

# Managing the Aquifer Systems Single County District

## GCD Case Study

*CO-EVOLUTION OF SCIENCE AND POLICY*

Leland Gersbach, Board President, CUWCD

Dirk Aaron, General Manager, CUWCD

November 17, 2021

# State of Groundwater In Bell County

1. Who is Clearwater UWCD?
2. Who over sees the District?
3. Is Clearwater UWCD Evolving?
4. What are the current trends in groundwater use?
5. What is Best Available Science?
4. What is the reality of the Aquifer Systems?

---

# Management of Groundwater?

---

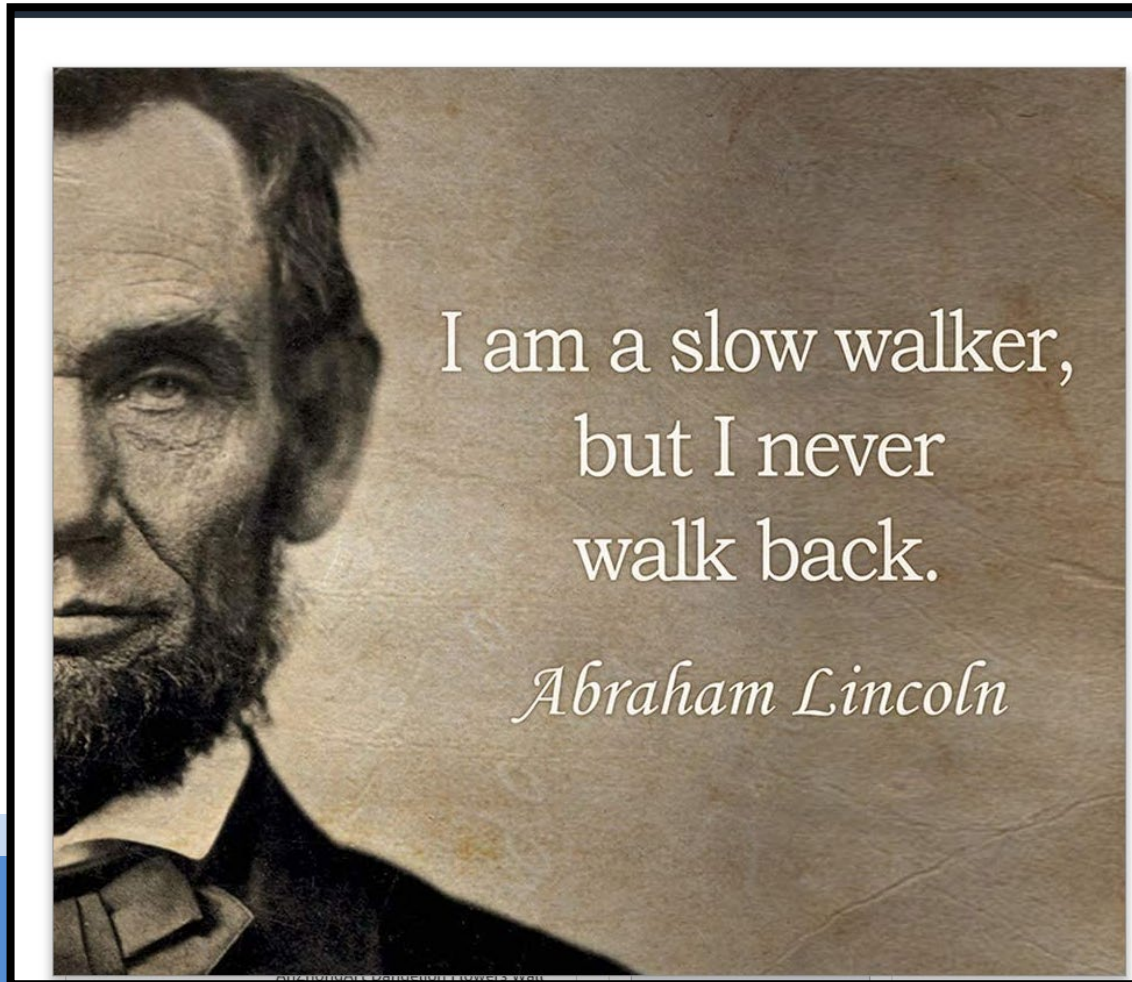
Good Policy established by Who?

Best Available Science is established How?

Case Study in Clearwater UWCD

# Evolving

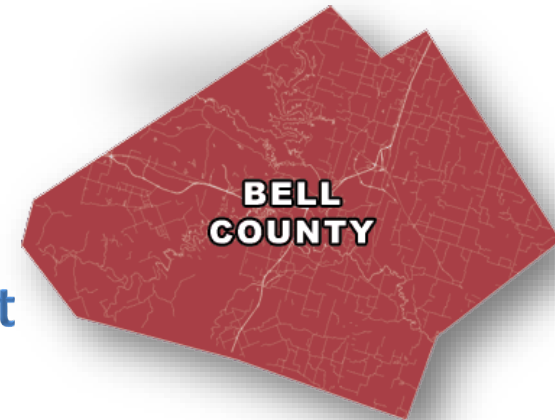
## Changing, Growing, Maturing?





# Who is Clearwater UWCD?

- ❖ Created by 71<sup>st</sup> Legislature in 1989 (HB 3172)
- ❖ Confirmed by Bell County voters in 1999
- ❖ Doors opened for business in 2002
- ❖ District's jurisdiction includes all of Bell County—approximately 1,055 square miles
- ❖ Authority to levy ad valorem tax at rate not to exceed \$0.05/\$100 assessed value



FY22 tax rate  $\$0.003100/\$100 = \$777,106$

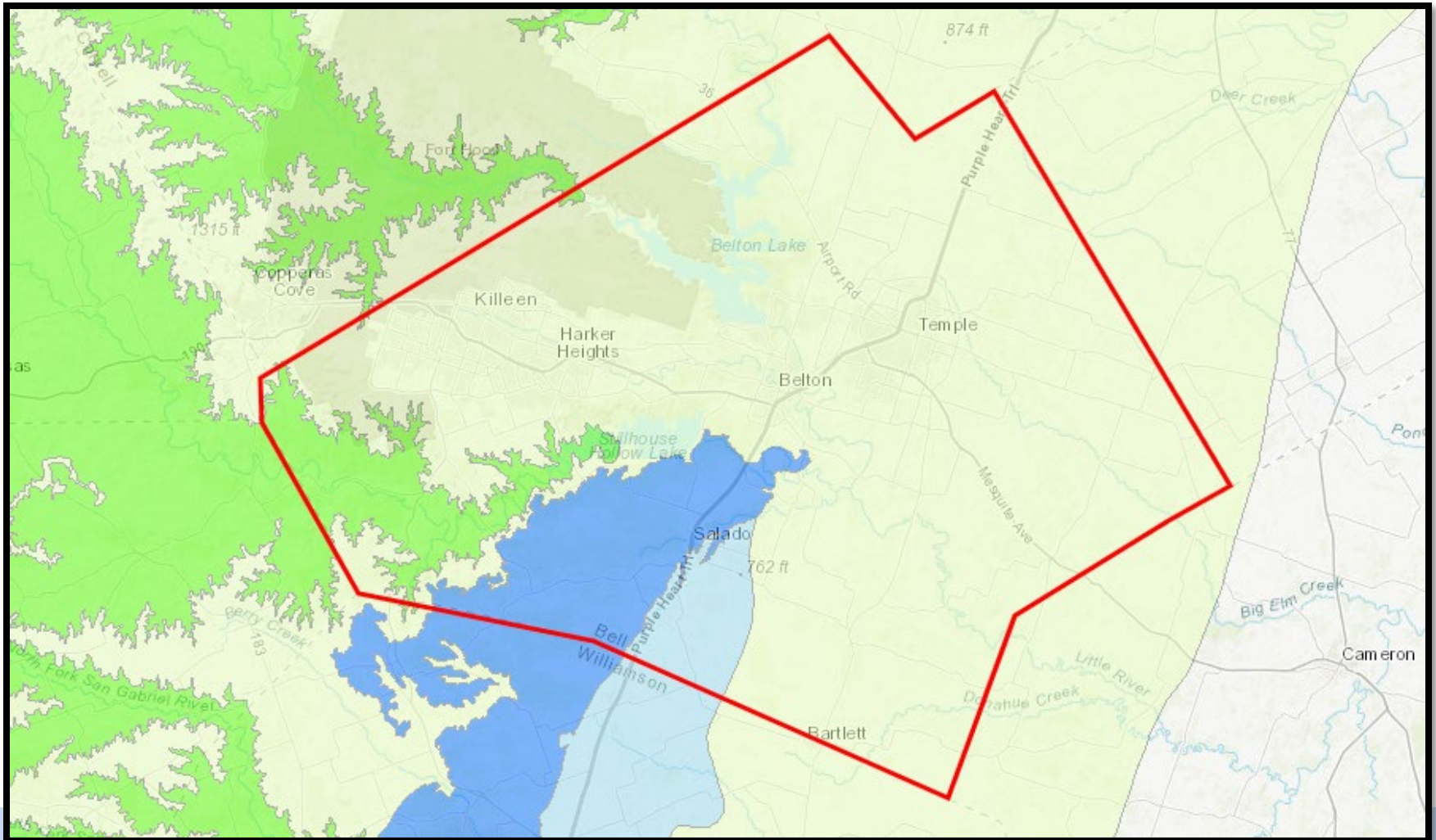
FY21 tax rate  $\$0.003272/\$100 = \$736,203$

