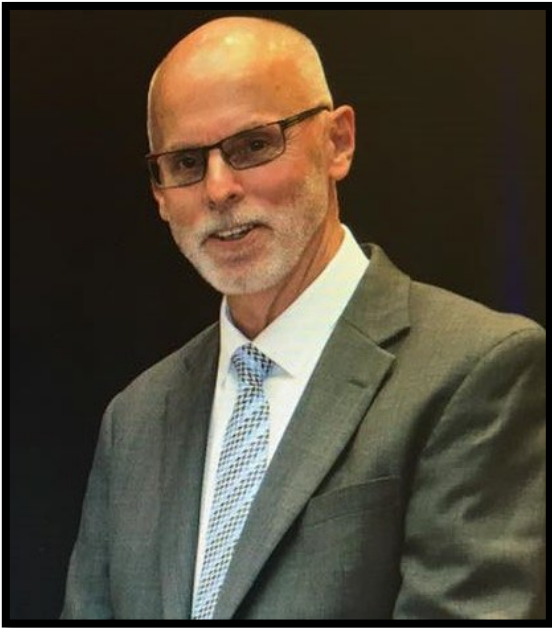


# Groundwater Resource Update

## Clearwater UWCD



**Dirk Aaron**  
**General Manager**

- ✓ **Serving as General Manager since 2011**
- ✓ **Texas AgriLife Extension Service 30 yrs. until 2011**

**Leland Gersbach**  
**Board President**



- ✓ **Serving since 2002**
- ✓ **Board President since 2010**

# Elected Directors



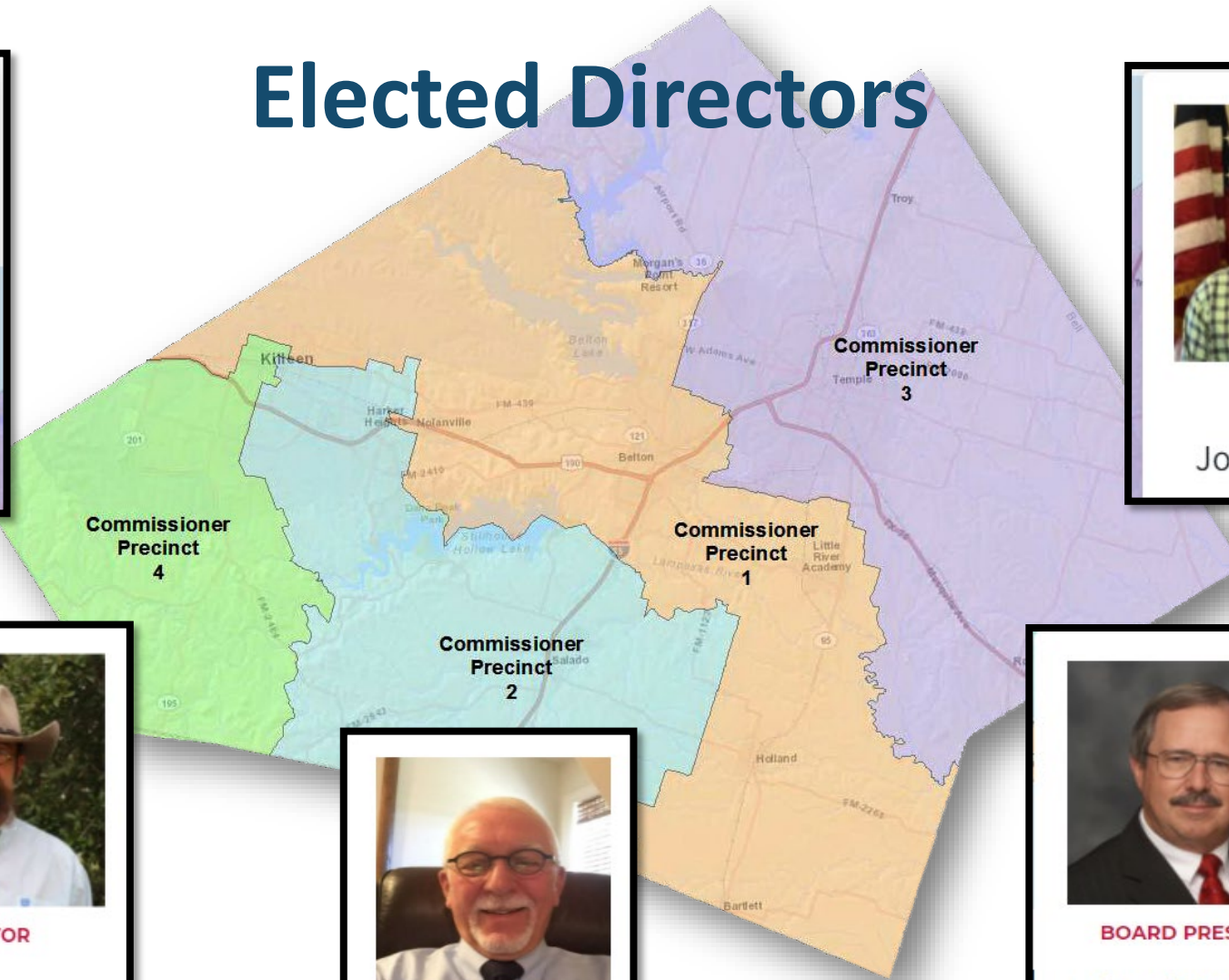
**DIRECTOR AT-LARGE**

David Cole



**DIRECTOR**

Jody Williams



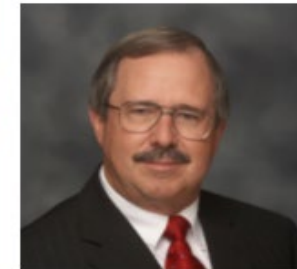
**DIRECTOR**

Scott A. Brooks



**DIRECTOR**

Gary Young



**BOARD PRESIDENT**

Leland Gersbach

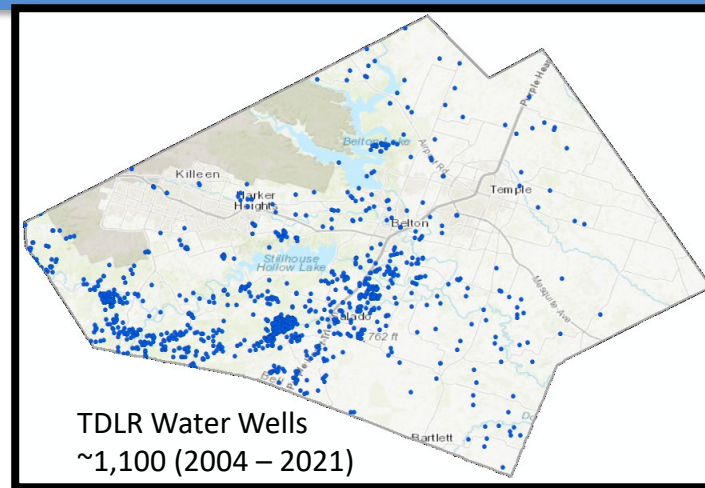
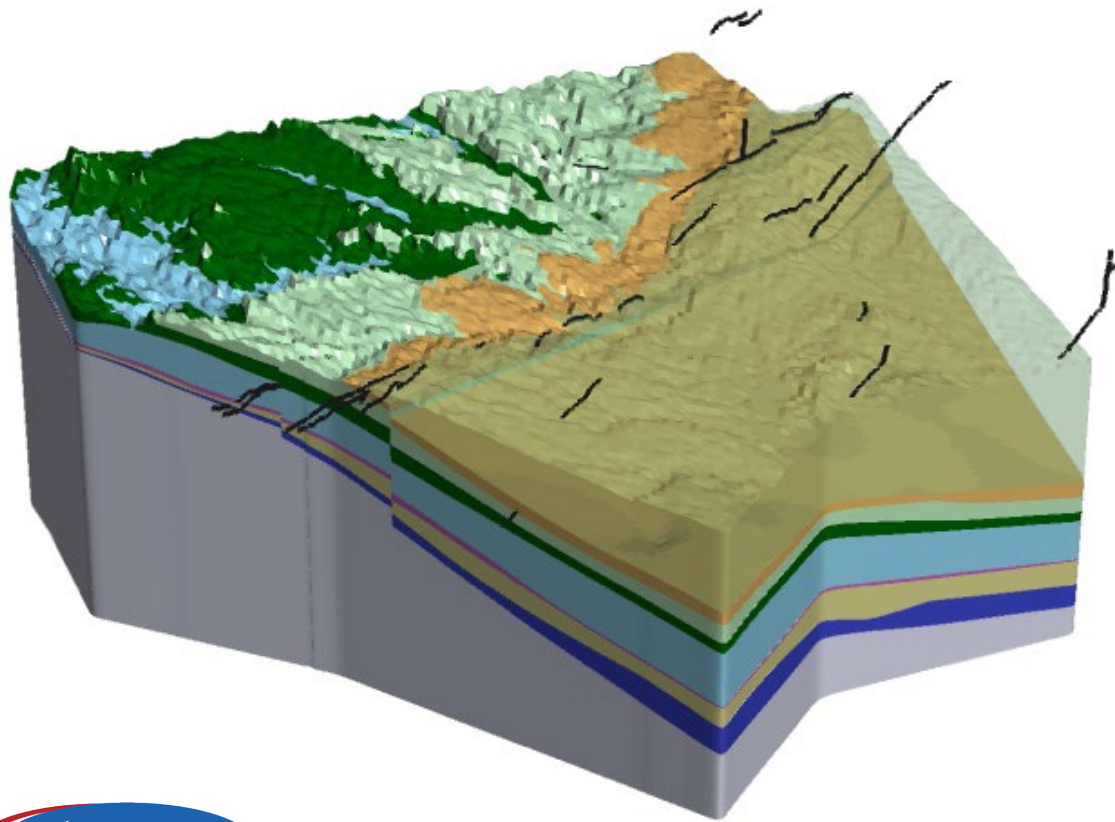
# District Update

- **Dirk Aaron**
  - *General Manager*
- **Shelly Chapman**
  - *Administrative Manager*
- **Tristin Smith**
  - *Compliance & Education Coordinator*
- **Corey Dawson**
  - *Field Technician*



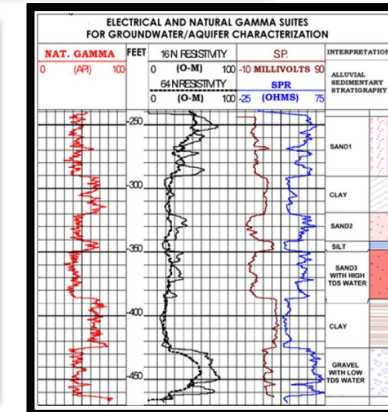
# WORKING TOWARDS THE BEST AVAILABLE SCIENCE TAKES:

## PATIENCE COMMITMENT INVESTMENT



Lithology:  
DESCRIPTION & COLOR OF FORMATION MATERIAL

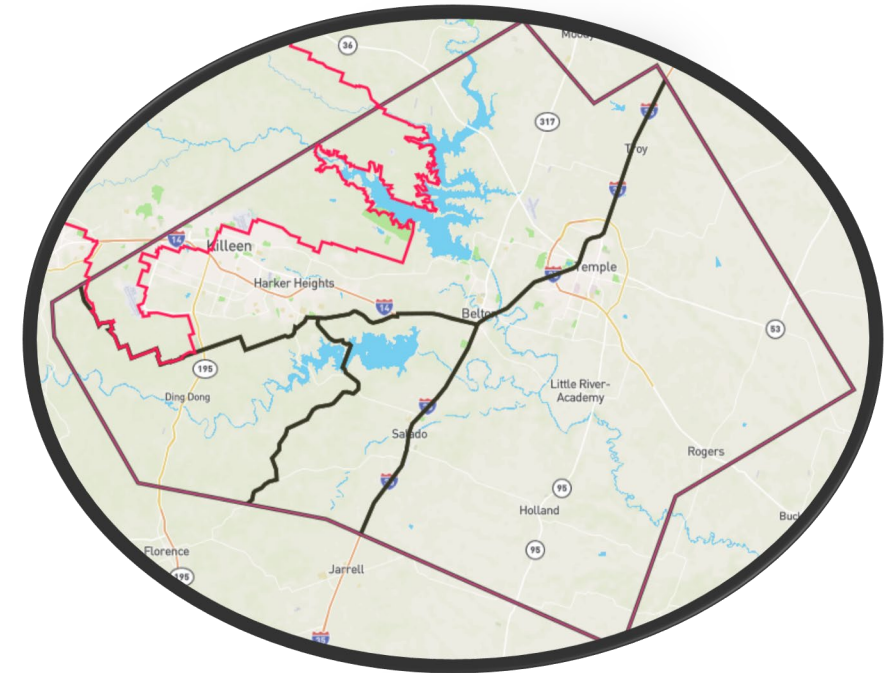
Top (ft.)	Bottom (ft.)	Description
0	3	overburden
3	21	tan lime
21	180	grey lime
180	670	grey and tan lime and grey shale
670	710	tan and grey sandstone
710	720	tan sandstone and green sandy shale
720	755	water sand and gravel
755	760	grey sandstone



Depth to Formation (ft)*	Formation Thickness (ft)*	Formation (Geologic Unit)
0	217.755	Edwards and Comanche Peak Limestone
217.755	137.904	Walnut
355.659	466.399	Glen Rose
822.058	50.202	Hensell and Cow Creek Limestone
872.260	177.123	Pearsall and Hammett Shale
1049.383	113.075	Hosston
1162.458		Undifferentiated

