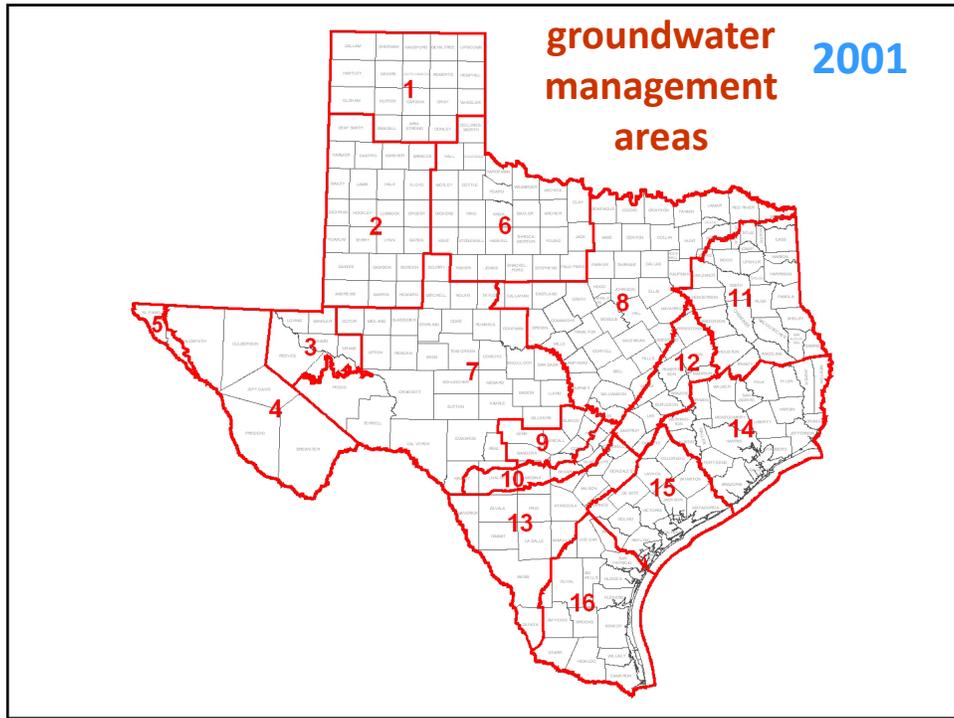
**Regional Water  
Planning Groups**

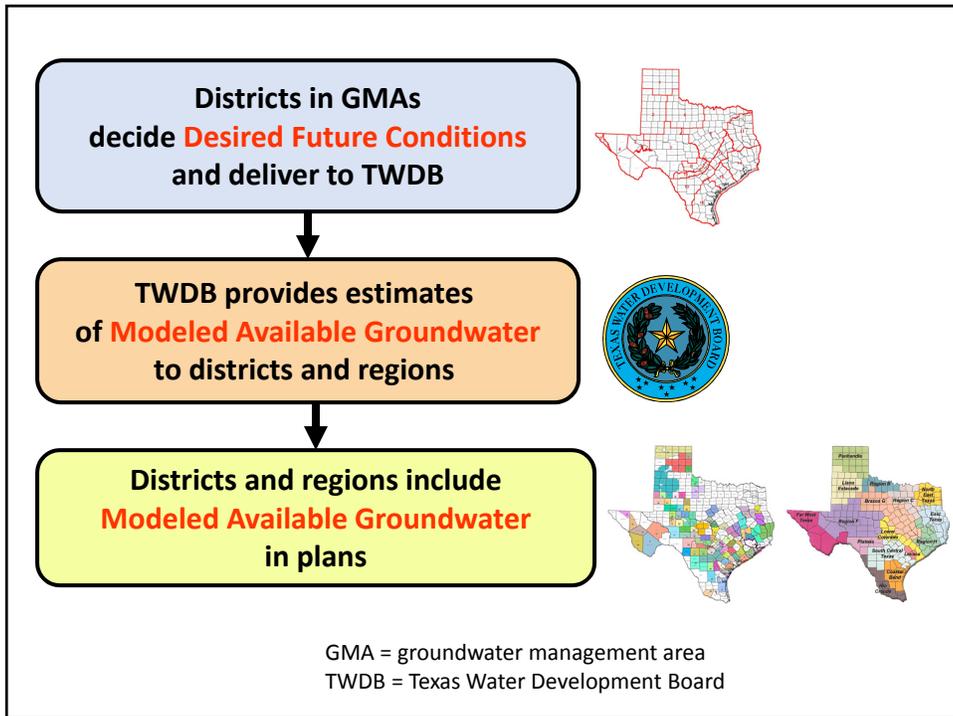
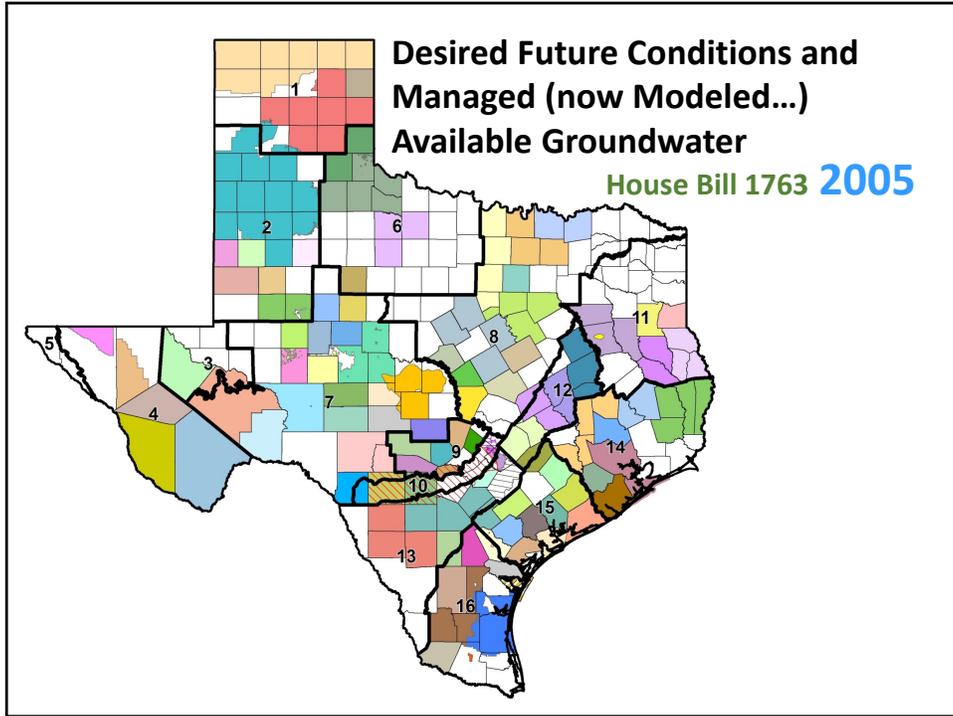


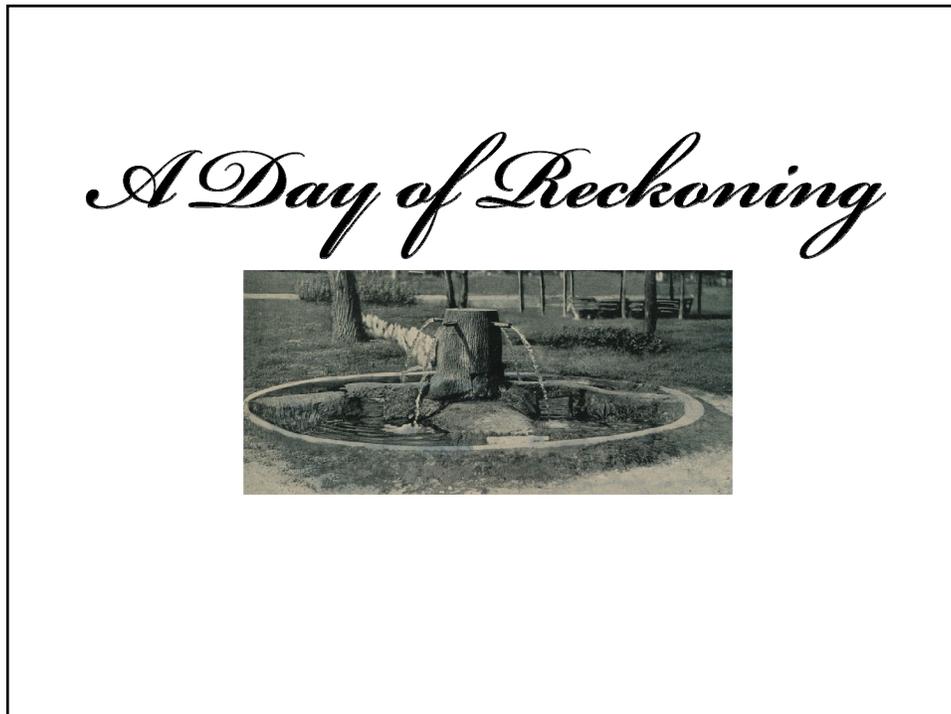
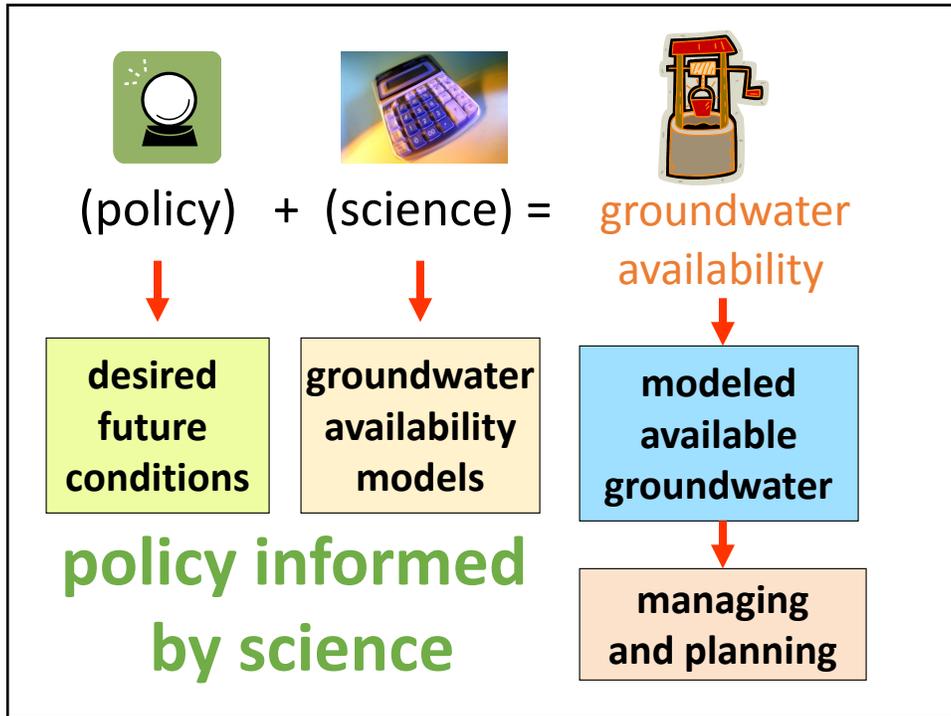
**Groundwater  
Conservation  
Districts**

*A Streetcar Named  
Desired Future Conditions*









## Edwards Aquifer Authority v. Day and McDaniel

2012



photo by Kemp Smith

## timeline

- 1993: Edwards Aquifer Authority (EAA) is created
- 1996: Day & McDaniel file for permit (700 AFY)
- -----: EAA supports 600 AFY
- -----: Day & McDaniel protest
- 2003: EAA makes a site visit and grants 0 AFY
- -----: Day & McDaniel protest; goes to an administrative law judge
- -----: Judge grants 14 AFY; EAA concurs
- 2004: Day & McDaniel file lawsuit
- 2006: District court favors EAA
- 2008: Appeals Court favors Day & McDaniel
- 2012: The Supremes rule for Day & McDaniel

## What does Day & McDaniel mean?

- Landowner owns the water
  - “...we held long ago that oil and gas are held in place, and we find no reason to treat groundwater differently.”
- Who owns recharge?
- The EAA was correct in permitting 14 AFY
- “...a landowner is the absolute owner of groundwater flowing at the surface from its well, even if the water originated beneath the land of another.”
- “‘the rule of capture determines title to [natural] gas that drains from property owned by one person onto property owned by another. It says nothing about the ownership of gas that has remained in place.’ The same is true of groundwater.”