FY20 tax rate  $\$0.003570/\$100 = \$734,449$



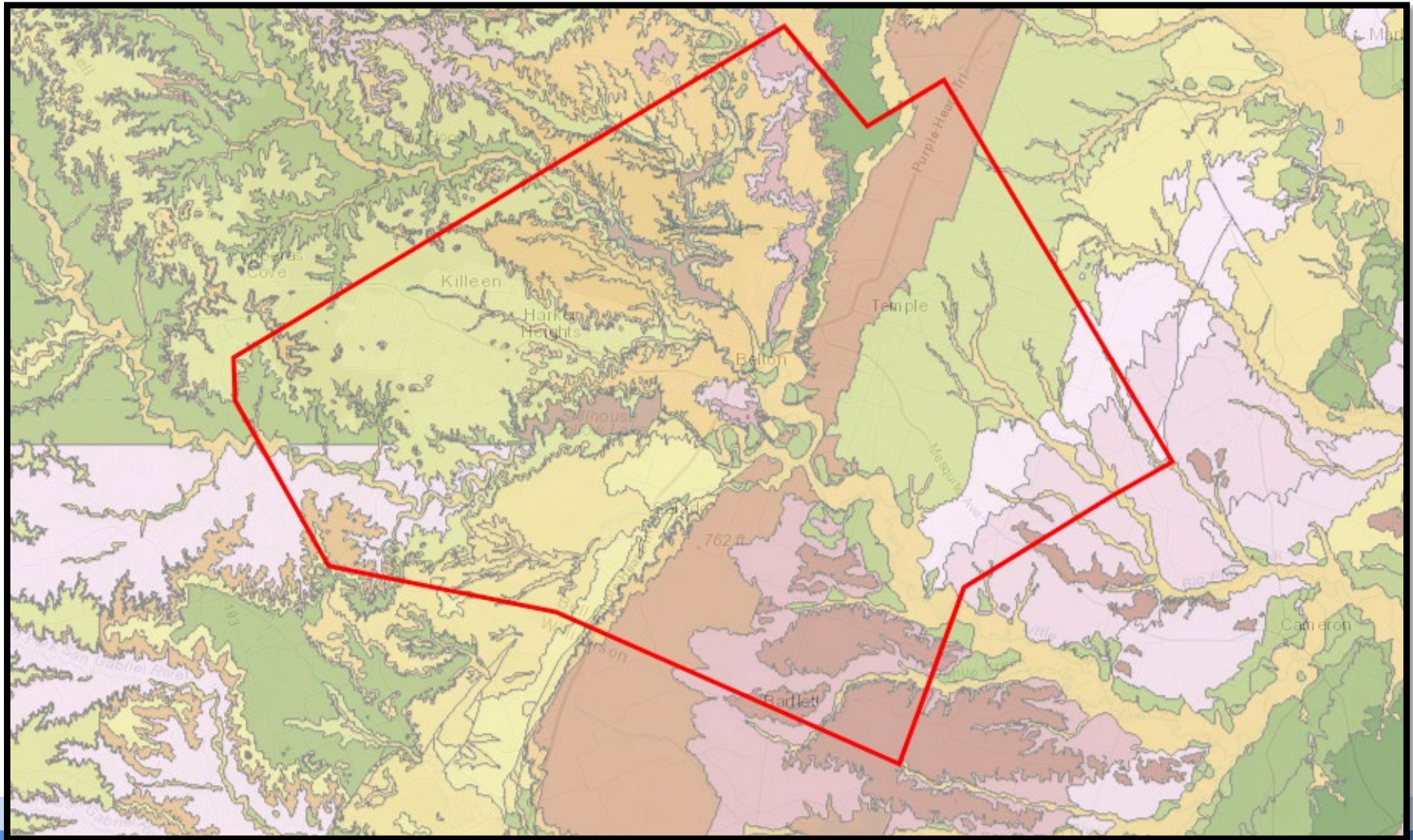
*Every drop counts!*

# Major Aquifers Managed



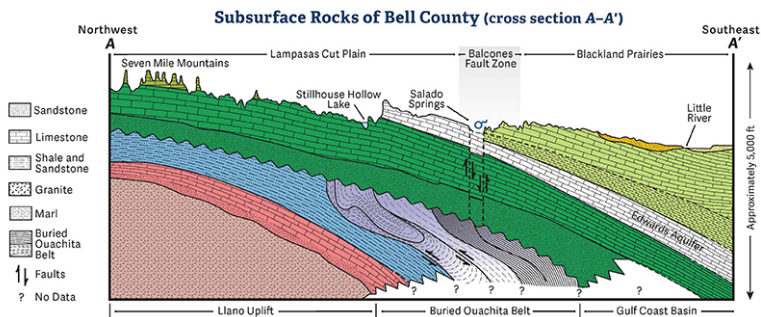
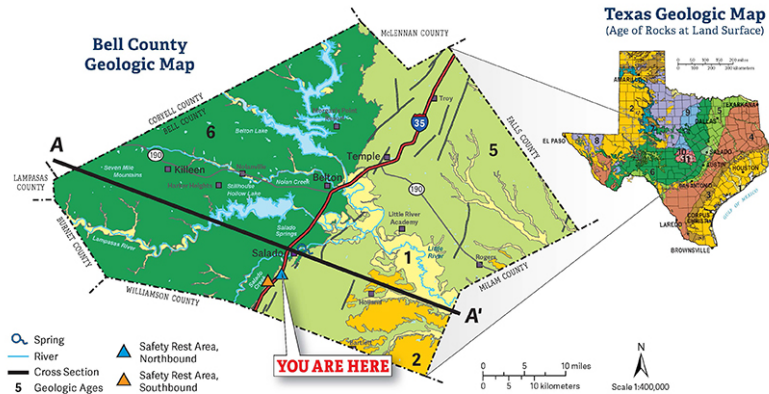


# Geologic Atlas of TX

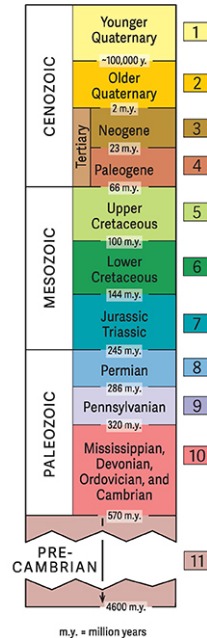




# Geology of Bell County

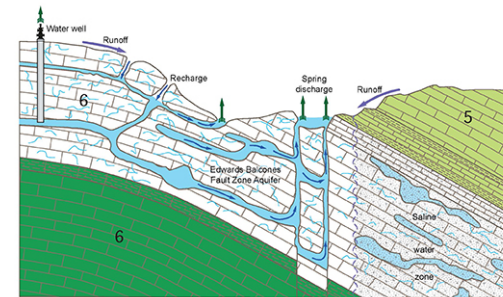


## Geologic Ages



## The Creation of Salado Springs

The water in Salado Springs comes from the **Edwards Aquifer**. These rocks have been broken by faults and locally dissolved by water to form a landscape that includes sinkholes, caves, and springs. Interconnected pathways allow rapid movement of water into the aquifer (**recharge**) and out of the aquifer (**discharge**).



Salado Springs is a complex of several springs, including Robertson Spring, Big Boiling Spring, Little Bubbly Spring, Critchfield Spring, Doc Benedict Spring, and Anderson Spring.



In the late 1800's, hydro power from Salado Creek fueled economic development in the area by powering several gristmills that are featured in the architecture and displays at the Bell County Safety Rest Area.

## Recharge

**Recharge** to the aquifer occurs when it rains and surface water runoff enters the aquifer through fractures, sinkholes, caves, and other pathways. Because surface-water runoff carrying pollutants can rapidly mix with groundwater with little filtration, the aquifer and springs are environmentally sensitive.

## Discharge

Most of the **discharge** from the aquifer is from **spring flow** into the creeks. Even during extended droughts, discharge from Salado Springs has kept Salado Creek flowing. Pumping from **water wells** is another source of discharge from the aquifer. As populations in the area grow, increased pumping could decrease water in the aquifer and result in reduced spring flow.

**TEXAS**  
THROUGH TIME

Visit **Texas Through Time Great Place #2** - Pool at Barton Springs in Austin—to learn more about Edwards Balcones Fault Zone Aquifer springs. This publication can be found at <http://begstore.beg.utexas.edu/store/>



The Bureau of Economic Geology, established in 1899, is the oldest research unit at The University of Texas at Austin. The Bureau functions as the state geological survey of Texas, and the Director is the State Geologist. The Bureau conducts basic and applied research programs in energy resources and economics, coastal and environmental studies, land resources and use, geologic and mineral mapping, hydrogeology, geochemistry, and subsurface nanotechnology.