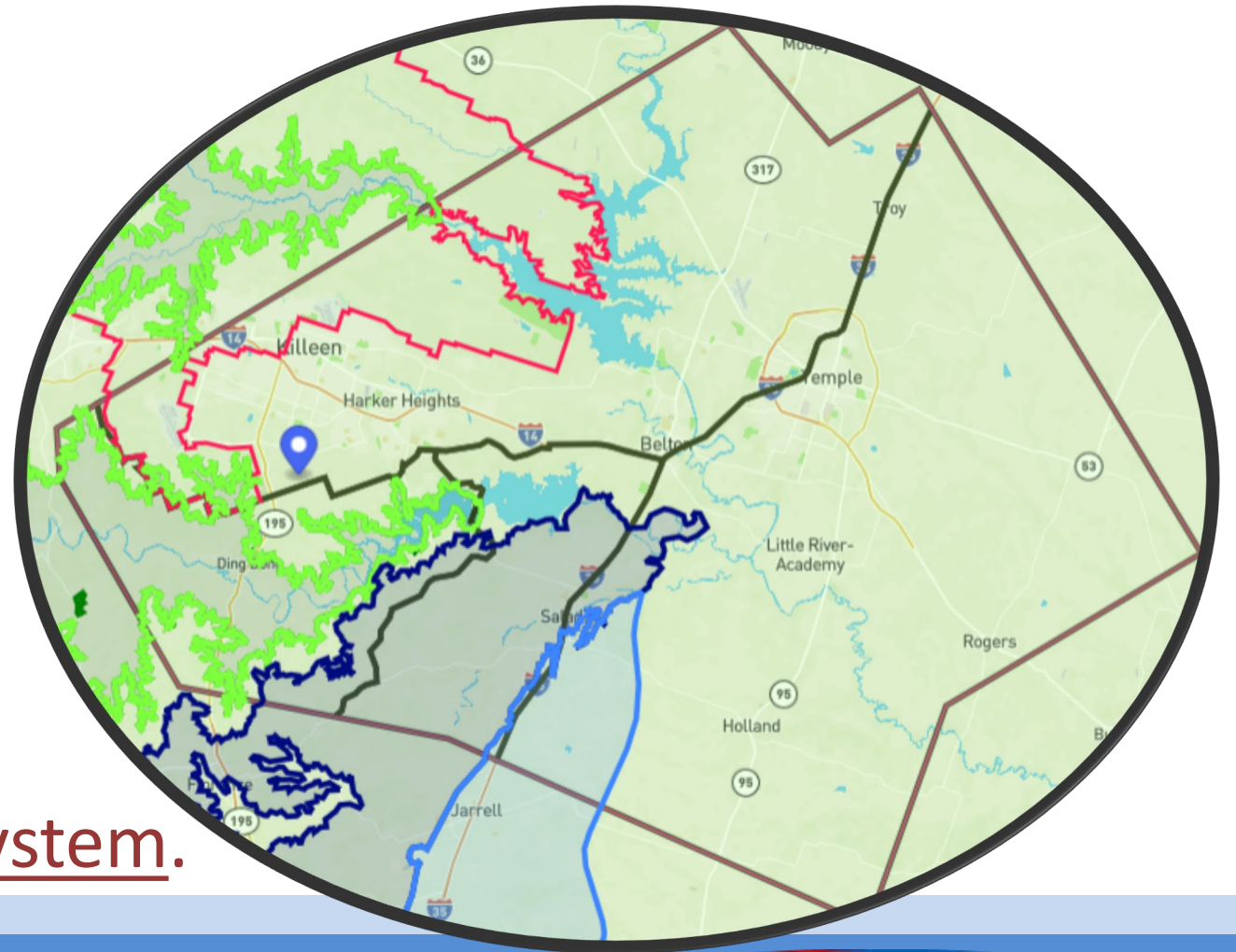
# Who is Clearwater UWCD?

- ❖ 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 five cents/\$100 assessed value—
- ❖ FY21 tax rate \$0.003272/\$100 assessed value
- ❖ FY22 tax rate \$0.003100/\$100 assessed value
- ❖ FY23 tax rate \$0.002708/\$100 assessed value



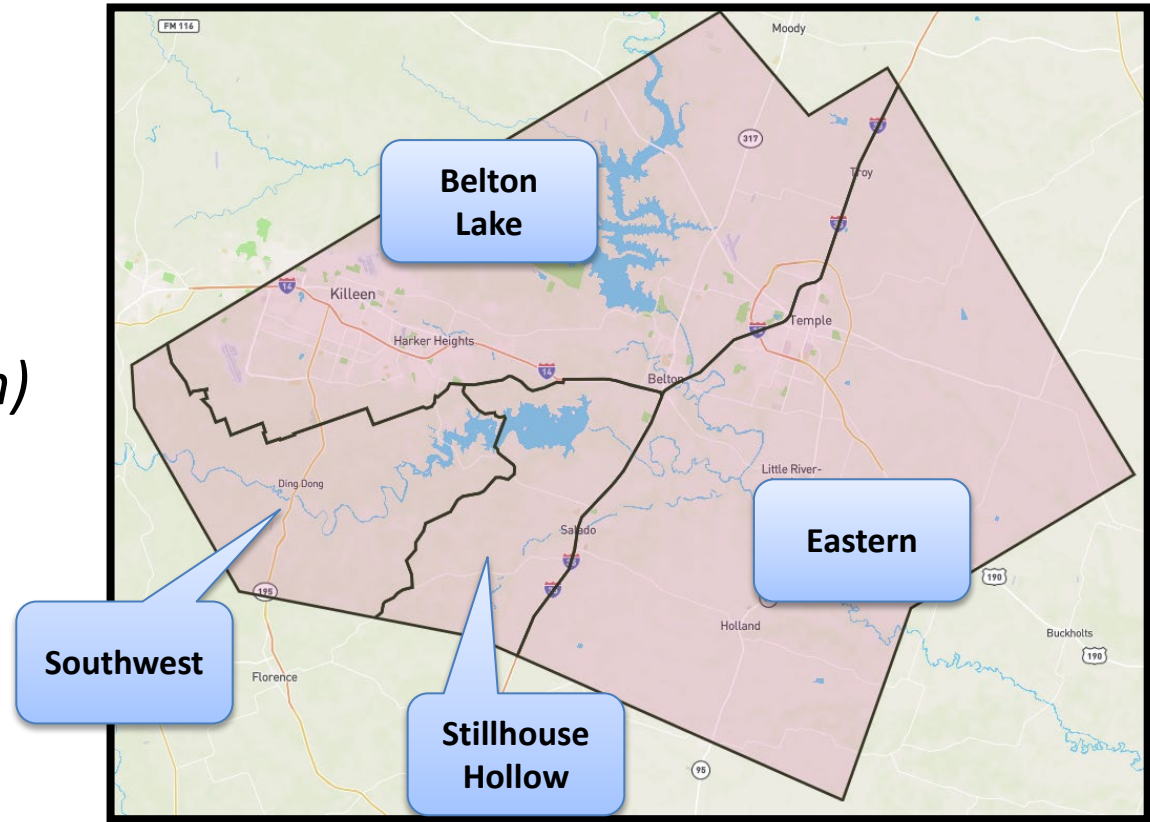
# Science & Analysis = Management Zones

1. Advanced 3D modeling.
2. Managing by Zones?
3. Enhanced Setbacks?
4. Real Time Analytic Tools.
5. Column Pipe Size Limits.
6. Minimum tract size.
7. New Data Management System.



# New Trinity Management Zones

- ✓ Science justified management zones
- ✓ Adopted Zone (*Specific Spacing*)
- ✓ Adopted Zone (*Minimum tract size*)
- ✓ Column Pipe Size (*Ranges 1 ¼ - 10 inch*)
- ✓ Allow for Exceptions (*Remedies*)
- ✓ **Repealed Hydrogeologic Report**
- ✓ Added "Well Completion Report"



# Upper Trinity Middle Trinity

- ✓ Col. Pipe Size,
- ✓ Tract Size,
- ✓ Spacing

Management Zones ***	Min Well Spacing	Min Well Spacing	Min Well Spacing	Min Well Spacing	Min Well Spacing	Min Well Spacing
	*	*	*	*	*	*
Column Pipe **Size	Min Tract Size	Min Tract Size	Min Tract Size	Min Tract Size	Min Tract Size	Min Tract Size
Southwest	1 ¼-inch 2-acres	1 ½-inch 5-acres	2-inch 10-acres	>2-4 inch 20-acres	>6-8 inch 50-acres	>8 inch 100-acres
Stillhouse Hollow	150 ft 2-acres	330 ft 5-acres	660 ft 10-acres			
Belton Lake	150 ft 2-acres	330 ft 5-acres	660 ft 10-acres			
Eastern IH35	150 ft 2-acres	330 ft 5-acres	660 ft 10-acres	1320 ft 20-acres		



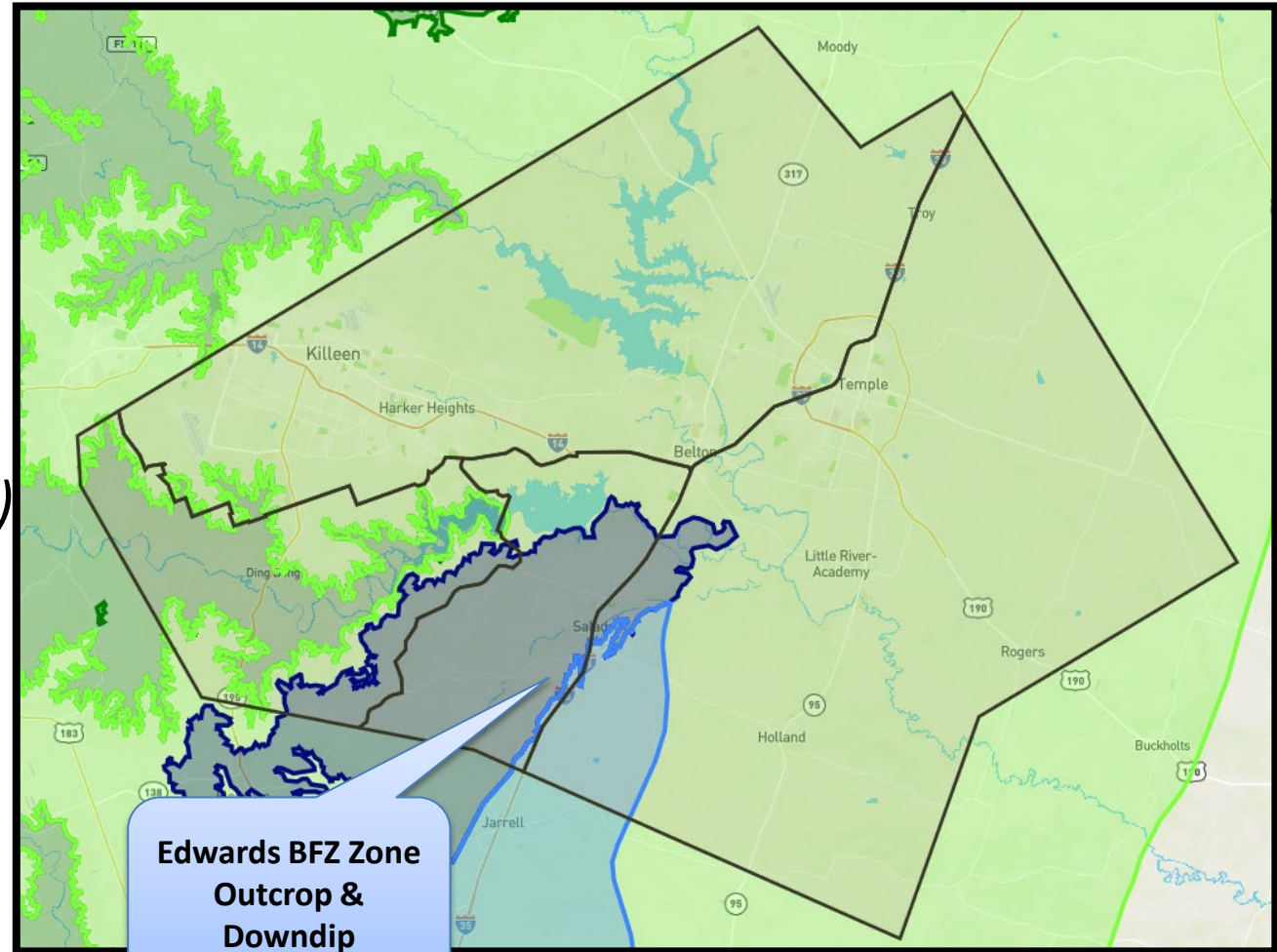
# Lower Trinity

- ✓ Col. Pipe Size,
- ✓ Tract Size,
- ✓ Spacing

Management Zones	Min Well Spacing * Min Tract Size	Min Well Spacing * Min Tract Size	Min Well Spacing * Min Tract Size	Min Well Spacing * Min Tract Size	Min Well Spacing * Min Tract Size	Min Well Spacing * Min Tract Size	Min Well Spacing * Min Tract Size
Column Pipe **Size	1 ¼-inch	1 ½-inch	2-inch	>2-4 inch	>4-6 inch	>6-8 inch	>8 inch
Southwest	150 ft 2-acres	330 ft 5-acres	⊗	⊗	⊗	⊗	⊗
Stillhouse Hollow	150 ft 2-acres	330 ft 5-acres	660 ft 10-acres	1320 ft 20-acres	1980 ft 30-acres	⊗	⊗
Belton Lake	150 ft 2-acres	330 ft 5-acres	660 ft 10-acres	1320 ft 20-acres	1980 ft 30-acres	5280 ft 40-acres	5280 ft 40 acres
Eastern IH35	150 ft 2-acres	330 ft 5-acres	660 ft 10-acres	660 ft 20 acres	1320 ft 30-acres	2640 ft 40-acres	5280 ft 50 acres

# Proposed Edwards BFZ Management Zone

- ✓ Science justified management zones
- ✓ Same for Outcrop and Dwndip
- ✓ Adopted Zone (*Specific Spacing*)
- ✓ Adopted Zone (*Minimum tract size*)
- ✓ Column Pipe Size (*Ranges 1 ¼ - 10 inch*)
- ✓ Allow for Exceptions (*Remedies*)
- ✓ **Repealed Hydrogeologic Report**
- ✓ Added "Well Completion Report"



# Proposed Edwards BFZ

## Column Pipe Size, Tract Size, Spacing

Management Zone  ***	Min Well Spacing  *	Min Well Spacing  *	Min Well Spacing  *	Min Well Spacing  *	Min Well Spacing  *	Min Well Spacing  *	Min Well Spacing  *
	Min Tract Size	Min Tract Size	Min Tract Size	Min Tract Size	Min Tract Size	Min Tract Size	Min Tract Size
Column Pipe **Size	1 ¼ -inch	1 ½-inch	2-inch	>2-4 inch	>4-6 inch	>6-8 inch	>8 inch
Edwards BFZ	150 ft  *	330 ft  *	330 ft  *	660 ft  *	1320 ft  *	2640 ft  *	5280 ft  *
	2-acres	5-acres	10-acres	20-acres	30 -acres	40-acres	50-acres

# Groundwater Wells Managed

All wells in Bell County are required to be registered.

