

Clearwater Source



Clearwater Underground Water Conservation District



www.cuwcd.org

2024 Annual Newsletter

October 2024

Volume 20, Issue 1

CALL TO ACTION : TURNING PLANS INTO PIPELINES



Since the impoundment of Lake Belton in 1954, Central Texas has had an abundant water supply for residents, businesses, and industry. Three generations have relied on that supply for their needs. Now, some 70 years later, new supply options are needed. Texas is the fastest growing state in the country, with Bell County and the Central Texas region growing at a faster rate than Texas. Growth along the Interstate 35 and Interstate 14 corridors is forecasted to continue for the foreseeable future.

Under the leadership of Bell County, several water purveyors, and stakeholders, discussions are occurring with the idea that a more regionalized approach to water planning and development is the best approach for meeting the needs of Central Texas over the next 70 years. Five benefits of actionable solutions include 1) meeting current water supply challenges, 2) economic development, 3) public health and safety, 4) environmental protection, and 5) long-term sustainability.

No single entity in the region has the capacity, either in existing water supply and/or infrastructure to meet the needs and challenges for the region with the anticipated demands of the growth and expansion that is forecasted. A consortium of entities, leveraging individual interests and resources, will help address this challenge.

Furthermore, a reliable regional water source is essential to support sustainable economic growth, enabling new businesses to establish themselves in the area and existing industries to expand without facing water-

related constraints. Paramount is the access to a secure and clean water supply is critical for public health, reducing the risk of waterborne diseases, and ensuring that residents have access to safe drinking water at all times. Leadership believes that developing a managed regional water source will also help protect local ecosystems by reducing the over-extraction of groundwater and preserving rivers and lakes from depletion and pollution. Ultimately, this investment would provide a long-term solution to water scarcity, ensuring that future generations have the resources they need to thrive in an increasingly volatile global water landscape.

The CUWCD Board of Directors and staff recognize the need for resiliency as we navigate growth and climate variability concerns from the citizens we serve in Bell County. This year's annual Bell County Water Symposium will be held on November 13th at the Cadence Bank Center in Belton.

Topics from featured speakers and the keynote address will be a "Call to Action". Since inception, Clearwater has spent over 1.3 million dollars in scientific endeavors to better understand both the resource and emerging technologies. To us, groundwater is no longer "so secret, occult, and concealed," and there are feasible strategies—like ASR—to pursue long-term solutions to meet the projected need in Bell County. More than a vision, the call to action is for Central Texas to start "Turning Plans into Pipelines" to ensure the viability of this precious resources for future generations.

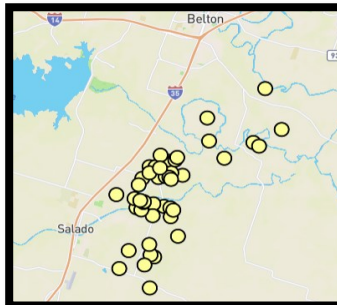
Dirk Aaron, General Manager
Clearwater UWCD

ELEVATED FLUORIDE IN THE EDWARDS

In 2015, CUWCD investigated water quality changes in the Edwards aquifer. Results from the investigation showed increasing levels of Fluoride in the groundwater. While Fluoride in drinking water is beneficial at low concentrations, levels in some areas of the Edwards aquifer (about 2 miles or more east of I-35) now exceed the maximum contaminant level for drinking water of 4.0 mg/L.

The Fluoride concentration in groundwater produced from the Edwards Aquifer is naturally occurring. That is, the element enters the water as the minerals that make up the rock comprising the aquifer dissolve. While it is naturally occurring, there are strategies well owners can use to reduce the water's fluoride concentration prior to consumption. An effective and common method is a reverse osmosis system either under your sink(s) or for the whole home.

The map above shows well points in the Edwards BFZ and Edwards Equivalent aquifers, screened for water quality by CUWCD, with elevated Fluoride levels at 4.0 or greater mg/L. To check the Fluoride concentration in your well water, a no-cost water screening by CUWCD is afforded annually to every well owner in Bell County.