## What does Day & McDaniel mean?

- “Groundwater regulation must take into account not only historical usage but future needs, including the relative importance of various uses, as well as concerns unrelated to use, such as environmental impacts and subsidence.”
- “...landowners do have a constitutionally compensable interest in groundwater...”
- “In many areas of the state, and certainly in the Edwards Aquifer, demand exceeds supply. Regulation is essential to its conservation and use.”
- “As with oil and gas, one purpose of groundwater regulation is to afford each owner of water in a common, subsurface reservoir a fair share.”
- “The Authority argues that basing permits on historical use is sound policy because it recognizes the investment landowners have made in developing groundwater resources.” *later in the same paragraph:* “The Authority’s policy argument is flawed.”
- “To forfeit a landowner’s right to groundwater for non-use would encourage waste.”

**Stay tuned!**

# *Bragg'ing Rights*



## The Bragg Case (in a nutshell...):

2016



- **Two orchards:**
  - D.Hanis (Edwards well drilled in 1980)
  - Home Place (neighbor's well)
- **Bragg's get a permit from a district in 1995 to drill an Edwards well for Home Place** (after EAA created)
- **Bragg's apply for permits in 1996 from EAA for both orchards** (twice as much as used)
- **EAA denies permit for Home Place and reduces D'hanis in 2004**
- **Braggs sue in 2006**
- **District, appeals, and supreme courts rule in favor of the Braggs; district court awards \$2.55 million in takings**



**Recipe For:**  
**Groundwater  
Pound Cake**

\* This could cost you  
some dough!

\*\* Add rum for flavor

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## Questions?

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# So Secret, Occult, and Concealed: An Overview of Groundwater Management in Texas

Robert E. Mace, Ph.D., P.G.<sup>1</sup>  
Texas Water Development Board<sup>2</sup>

## Setting the (Water) Table

If groundwater management in Texas were my girlfriend, our relationship status on Facebook would be “It’s complicated.” Sure, there would be the romantic candlelit evenings near bubbling springs with heated whispers about transmissivities and boundary fluxes, but there’s a lot more going on (cough, cough) beneath the surface than sweet nothings. A lot more. Depending on which part of the state we were in, the relationship could be quite rocky (even if the aquifers weren’t) if not completely nonexistent (“Why are you giving me the silent treatment?”). I’m not proud of this, but we would almost certainly (occasionally) raise our voices at each other, disturbing our neighbors and my cat (hypothetically named, for this paper, Spring<sup>3</sup>).



**Figure 1: My relationship with groundwater in Texas is complicated.**

Indeed, groundwater management in Texas *is* complicated: The resource is complicated, the history is complicated, the law is complicated, and, for the time being, a certain level of legal uncertainty complicates everything. The purpose of this paper is to describe, as simply as possible, how groundwater management currently works in Texas and how we got there.

If all you care about is the here and now, here’s the bottom-line recipe for getting you along your merry groundwater management way:

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<sup>1</sup> [robert.mace@twdb.texas.gov](mailto:robert.mace@twdb.texas.gov); (512)936-0861; P.O. Box 13231, Austin, Texas 78711-3231; Deputy Executive Administrator of Water Science & Conservation.

<sup>2</sup> The following paper 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.

<sup>3</sup> Her real name is Lilly Reich.

1. Are you in a groundwater conservation district, a subsidence district, or the Edwards Aquifer Authority?
2. If the answer is NO, then the Rule of Capture rules, which means you can drill wherever you want and pump whatever you want whenever you want unless
  - (a) a previous owner has severed the groundwater rights from your surface estate [in other words, someone else owns the groundwater beneath your property],
  - (b) you are inside a city's boundaries [in which case you should check with the city on how it may restrict groundwater pumping],
  - (c) you damage someone's property through groundwater-pumping induced land subsidence [and someone sues you for it],
  - (d) you are wasting the water [shame on you], or
  - (e) you are pumping it specifically to damage your neighbor [you're a piece of work, aren't you?].
3. If the answer is YES, then you need to check with the appropriate district or authority (including the city if you are inside a city) to find out what you can and can't do.
4. Regardless of whether you answered YES or NO, you should keep close tabs on case law and the legislature (and the city, if applicable) due to rule changes and the general uncertainty of water law and what regulating bodies can and can't do.

For the rest of y'all, the juicy gossip, heartbreak, uplifting victories, and crushing defeats are below. I should note that any one of these sections warrants their own paper-length description and analysis. While I've strived to keep things accurate, I've also attempted to keep things short and understandable.

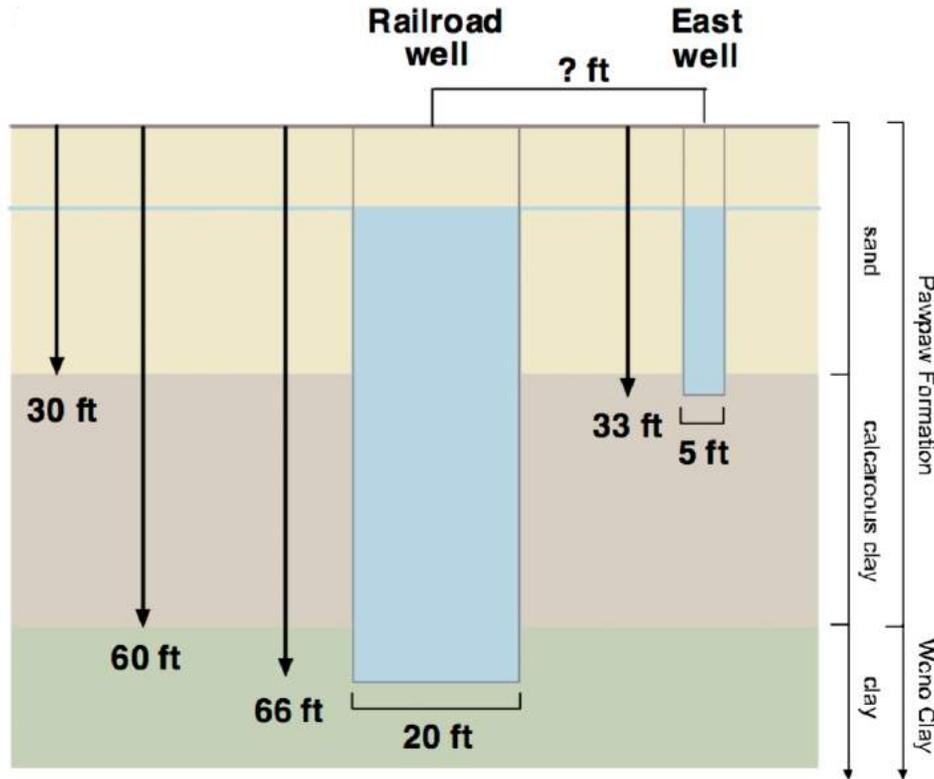
## The Rule of the Land

In the good ole days, with respect to sinking a well and producing from it, you could do whatever you wanted. This freedom was facilitated in large part by ample water resources, fewer people, and a less-litigious society. However, as Texas grew, it was inevitable that one well would impact another, and the drained party would sue. That happened for the first time in Texas in Denison when the Houston and Texas Railway Company sunk and pumped a deeper-than-everyone-else's well at 25,000 gallons per day, allegedly draining nearby wells<sup>4</sup>.

In response, in April 1902, Mr. William A. East, a police officer with a rental house next to the Railway's well, sued, alleging that, by draining the well on his property, the railway was taking an unreasonable amount of water and that pulling water out from under his land was equivalent to trespass. District Court Judge Rice Maxey found that the railway's pumping was not reasonable but that "...no cause of action is shown in behalf of plaintiffs in any sum whatsoever, because I do not believe that any correlative rights exist between the parties as to underground, percolating waters, which do not run in any defined

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<sup>4</sup> The Railway's well was 66 feet deep; Mr. East's well was 30 feet deep.



**Figure 2: Geology and geometry of the Houston and Texas Central Railway Company’s well and William A. East’s well (from Mace and others 2004)**

channel.”<sup>5</sup> Interestingly, although he did not rule in East’s favor, the judge noted that if indeed there were any damages, those damages would be \$206.25 and not the \$1,100 Mr. East desired.<sup>6</sup>

Mr. East appealed the District Court’s decision<sup>7</sup>. In his opinion, Judge John Bookhout of the Appeals Court referred to a New Hampshire court ruling, *Bassett v. the Salisbury Manufacturing Company*<sup>8</sup>, which, in the judge’s words, said that “...the right of a land owner to draw from his land all water found percolating underground, was not absolute, but qualified and limited to the amount necessary for the reasonable use of the land, as land. That the rights of adjoining landowners are correlative and from the necessity of the case the rights of each is only to a reasonable use.” In the end, Judge Bookhout, on November 29, 1903, overturned the lower court and awarded Mr. East \$206.25 in damages. The judge concluded his opinion by referring to *Acton v. Blundell*<sup>9</sup> (a key Rule of Capture case) and acknowledging that other states had adopted this doctrine. However, the judge also concluded that “[to] apply this rule under the facts here shown would shock our sense of justice.”

<sup>5</sup> The original filing appears to have been lost in a courthouse fire during the racial-infused Sherman Riot of 1930; however, appeals court documents (see later footnote) include the filings.

<sup>6</sup> According to westegg.com, \$206.25 in today’s dollars would be \$5,695.60, and \$1,000 in today’s dollars would be \$27,615.

<sup>7</sup> *East v. Houston & Texas Central Railroad Company*. 77 SW 646 (Civ. App. Dallas, 1903).