## Two Types of Wells

1) Exempt Wells are exempt from permitting:

- ❖ Wells used for domestic purposes or for watering livestock or poultry
- ❖ Wells must be incapable of producing more than 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.

2) Non-Exempt wells must obtain a permit and report monthly Use.

5,778 well pts in the data base

4,028 active Exempt wells

159 active permitted wells

61 in the Edwards BFZ

73 in the Trinity Aquifer

25 in the Other formations

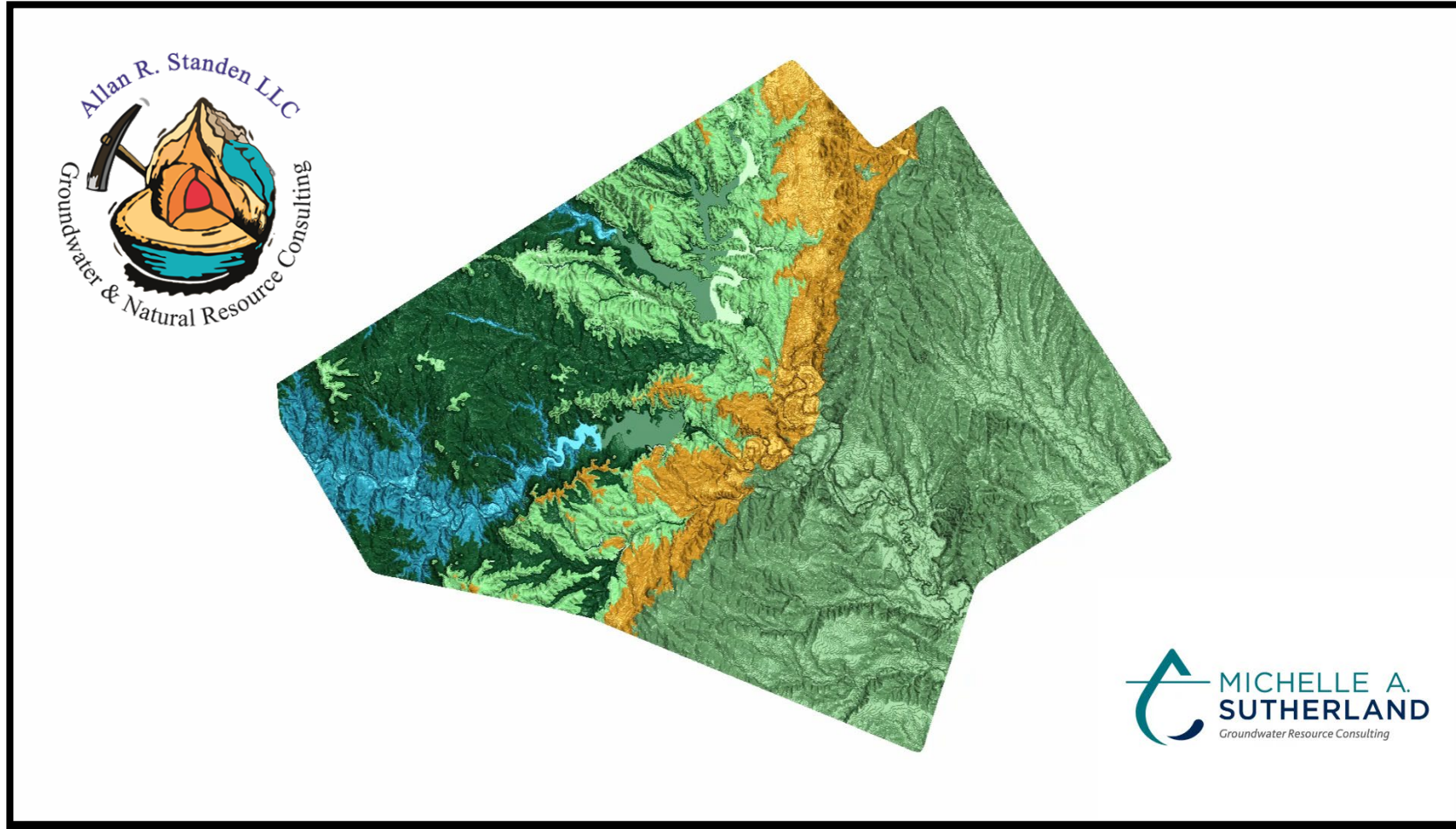
# CUWCD Consultants



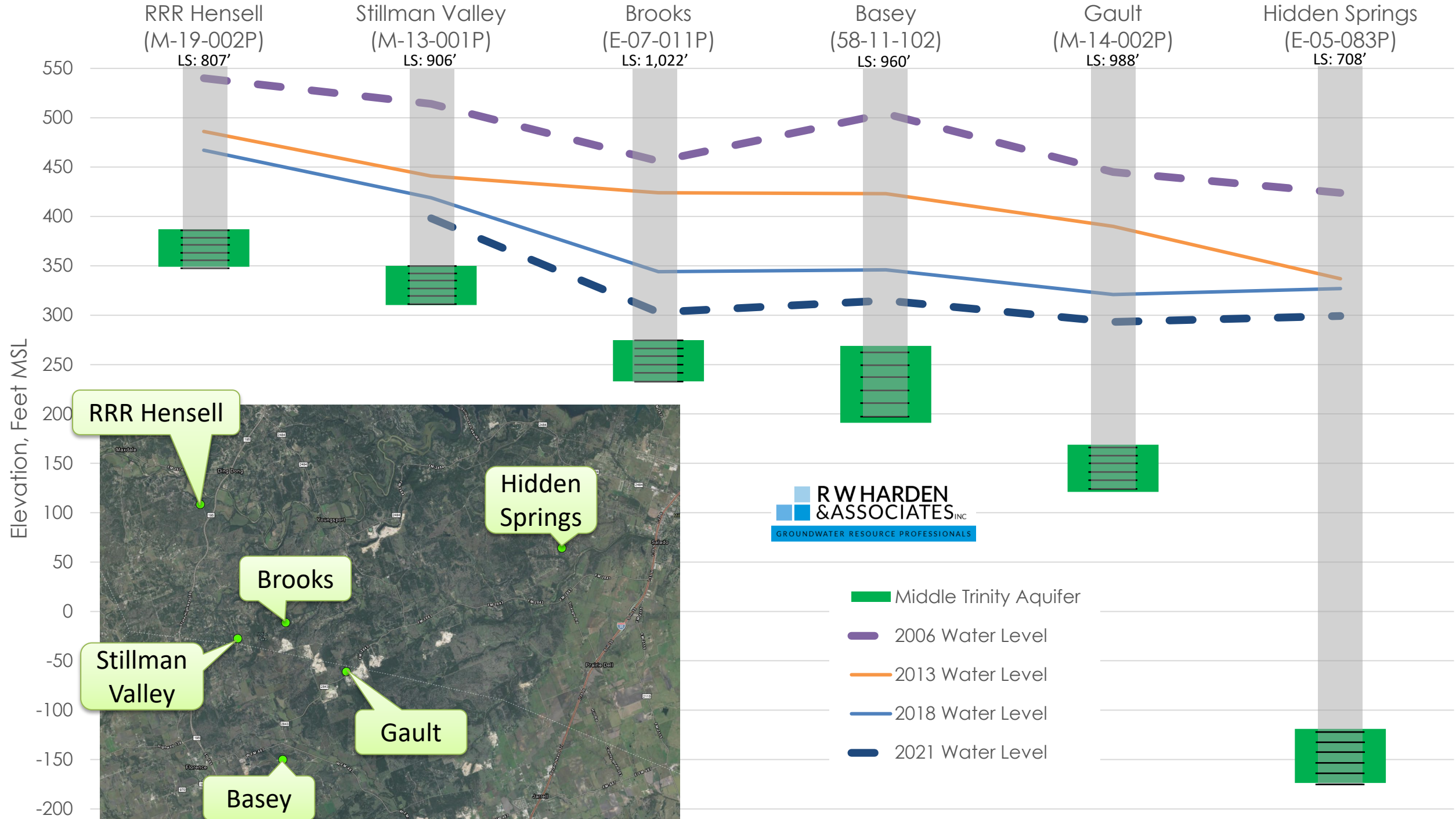
Mike Keester  
Allan Standen  
Vince Clause  
Michelle Southerland  
James Beach



# Allan Standen's Team



 MICHELLE A.  
SUTHERLAND  
Groundwater Resource Consulting



# Monitoring of Wells Overtime

Select Middle Trinity Well to View:

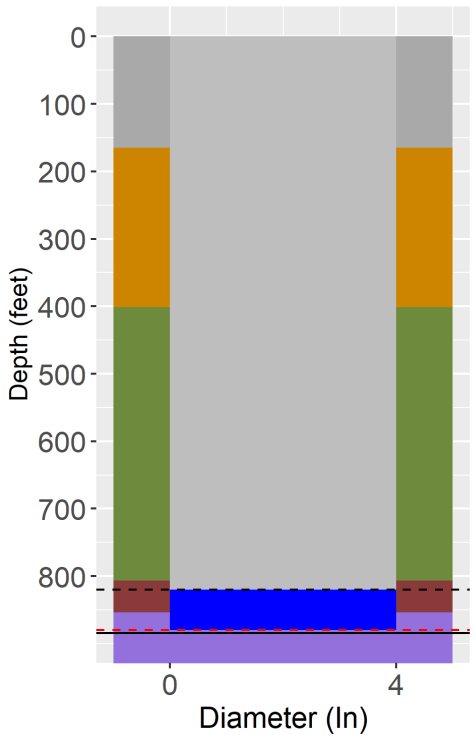
Select Date Range to View:  to

Select Time Period Range:  Period of Record

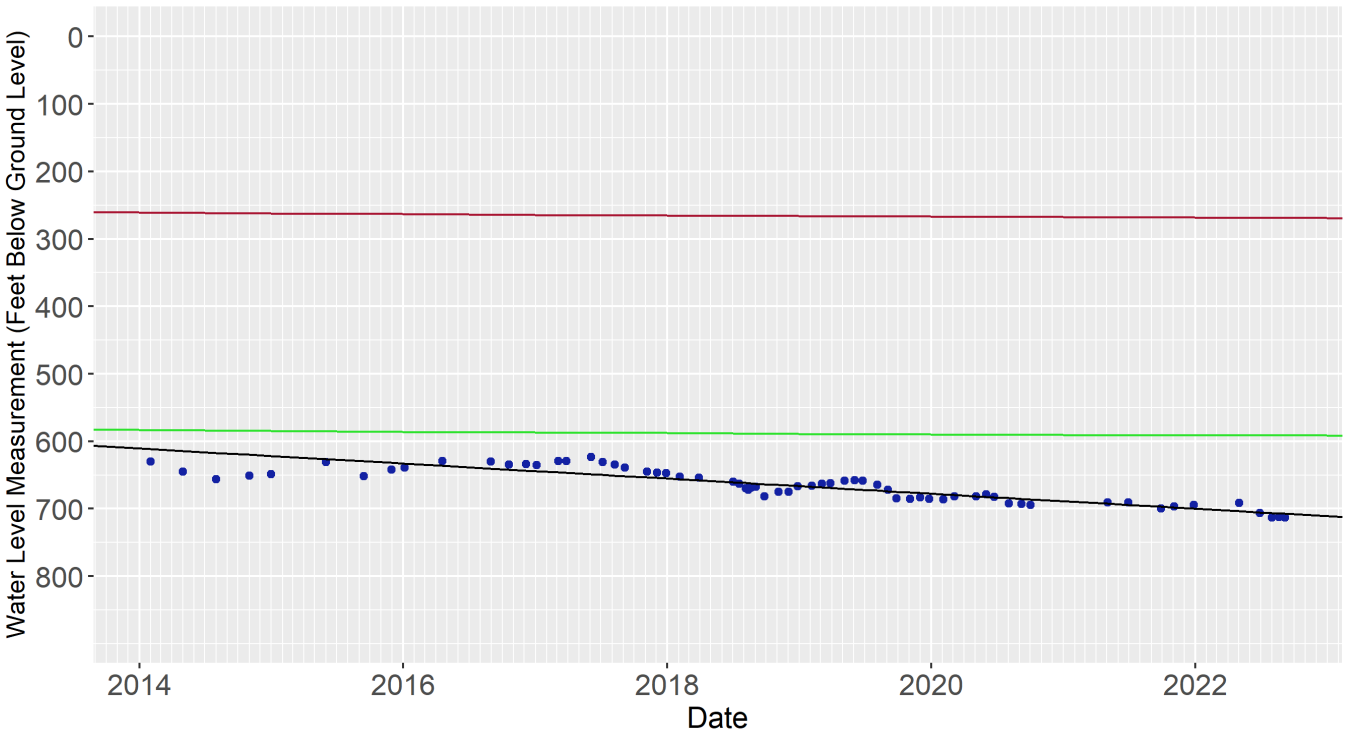
State Well Number: 5804417

Primary Water Use: Domestic

Casing

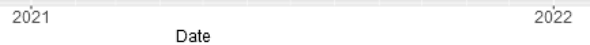


Hydrograph - M-14-002P (Gault - Middle Trinity)