CUWCD MAINTAINS COMMITMENT TO NO-NEW REVENUE RATE

Clearwater UWCD proudly reaffirms its longstanding commitment to maintaining a no-new revenue property tax rate. The Board adopted the rate of \$0.002230 per \$100 of assessed valuation, costing the average Bell County homeowner about \$6.09 on the average appraised value of a residence. This rate reflects our dedication to fiscal responsibility and community service.



At the heart of our mission is the development and application of the best available science to inform our policy decisions. We believe that sound science is the cornerstone of effective water resource management. Our qualified staff conducts research to support policies that protect groundwater now and for future generations. These science-driven decisions are transparent and benefit the community.

We also ensure efficient financial management, balancing operational needs with minimizing taxpayer costs. Our continued focus on fiscal responsibility strengthens the long-term resiliency of the District.

Engaging with Bell County residents remains a key priority. We actively listen to their concerns and provide information while our dedicated staff delivers the highest level of service. Clearwater UWCD will continue to protect groundwater, maintain transparency, and uphold the trust of the community.

Leland Gersbach, Board President
Clearwater UWCD

BOARD OF DIRECTORS

Leland Gersbach - Precinct 1
2013-Present (President)

Jody Williams - Precinct 3
2018-Present (Vice President)

Gary Young - Precinct 2
2014-Present (Secretary)

Scott Brooks - Precinct 4
2018-Present (Director)

James Brown - At Large
2023-Present (Director)

MISSION STATEMENT

To implement an efficient, economical, and environmentally sound groundwater management program to protect and enhance the water resources of the District.

WATER QUALITY SCREENING

The District's in-house lab offers registered well owners free screening for common constituents and bacteria. Annual screening is recommended.

Join the District for the 23rd Annual *Bell County Water Symposium*

November 13, 2024

8:00 AM - 3:30 PM

Cadence Bank Center - Assembly Hall

****This event is free but requires RSVP by November 8th****

Phone: 254-933-0120

Email: tsmith@cuwcd.org

Noon Lunch Provided

Call to Action: Turning Plans into Pipelines

Featured Presentations

A Tale of Two Trinities

Dr. Neil Deeds

Vice President, Principal Water Resources Engineer, INTERA Inc.

Communication: The Last Frontier in Science

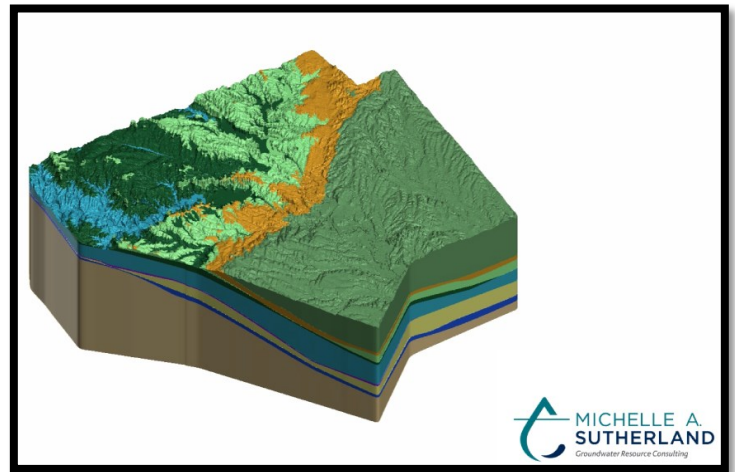
Dr. Hal Needham

Extreme Weather & Disaster Scientist

3-D MODEL OF BELL COUNTY AQUIFERS FOR LANDOWNERS

In 2014 the Board had Mr. Allan Standen prepare and develop a 3-D Model of the District and its aquifers. The finished model is has been complete for 9 years and is calibrated annually therefore it is the primary tool for landowners to accurately understand the stratigraphy below their property. To use this tool (the Virtual Bore), call the CUWCD office and ask staff for assistance. The tool allows us to offer the best information as it relates to groundwater at any given location. Models are not perfect so this model requires annual calibration and updating as new information becomes available. Upon request, we are willing to assist landowners who need information on their land and its groundwater resources.