<sup>8</sup> 47 N.H. 426; this decision introduced the Reasonable Use Doctrine, also referred to as the American Rule.

<sup>9</sup> 12 Mees. & W. 324, 354, 152 Eng. Rep. 1223, 1235 (Ex. Ch. 1843).

The appeal court decision warranted a short column in the Dallas Morning News, who noted that “[t]he case is not of so very much importance on account of the amount involved, but on account of a fine point of law,” namely that a person doesn't have a right to dig a well so deep as that it would drain others. The paper also noted that 22 cases were depending on the verdict<sup>10</sup>.

The railway appealed that decision to the Texas Supreme Court. On June 13, 1904, Justice F.A. Williams delivered the court's opinion.<sup>11</sup> After presenting the facts of the case and the conclusions of the district and appeals courts, Justice Williams quickly jumped to the bottom line: “We are of the opinion that [the appeals court] judgment is wrong and that of the district court is right.” And with that, the Supremes ruled for the railway and put into place the Rule of Capture in Texas. The Supreme Court famously quoted an 1861 Ohio Supreme Court case (*Frazier v. Brown*<sup>12</sup>) that stated:

“In the absence of express contract and a positive authorized legislation, as between proprietors of adjoining land, the law recognizes no correlative rights in respect to underground waters percolating, oozing, or filtrating through the earth; and this mainly from considerations of public policy: (1) Because the existence, origin, movement, and course of such waters, and the causes which govern and direct their movements, are so secret, occult, and concealed that an attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty, and would, therefore, be practically impossible. (2) Because any such recognition of correlative rights would interfere, to the material detriment of the commonwealth, with drainage and agriculture, mining, the construction of highways and railroads, with sanitary regulations, building, and the general progress of improvement in works of embellishment and utility.”<sup>13</sup>

The Texas Supreme Court also quoted a New York case, *Pixley v. Clark*<sup>14</sup>, which stated that “[a]n owner of soil may divert percolating water, consume or cut it off, with impunity. It is the same as land and cannot be distinguished in law from land. So the owner of land is the absolute owner of the soil and of percolating water, which is part of and not different from, the soil. No action lies against the owner for interfering with or destroying percolating or circulating water under the earth's surface.” In quoting a case from Minnesota<sup>15</sup>, Justice Williams noted that any groundwater pumped needed to be used for beneficial purposes. In that case, the defendant, apparently angry at the city, installed a well for the express purpose of draining the city's well, discharging the water he produced into the sewers.

Justice Williams concluded the court's opinion by noting that the Houston & Texas Central Railway Company was “...making a reasonable and legitimate use of the water which it took from its own land...” and that there was “...no claim of malice or wanton conduct of any character...” and that “...[n]o reason exists why the general doctrine should not govern the case.”

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<sup>10</sup> Dallas Morning News, December 2, 1903.

<sup>11</sup> 98 Tex. 146, 81 S.W. 279 (1904).

<sup>12</sup> 12 Ohio St. 294.

<sup>13</sup> Although the Texas Supreme Court seems to suggest that the science of groundwater was unsettled, enough was known about groundwater at that time to have come to a different conclusion (Mace and others 2004).

<sup>14</sup> 35 N.Y., 520..

<sup>15</sup> *Stillwater Co. v. Farmer*, 93 N.W.(Minn.) 907

The railroad had won. Before this case, you could do whatever you wanted with respect to sinking and producing from water wells; after the case you could do the same, absent willful malice and waste, but now with case law behind you.

The local Denison paper was silent on the decision.<sup>16</sup> The Dallas Morning News summarized the results as “[t]he Supreme Court says today that old English decisions and those of this country sustain the railroad company.”<sup>17</sup> In *Lawyers' Report Annotated*, a book that reproduced court decisions from around the country, editor Henry P. Farnham noted in a footnote on the Texas Supreme Court's decision that the “...case is not only opposed to the trend of the modern decisions upon the subject of subterranean water, but it would also seem to be opposed to equity, justice, and sound reason.”<sup>18</sup>

The Rule of Capture still rules in Texas, although the rule can be substantially modified by groundwater conservation districts (more on that later). The courts have upheld the Rule of Capture many times, most famously when groundwater pumpers outside of Fort Stockton dried up Comanche Springs, a spring that flowed nearly 20,000 gallons per minute and supported 108 downspring irrigators<sup>19</sup>, and more recently in 1999 when nearby landowners alleged that the water bottling company Great Spring Waters of America, Inc. (makers of Ozarka among other brands) had dried up their wells<sup>20</sup>.

## Waste Not, Want Not

In 1876, Thomas Patton Day wildcatted a deep well tapping into the artesian part of the Trinity Aquifer, an aquifer that, at the time, pushed water up and out of the well in the most dramatic fashion<sup>21</sup>. In a few years, locals drilled more than 100 wells earning Fort Worth the title The City of Artesian Wells.

The discovery of flowing artesian wells in Texas was a big deal. Back in those days (and up until the 1920s), there weren't pumps small enough to pump large amounts of water from depth<sup>22</sup> (they did have stream powered suction pumps that pulled water upwards, but a suction pump can only reach 20 to 30 feet down from the pump; windmills could be used to pump water, but production volumes were generally limited and only available when the wind blew). If water flowed of its own volition, you not only didn't have to pump, but the water produced itself at no cost. The discovery of flowing artesian wells sparked a well drilling frenzy across the state as Texans searched high and low for flowing artesian water.<sup>23</sup>

And people found flowing artesian wells in most places in the eastern half of the state and a small part of west Texas near Pecos. The area from Dallas-Fort Worth down through Waco and San Antonio became

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<sup>16</sup> Based on my own review of newspaper archives at the Denison Public Library in 2004; confirmed by Porter (2012).

<sup>17</sup> Dallas Morning News, June 14, 1904.

<sup>18</sup> Rich and Farnham (1905)

<sup>19</sup> *Pecos County Water Control and Imp. Dist. No. 1 v. Williams*, 271 S.W.2d 503, 507 (Tex. Civ. App.—El Paso 1954, writ ref'd n.r.e.).

<sup>20</sup> *Sipriano v. Great Spring Waters of America, Inc.*, 1 S.W.3d 75, 78 (Tex. 1999).

<sup>21</sup> Earlier artesian wells were drilled at Corpus Christi in 1845 by the U.S. Military as Texas awaited entry to the United States, and the U.S. Corps of Topographical Engineers drilled several wells between 1855 and 1856 near where the Pecos River crosses the Texas-New Mexico state water line (these Pecos wells, although technically artesian, were considered failures because they didn't flow at the land surface).

<sup>22</sup> Mohadi (2012)

<sup>23</sup> ...and in the process discovered oil in many parts of the state!

known worldwide in the late 1800s as the Great Artesian Basin as flowing well after flowing well tapped into the aquifers below. After drilling a few gushers, Waco became known as Geysers City. Fort Worth moved from surface water to groundwater for its water supply. Dallas celebrated in the streets after its first flowing artesian well came in and promptly proposed drilling 270 wells and dumping the water into the Trinity River to turn the city into a “seaport town”<sup>24</sup>.

Initially, everyone, including scientists, thought the water supply was nearly limitless. Judge E.G. Bower said “My idea is that the source of the artesian supply here is in the Ozark mountains, in southern Missouri and northern Arkansas. It is not in the northwest, for if it were Fort Worth would have an immense supply of artesian water whereas it is limited to the first light flow that we struck here.” The good judge went on to describe that the Ozarks supply the water to San Marcos and San Antonio as well.<sup>25</sup> The belief that Texas was underlain by a 100 foot thick layer of sand connected to the Arctic Ocean—a theory proposed by Professor C.B. Wilbur from the Nebraska Academy of Sciences—persisted such that people, including local scientists, believed that “...it would be as difficult to cut off its supply of artesian water by the ordinary use of it as it would be to empty a lake with a ladle.”<sup>26</sup> Robert T. Hill, a geologist for the U.S. Geological Survey, said “Ask any man between Pike's Peak and Galveston the source of the water in his well, and he will invariably reply: ‘The snowfall of the Rocky mountains!’ Except what flows down the Rio Grande, the Pecos, the Arkansas and the Canadian, there is not a drop of Rocky mountain water in Texas...”<sup>27</sup>

Mr. Hill noted, correctly, that the source of water for the aquifer was to the west of Fort Worth where the rocks of the Trinity cropped out, exposing themselves to percolating rainfall. He predicted that there would soon be thousands of deep artesian wells between the Colorado and Trinity rivers. When asked the question “Will the flow be diminished by an increased number of wells?” he answered, “Theoretically, yes; practically, never.” Hill noted that the artesian wells in London had stopped flowing after many wells had been drilled, but that the recharge area supplying the Dallas wells was much greater than the area feeding the London wells. “Dallas has in these wells an inexhaustible supply of water.”<sup>28</sup> Hill thought the Trinity Aquifer captured 50 percent of the rainfall that fell on its outcrop<sup>29</sup> (in reality, 0.8 percent of the total volume of recharge flows into the artesian aquifer system, which is less than 0.04 percent of the total rainfall<sup>30</sup>). By 1892, nearly 50,000,000 gallons per day of water were gushing out of the artesian basin underlying the Black and Grand prairies between Del Rio, San Antonio, Austin, Waco, Dallas, and Fort Worth.<sup>31</sup>

And then hydrogeologic reality set in.

When folks drilled flowing artesian wells, they tended to leave them flowing all the time, regardless of whether they were using the water or not. Having a flowing well, especially in the early days, was considered something of a status symbol. Even the Dallas Morning News publically drilled a well to gain

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<sup>24</sup> Dallas Morning News, June 29, 1891.

<sup>25</sup> Dallas Morning News, May 3, 1891.

<sup>26</sup> Dallas Morning News, August 24, 1893.

<sup>27</sup> Dallas Morning News, May 20, 1891.

<sup>28</sup> Dallas Morning News, October 25, 1890.

<sup>29</sup> Whitney (1894)

<sup>30</sup> Kelley and others (2014)

<sup>31</sup> Dallas Morning News, January 4, 1892.

attention for itself and the city. Folks also used the wells to keep food preserved by submerging perishables beneath the flow's surface. As early as 1891 well owners started observing a decrease in flow in areas where many wells were drilled close to each other<sup>32</sup>. Scientists with the U.S. Geological Survey noted with alarm that flows (and shut-in pressures) were rapidly declining in many wells and encouraged people to shut their wells off when not in use. Because folks tend to believe what they want to believe, especially if their beliefs don't require them to change their behavior, most wells remained opened and flowing. By 1894, about 237 of 240 wells drilled in Fort Worth had ceased to flow<sup>33</sup>. A.F. Kirkpatrick, head of a prominent real estate company in Dallas, stated in 1900 that "...the continual flow of artesian wells is too uncertain to be relied on for a permanent supply."<sup>34</sup> By 1903, many artesian wells across the aquifer had ceased to flow<sup>35</sup>. Dreams saturated with limitless artesian supplies had dried up.<sup>36</sup>



**Figure 3: A flowing artesian well in the Pecos, Texas, area circa 1910 (postcard from the author's personal collection).**

Concerns about uncontrolled flowing wells finally made it down to Austin in 1913 when the legislature passed the Burges-Glasscock Act<sup>37</sup>. Although the act is primarily focused on (and remembered for) its contributions to surface-water law<sup>38</sup> and the creation of the Texas Board of Water Engineers (a

<sup>32</sup> Dallas Morning News, June 17, 1891; because of the costs associated with drilling deep wells, people financing such efforts stayed close to an existing well that had been a success.