---

# Groundwater in Bell County?

---

## Good Policy established by Who?

---

### Best Available Science?

### Case Study of Clearwater UWCD

# Elected Directors



**DIRECTOR AT-LARGE**

David Cole



**DIRECTOR**

Scott A. Brooks



**DIRECTOR**

Gary Young



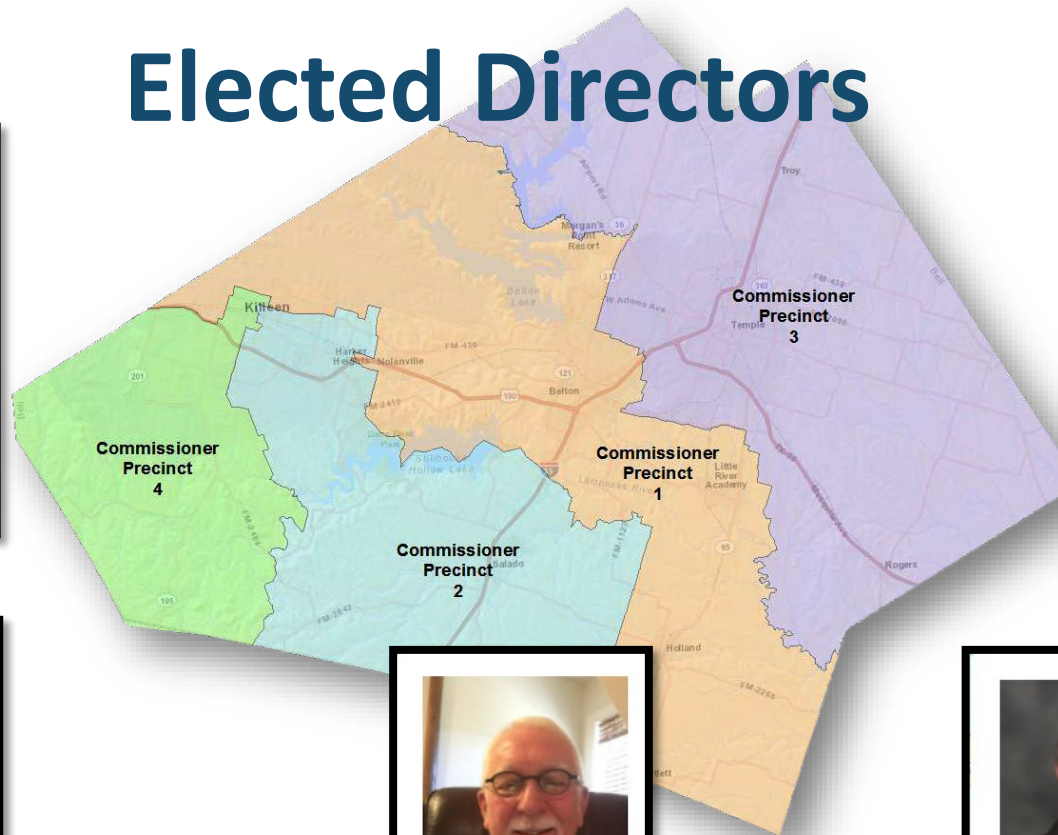
**DIRECTOR**

Jody Williams



**BOARD PRESIDENT**

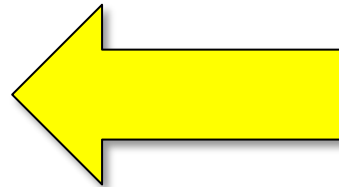
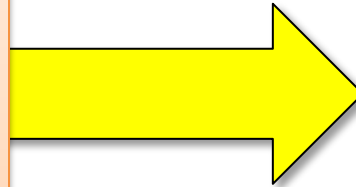
Leland Gersbach



# Management / Legal Authority

## Guiding Principles

- ❖ Protect
- ❖ Preserve
- ❖ Educate
- ❖ Regulate
- ❖ Studies
- ❖ Facilitate
- ❖ Interpret
- ❖ Administer
- ❖ Transparent



- ❖ Texas Constitution (1917)
  - ❖ *Conservation Amendment*
- ❖ Chapter 36- State Water Code
- ❖ Texas Supreme Court Affirmation
- ❖ District Management Plan
- ❖ District Rules
- ❖ District Policy and Procedures
- ❖ District Annual Report

*1. Made the Development, Management, and Conservation of our natural resources (including water) a constitutional right of each and every Texan*



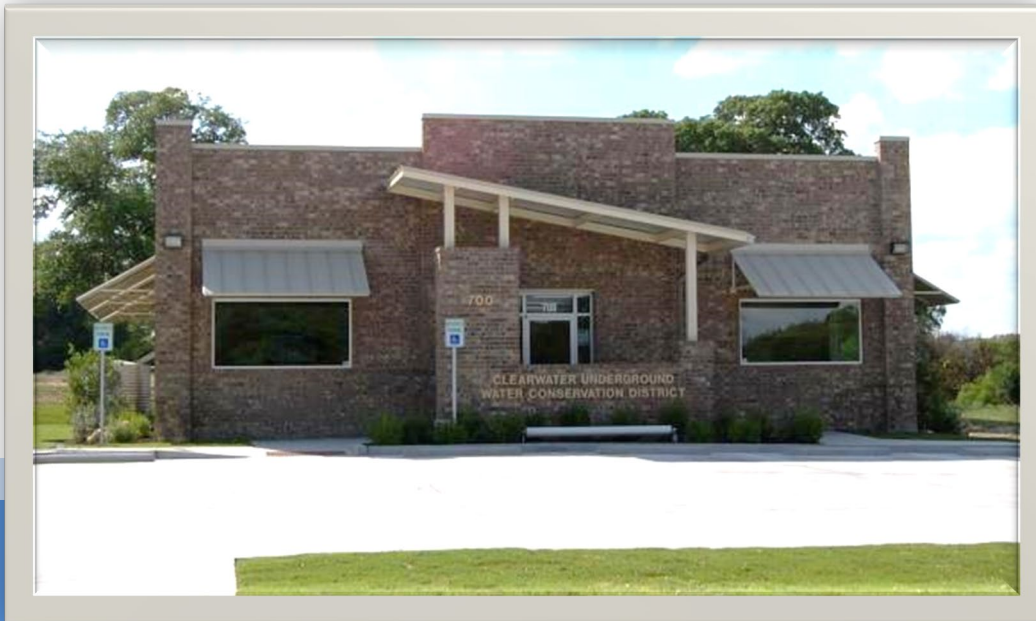
# Clearwater UWCD Staff & Office

Dirk Aaron – General Manager

Shelly Chapman – Administrative Manager

Tristin Smith– Education/Compliance Coordinator

Corey Dawson – Field Operations





# *Groundwater Resource Management*

All wells in Bell County are required to be registered.

Wells exempt from permitting include:

- ❖ Wells used for domestic purposes or for watering livestock or poultry
- ❖ Wells must be incapable of producing more than **17 gpm.**  
(**25,000 gallons per day**)
- ❖ Wells must be located on a tract of land consisting of at least ten acres; smaller tracts are acceptable if they were lawfully configured prior to **March 1, 2004** as a tract less than **10 acres** in size.

Wells not deemed exempt must obtain a permit and report monthly production.

# Groundwater Resource Management

All wells in Bell County are required to be registered.

5124 well pts in the data base

Wells exempt from permitting include: 3,547 active exempt wells

- ❖ Wells used for domestic purposes or for watering livestock or poultry
- ❖ Wells must be incapable of producing more than 17 gpm. (25,000 gallons per day)
- ❖ Wells must be located on a tract of land consisting of at least ten acres; smaller tracts are acceptable if they were lawfully configured prior to March 1, 2004 as a tract less than 10 acres in size.

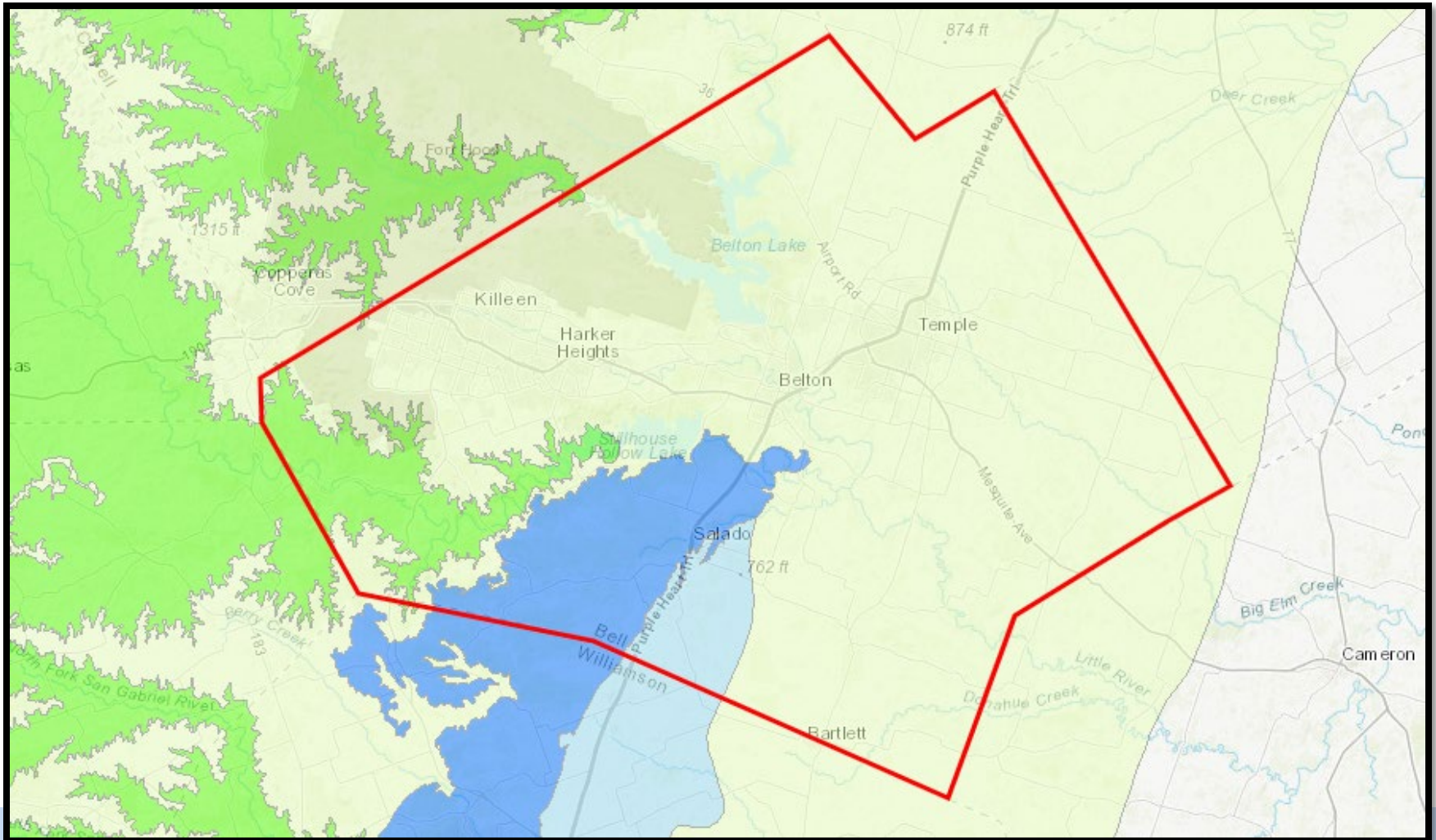
Wells not deemed exempt must obtain a permit and report monthly production.

124 active permitted wells  
52 in the Edwards BFZ  
53 in the Trinity Aquifer  
19 in the Other formations



Every drop counts!