We also encourage well owners to make sure that our files are complete on their respective wells. We acknowledge that a well is a tremendous financial asset when properly registered and constructed in accordance with the Texas Department of Licensing and Regulations. Clearwater UWCD communicates with local and region wide well drillers and pump installers on the State rules of construction and completion of wells and ensures that those rules are adhered to on behalf of the well owner.



MICHELLE A. SUTHERLAND
Groundwater Resource Consulting

CUWCD INVESTS IN DATA ANALYSIS TOOLS

Over the past decade, CUWCD has prioritized investment in scientific research, data analysis tools, and groundwater flow modeling to help the Board of Directors with making informed decisions regarding management of Bell County's groundwater resources. An example of the culmination of these efforts is the Board's application of research to aid with the delineation of District management zones. The research also guided the development of data analysis tools used in permitting and assessing the condition of the aquifers as well as the development of the Clearwater Groundwater Management Model.

In August of this year, the CUWCD Board once again invested in technology tools to help them manage the groundwater resources of Bell County. In addition to resource management, the Board foresees these tools as effective means for communicating aquifer conditions with the goal of making these tools accessible through the District's website. The two tools the Board approved for improvement and development are (1) the Aquifer Status Tool, and (2) the Clearwater Groundwater Management Model Dashboard.

CUWCD currently maintains water-level measurements for 1,350 wells in Bell County. Of these 1,350 wells, 168 wells have three or more water-level measurements collected over time. While most of the water-level data have been collected in the last 15 years under the direction of CUWCD, there are a few wells with water-level data spanning more than 50 years. While these data by themselves are informative, water levels by themselves may not mean much to most people. However, through a few relatively simple evaluations the data provide tremendous insight into the condition of the Bell County groundwater resources. A challenge for the District is: How can we efficiently use the data to communicate information and conditions about the managed aquifers?

This tool evaluates water-level data from each well to calculate the long-term trend. The tool then recalculates the trend for each monitoring well

when new water-level measurements are collected. The District is then able to quickly access these automated evaluations when considering the trend in water level relative to the adopted desired future conditions or how a new permit may affect the water-level trend.

In 2023, CUWCD developed a local groundwater flow model to aid with aquifer management called the Clearwater Groundwater Management Model ("CGMM"). The CGMM is a revision of the regional groundwater model used for joint planning with other groundwater conservation Districts. The CGMM is focused on Bell County with the properties of the model updated based on the scientific research conducted over the last several years. While the CGMM is robust model for the District to use in evaluating permit applications and considering various desired future conditions for the aquifers, it is not easily accessible for District staff.

To make the CGMM more accessible, the Board approved development of a dashboard that will allow District staff to add potential operating permits or pumping scenarios to the model. The dashboard will allow the District staff to simulate the pumping and then visualize the model results. The purpose of the tool is to make the CGMM and other future groundwater mathematical models more accessible to District staff and constituents.

The investments by CUWCD in improving the understanding of the local aquifers and making that understanding accessible to the public keep CUWCD at the forefront of groundwater management in Texas. The data collection and analysis provide transparency regarding the conditions of the aquifers in Bell County and inform our understanding of aquifer conditions in neighboring areas which may impact Bell County. The tools being developed and improved will continue to improve CUWCD's ability to effectively manage our local groundwater resources.