- Top Screen
- Bottom Screen
- Well Bottom
- Edwards and Comanche Peak Limestone
- Walnut
- Glen Rose
- Hensell
- Pearsall, Cow Creek Limestone, and Hammett Shale
- Casing
- Screen

- Water Level Measurement (ft bgl)
- Measured Water Level Trend
- NTWGAM Water Level (ft bgl)
- Trend Adjusted NTWGAM Water Level (ft bgl)



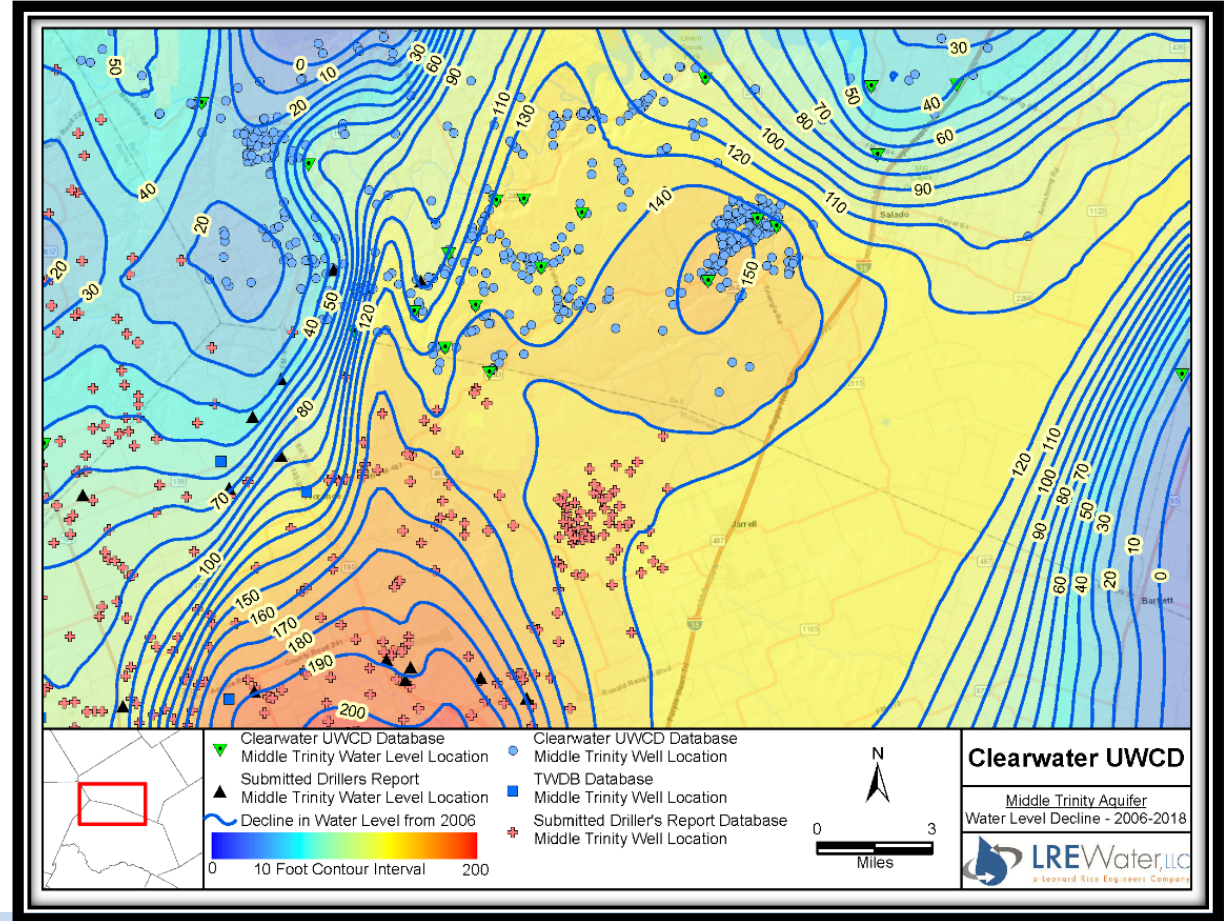
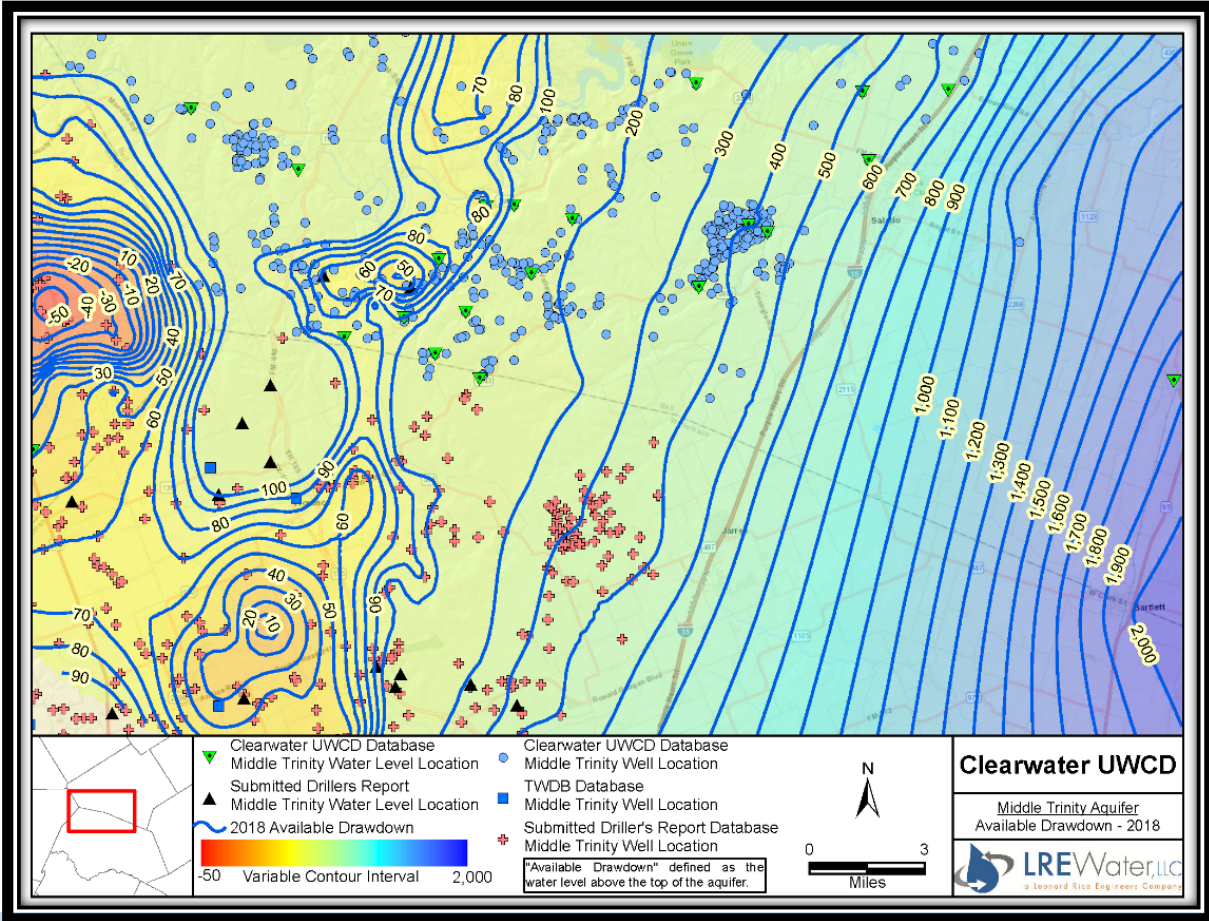