<sup>33</sup> Whitney (1894, p. 116)

<sup>34</sup> Dallas Morning News, September 25, 1900.

<sup>35</sup> Dallas Morning News, June 15, 1903.

<sup>36</sup> Today, water levels in the Trinity Aquifer in the Dallas-Fort Worth area or, more precisely, the potentiometric surface, have declined more than 1,000 feet since the late 1800s.

<sup>37</sup> House Bill 37, 33rd Regular Session; Burges-Glasscock Act, 33rd Leg., R.S., Tex. Gen. Laws ch. 171 (codified at Tex. Rev. Civ. Stat. Ann. 1920, art. 7579).

<sup>38</sup> Centralized permitting.

predecessor of the Texas Commission on Environmental Quality), it also provided the first regulation of groundwater in Texas by requiring the registration of artesian wells with the state (the Texas Board of Water Engineers) and disallowing the waste of groundwater, specifically flowing a well with no beneficial purpose. This law is still on the books<sup>39</sup>.

## We Shall Conserve

With a growing population and the state suffering drought after drought, including a severe one that started in 1916 (and continued into 1918), the Legislature proposed an amendment to the state constitution in 1917 via Senate Joint Resolution 12 “...providing for conservation districts, the creation of such districts and their government and regulation.”<sup>40</sup>

The Texas Conservation Districts Amendment (known these days simply as the Conservation Amendment) stated, in part, that “[t]he conservation and development of all of the natural resources of this state...are each and all hereby declared public rights and duties...” One of the natural resources listed is water. The amendment goes on to state that “[t]here may be created within the State of Texas, or the State may be divided into, such number of conservation and reclamation districts as may be determined to be essential to the accomplishment of the purposes of this amendment to the constitution...”

In campaigning for the amendment, Judge C.M. Cureton, First Assistant Attorney General, stated that “[t]his amendment to the Constitution contemplates the doing of large things in a large way...” including the formation of large conservation districts to conserve water through the “...pumping and distribution of water from wells for irrigation...”<sup>41 42</sup>.

Voters approved the amendment<sup>43</sup> in August of 1917 by 49,116 votes to 36,827 votes (57 to 43 percent). Although the amendment allowed for the creation of conservation districts for groundwater, the first groundwater conservation district wasn’t created until many years later.

## We Will Somehow Manage<sup>44</sup>

In the early days, it was considered shameful to irrigate your crops with water from the Ogallala Aquifer<sup>45</sup>. It was seen as an admission that the Good Lord didn’t provide enough water to support farming on the High Plains (although in reality irrigation made business difficult for land boosters promising adequate rain to potential farmers from the East). However, that didn’t stop land developer D.L. McDonald from sinking a well in Hereford in early 1910, dropping a vertical centrifugal pump in it, and producing over a 1,000 gallons a minute to smooth out the rough edges of the West Texas version of

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<sup>39</sup> Texas Water Code, Chapter 11, Subchapter F, §§ 11.201–207. Well registration is now handled by the Texas Department of Licensing and Regulation, and regulation of local use is handled by groundwater conservation districts, where they exist.

<sup>40</sup> Tex. S.J. Res. 12, § 1, 35th Leg., R.S., 1917 Tex. Gen. Laws 500.

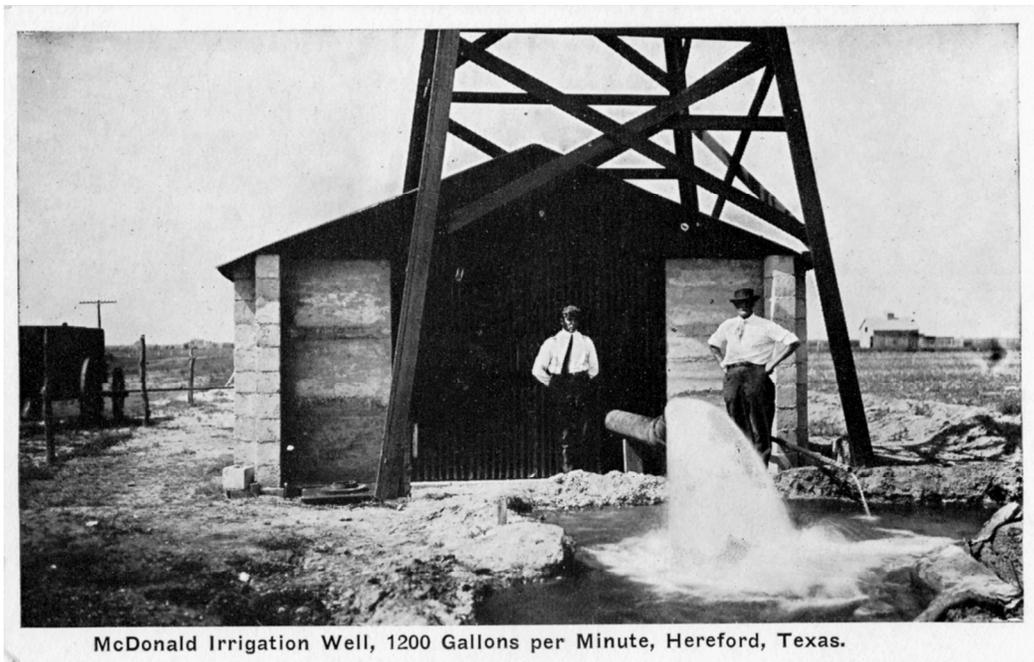
<sup>41</sup> Cureton (1917, p. 89)

<sup>42</sup> Conservation had a different meaning back then that it does today, namely the capture and use of water.

<sup>43</sup> Tex. Const. art. XVI, § 59.

<sup>44</sup> Much of this discussion, especially that of the provenance of groundwater conservation districts, is based on Green (1974 p. 165–189).

<sup>45</sup> Green (1974)



McDonald Irrigation Well, 1200 Gallons per Minute, Hereford, Texas.

**Figure 4: D.L. McDonald (on the right), the father of high-volume irrigation on the High Plains, standing next to his famous well sunk in 1910 near Hereford, Texas (postcard from the author's personal collection).**

Mother Nature. This feat earned McDonald the title “the father of irrigation on the Staked Plains”.<sup>46</sup> After his neighbors saw the benefits of irrigating with groundwater, they started to irrigate as well.

Similar to the Trinity Aquifer, people initially believed that water from the Ogallala was limitless, connected directly to the Rocky Mountains or even to the Arctic Ocean. Captain Livermore promoted the idea that glacial water from the Arctic fed the underground river and that “the only power that could ever exhaust the Plains water supply would be an earthquake that would crack the flint bottom and give the water another channel.”<sup>47</sup> During the 1930s dust bowl, pumping from the Ogallala became more and more prevalent (although nothing like the uptick in pumping during the 1950s drought). Towns and cities on the High Plains as well as government officials and state organizations became concerned about systematic water-level declines and began pushing for the state to take ownership of groundwater and regulate it. The irrigators, on the other hand, particularly the irrigators in the Lubbock area, had a different idea: Leave things the way they were; leave the Rule of Capture untouched.

In 1934 and again in 1938 the Texas Board of Water Engineers, supported by several federal organizations<sup>48</sup>, called for comprehensive management of groundwater resources, including state control of groundwater. However, legislation proposed in 1937, 1941, and 1947 failed to pass, in large part due to the efforts of the irrigators, including the 3,200-member High Plains Water Conservation and Users Association. Cities and businesses became more concerned about water-level declines, and not only in the

<sup>46</sup> Green (1974 p. 77)

<sup>47</sup> Opie (2000, p. 73); it's unclear exactly who Captain Livermore was, although I suspect that it's William Roscoe Livermore who, while with the Corps of Topographical Engineers, explored West Texas (and who had a penchant for exaggeration).

<sup>48</sup> FDR's Great Plains Committee and the National Advisory and Legislative Committee on Land Use.

Ogallala since water levels were also falling in the Lower Rio Grande Valley, turning a regional concern into more of a state-wide concern. In response, the Texas Water Conservation Association developed bill language in 1948 that placed groundwater under correlative rights managed by the Texas Board of Water Engineers with priority given to municipalities and manufacturers. After reading the bill, *Southwestern Crop and Stock* said that irrigators were “Carthaginians defending their city against the Roman onslaught.”<sup>49</sup>

Concerned that the tide had turned against them, the irrigators, through the Farm Bureau and the aforementioned High Plains Water Conservation and Users Association, began working on their own bill, a bill that would create locally controlled groundwater conservation districts similar to soil conservation districts<sup>50</sup>. The Texas Water Conservation Association reached out to the Users Association to work on a compromise bill, which was finalized in December of 1948, right before the '49 legislative session. The irrigators felt triumphant with the result. A Users Association negotiator reported back that “We wrote our own ticket.” *Southwestern Crop and Stock* crowed that “West Texans can consider the water their own—to use or waste as they please.” Introduced by Representative I.B. Holt of Olton<sup>51</sup> and passed by the Texas Legislature, Governor Beauford Jester signed the bill in June of 1949.<sup>52</sup>

In 1951, after some prodding by area leaders<sup>53</sup>, locals flocked to the polls to the cry of “Prevent state control of groundwater!” and voted to confirm a local groundwater district.<sup>54</sup> Ironically, groundwater conservation districts were originally created to prevent the management of the resource, something districts avoided for a long time. Nevertheless, Texas water law explicitly states that groundwater conservation districts “...are the state’s preferred method of groundwater management...”<sup>55</sup>

These days, groundwater conservation districts are presented with a menu of management options in statute<sup>56</sup>, including the ability to require registration and permits, have spacing requirements (away from property lines and other wells), and have production permits. In those districts that regulate production and spacing, the Rule of Capture has been locally modified—you can no longer do whatever you want. Certain uses, such as certain livestock and residential use below 25,000 gallons per day<sup>57</sup> and use for the exploration of oil and gas, are exempt from district regulation. To fully understand the powers of a particular district, you should read Chapter 36 of the Water Code, the enabling legislation of the district, any subsequent modifications to that enabling legislation, and the district’s rules.

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<sup>49</sup> Gowen (1948) as quoted in Green (1973 p. 176).

<sup>50</sup> Soil conservation districts are political subdivisions of the state first created after the Dust Bowl to help farmers and ranchers protect their topsoil.

<sup>51</sup> Olton is just west of Plainview and over the Ogallala Aquifer.

<sup>52</sup> Subsequent efforts to save the water supply for West Texas focused on bringing the Mississippi River to the High Plains, state and federal efforts that continued until the 1980s.