Mike Keester, Principal
KT Groundwater

CONTINUING EFFORTS TO ESTABLISH ASR IN BELL COUNTY

Under the leadership of Judge David Blackburn and CUWCD Manager Dirk Aaron, Bell County launched a county wide Aquifer Storage and Recovery (ASR) study. These projects aim to assess the feasibility of using ASR to address the region's water needs. This past spring, two concurrent Aquifer Analysis projects were underway as a result of that preliminary initiative. Both efforts centered on the Lower Trinity, or the Hosston formation. Fort Cavazos is pursuing ASR as a means to mitigate chronic drought effects or curtailments and a means of replacement water supply in an emergency outage situation lasting only a few days. The City of Temple site, about 16 miles to the east, is looking to establish a source for industrial uses in an area of their city with particularly large users. They are seeking approval to use fully treated wastewater effluent for injection and storage so that this non-potable water could be used during drought or curtailments but primarily to support a growing industrial base on the east side of the city. Both of these projects were led by Dr. Neil Deeds of INTERA Inc., Georgetown, Texas.

The **Fort Cavazos Project** included drilling a monitor well and a small production well as there is very little data on the Hosston in the area on the Military Reservation near North Nolan Road and the Boy Scout Campground. Desktop data suggested that the Hosston would be 850 to 950 feet below ground level at the targeted location. INTERA established that there were three fatal flaws that could occur during the drilling phase that would deem an ASR project at this site infeasible: 1) The Hosston/Lower Trinity is not present, or very thin. 2) The lithology in the Hosston has high percentage of clays/shales. 3) The static water level is too deep leaving insufficient available drawdown for production.

The Hosston was found to be only 60 feet thick at this location, but the size and shape of the large sand and small gravel was very promising that the formation could support the Fort Cavazos criteria for ASR which were: 1) To mitigate the effects of a chronic drought (5 months), Fort Cavazos determined 2 million gallons per day of ASR water would be needed and 2) To sustain services during an emergency outage at the Belton Water Treatment Plant, 4 million gallons per day would be needed for up to 15 days.

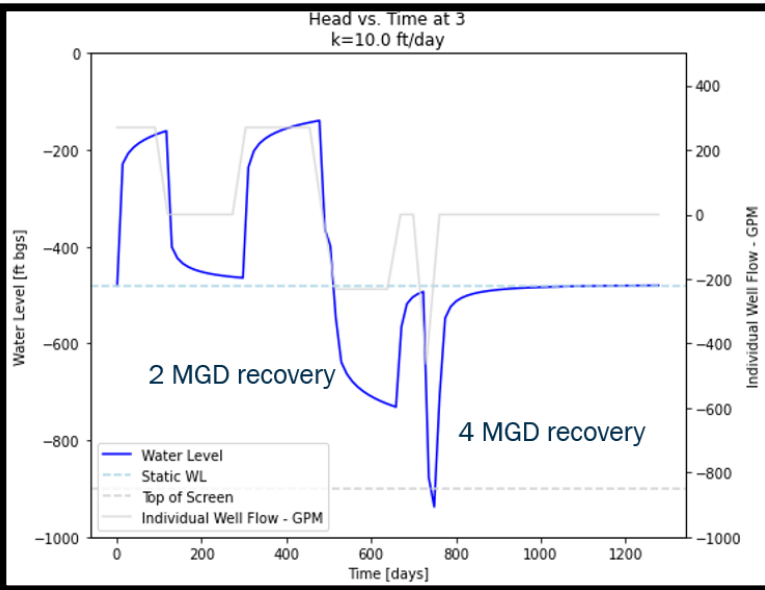
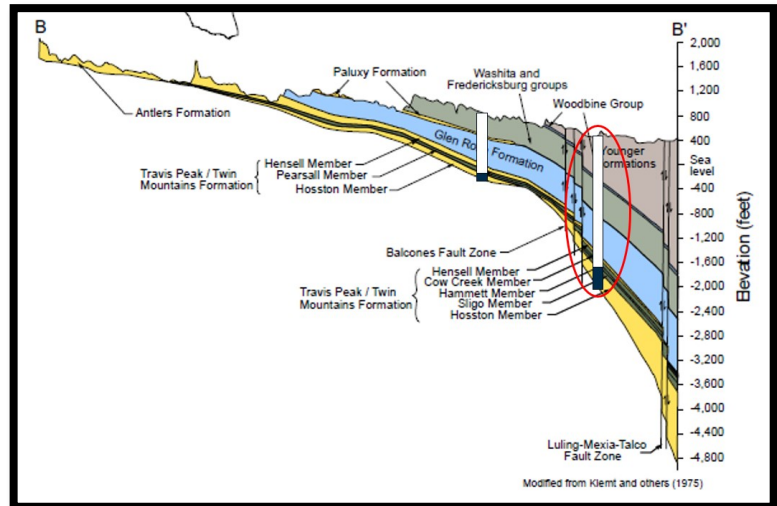
The static water level at the well location was 485 feet below the ground surface while the bottom of the upper confining layer is at 940 feet below the surface. A hydrogeologic model was developed using the findings from