Sept 8, 2022

# Reality of Groundwater

2006-2022

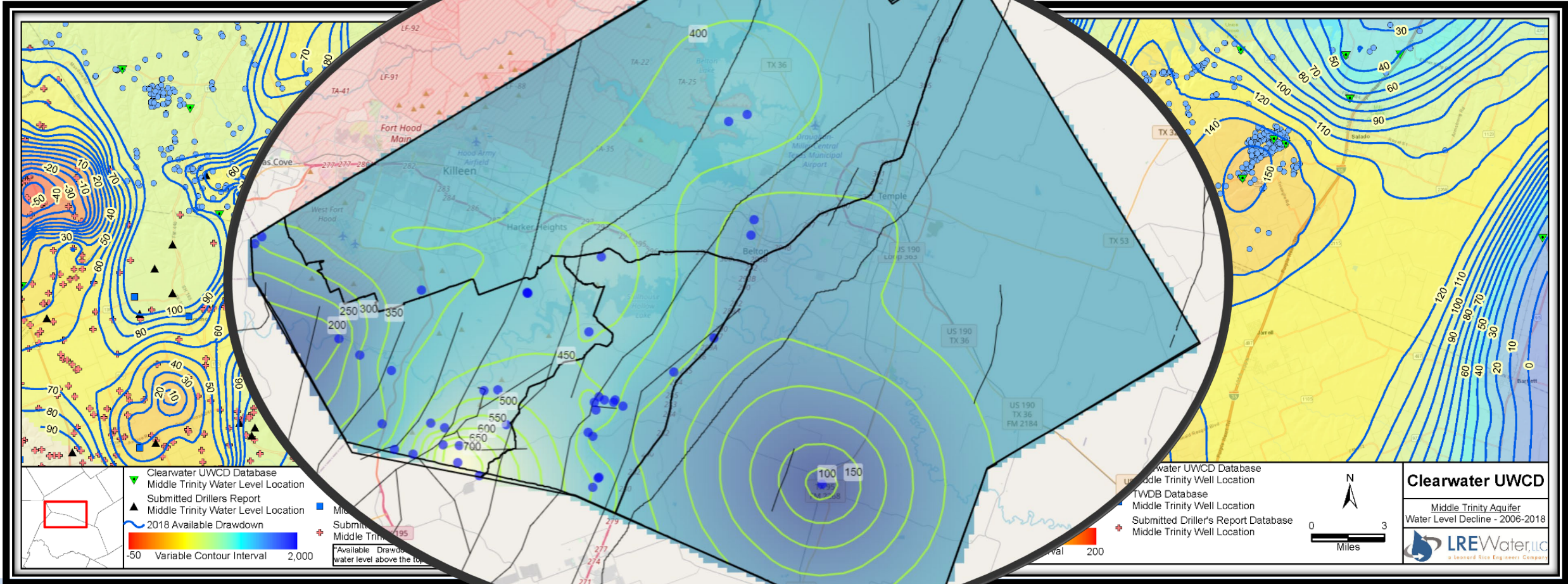
*Truly a Shared Resource*



Sept 8, 2022

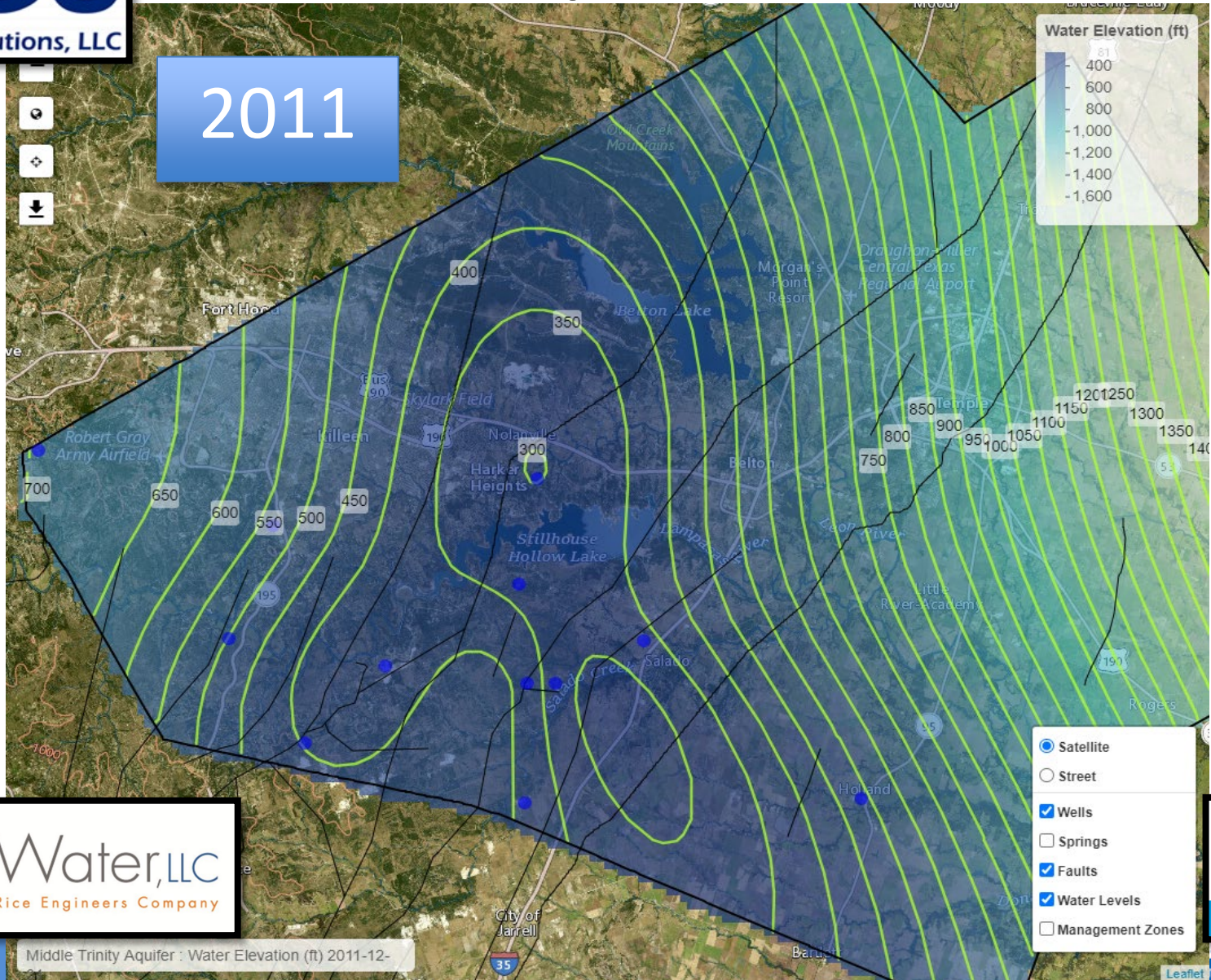
# Reality of Groundwater

2006-2022



# CUWCD Aquifer Status Tool

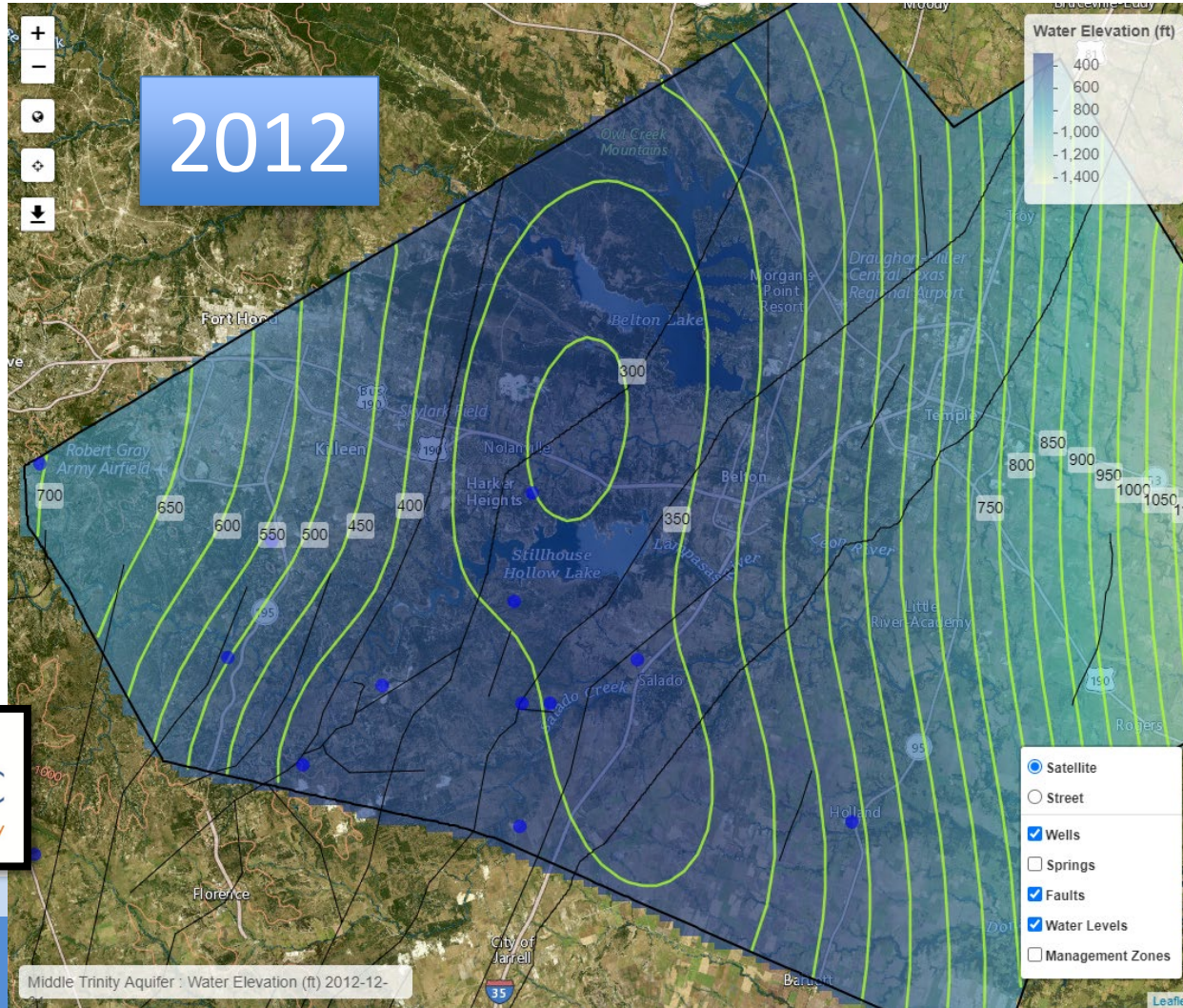
2011





# CUWCD Aquifer Status Tool

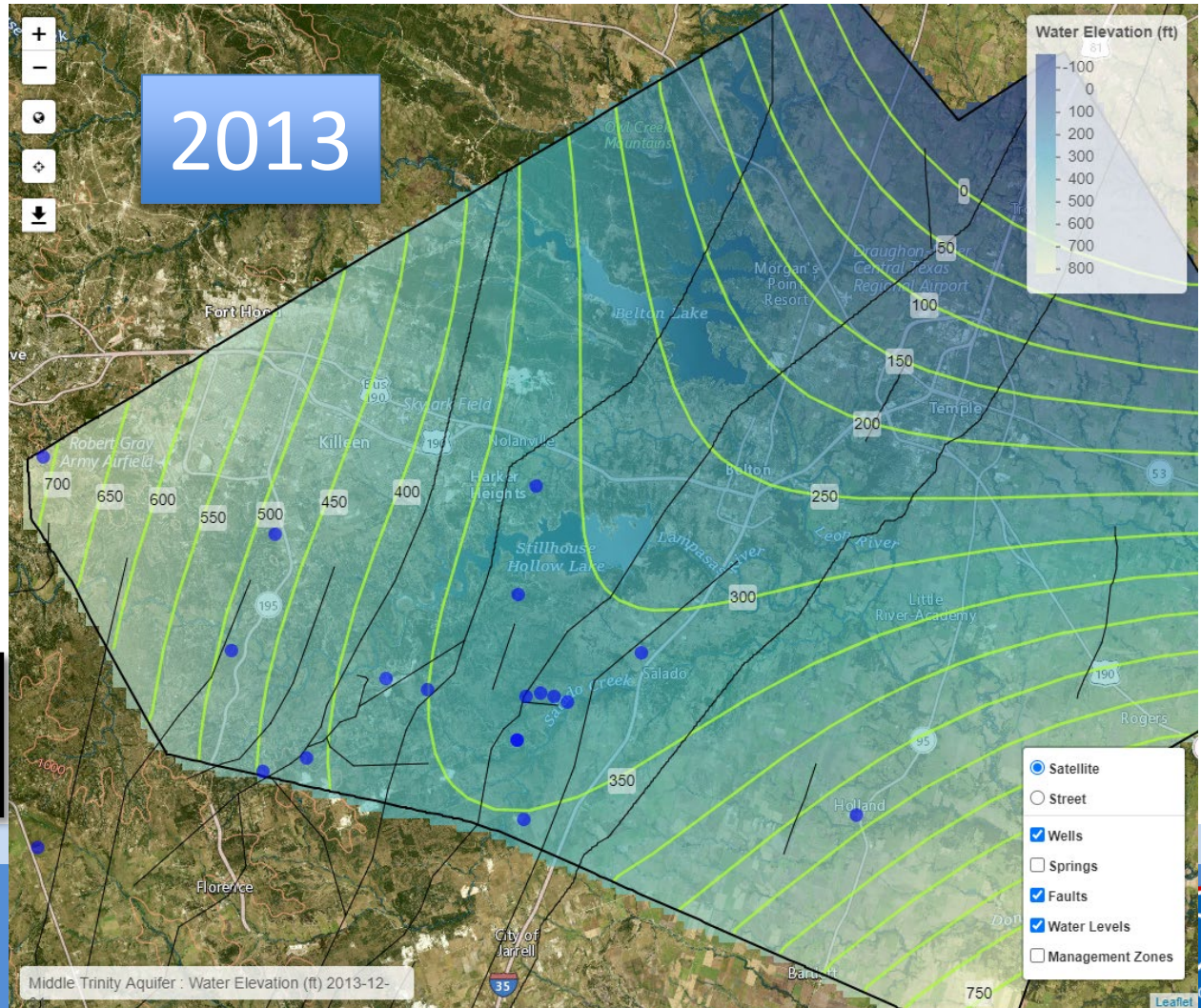
## 2010 - 2021





# CUWCD Aquifer Status Tool

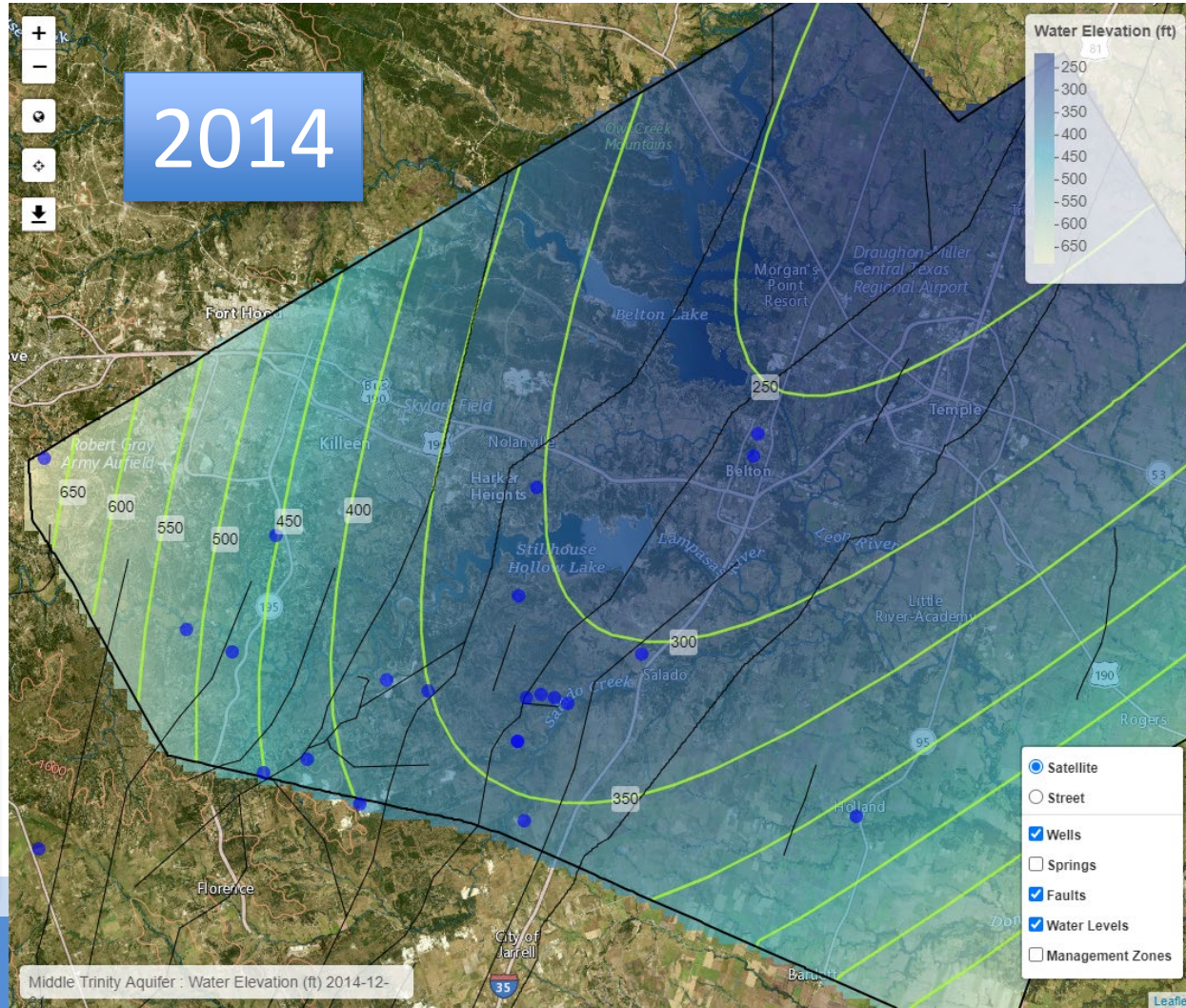
## 2010 - 2021





# CUWCD Aquifer Status Tool

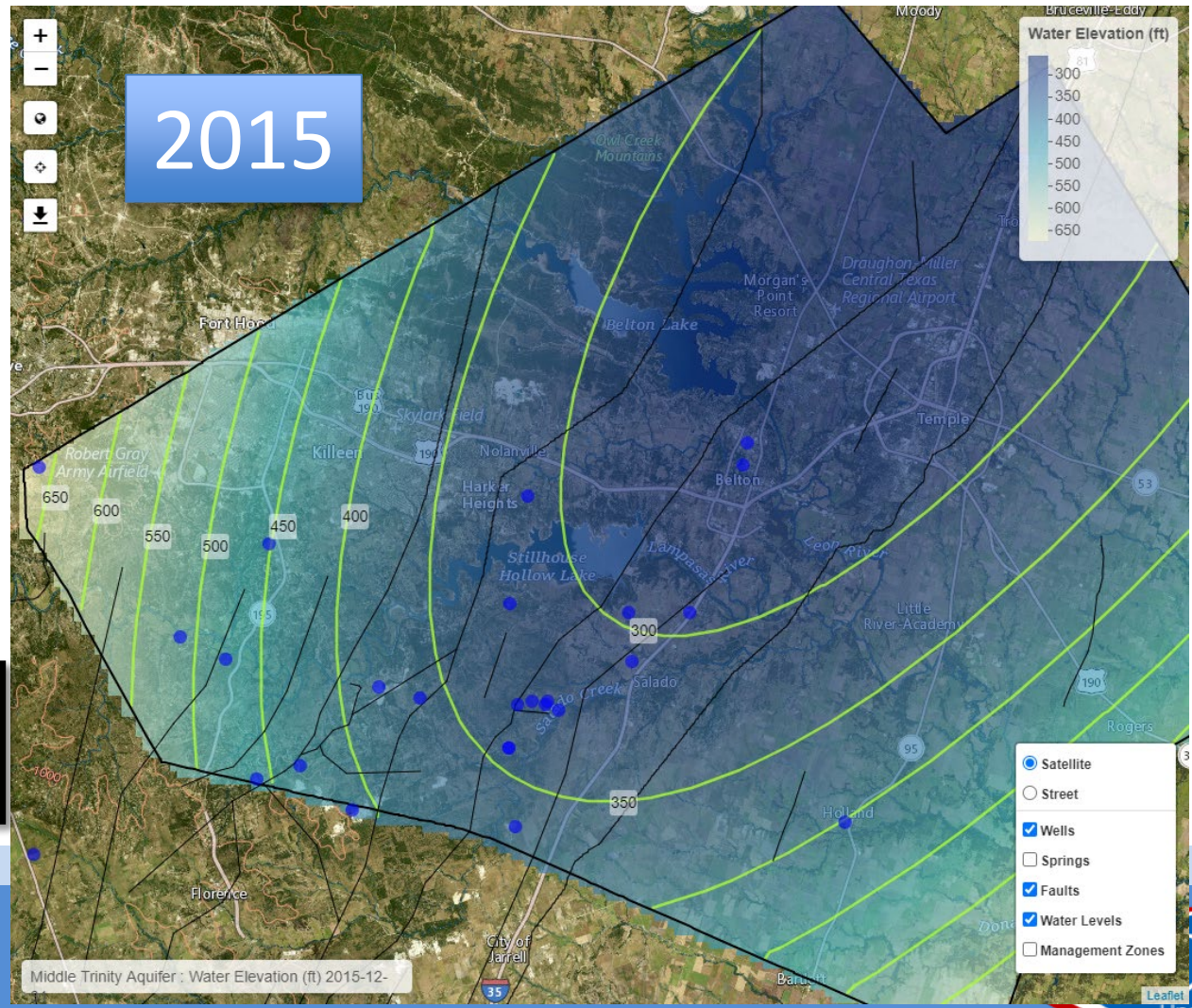