<sup>53</sup> Many irrigators felt that they didn’t have to actually create a district (and they really didn’t want to create a governmental body); however, area leaders noted that if they didn’t form a district, the Texas Water Conservation Association might return to the legislature pushing for state control if the district legislation appeared to be a failure.

<sup>54</sup> I continued to hear this rallying cry for district creation into the early 2000s.

<sup>55</sup> Texas Water Code §36.0015.

<sup>56</sup> Texas Water Code, Chapter 36.

<sup>57</sup> Although unproven, surely this number came from the East case (this is how much the Railway reported pumping from its well); enabling legislation for individual districts may change this volume; sometimes districts increase this volume in their rules.

## Writing Off the Ogallala

Since the 1950s, the Ogallala Aquifer in Texas has been pumped about six times (~6 million acre-feet per year) the estimated rate of recharge<sup>58</sup> to the aquifer (~1 million acre-feet per year). The outcome of this situation is a steady decline in water levels over time and a concomitant decrease in the saturated thickness.<sup>59</sup> Because land with access to irrigation water is worth more than dryland, a decreasing saturated thickness decreases the value of the land. Therefore, irrigators over the Ogallala wanted the ability to account for the depreciation of their land in their federal tax filings.

In a “carefully and elaborately”<sup>60</sup> assembled test case for the irrigators of the Southern High Plains in Texas and New Mexico south of the Canadian River and east of the Pecos River, Marvin Shurbet and his wife, both of Floyd County, Texas, sued the Internal Revenue Service for “a cost depletion deduction for the exhaustion of their capital investment in the ground water extracted and disposed of by them in their business of irrigation farming” for their federal taxes after the Service denied the deduction. The federal trial court ruled for the Shurbets in 1961<sup>61</sup>. The Internal Revenue Service appealed, and, in 1965, the federal appeals court ruled in favor of the Shurbets agreeing with the district court that such deductions needed to be allowed by the Internal Revenue Service.<sup>62</sup>

Groundwater conservation districts over the Ogallala in Texas today carefully measure and map out annual water-level declines to assign depletion allowances to each landowner. A similar case filed in 1978 in Kansas expanded the deduction to the rest of the Ogallala.<sup>63</sup>

## A Sinking Feeling

Unconsolidated sediments—sands and silts that haven’t turned into rock yet—tend to be held in place, in part, by water. When groundwater is pumped from a silt- and clay-rich aquifer, water moves out of the silts and clays, which may cause the overburden—the weight of the sands and silts and whatnot above—to compress the de-pressurized silts and clays. This compression can lead to observable land subsidence—a decrease in the surface elevation of the land. Depending on how much and where, land subsidence may or may not be an issue. If land subsides near sea level, the impacts may be disastrous, including the loss of the land itself.

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<sup>58</sup> Recharge is the amount of water that makes it into the aquifer to replenish it.

<sup>59</sup> The Ogallala is a water-table, or unconfined, aquifer. Rather than a depletion of pressure in an artesian aquifer, water-level declines in an unconfined aquifer represent an actual drainage of the aquifer (although it’s theoretically possible to do this to an artesian aquifer once all the artesian pressure is depleted).

<sup>60</sup> Words used by judges in the U.S. Court of Appeals Fifth Circuit; *United States v. Shurbet*, 347 F.2d 103 (1965).

<sup>61</sup> *Marvin Shurbet v. United States*, 242 F.Supp. (N.D. Tex. 1961).

<sup>62</sup> *United States v. Shurbet*, 347 F.2d 103 (5th Cir. 1965). These decisions are chock full of groundwater hydrology; a fun read for hydrogeologists.

<sup>63</sup> In January 1978, brothers Dean, Jerry, and Terry Gigot filed a lawsuit in U.S. District Court against the Internal Revenue Service because the Service disallowed their deductions for depletion of the Ogallala Aquifer beneath their 30,000 acre farm in Kansas irrigated with 350 wells. In September 1980, the U.S. Department of Justice reached an agreement with the Gigot brothers that allowed for deductions for the Ogallala Aquifer (AP 1980). These deductions are codified under Revenue Ruling 65-296 (for the Ogallala Aquifer south of the Canadian River) and Revenue Ruling 82-214 (for the rest of the Ogallala Aquifer).

Between 1943 and 1973, 200 feet of water-level declines in the Chicot Aquifer and 325 feet of water-level declines in the Evangeline Aquifer (both sub-aquifers of the Gulf Coast Aquifer and both artesian) resulted in upwards of 7.5 feet of land subsidence in Pasadena, Texas, a community southeast of Houston<sup>64</sup>. Smith-Southwest Industries and other landowners filed a class action lawsuit against Friendswood Development Company (owned by Exxon Corporation) in 1973 alleging that Friendswood's groundwater pumping was causing severe land subsidence.

Before the court system fully ruled on the lawsuit and subsequent appeals, the Legislature responded to the issue with the creation of the Harris-Galveston Coastal Subsidence District in 1975 (House Bill 552, Representative Bill Caraway of Clear Lake). According to the House Committee Report, "The only opponents to the bill are large commercial users of groundwater which is less expensive to use than surface water." Lining up in support of the bill was the Office of the Attorney General, local representatives and senators, the Galveston County Judge, Exxon, and the cities of Deer Park, LaMarque, Nassau Bay, Baytown, Houston, Pasadena, and Seabrook. DuPont de Nemours (DuPont) and Diamond Shamrock did not support the bill.



**Figure 5: Flowing artesian well in Houston, Texas, circa 1910 (postcard from the author's personal collection).**

Citing the Rule of Capture, the trial court ruled against the landowners through a summary judgment. The landowners appealed the judgment, and the Court of Civil Appeals reversed and remanded the case to trial court<sup>65</sup>. Friendswood appealed that decision to the Texas Supreme Court where the justices, in 1978, affirmed the judgment of the trial court<sup>66</sup>: "The Supreme Court of Texas rejects the plaintiff-respondents' claim for damages according to the traditional rule that a landowner has the right to withdraw ground

<sup>64</sup> House Committee on National Resources Committee Report for House Bill 552, 64<sup>th</sup> Texas Legislature

<sup>65</sup> *Smith-Southwest Indus. v. Friendswood Dev. Co., Ltd.*, 546 S.W.2d 890 (Tex. App.—Houston [1st Dist.] 1977).

<sup>66</sup> *Friendswood Dev. Co. v. Smith-Southwest Indus., Inc.*, 576 S.W.2d 21 (Tex. 1978).

water without incurring liability for subsidence damage to neighboring lands absent willful waste or malicious injury.” However, the court did note that, going forward, a landowner would be liable for subsequent damage from land subsidence “...if the landowner's manner of withdrawing ground water from his land is negligent, willfully wasteful, or for the purpose of malicious injury, and such conduct is a proximate cause of the subsidence of the land of others...”.

The Harris-Galveston Coastal Subsidence District has successfully reversed water-level declines in much of its jurisdiction and encouraged and obligated water users to transfer their supply to alternative sources, namely surface water. Later, in 1989, the Legislature created the Fort Bend Subsidence District in Fort Bend County.

This decision amounted to another modification of the Rule of Capture: you could no longer pump as much groundwater as you wanted and remain non-labile if your pumping caused damage to someone else’s property through land subsidence.

## A River Runs Through It

The Edwards Aquifer is the California of Aquifers in Texas. As far as hydrogeology and groundwater management in Texas go, there are generally applicable rules of thumb, and then there’s the Edwards. A key reason the Edwards is so different from other aquifers is because it’s a karst aquifer—a limestone aquifer cracked up by faults and partially dissolved with water. Whereas water eases through sandy aquifers at one to two feet per year, water in the Edwards shoots through at miles per year (if not miles per day). Whereas water slowly seeps into sandy aquifers over large areas, seepage into the Edwards happens quickly through stream beds and sinkholes. Whereas water generally discharges from sandy aquifers slowly over large areas, water discharges from the Edwards in the seven largest springs in Texas:

- Comal at ~320 cubic feet per second,
- San Marcos at ~150 cubic feet per second,
- Goodenough at ~140 cubic feet per second,
- San Felipe at ~90 cubic feet per second,
- Barton at ~50 cubic feet per second,
- San Antonio at ~50 cubic feet per second, and
- Hueco at ~40 cubic feet per second.<sup>67</sup>

It is this latter attribute—localized spring discharge—that causes a somewhat unique groundwater issue: the occurrence of distinctive plants, fish, and insects in these springs. And that invites federal law into the groundwater conversation.

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<sup>67</sup> Brune (2002); note that Goodenough Springs is now under Lake Amistad (although still has a healthy flow) and San Antonio Springs, due to local pumping, only flows episodically these days.



**Figure 6: Just downstream of San Marcos Springs in San Marcos, Texas, circa 1910 (postcard from the author’s personal collection).**

By 1980, the U.S. Fish and Wildlife Service had listed four species in Comal and San Marcos springs as endangered (Texas Blind Salamander, 1967; Fountain Darter, 1970; Texas Wild Rice, 1978; San Marcos Gambusia, 1980)<sup>68</sup>. One concern for the species were water levels in the Edwards Aquifer and how those levels impacted spring flows. The concern was not without merit. During the drought of the 1950s, a small lake fed by Comal Springs stopped discharging to the Comal River, extirpating the Fountain Darter at that location (scientists later reintroduced Fountain Darters from San Marcos Springs)<sup>69</sup>. Since the 1950s, San Antonio—wholly reliant on the aquifer at that time, had grown and become more dependent on the aquifer.