the monitoring well and the test well. The graph on the left shows that the first criteria by Fort Cavazos staff, of 2 million gallons per day for 15 weeks is attainable. The second criteria of 4 million gallons per day shows to slightly overdraft the aquifer, but so slightly that Dr. Deeds is confident that with minor changes to well spacing and configuration, both criteria will be met.

Aside from proving there were no fatal flaws, this project has a lot of potential for water supply purposes. First, the wellfield will be entirely on the Fort Cavazos Military Reservation. Second, their water supply line from Bell County Water Control & Improvement District #1 (WCID 1) is within 100 feet from the test wells. Once a wellfield is established, the infrastructure cost for injection and withdrawal will be nominal. Third, there is no record of a Hosston well owner anywhere in that area even off the reservation, meaning storage and withdrawal will not affect any nearby well owners. Fourth, at this far west location, well depth is only about 1,000 feet for a Hosston well, meaning cost is relatively cheap in terms of water production wells.

With all of this potential, Fort Cavazos and WCID 1 have awarded a project to Camp Dresser & McKee-Smith (CDM-Smith) and INTERA Inc. to develop a 30% wellfield design and provide buildout costs for the wellfield for full scale ASR to meet their objectives.

The **City of Temple Well Project**, being 16 miles east of the Fort Cavazos site is a very different Hosston story. The Hosston is much deeper and much thicker as shown on the geologic cross section below.



Since the aquifer at the Temple site has been studied with extensive data on hand, the objectives were not exploratory. The objectives provided to INTERA were to: 1) Construct a Lower Trinity well to provide a water supply to an industrial partner (data center) southeast of town, 2) Construct well to meet UIC requirement for ASR (e.g. HSLA steel casing), and 3) Potentially convert well to ASR in the future, with recycled water as a source.

The well did not disappoint! The formation is more than 300 feet thick with extraordinary lithology for water production and storage purposes. Initial testing indicates more than 2,000 gallons per minute is possible without impacting any neighboring well owners.

The City of Temple intends to pursue ASR and use recycled water for injection purposes as a significant water conservation strategy for industrial, non-potable uses to support their growing industrial district.

(continued on page 4)



Contact Us



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Contact the District office if you would like to be added to our e-mail list for more frequent updates.