# Major Aquifers Managed



# Edwards BFZ Aquifer Status Report

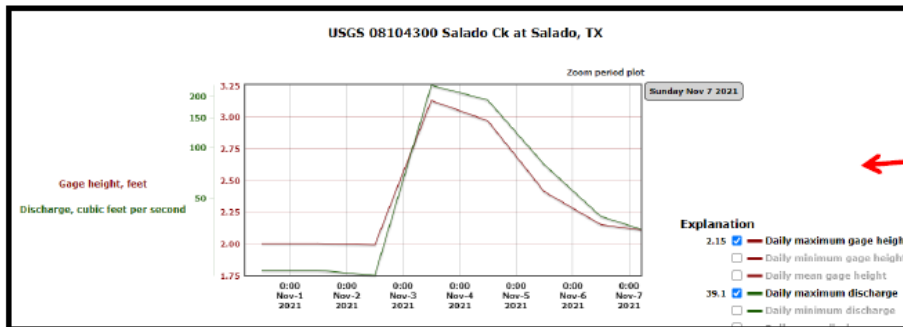
<u>DFC Analysis Over Time</u> (2000-Present) Modeled Available Groundwater				<u>HEUP and OP Permit Analysis</u> Relative to the Modeled Available Groundwater			2021 YTD Prod. Jan - Oct 1497.73 Ac-ft 59.51%	<u>Pending Applications</u>		<u>Exempt Well Reservations</u>		
	DFC Adopted * Minimum Spring Flow	Status of DFC ** Current / Low	MAG *** Ac-ft	HEUP Ac-ft	OP Ac-ft	Total Permitted Ac-ft	2020 Actual Production	Available for Permitting Ac-ft	Pending Applications Ac-ft	Exempt Well Reservation Ac-ft	Exempt Well Use Estimation Ac-ft	Available Exempt Use Ac-ft
Edwards (BFZ) Aquifer	100 Ac-ft per month or 1.68 cfs	6789.43 Ac-ft 11/7/2021 vs 220 Ac-ft 08/20/2014	6469	2209.7	307.25	2516.95	2,189.47 Ac-ft 87.13%	3127.05	500.00	825	357	468

\*Desired Future Conditions (DFC) established by Clearwater UWCD and approved by GMA8 and TWBD, is the description of how the aquifer should look in the future (50 years based on maintaining the Salado Spring Complex discharge during a repeat of drought conditions similar to the drought of record in the 1950's, under drought of record, a five-day average of discharge amounting to 200 ac-ft/month is preferred and 100 ac-ft/month is the minimum acceptable spring flow. Spring flow is measured and estimated by the USGS Gage in Salado Creek located below the Salado Creek Spring Complex.

\*\*Status of the DFC is the estimated spring flow over a five-day average from the springs releasing artesian pressure from the Edwards BFZ Aquifer expressed as acre feet per month of spring flow into Salado Creek.

\*\*\*The Modeled Available Groundwater (MAG) is the estimated amount of water available for permitting assigned to Clearwater UWCD by the Executive Administrator of TWDB, based on the desired future conditions.

7KX Investments N2-19-005P (500 ac-ft/vr)



CFS is measured continuously at the downstream gage with USGS developing the rating curve according to industry standards and maintaining the information for public access on the USGS website.

5 - day average for November 2<sup>nd</sup> – November 6<sup>th</sup> was 114.1 CFS = 6789.43 ac-ft/month

5 - day average for September 29<sup>th</sup> – October 3<sup>rd</sup> was 38.98 CFS = 2319.47 ac-ft/month

Clearwater UWCD Status Report – November 10, 2021



# Trinity Aquifer Status Report

<u>DFC Analysis Over Time</u> (2000-Present) Modeled Available Groundwater			<u>HEUP and OP Permit Analysis</u> Relative to the Modeled Available Groundwater			<u>2021 YTD</u> <u>Total Prod.</u> Jan - Oct 1500.62 Ac-ft 31.56%		<u>Pending Applications</u>		<u>Exempt Well Reservations</u>		
Trinity Aquifer (by layer)	DFC Adopted * Average Drawdown (by layer)	MAG ** Ac-ft	HEUP Ac-ft (by layer)	OP Ac-ft (by layer)	Total Permitted Ac-ft (by layer)	2020 YTD Prod. (by layer)	2021 YTD Prod. (by layer)	Available for Permitting Ac-ft (by layer)	Pending Applications Ac-ft (by layer)	Exempt Well Reserve Ac-ft (by layer)	2020 Exempt Well Use Estimate Ac-ft (by layer)	Available Exempt Use Ac-ft (by layer)
		Current										
Pawluxy	NA	0	0	0	0	0	0	0	0			0
Glen Rose (upper)	-1.38 ft/yr -83 ft/60 yrs	974	61.9	71.28	133.18	25.85	17.20	147.82	0	693	194	499
Hensell (middle)	-2.28 ft/yr -137 ft/60 yrs	1099	259.3	211.25	470.55	93.69	57.46	80.45	0	548	524	24
Hosston (lower)	-5.50 ft/yr -330 ft/60 yrs	7193	1181.4	2969.38	4150.78	1119.97	1425.98	2864.22	0	178	53	125
Total		9266	1502.6	3251.91	4754.51	1239.50 (27.45%)	1500.62 (31.56%)	3092.49	0	1419	771	648

\*Desired Future Conditions (DFC) is the description of how the aquifer should look in the future (60 years).

\*\*The Modeled Available Groundwater (MAG) is the estimated amount of water available for permitting assigned to Clearwater UWCD by the Executive Administrator of TWDB.

\*\*\*Pending applications

# Activities / Mission



# Activities / Mission of a GCD?

## *Services Added by ILAs and Stakeholders*



---

Groundwater in Bell County?

---

Good Policy established by Who?

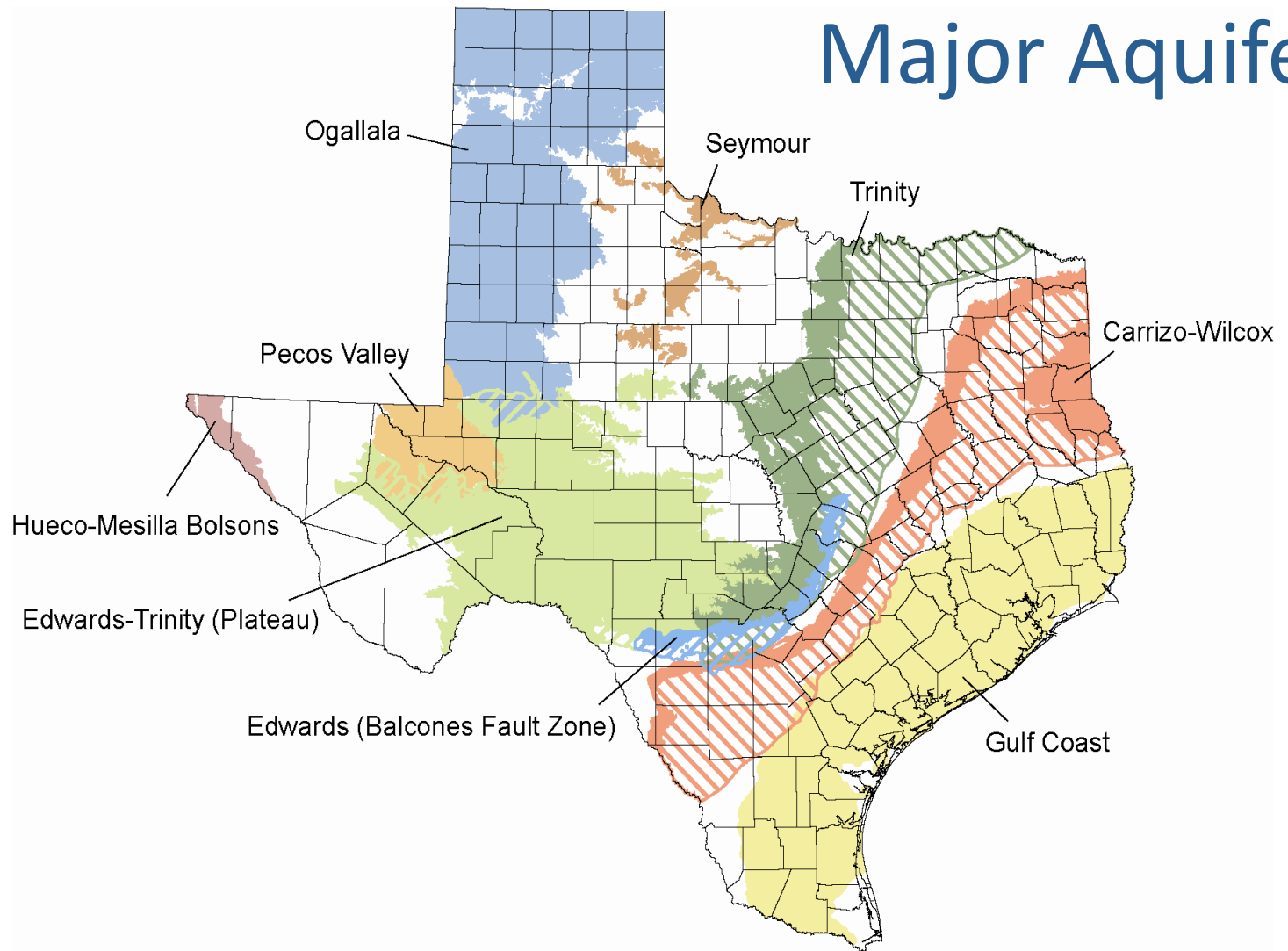
---

Best Available Science?