To complicate matters, a catfish farm opened southwest of San Antonio in 1991 after drilling a well they named Ave Maria No. 1 that flowed as much as 40 million gallons of water a day, about a quarter of the amount San Antonio produced from the aquifer<sup>70</sup>. This incredible flow caused a number of folks to go into full freak-out mode. In October 1991, the Edwards Underground Water District and the San Antonio River Authority sued the catfish farm claiming waste of groundwater and pollution of the Medina River. The well was shut down by consent decree while it awaited a discharge permit from the Texas Water Commission (a predecessor of the Texas Commission on Environmental Quality). In November 1991, the Attorney General opined that the Water Commission could regulate groundwater, only to reverse course several months later in March. In April 1992, the Commission proposed an aquifer management plan for approval by stakeholders by April 14<sup>th</sup>; San Antonio and the Edwards Underground Water District rejected the plan. On April 15<sup>th</sup>, the Commission declared the Edwards Aquifer to be an underground

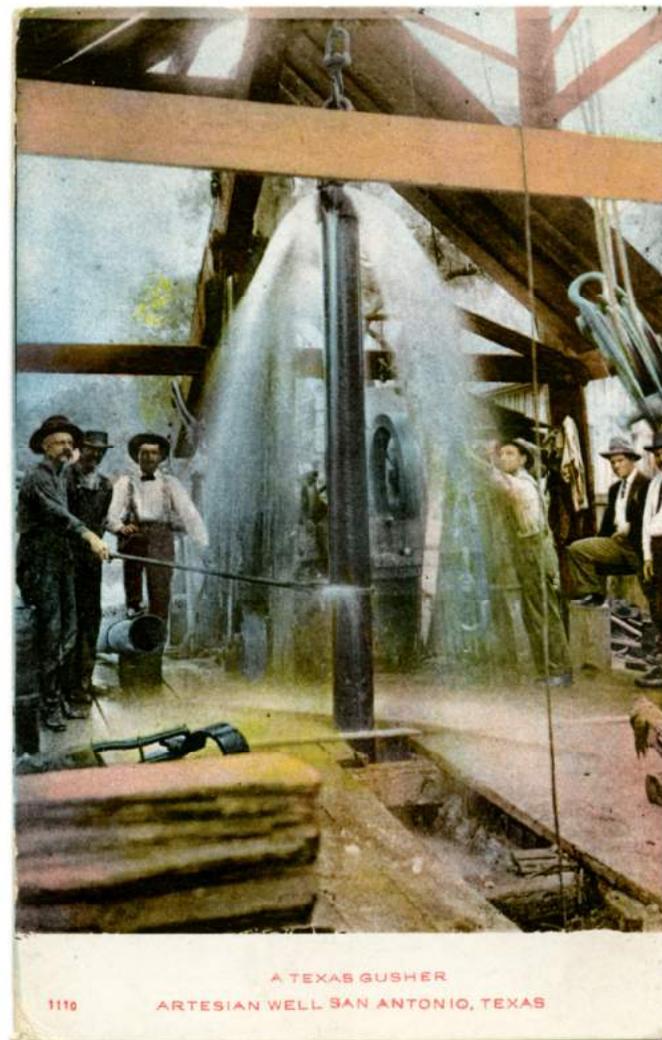
<sup>68</sup> U.S. Fish and Wildlife Service webpage ([www.fws.gov](http://www.fws.gov); accessed March 6, 2016).

<sup>69</sup> Unlike the Ogallala Aquifer, the Edwards Aquifer responds rapidly to rainfall and thus recharges quickly.

<sup>70</sup> Much of this paragraph is based on Votteler (1998).

stream and, therefore, subject to regulation by the state (as exercised through the Commission; unlike groundwater, surface water is owned and regulated by the state in Texas). The Commission approved rules to regulate the aquifer in September. Edwards irrigators sued the Commission; the district court responded by voiding the Commission's rules and underground stream declaration. However entertaining, all of this was a sideshow to the federal lawsuit.

In 1991, the Sierra Club filed a lawsuit in federal district court alleging that the Secretary of the Interior (first Manuel Lujan Jr, then Bruce Babbitt) and the U.S. Fish and Wildlife Service were not ensuring enough flow in Comal and San Marcos springs to protect the endangered species<sup>71</sup>. The Sierra Club asked for pumping to be restricted from the aquifer under certain conditions and that habitat recovery plans be



**Figure 7. “A Texas Gusher”; flowing artesian well completed in the Edwards Aquifer circa 1910 (postcard from the author’s personal collection).**

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<sup>71</sup> Much of the following discussion is informed by Votteler (1998) and Votteler (2002).

developed and implemented for the endangered species. In February 1993, Judge Lucious D. Bunton III ruled in favor of the Sierra Club<sup>72</sup> and required that the Wildlife Service determine springflow requirements to protect the species. Recognizing that existing state groundwater law and districts were not protective<sup>73</sup>, Bunton set a deadline for the state to prepare a plan to protect springflow, stating that “The next session of the Texas Legislature offers the last chance for adoption of an adequate state plan before the 'blunt axes' of Federal intervention have to be dropped.”<sup>74</sup>

The Texas Legislature responded by May 30, 1993, one day before the end of session, by passing Senate Bill 1477<sup>75</sup>, which created the Edwards Aquifer Authority under the authority of the Conservation (Districts) Amendment. Unlike other groundwater conservation districts at the time, the Edwards Aquifer Authority had pumping restrictions baked into its enabling legislation as well as a permitting scheme that focused on historic use. After responding to a Voting Rights Act challenge (the appointed board was replaced with an elected one during the 1995 Legislative Session), the Medina County Groundwater Conservation District and the Uvalde County Underground Water Conservation District filed a lawsuit in August 1995 against the newly elected board members of the Authority alleging that the regulation of groundwater was a violation of private property rights and thus the Authority was unconstitutional. The trial court in Medina ruled for the Medina and Uvalde districts. Because of a drought at that time, the Attorney General asked for the appeal to go straight to the Texas Supreme Court where the justices, because of the Conservation (Districts) Amendment, ruled for the state<sup>76</sup>. The Edwards Aquifer Authority would live to see another (ahem) Day.

## We've Got a Plan

After a severe drought in the mid-1960s, Texas enjoyed a long 30-year spell of above average rainfall and below average temperature, a period that lulled the state into water resource complacency. And then came the drought of 1996. In retrospect, the drought of 1996 was merely a minor speed bump, especially when compared to the series of droughts that came afterwards. However, coming after 30 wet years, 1996 was a wake-up call from climate-induced complacency<sup>77</sup>. Cities struggled with water supplies, several small towns ran out water, and the legislative power brokers in Austin got worried. In response, the Legislature completely revamped water planning from a top-down technocratic exercise to a more local and meaningful bottom-up process. This regional water planning process was originally encapsulated in a famous-in-the-Texas-water-world bill known simply as Senate Bill 1<sup>78</sup>.

Senate Bill 1 touched on water management law, including groundwater law, both directly and indirectly. Indirectly, the bill introduced what people refer to as the Junior Provision or simply Junior. The Junior

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<sup>72</sup> *Sierra Club v. Babbitt*, No. MO-91-CA-069, slip op. at 69 (W.D. Tex. May 26, 1993)

<sup>73</sup> There were three groundwater conservation districts over the San Antonio segment of the Edwards Aquifer at the time: the Edwards Underground Water District, the Medina County Underground Water Conservation District, and the Uvalde County Underground Water Conservation District.

<sup>74</sup> By February 1993, the legislative session he referred to in the decision was already underway; the Judge gave the Legislature until the end of that session to offer up a plan.

<sup>75</sup> Edwards Aquifer Authority Act, S.B. 1477, 73rd Leg., R.S., ch. 626 Tex. Gen. Laws.

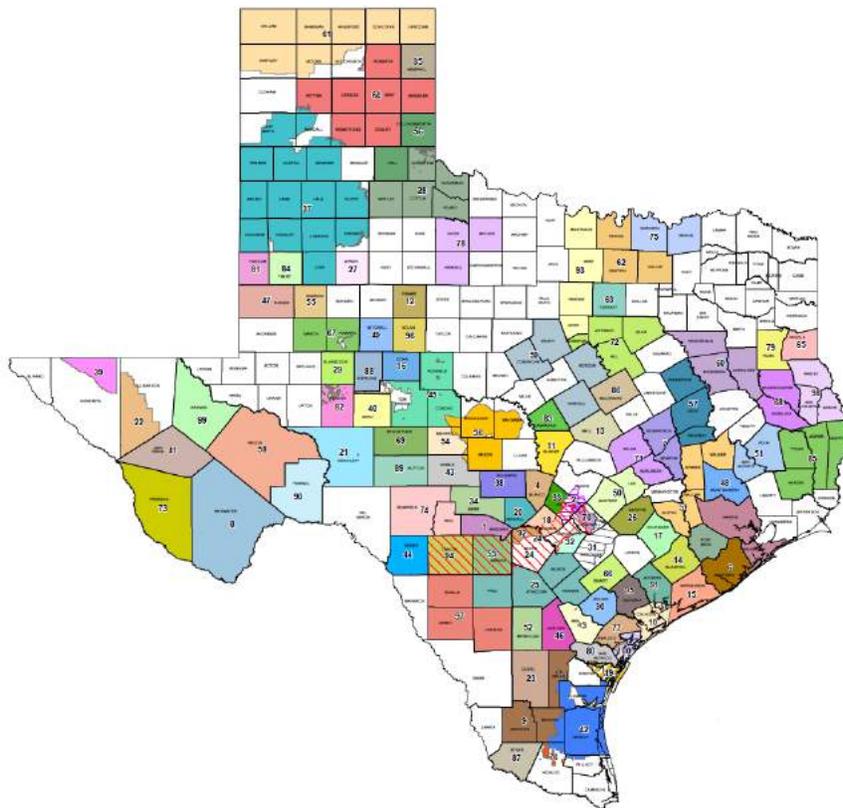
<sup>76</sup> *Barshop v. Medina County Underground Water Conservation Dist.*, 925 S.W.2d 618 (Tex. 1996).

<sup>77</sup> These things come in cycles; the Atlantic Multidecadal Oscillation and the Pacific Decadal Oscillation—long-term trends in sea surface temperatures similar to the shorter El Niño Southern Oscillation, were good for Texas between 1965 and 1995. The drought of 1995 marked a switch to conditions not so good for Texas.

<sup>78</sup> Act 1997, S.B. 1, 75th Leg. R.S., ch. 1010 Tex. Gen. Laws (codified in various part of the Tex. Water Code).

Provision holds that if you want to move surface water from one river basin to another, the water right you want to move becomes the most junior water right in the basin. Surface water in Texas is primarily managed through prior appropriation where your surface water right has a priority date associated with it. During drought, when there's not enough water to go around, the more recent priority dates—the more junior rights—are cut off first to preserve the water for the more senior rights. The Junior Provision created a strong disincentive to move surface water from one basin to another, but legislative leaders needed to include Junior in the bill to get the political support of East Texas.

Groundwater, on the other hand, has no such export restriction (except Edwards Aquifer water under the jurisdiction of the Edwards Aquifer Authority). In fact, groundwater conservation districts are expressly forbidden by state law from preventing export, although they can require permits and export fees (among other things<sup>79</sup>). I attribute the junior provision, the ability to export groundwater, regional water planning, and good ole entrepreneurialism with the explosion in groundwater district creation after the mid-1990s<sup>80</sup>.



**Figure 8:** Location of the 99 groundwater conservation districts and 2 subsidence districts in Texas (as of November 2015). The legend for the map (listing the individual districts) can be accessed at <http://www.twdb.texas.gov/mapping/>

<sup>79</sup> Texas Water Code §36.112.

<sup>80</sup> Groundwater districts can be created in three and a half ways: by petition, by legislative action, by Texas Commission on Environmental Quality action, and by annexation

With no restrictions on exporting, groundwater can be readily moved from one part of the state to another. With the advent of regional water planning, regional water planning groups would be deciding what projects would be included in the plan to meet future water needs, thus creating something of a market. And with a market, groundwater marketers began lining up water to sell to (hopefully) willing buyers, most famously by T. Boone Pickens through Mesa Water. The rallying cry for district creation shifted from “Prevent State Control” to “Prevent [insert perceived villain] from stealing our water!”

Going into the 1997 Legislative session, there were 40 districts in Texas. By 2000 there were 50 districts, and by 2010 there were 97. Today there are 99 districts in addition to the two subsidence districts.