## 2010 - 2021





# CUWCD Aquifer Status Tool

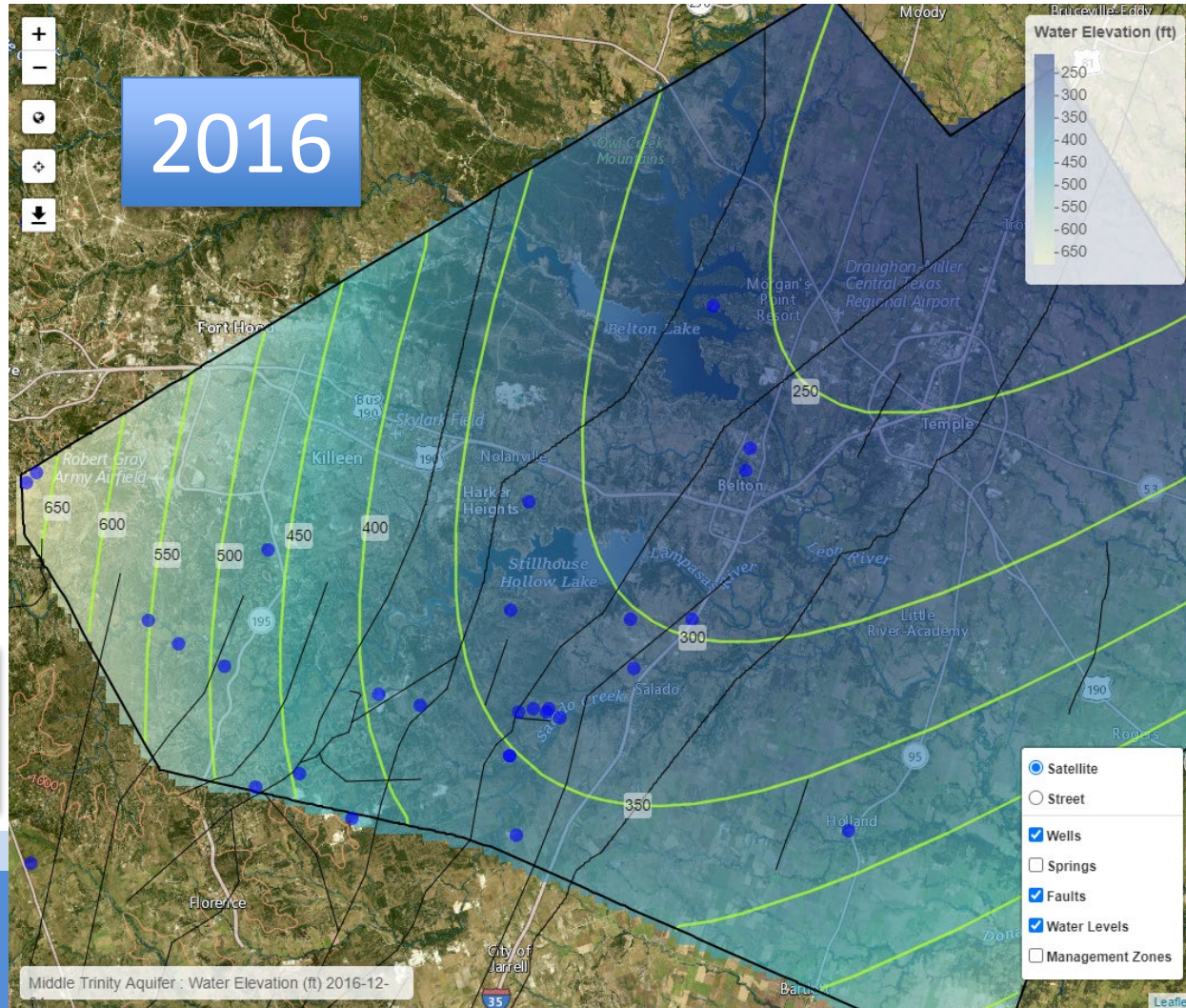
## 2010 - 2021





# CUWCD Aquifer Status Tool

## 2010 - 2021

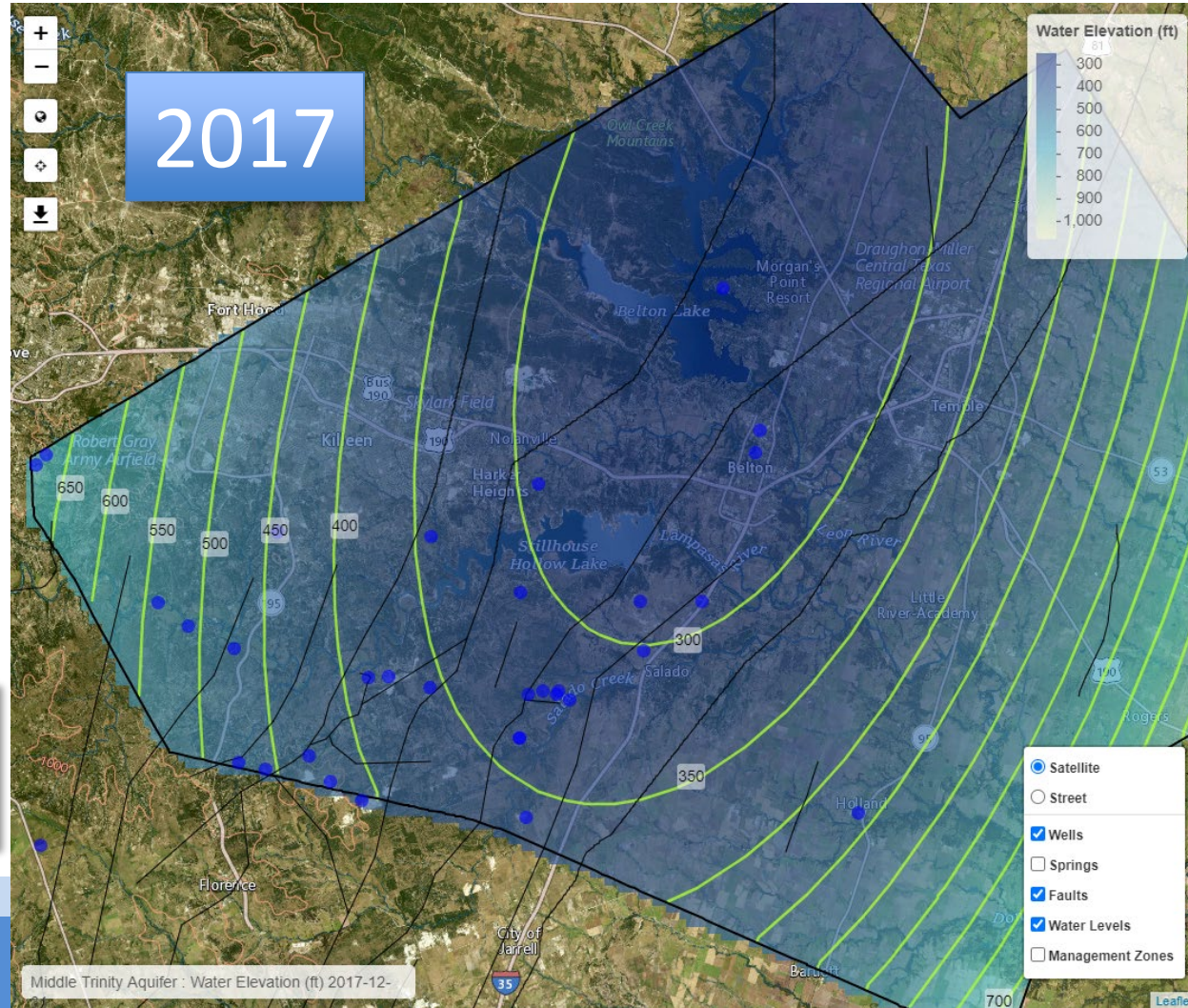






# CUWCD Aquifer Status Tool

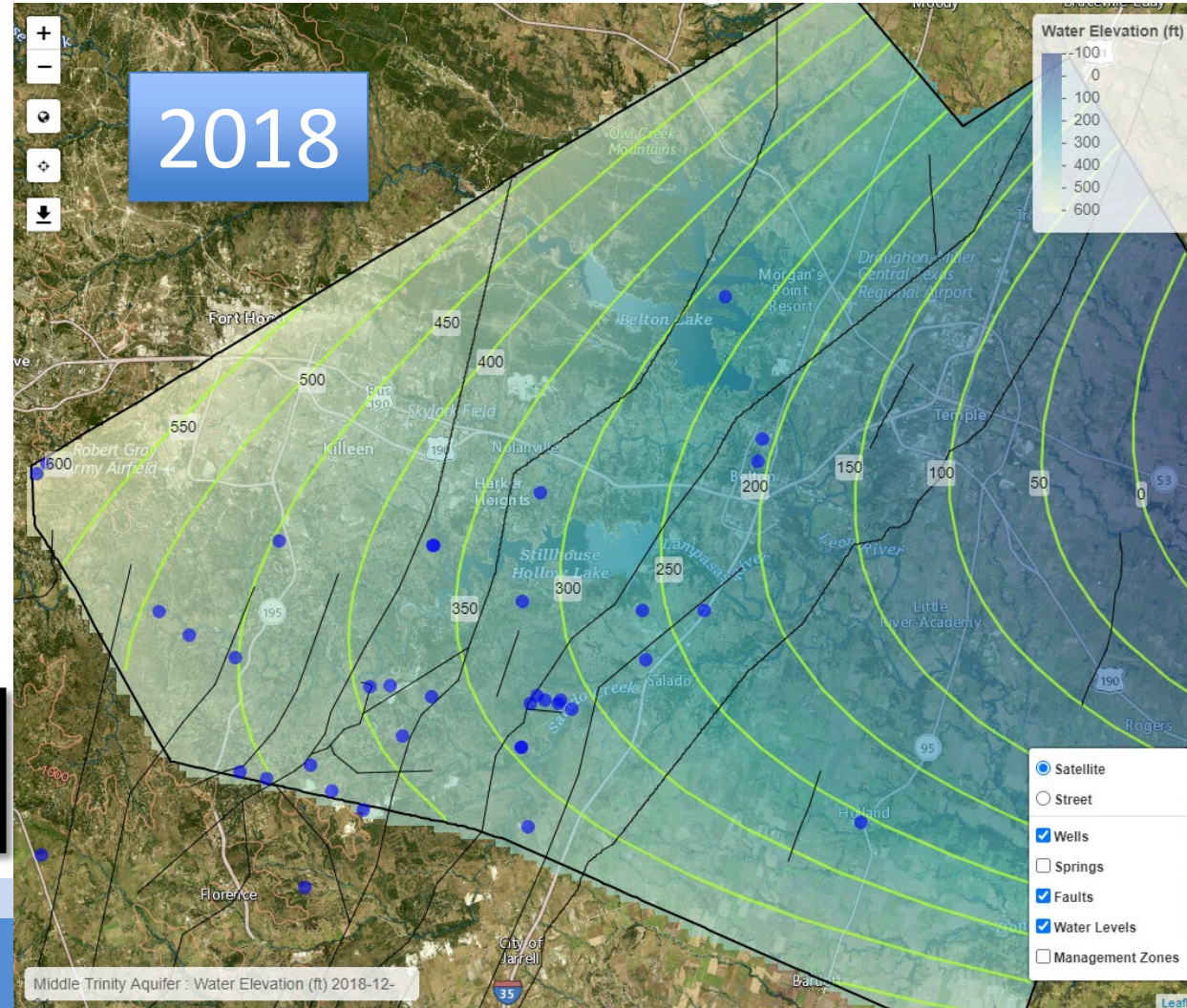
## 2010 - 2021





# CUWCD Aquifer Status Tool

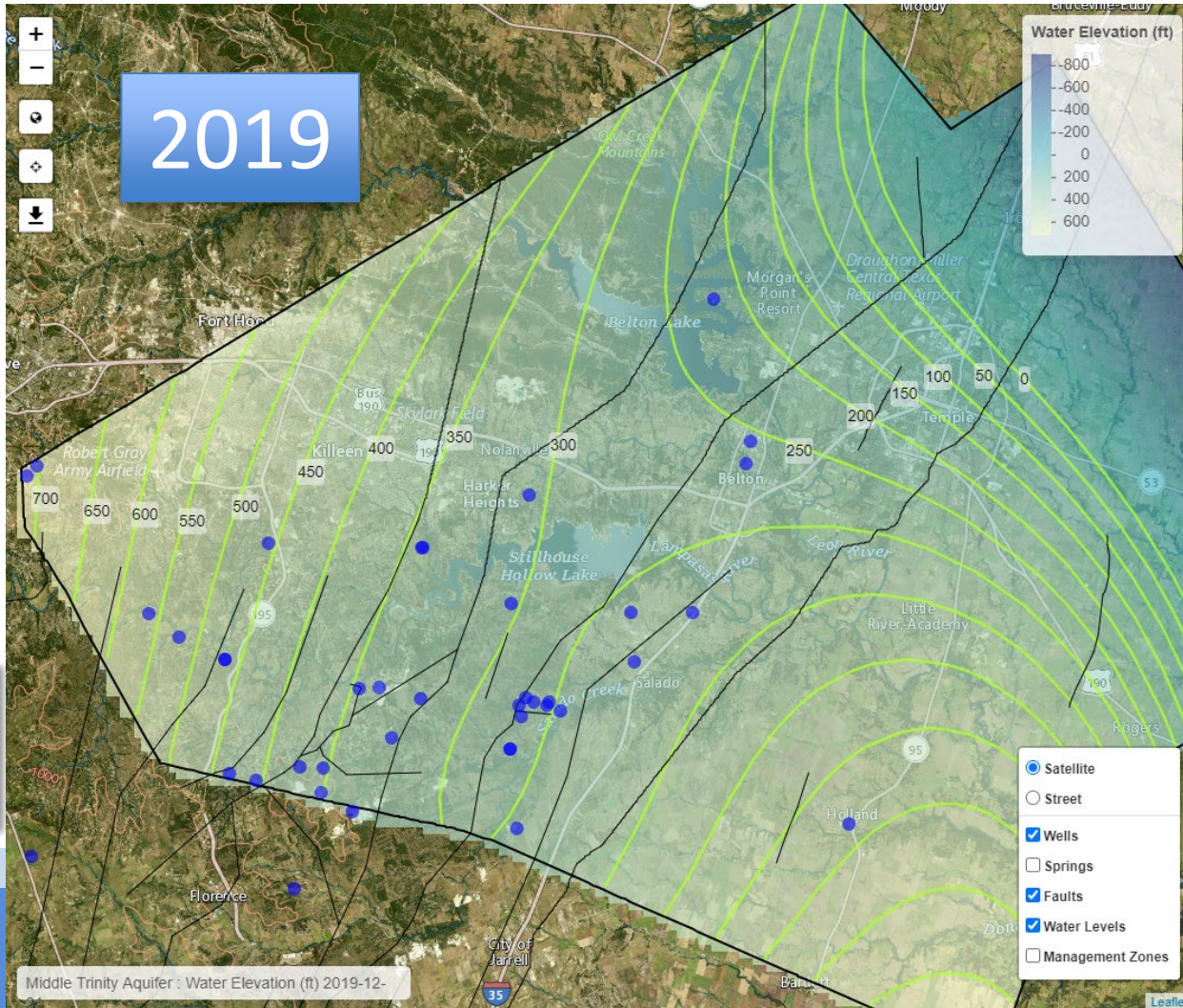
## 2010 - 2021





# CUWCD Aquifer Status Tool

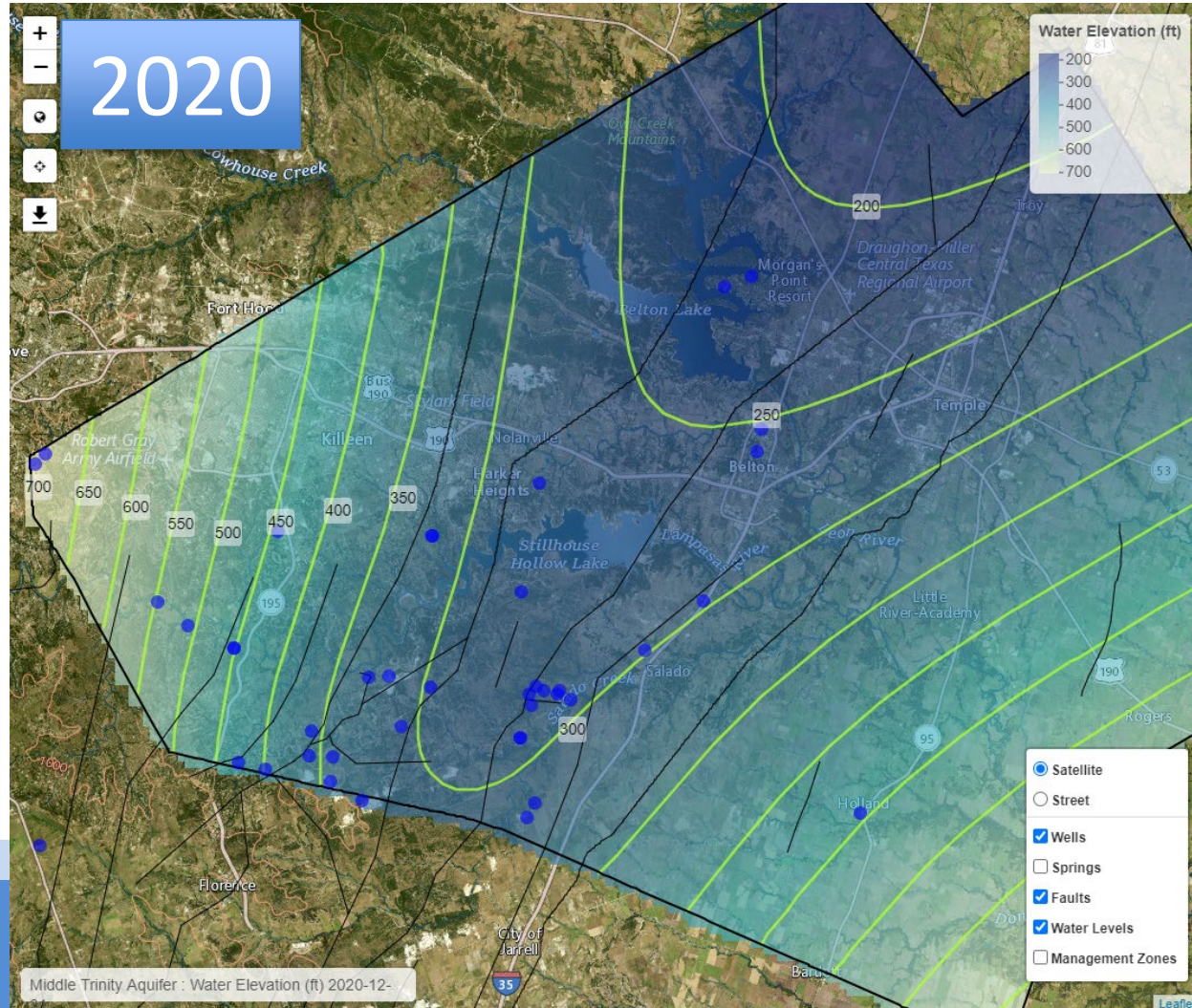