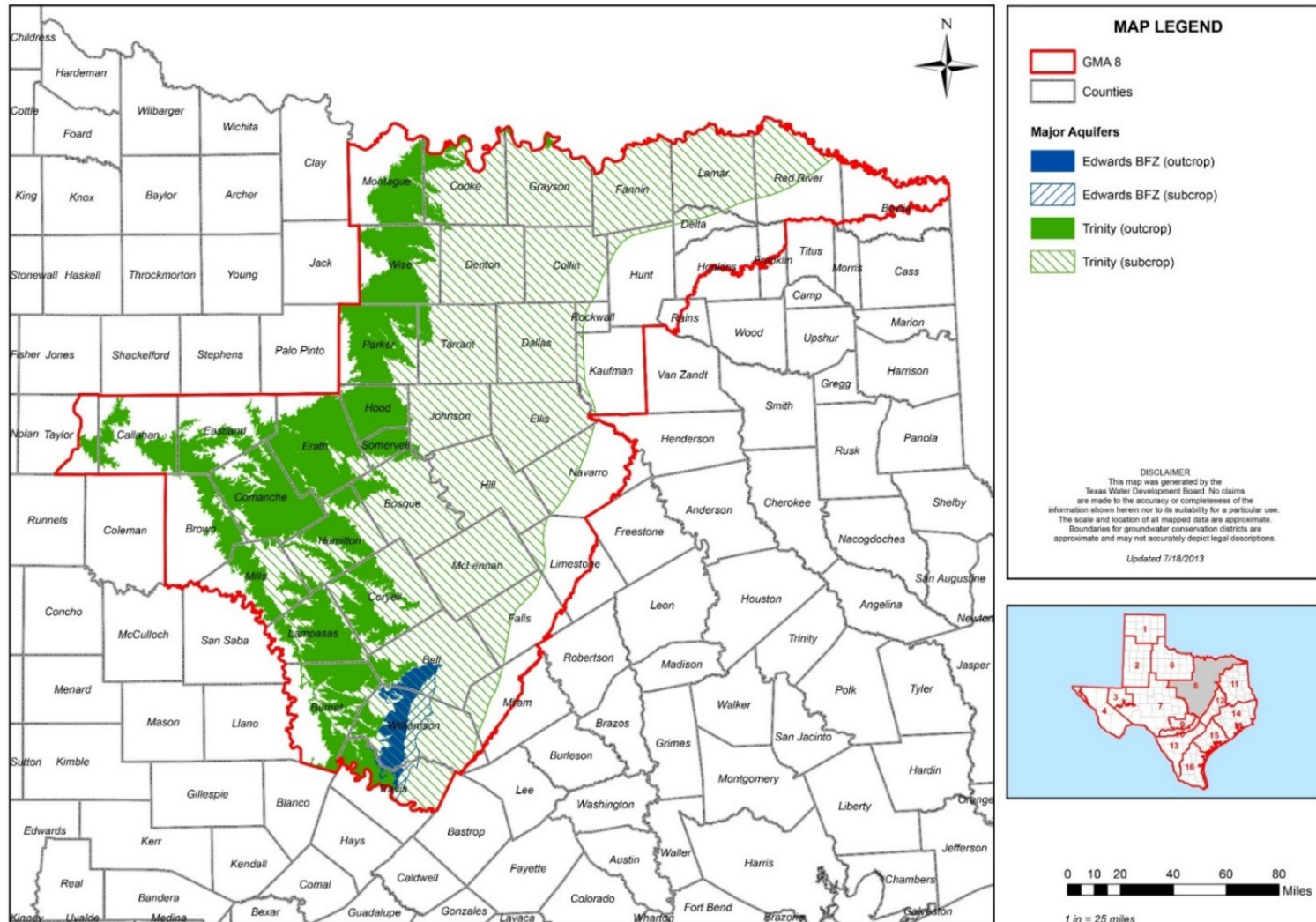
Case Study of Clearwater UWCD



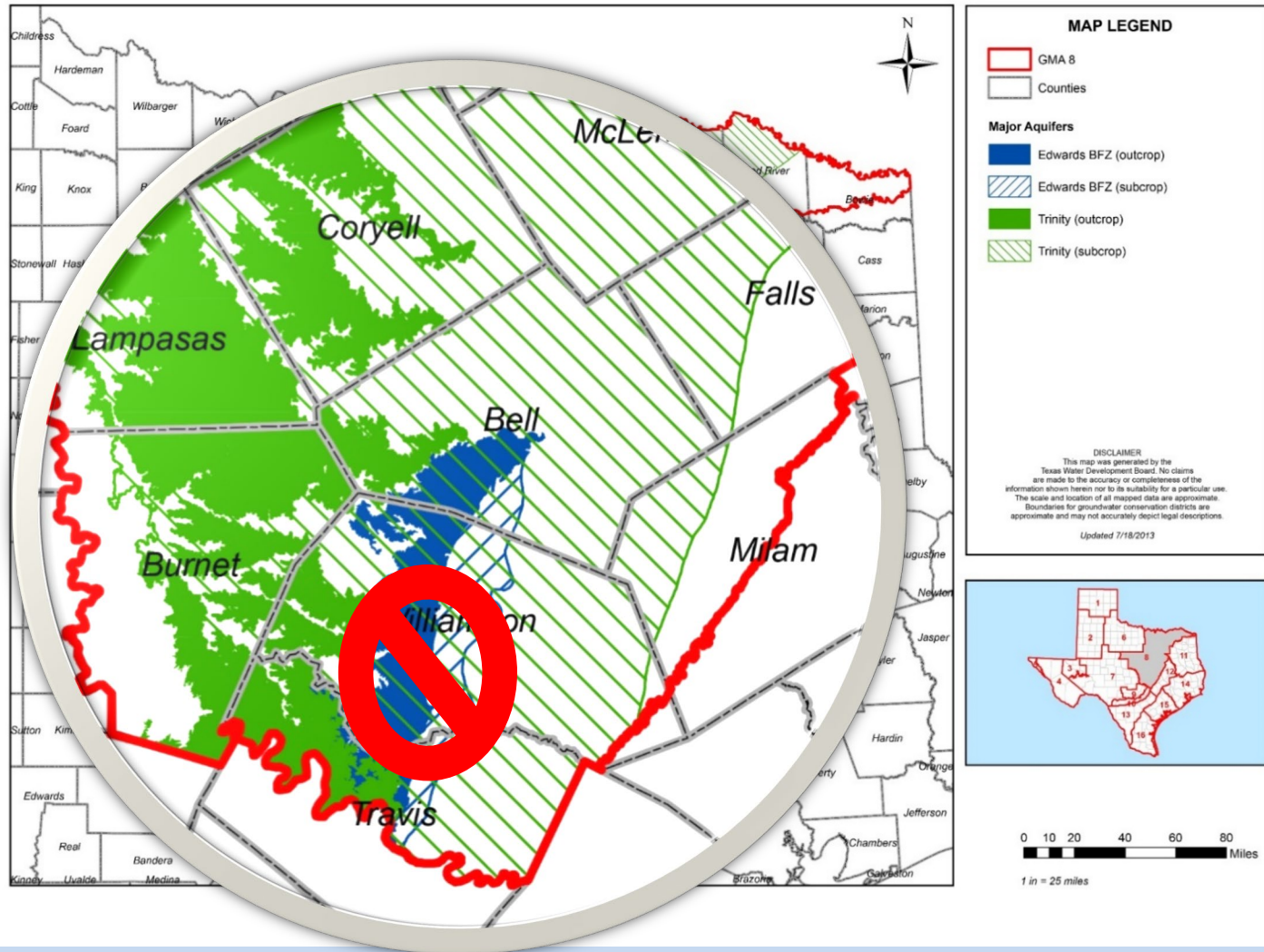
# Major Aquifers



# Groundwater Management Area 8



# Groundwater Management Area 8

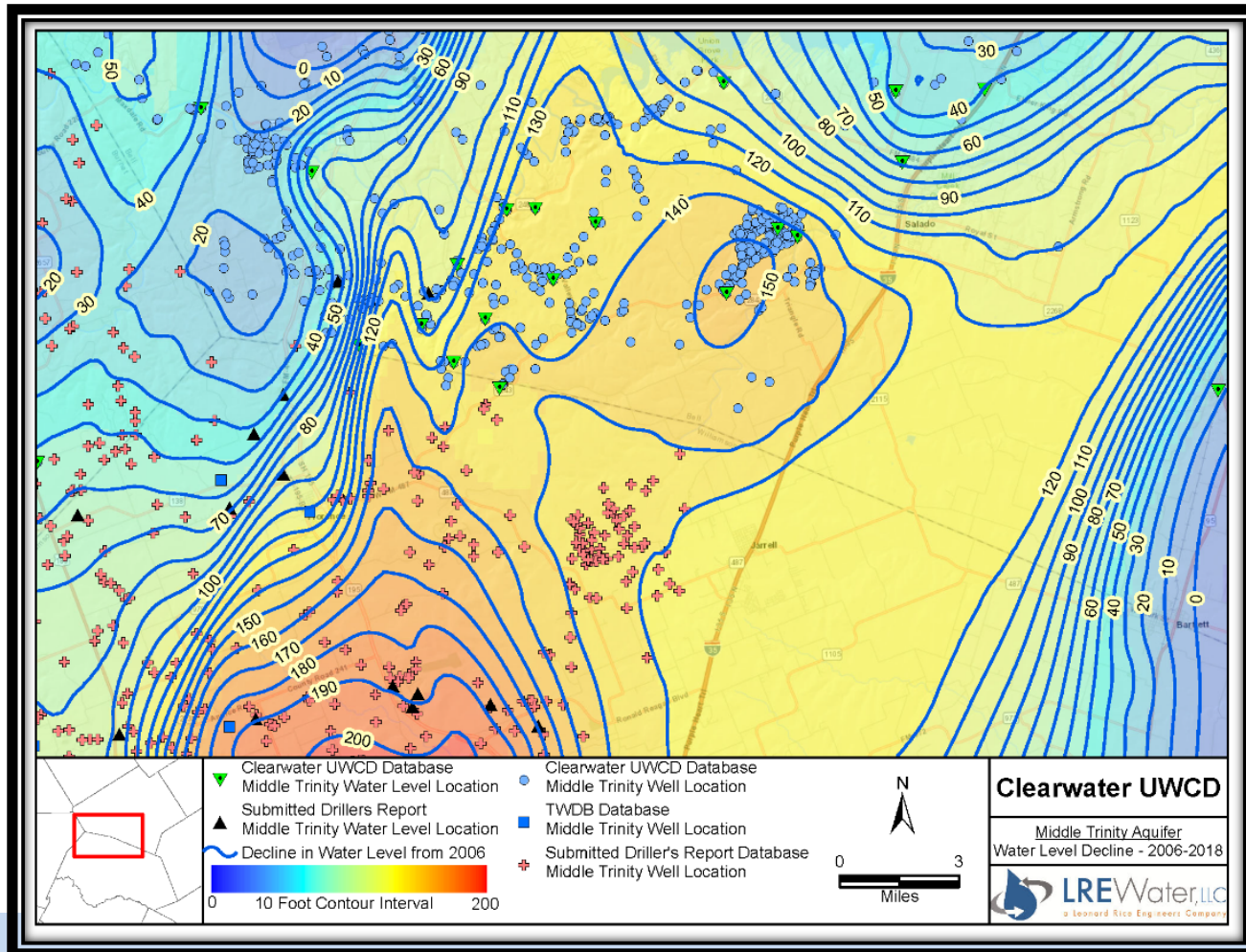