## A Streetcar Named Desired Future Conditions

By 2001, tensions were rising between folks looking for water (cities and marketers) and folks managing water (groundwater conservation districts). There were concerns about “shell districts”—districts in place but doing little to nothing (locals probably formed these districts for the sole purpose of fending off state control and/or exportation)—and districts with no management goals or, if they had goals, having dramatically different goals with a neighboring district over the same aquifer. The legislature responded two-fold: by beefing up requirements for groundwater management plans and by requiring joint planning to define management goals called desired future conditions.

Groundwater management plans are documents required by state law<sup>81</sup> that present to the public the district’s goals and how they are going to achieve those goals. The state, through the Texas Water Development Board, reviews the plans for administrative completeness. The Board doesn’t opine on the philosophy of the content or how a district chooses to manage its water, only that the required elements of the plan are present. The State Auditor’s Office audits several districts each year on actions taken to meet goals (such as measuring water levels or holding public events). If a district doesn’t submit a plan, eventually the Texas Commission on Environmental Quality can enforce against the district up to and including dissolution<sup>82</sup>. Furthermore, if a district’s plan doesn’t strive to meet the desired future condition (to be discussed shortly), the Commission can enforce against the district up to and including dissolution<sup>83</sup>.

In 2001, the Legislature passed Senate Bill 2, another omnibus water bill, which, among other things, moved the designation of groundwater management areas, a tool to facilitate the creation of districts by petition from the original 1949 legislation, from Texas Commission on Environmental Quality to the Texas Water Development Board with instructions for the Board to place all of major and minor aquifers in groundwater management areas<sup>84</sup>. The Board responded by dividing the entire state into 16 groundwater management areas based primarily on the location of major aquifers. The statute at that time called for a sharing of groundwater management plans within existing groundwater management areas; Senate Bill 2 added the option of voluntary joint planning within a groundwater management area.

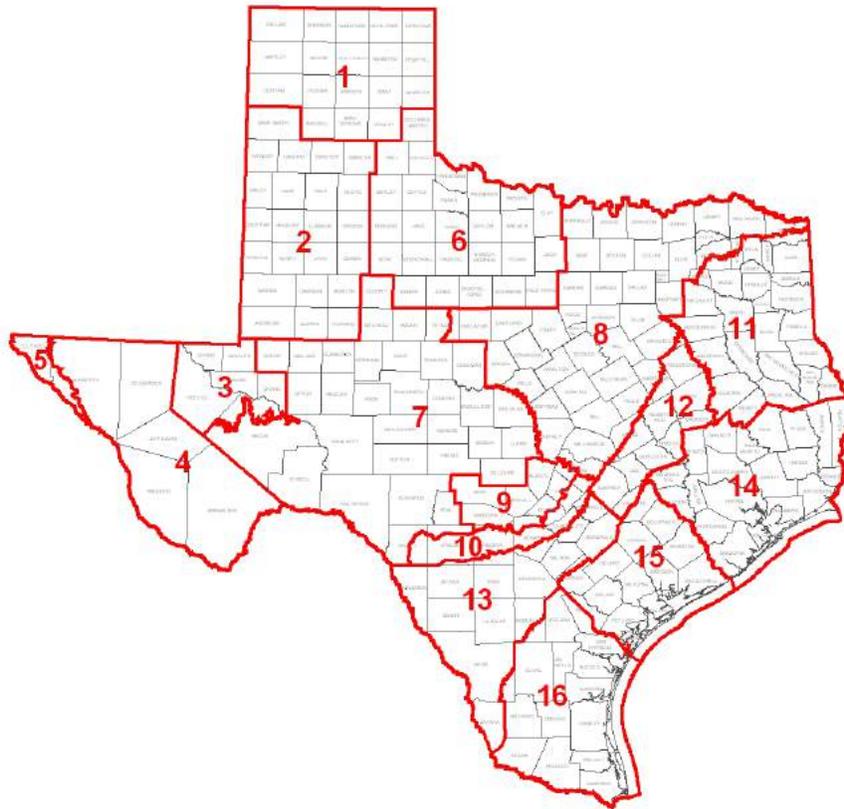
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<sup>81</sup> Texas Water Code, Chapter 36; 31 Texas Administrative Code, Chapter 356.

<sup>82</sup> Tex. Water Code § 36.301.

<sup>83</sup> Tex. Water Code § 36.3011.

<sup>84</sup> Act of 2001, S.B. 2, 77th Leg., R.S., ch. 966 Tex. Gen. Laws.



**Figure 9: Location of the 16 groundwater management areas in Texas.**

A recommendation by the Texas Water Development Board in the 2002 State Water Plan called for requiring groundwater conservation districts “...to include in their groundwater management plans a management goal quantifying the desired future condition of the aquifer.”<sup>85</sup> In 2005, the Legislature picked up that recommendation and passed House Bill 1763<sup>86</sup>. The Bill provided three major changes in groundwater law: (1) it regionalized decisions on groundwater availability, (2) it required regional water planning groups to use groundwater availability numbers developed from the groundwater management area process, and (3) it required a target/cap for groundwater permitting.<sup>87</sup>

Before House Bill 1763, each district decided on its own how much groundwater was available for use. With passage of the bill, districts now had to work together within groundwater management areas to define desired future conditions of their groundwater resources.<sup>88</sup> Statute charges the Texas Water

<sup>85</sup> TWDB (2002 p. 5)

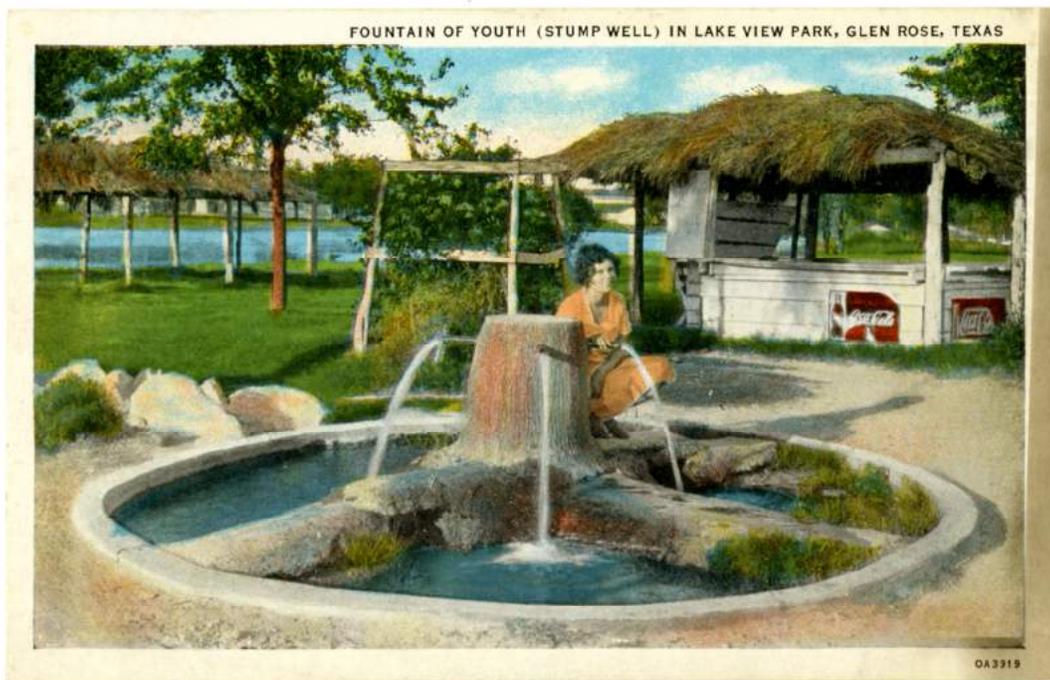
<sup>86</sup> Act of 2005, H.B. 1763, 79th Leg., R.S., ch. 970 Tex. Gen. Laws (codified in various parts of the Tex. Water Code).

<sup>87</sup> Mace and others (2008); much of the subsequent discussion is based on this paper.

<sup>88</sup> There is process through which certain parties can challenge the reasonableness of the desired future condition (Texas Water Code §§36.1083 and 36.10835).

Development Board with using the desired future conditions to estimate the modeled available groundwater<sup>89</sup>, the amount of water that can be pumped to meet the desired future condition.

Before House Bill 1763, regional water planning groups only had to *consider* groundwater availability information that groundwater conservation districts provided in groundwater management plans. Therefore, if a planning group wanted to use a groundwater availability number different from that provided by a groundwater conservation district, they could. In addition, groundwater availability numbers in groundwater management plans needed to “...address water supply needs in a manner that [was] not in conflict with the appropriate approved regional water plan...”<sup>90</sup> In other words, if a planning group had plans for a certain amount of groundwater, the groundwater district had to choose a groundwater availability value that accommodated that plan. With the passage of House Bill 1763, regional water planning groups are now required to use modeled available groundwater for their groundwater availability estimates.<sup>91</sup> Because modeled available groundwater is defined by the desired future conditions, groundwater conservation districts, working collectively within each groundwater management area, determine groundwater availability for the regional water planning process.



**Figure 10: Flowing artesian “stump well” completed in the Trinity Aquifer in Glen Rose, Texas, circa 1910 (postcard from the author’s personal collection).**

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<sup>89</sup> At the time House Bill 1763 passed, this was actually called managed available groundwater and did not include exempt uses of groundwater. The present term, modeled available groundwater, includes all pumping, including that for exempt use.

<sup>90</sup> Texas Water Code §§36.1071(3)–(4) before September 1, 2005.

<sup>91</sup> Texas Water Code §16.053 (e)(3)(A).

Before House Bill 1763, it was arguable whether groundwater conservation districts—outside of the Edwards Aquifer Authority and the subsidence districts—had the ability to place a cap on groundwater production. With the passage of House Bill 1763 (and subsequent statutory tweaks), the statutes now state that “[a] district, 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...” Before the first desired future conditions were established, the majority of districts did not have an overall cap on groundwater production.<sup>92</sup>

House Bill 1763 essentially turned all groundwater conservation districts into little Edwards Aquifer Authorities with a management goal and a volume of pumping to achieve that goal. However, unlike the Authority, the districts, working together, define their own goals.

## A Day of Reckoning

In 1994, Burrell Day and Joel McDaniel bought a farm, 300 acres of which were irrigated with water that sourced from a free-flowing, collapsed artesian well poking into the Edwards Aquifer. The well flowed into a ditch that emptied into a 50-acre lake occasionally fed by an intermittent stream. Most of the water used to irrigate the farm was pumped from the lake.

With the creation of the Edwards Aquifer Authority, Day and McDaniel, like everyone else in the Authority’s jurisdiction, needed to apply for a permit before December 30, 1996, to continue to use groundwater from the aquifer. Applicants had to show that Edwards groundwater had been beneficially used sometime between June 1, 1972, and May 31, 1993. In response, Day and McDaniel applied for 700 acre-feet per year: the two acre-feet per irrigated acre allowed by statute for their 300 irrigated acres and an extra 100 acre-feet for the recreational use of their 50-acre lake. The request for recreational water was a stretch—the Authority was unlikely to approve it. The general manager of the Authority responded in December 1997 that their preliminary analysis of Day and McDaniel’s permit application appeared to support a permit of 600 acre-feet per year based on irrigated acreage.