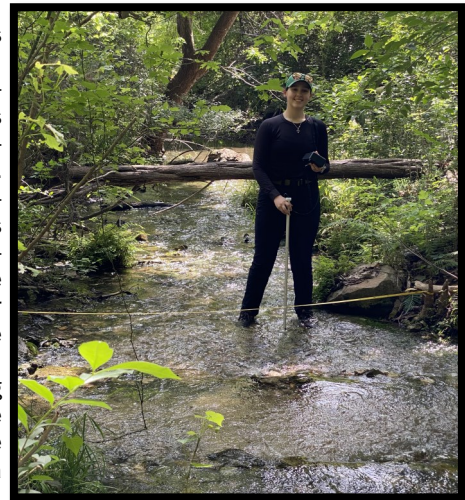


BAYLOR GEOSCIENCE WORKS WITH CUWCD

Several people have used tracers to learn more about flow in the Edwards aquifer near the Downtown Salado Spring Complex (DSSC) but Toluwaleke Ajayi (A.J.) is the first person to “model” the flow in this area using dye tracing techniques. A.J. is a Ph.D. student working with Dr. Joe C. Yelderman Jr. (Dr. Joe), a hydrogeology professor and Chair of Geosciences at Baylor University. Dr. Joe placed dye in the Stagecoach Inn Cave Well (Cave Well) and A.J. along with Wayne Hamilton (Baylor scientist), monitored the flow from Big Boiling, Doc Benedict, Anderson, and Critchfield springs. Results confirmed previous work by Dr. Stephanie Wong indicating all the springs are connected. The more quantitative measurements by A.J. showed that 73% of the dye traveled to Big Boiling Spring, 7.76% traveled to Anderson Spring, and 4.3% traveled to Doc Benedict Spring. Under the flow conditions during the dye test the first arrival of dye traveled from the Cave Well to Big Boiling Spring in 45 minutes and peaked shortly after only one hour. Finally, 14% of the dye was undetected after 72 hours indicating some of the dye remained in immobile regions of the aquifer. This information can be used to help protect and manage groundwater in this area of the Edwards aquifer. The complete results from A.J.’s research will be available to CUWCD and the public after A.J.’s paper is reviewed and hopefully published in the journal *Water* later this year.



Elena Muir, Baylor University Geosciences graduate student, is working on a project to study reservoir and aquifer interaction. Her thesis titled “The interactions of Stillhouse Hollow and Belton Reservoirs with the Trinity and Edwards aquifers of Central Texas” centers on the effects that infrastructure from the 1950-1960’s may have on the local groundwater. Her project team is sampling springs and wells from the Edwards Balcones Fault Zone and the Trinity aquifers. 2 reservoirs, 10 springs, and 40 wells are included in the study where Muir analyzes historic water levels and conducts chemical sampling. The data collection utilizes loggers that are deployed in select springs. Water samples from wells and springs are used to detect the chemical and isotopic composition. The research is well underway. Selected well owners were contacted, well sampling has begun, and the creation of a rating curve for Tahuaya Spring to measure the discharge is in progress. Additionally, Muir is planning to investigate potential lake leakage through tracing the residual signature of zebra mussel “eDNA” in the water.



CONTINUING EFFORTS TO ESTABLISH ASR IN BELL COUNTY

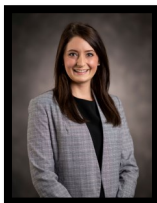


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These two Bell County sites establish that Lower Trinity (Hosston) ASR is feasible for drought mitigation, emergency supply for short duration on the western edge of the formation and also feasible for large industrial uses and additional water supply in the area just east of Temple. Water scarcity is a growing problem in Texas, particularly in the rapid growing area of Central Texas along the Interstate 35 corridor. Additional sources of supply are extremely expensive and usually not readily available. It is absolutely critical that innovative approaches to extending the supplies we have, such as ASR, be a major component of a long-term water supply strategy in the Bell County area.

Ricky Garrett, General Manager
WCID 1

CUWCD HIRES ASSISTANT GENERAL MANAGER



Whitney Ingram joined CUWCD as Assistant General Manager on March 1, 2024. She works closely with the GM, staff, and Board of Directors to provide groundwater regulation and education. This position serves as the primary contact for the District’s communication and outreach while participating in scientific endeavors, strategic planning, reporting, and accountability. Ingram will also represent CUWCD on water-related coalitions and at conferences.

CUWCD ACTIVE WELL REGISTRATION TOTALS

| AQUIFER | EXEMPT WELLS | NON-EXEMPT WELLS | MONITOR WELLS |
|---------------------------|--------------|------------------|---------------|
| GLEN ROSE (UPPER TRINITY) | 433 | 7 | 5 |
| HENSELL (MIDDLE TRINITY) | 1,065 | 32 | 48 |
| HOSSTON (LOWER TRINITY) | 206 | 34 | 27 |
| EDWARDS BFZ | 915 | 64 | 46 |
| MINOR AQUIFERS & ALLUVIUM | 1,639 | 24 | 3 |
| TOTALS | 4,258 | 161 | 129 |