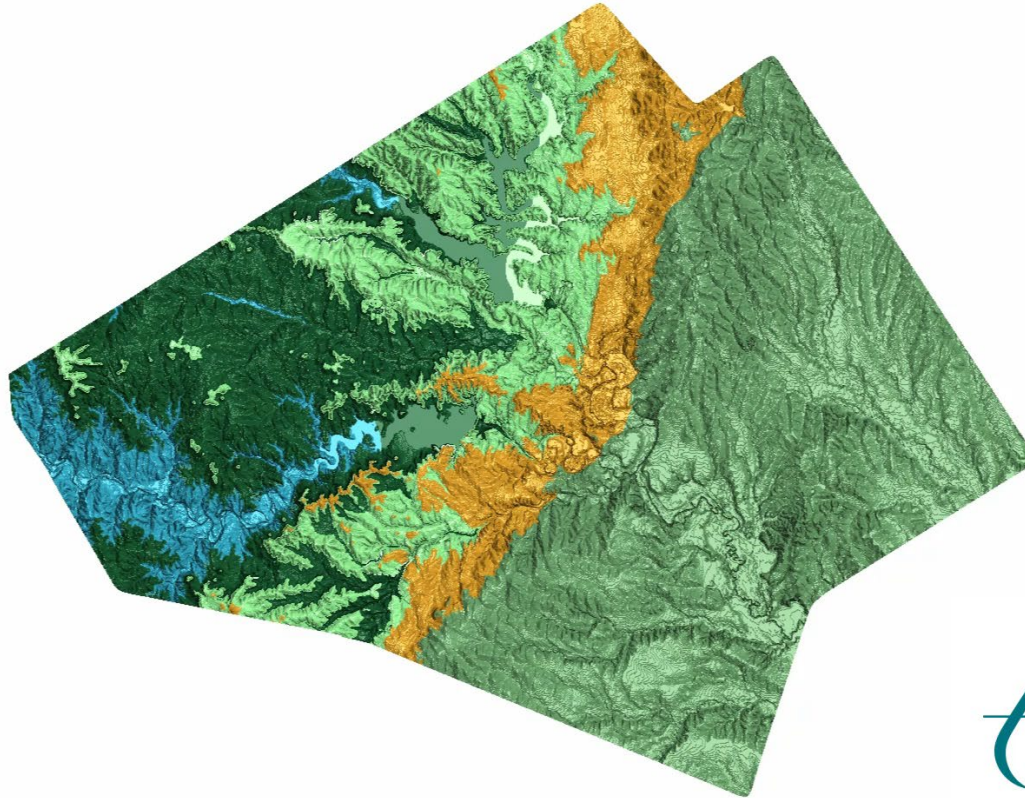


# Reality of Groundwater

*Truly a Shared Resource*



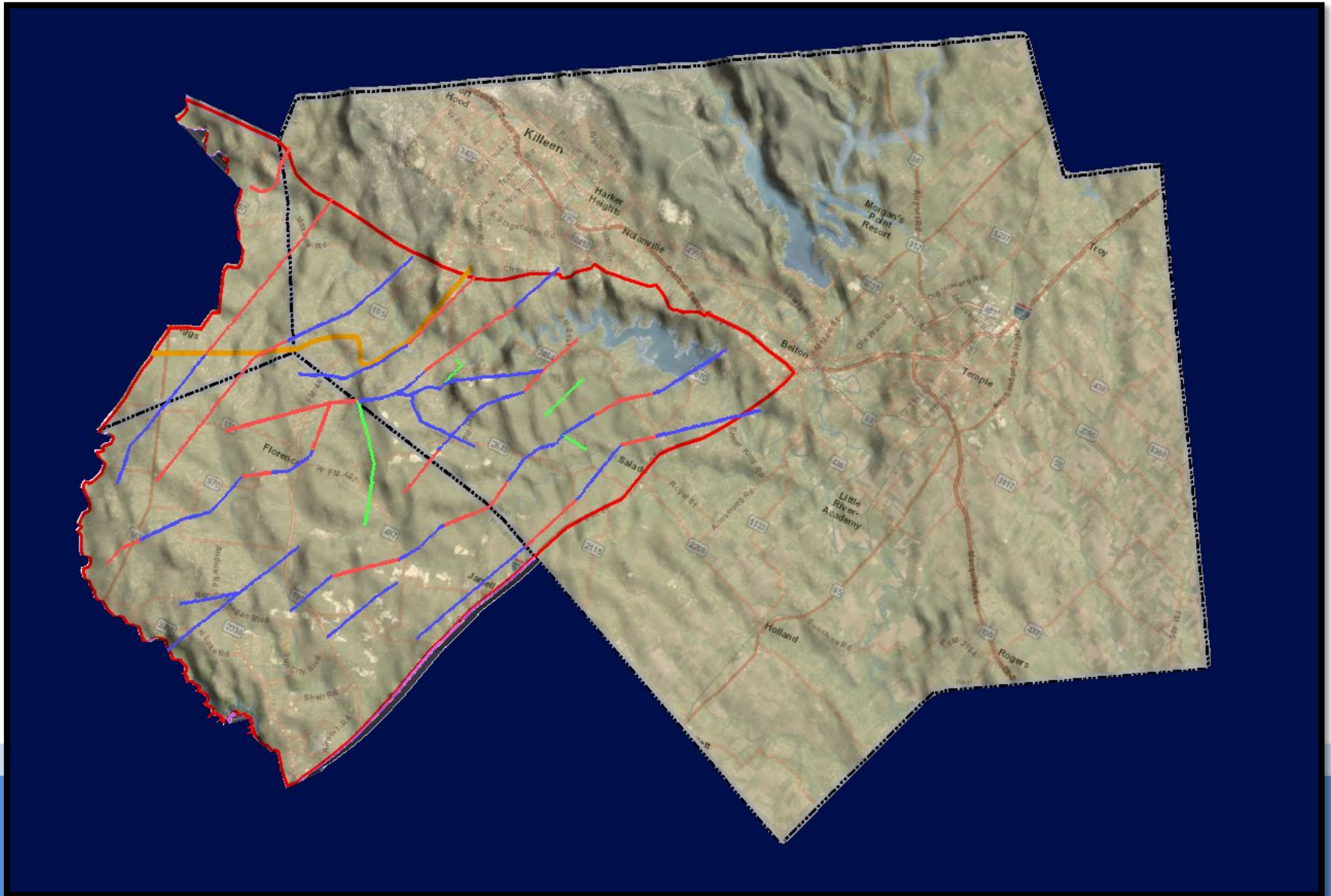
# Bell County Groundwater ?



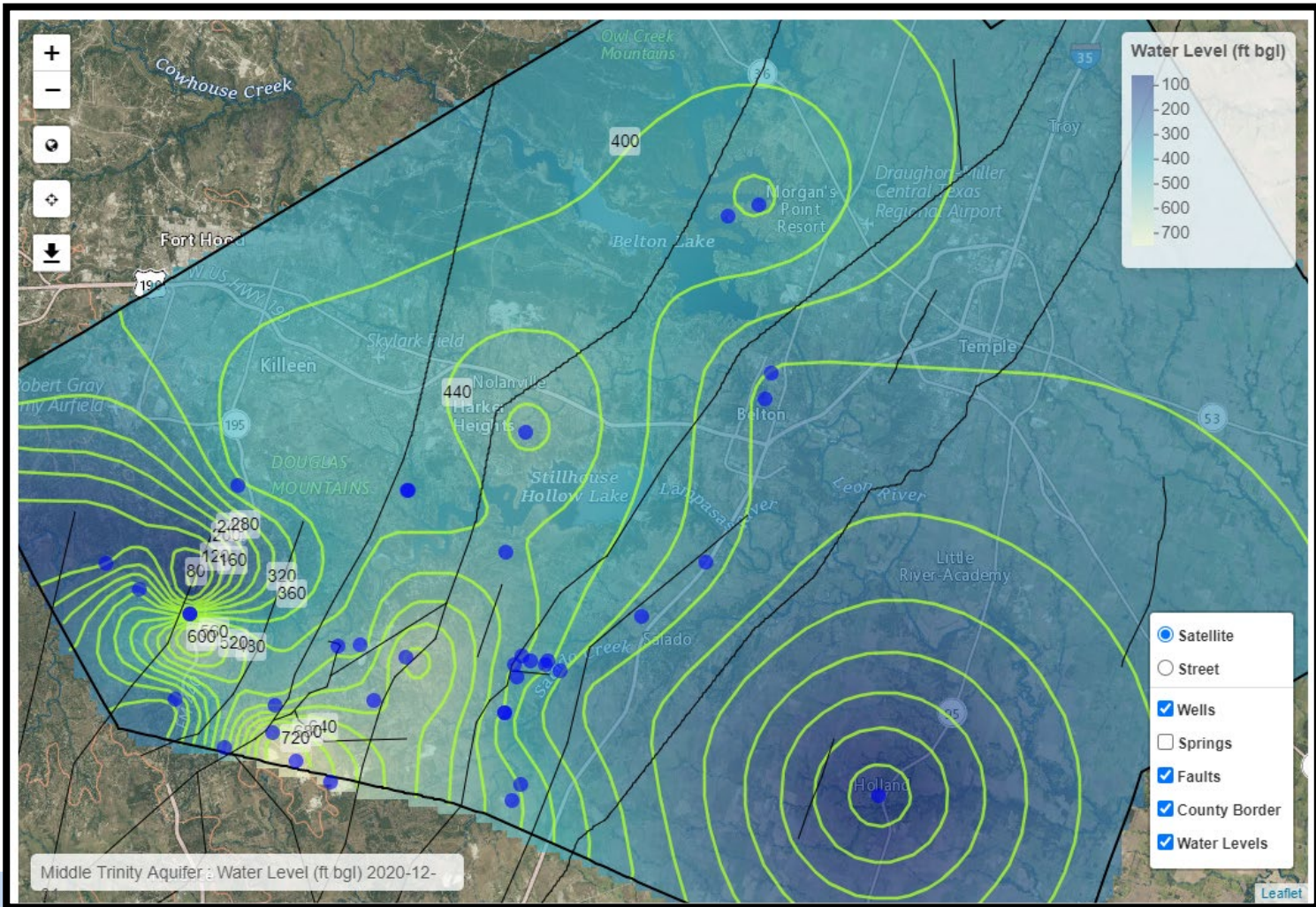
 **MICHELLE A.  
SUTHERLAND**  
*Groundwater Resource Consulting*