Day and McDaniel, wanting to replace the collapsed well (which, somewhat ironically, would presumably result in a more efficient use of water), applied for a replacement permit. In December 1999, the Authority granted approval to change the point of withdrawal to a different well, but noted that Authority had not yet granted Day and McDaniel their permit; therefore, their water was not yet guaranteed. Convinced that they would get a production permit, Day and McDaniel drilled a replacement well at a cost of \$95,000.

Once the Authority returned to process the production permit, Day and McDaniel still desired the full 700 acre-feet per year they initially requested. This prompted a site visit from the Authority to inspect the property for evidence supporting the additional 100 acre-feet over and above the 600 acre-feet the Authority was already willing to grant. The site inspectors noted that the original well discharged into a ditch that then entered a small lake on a natural drainage. This was fatally important. In Texas, once water enters a state stream course, that water becomes state water, subject to state permitting unless the water entering the state stream course has a bed and banks transport permit. Because Day and McDaniel did not have a bed and banks permit, they lost ownership of the groundwater once it entered the small lake. All

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<sup>92</sup> However, many districts have correlative pumping limits such as a certain amount of pumping per acre of land.

the Authority could legally see was groundwater flowing uncontrollably from a well into a state stream course, an action that is not a beneficial use. As a result, the general manager of the Authority denied the 700-acre feet permit request in total. Day and McDaniel got nothing.

The Authority allowed applicants to appeal the general manager's decisions to an administrative law judge who then made a recommendation to the Authority's board for a final administrative decision, so Day and McDaniel did just that. Testimony revealed, among other things, that 7 acres were irrigated straight from the well with the balance irrigated from the lake. In 2003, the administrative law judge recommended that the Authority give Day and McDaniel a permit for 14-acre feet. The Authority's board agreed.

In 2004, Day & McDaniel appealed the Authority's decision to district court alleging that the Authority had taken their property<sup>93</sup>. In 2006, the district court ruled mostly for the Authority. Day and McDaniel appealed, and, in 2008, the appeals court ruled mostly for Day and McDaniel<sup>94</sup>. The Authority appealed that decision which resulted in a Texas Supreme Court decision in 2012 that mostly favored Day and McDaniel<sup>95</sup>.

The justices ruled that the Authority had accurately implemented their statute and, in the case of groundwater becoming surface water, had accurately interpreted the law as it relates to when groundwater becomes state property. However, the court, for the first time, said that groundwater was private property and, furthermore, groundwater was subject to takings. The court also took a deeper look at the fundamentals of how groundwater regulation may or may not impinge on property rights.

Many have disparaged the court's decision while others have celebrated it. What's impressive to me, as a non-attorney, is how expertly the court juggled legal precedents, statute, and the question at hand into a cogent decision. Some key points, in my humble hydrogeologic opinion, from the ruling<sup>96</sup>:

- "...we held long ago that oil and gas are held in place, and we find no reason to treat groundwater differently."
- "...a landowner is the absolute owner of groundwater flowing at the surface from its well, even if the water originated beneath the land of another."
- "...landowners do have a constitutionally compensable interest in groundwater..."
- "...the rule of capture determines title to [natural] gas that drains from property owned by one person onto property owned by another. It says nothing about the ownership of gas that has remained in place. The same is true of groundwater."
- "In many areas of the state, and certainly in the Edwards Aquifer, demand exceeds supply. Regulation is essential to its conservation and use."

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<sup>93</sup> *Day v. Edwards Aquifer Auth.*, No. Civ.A.SA-03-Cao429FB, (W.D. Tex. 2004) (not reported, Westlaw cite at 2004 WL 1118721).

<sup>94</sup> *Edwards Aquifer Auth. v. Day*, 274 S.W.3d 742 (Tex. App.-San Antonio 2008).

<sup>95</sup> *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814 (Tex. 2012).

<sup>96</sup> My attorney friends tell me that this is *dicta*—stuff the court says that is authoritative but not binding. I share it because it does offer insight into what the court was thinking (and subsequent lawsuits and arguments will tend to quote this stuff).

- “Groundwater regulation must take into account not only historical usage but future needs, including the relative importance of various uses, as well as concerns unrelated to use, such as environmental impacts and subsidence.”
- “As with oil and gas, one purpose of groundwater regulation is to afford each owner of water in a common, subsurface reservoir a fair share.”
- “The Authority argues that basing permits on historical use is sound policy because it recognizes the investment landowners have made in developing groundwater resources....[t]he Authority's policy argument is flawed.”
- “To forfeit a landowner's right to groundwater for non-use would encourage waste.”

Some have argued that the Court’s decision means that the Rule of Capture rules once more (in other words, any regulation that restricts use is subject to takings lawsuits). Others argue that groundwater needs to be regulated through correlative rights. Yet others argue that oil and gas law should be used as the regulatory framework for groundwater here on out. What’s clear to me (and many others) is that there isn’t yet a bright line between what groundwater management actions constitute a taking and what doesn’t, and that future lawsuits will sharpen that line with time. However, it does seem clear that permitting based solely on historic use could be problematic, especially if the permitting scheme denies landowners access to groundwater beneath their property.<sup>97</sup>



**Figure 11: Things can get crazy at the Crazy Well in Mineral Wells, Texas, completed in the brackish formations of the Pennsylvanian, circa 1910 (postcard from the author’s personal collection).**

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<sup>97</sup> Some attorney friends I spoke to, with a probable bias towards the Authority, believe that the statute of limitations and other things will prevent future takings cases in the Edwards from folks who have the aquifer beneath them but have not yet tried to access it. After reading the dicta, I’m not so sure about that (and I’m sure I could find an attorney that agrees with me).

The Texas Supreme Court remanded the takings claim back down to the district court for the calculation of the takings claims in accord with the Court's decision. Shortly after the Texas Supreme Court decision, 18 years after they filed for their permit, the Authority settled with Day and McDaniel for an undisclosed amount.

## Bragg'ing Rights

Glenn and JoLynn Bragg own two pecan orchards near Hondo and D'Hanis, about 30 miles west of San Antonio and above the Edwards Aquifer. In 1980, the Braggs drilled an Edwards well to irrigate the Home Place Orchard near Hondo. The D'Hanis Orchard, for a time, relied on a shallower well not in the Edwards and on a neighbor's property. In 1995, the Braggs received a permit from the Medina County Groundwater Conservation District and drilled an Edwards well for the D'Hanis orchard. Although the Edwards Aquifer Authority existed at that time, it was in a legal limbo (see earlier section title *A River Runs Through It*); therefore, the Medina district, according to the court, was "...the only regulatory authority in existence at the time."<sup>98</sup>

In 1996, the Braggs applied for permits from the Edwards Aquifer Authority, requesting nearly twice their allowable historic use (two acre-feet per acre was allowed) for the Home Place Orchard (to account for the growing need for water for their trees) and a similar amount for the D'Hanis Orchard. Although this case is similar to *Day and McDaniel*, there are a couple key differences (by my non-legal eyes): (1) the Braggs were asking for a permit outside of the historic use requirements of the Authority's enabling legislation and (2) they were asking for more water per acre than the Authority's enabling legislation allowed. In 2004, the Edwards Aquifer Authority granted a reduced permit for D'Hanis Orchard (tied to actual historic use) and denied a permit for the Home Place Orchard (the Authority's enabling legislation did not allow the Authority to consider groundwater use after June 1, 1993).

In 2006, the Braggs sued the Authority for a takings and violation of their civil rights. After the federal court dismissed the civil rights claims and remanded the takings claim the state's district court, the district court ruled that the Authority's actions constituted a takings, awarding \$134,918.40 in compensation for the permit denial for the D'Hanis Orchard and \$597,575.00 in compensation for the permit reduction for the Home Place Orchard.

Both the Authority and the Braggs appealed (the Authority challenged the takings claim, argued that the liable party should be the state and that the statute of limitations had expired, among other items; the Braggs challenged the compensation calculation, among other items). In August 2013, the appeals court agreed with the district court on issues concerning takings, liability, and the statute of limitations but remanded the case back down to the trial court to reassess compensation<sup>99</sup>. The Authority appealed this decision to the Texas Supreme Court. In 2015, the Supreme Court denied review of the case and remanded it back to the trial court to reconsider compensation for the takings. On February 23, 2016, the trial court awarded the Braggs compensation of \$1.37 million for the Home Place Orchard and \$1.18

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<sup>98</sup> 421 S.W.3d 118 (Tex. App.—San Antonio 2013, pet. filed).

<sup>99</sup> 421 S.W.3d 118 (Tex. App.—San Antonio 2013, pet. filed).

million for the D’Hanis Orchard for a total of \$2.55 million (which may ultimately be more than \$4 million with pre-judgment interest).<sup>100</sup>

Takings cases are complicated fact-based legal assessments, so I’m not about to undertake a detailed analysis of the case. However, a couple reasons this case is important is that (1) these are the first court-determined damages assigned since the Day case and (2) the court awarded compensation for a well drilled outside of the historic use period. The Appeals Court decision is worth a read if only to gain an appreciation for the complexity involved in a groundwater takings case.<sup>101</sup>



**Figure 12: My kittycat “Spring”. She knows how to scratch.**

## The End?

So as you can see: “It’s complicated” (and Spring is now hiding under the couch). The foundation of Texas groundwater law and management remains the Rule of Capture; however, the Rule can be substantially modified by locally controlled groundwater conservation districts. What’s uncertain at this point is the bright line between effective groundwater management and regulatory takings (that is, when effective management may require compensation, something most districts will want to avoid). Clarity will hopefully come with additional litigation or, perhaps, with Legislative action. Additional questions

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<sup>100</sup> Case number 06-11-18170-CV in the District Court of Medina County, Texas.

<sup>101</sup> The case can be accessed here: <http://www.texastribune.org/2013/09/26/water-lawyers-and-experts-weigh-groundwater-case/>

are out there: Should brackish groundwater be managed the same as fresh? How deep do water rights extend? Should landowners be compensated for storing fluids beneath their property such as with aquifer storage and recovery or with waste disposal?

Perhaps at some point, groundwater and I will progress to a more stable “In a relationship” or even “Married” status where private property rights and management work together to achieve desired future conditions. I’ll be sure to invite you to the wedding.

## Thank You

I’ve wanted to write this paper for quite a while, but I have to thank Karen Huber at the LBJ School for finally shaking me out of my procrastinating ways when she hinted last year that “someone” needed to write a groundwater management overview since one was lacking. I also wish to thank my friend Joe Reynolds who quickly read and provided comment on the paper; however, all errors, omissions, and misinterpretations of judgments are mine. I’m also grateful to Todd Chenoweth and Kendal Payne for quick reviews and comments. I hope to republish this paper, further modified for clarity and accuracy, in the Texas Water Journal.

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