## 2010 - 2021





# CUWCD Aquifer Status Tool

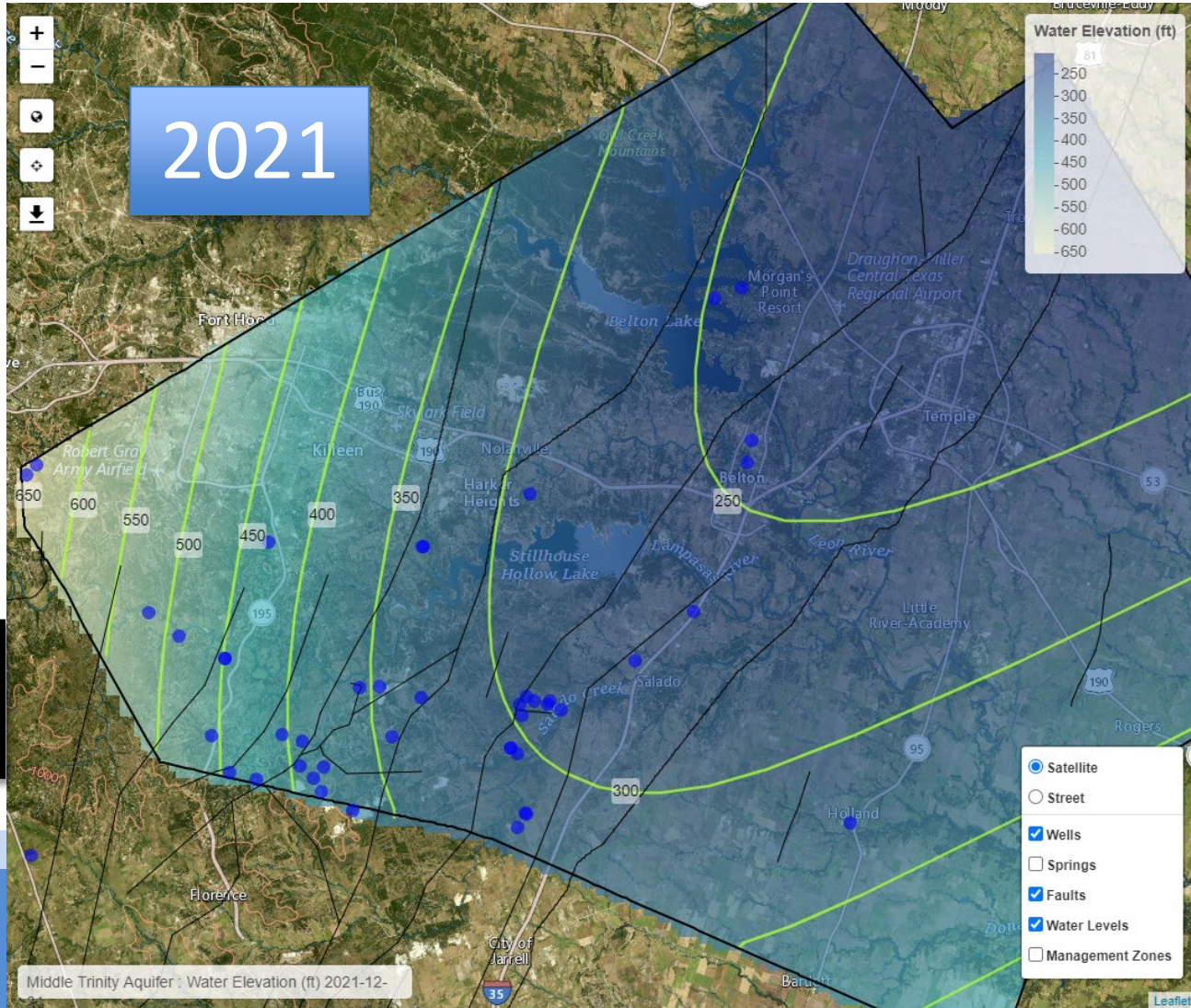
## 2010 - 2021





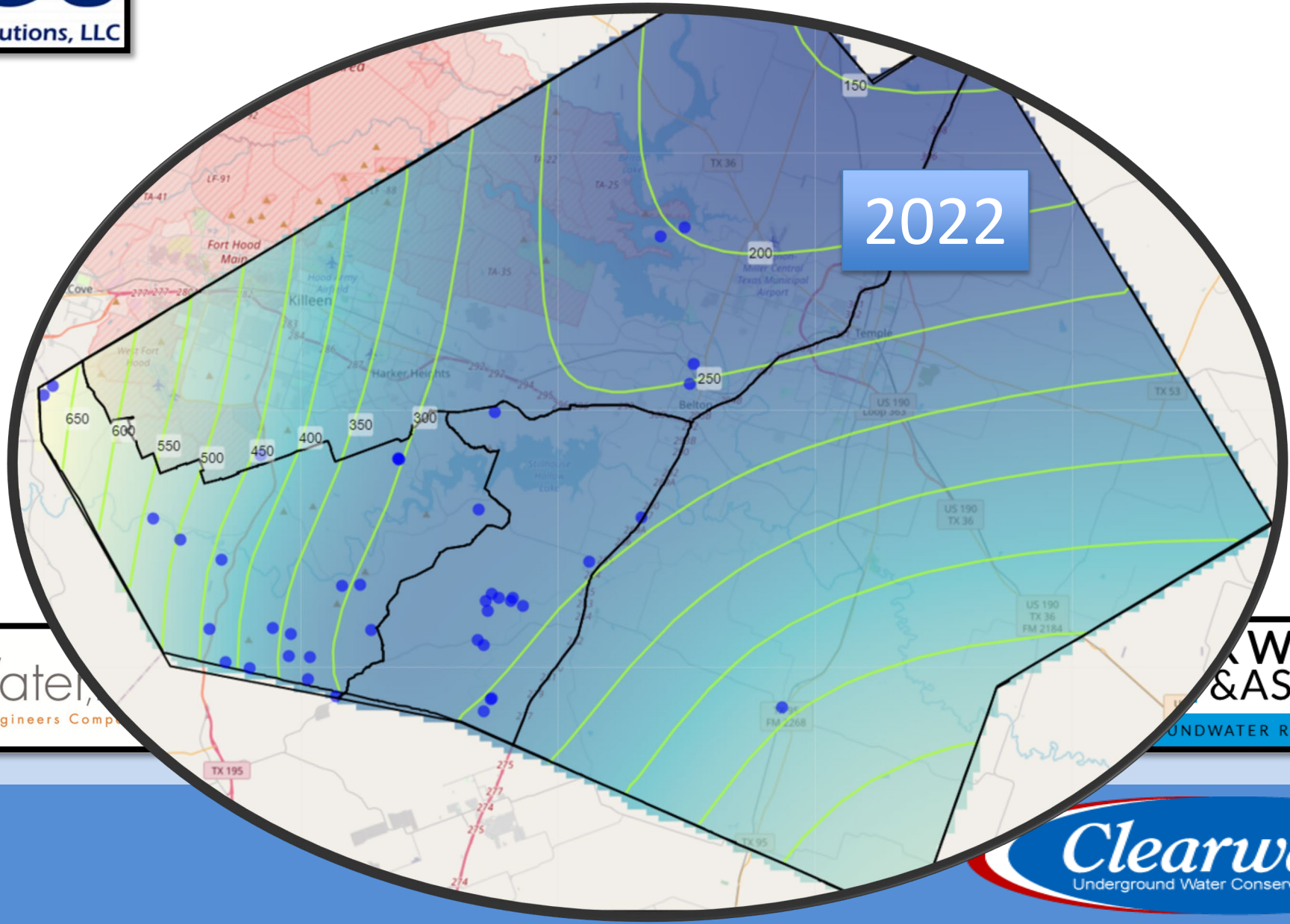
# CUWCD Aquifer Status Tool

## 2010 - 2021



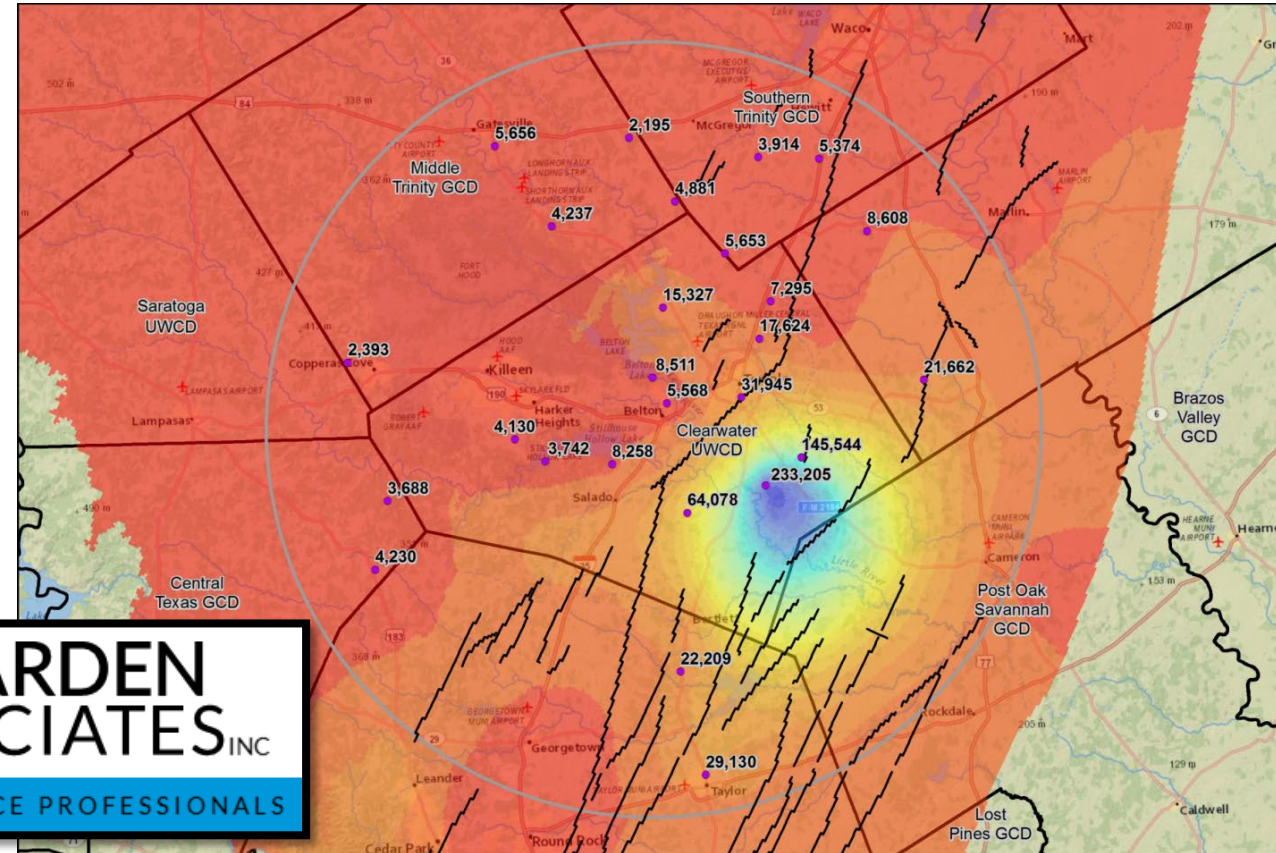


# CUWCD Aquifer Status Tool



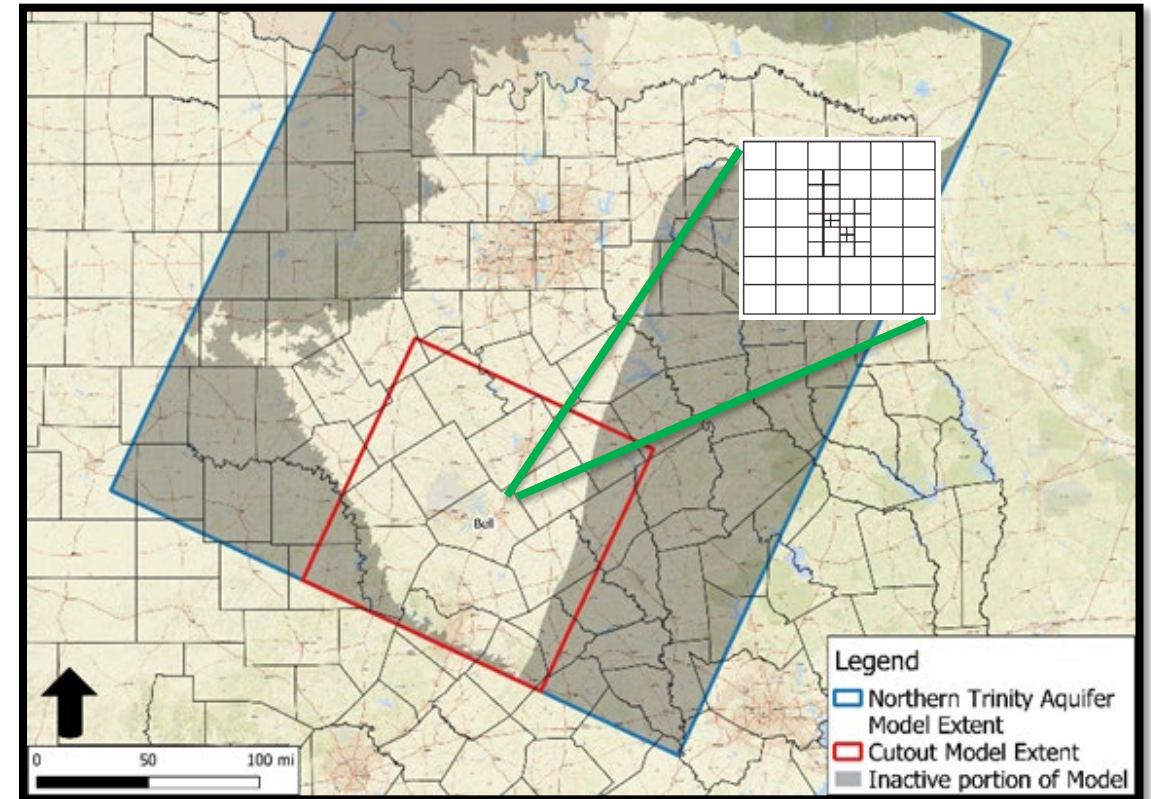
# “Current” CUWCD Modified GAM

- TWDB GAM parameters *did not* reasonably reflect observations
- Updated Lower Trinity T&S values
- No re-calibration of the model
- Used for District evaluations



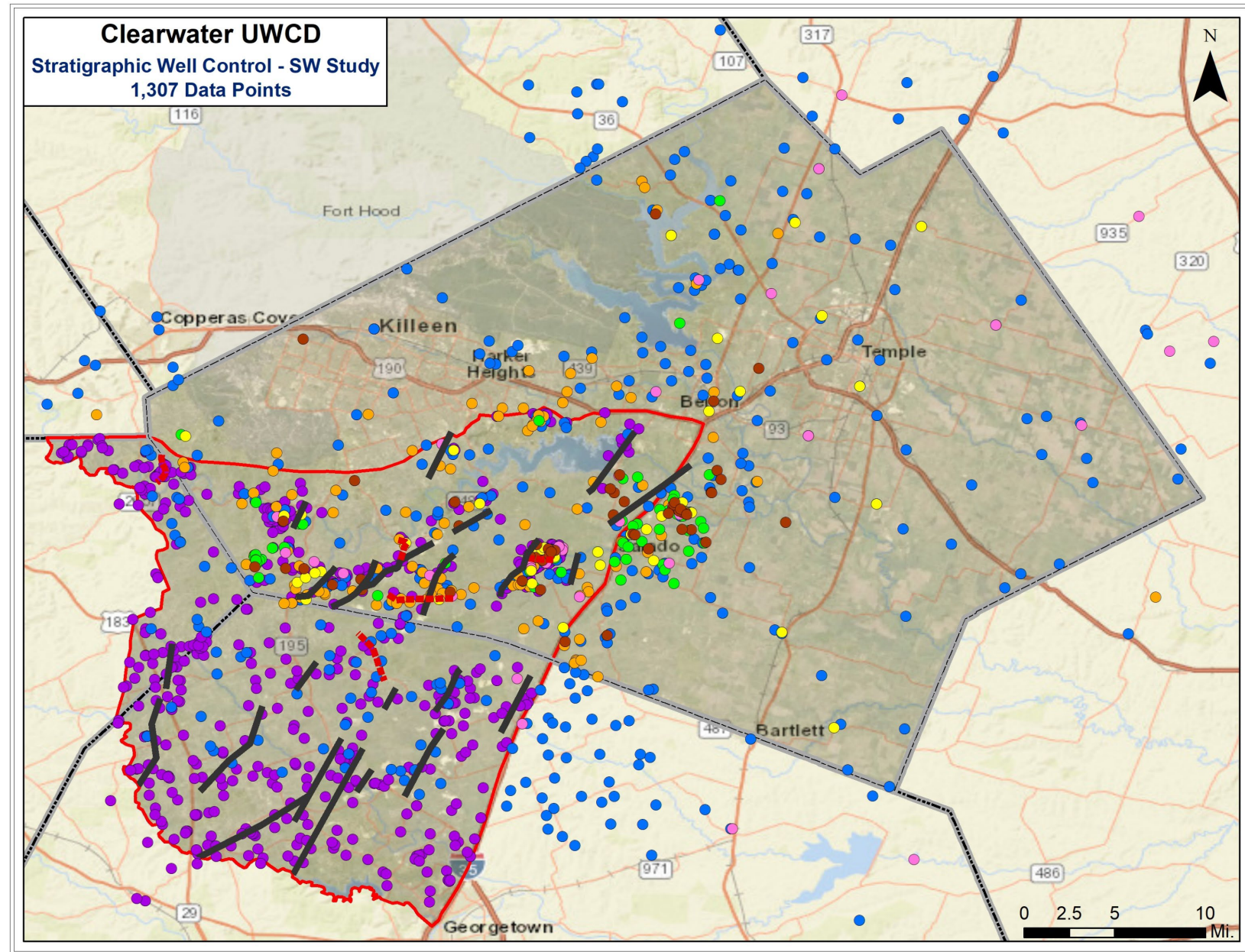
# Future Investment Proposed New CUWCD GAM

Develop	Develop smaller area model based on Bell County ASR model
Use	Use MODFLOW 6 code
Incorporate	Incorporate new pumping test results for Hensell and Hosston
Update	Update Bell County stratigraphy based on 3D model
Pumping	Update pumping
Calibrate	Calibrate the model with tight constraints on parameterization





# Stratigraphic Research



# Questions, Thoughts, Timeline

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

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