# Allan Standen Team

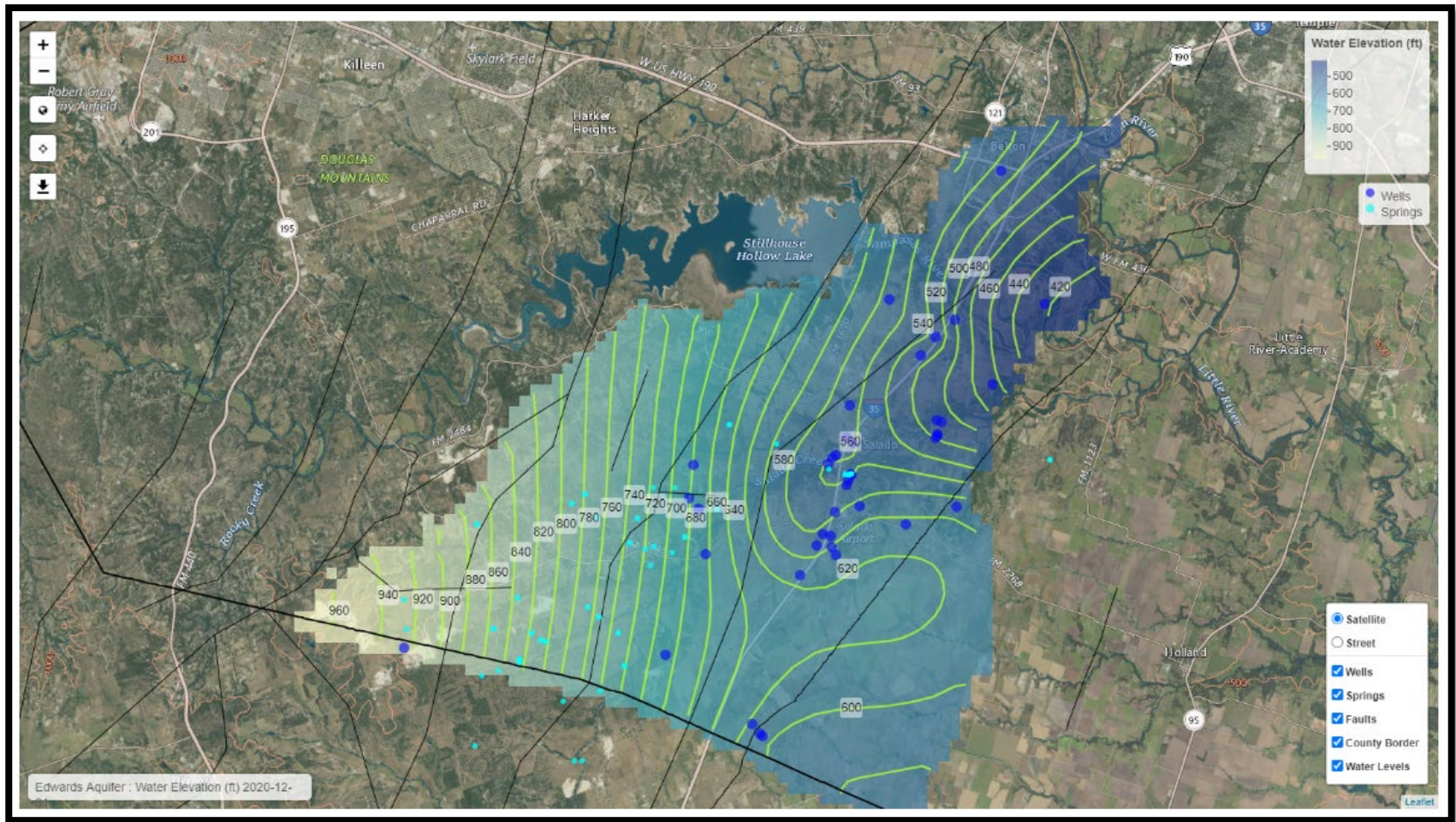


# LRE Automated Tool – Trends in Trinity





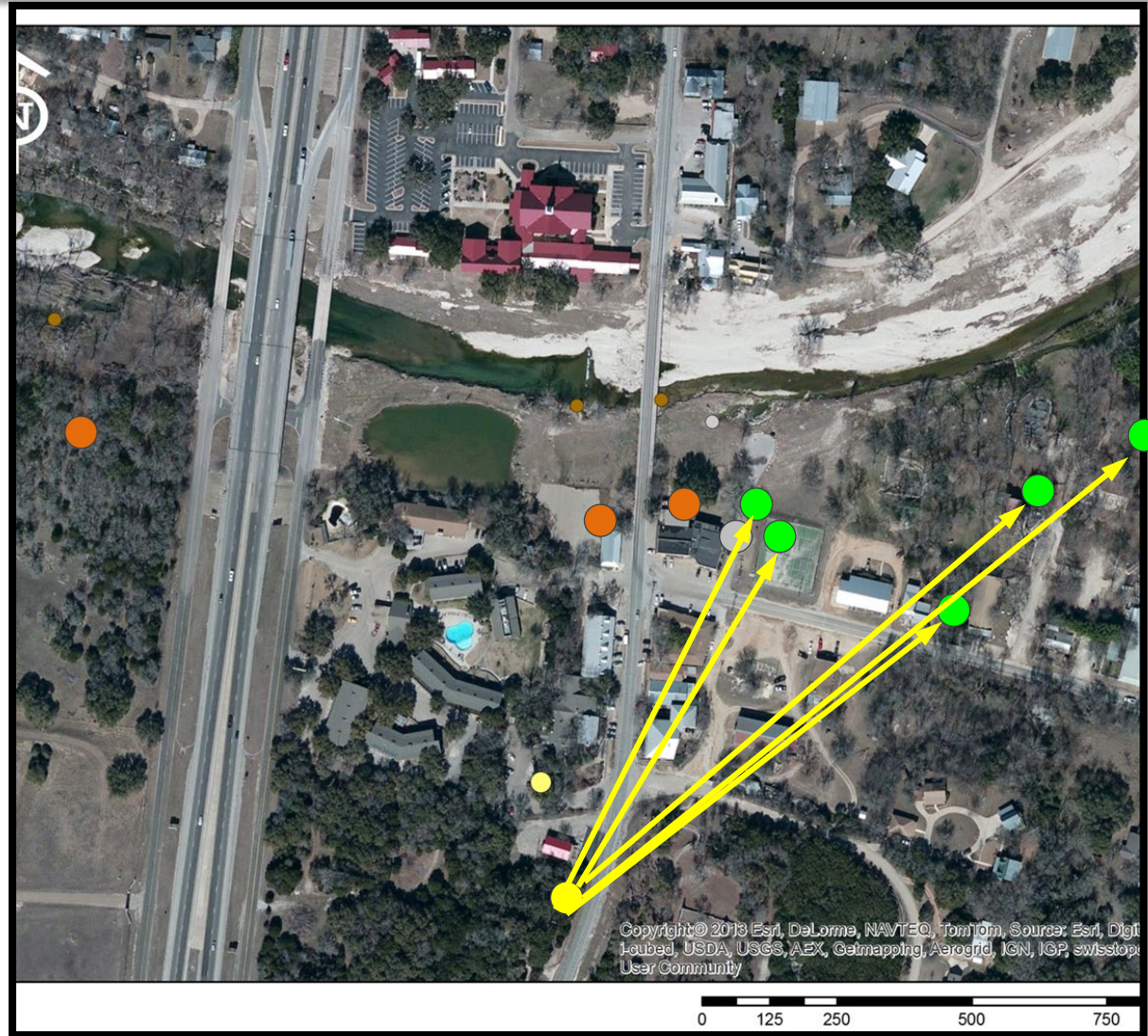
# Edwards BFZ





**Baylor**  
**Dr. Joe Yelderman**  
**Dr. Stephanie Wong**

## **Salado Springs Dye Tracer Studies**

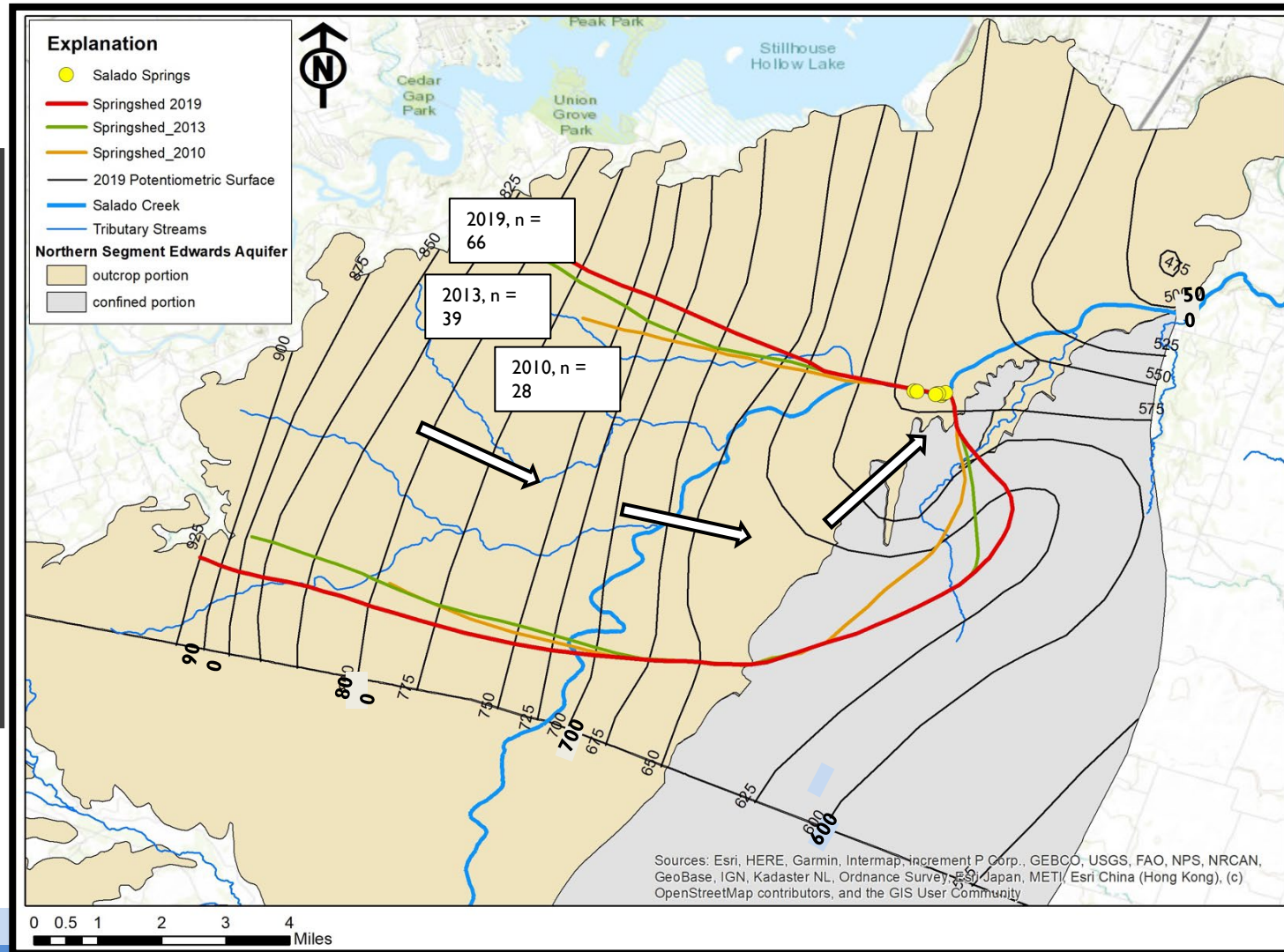


# Dr. Joe Yelderman and Dr. Stephanie Wong

## EDWARDS AQUIFER

### SPRINGSHEDED

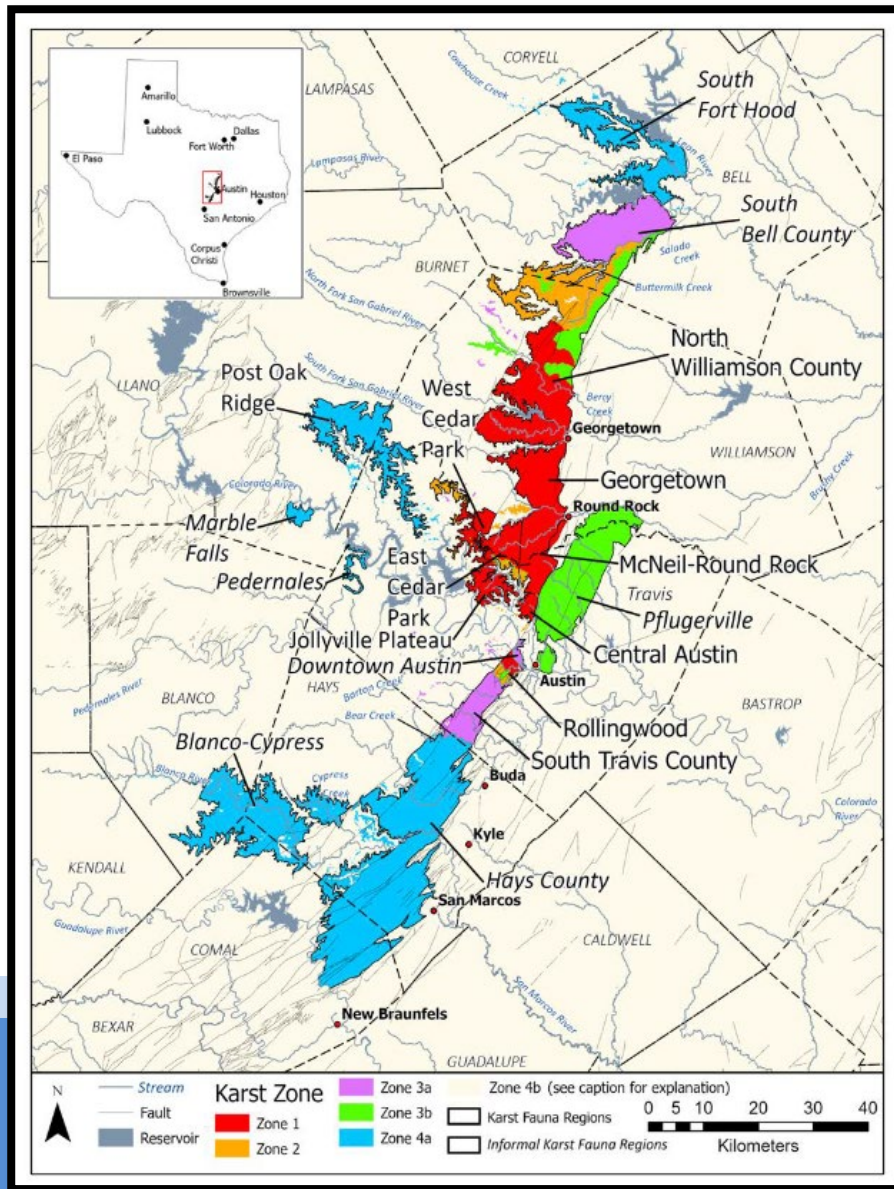
FROM  
SYNOPTIC  
WATER LEVELS






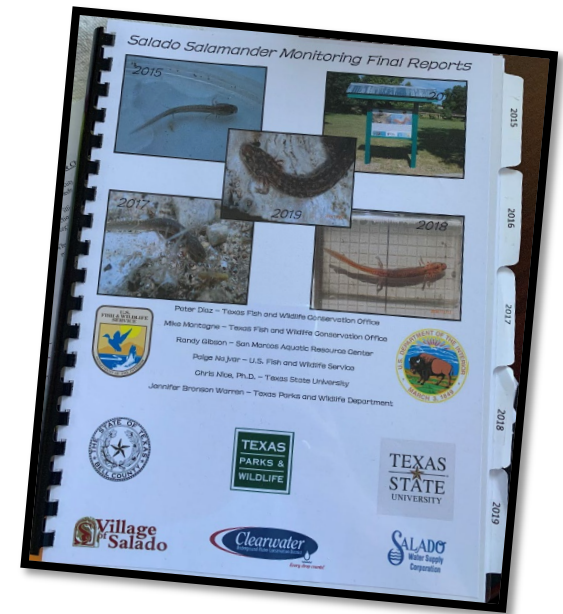
# New Reality 2021

## Veni & Jones

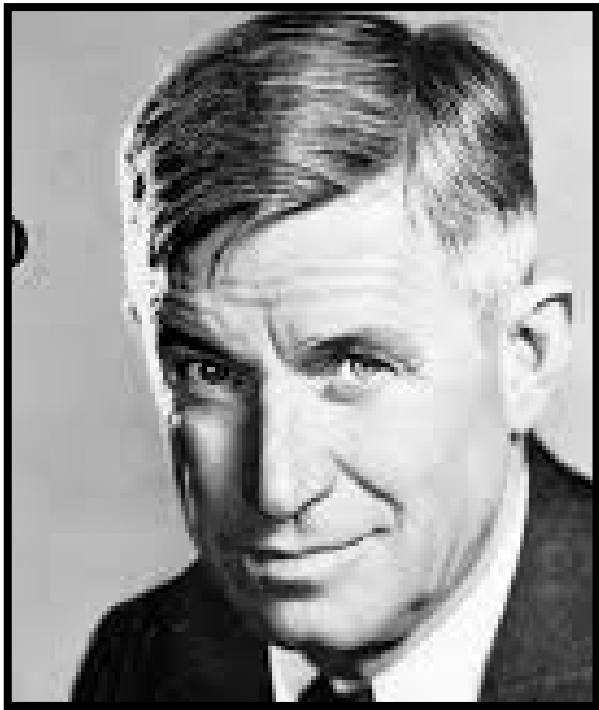


# Where do we go from Here?

- Watch & Listen & Collaborate & Coalesce
- Invest and Review **Best Available Science**
- Apply Sound Policy based on... 
- Continue our research
- Continue informing property owners
- Continue informing our Legislature
- Continue informing our Stakeholders
- Collaborate & Coalesce
- Embrace Participation in the Process



# Base Opinions on Legally Defensible Policy – Good Science – Reality



“A man only learns in two ways, one by reading, and the other by association with smarter people.”

– Will Rogers

# Questions?

Dirk Aaron

[daaron@cuwcd.org](mailto:daaron@cuwcd.org)

Learn more on our website at:  
[www.cuwcd.org](http://www.cuwcd.org)