UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT

ANNUAL REPORT FOR YEAR ENDING DECEMBER 31, 2019

Upper Trinity Groundwater Conservation District

2019 Anual Report

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General Manager's Report 2019

The adoption of District Rules in the summer of 2019 was the most notable event of the year, with the process dominating the first 8 months of 2019. The outcome was a result of multiple hearings and compromise based on input from stakeholders and local leadership. Because of that process, I feel that the final result is a set of rules that establish a framework to allow for the highest practicable level of groundwater production while also putting in place tools that will allow the District to conserve and preserve the groundwater resources within the District.

The District also continued to invest in the development of resources to expand the knowledge, data, and science available which further ensures that decisions are based on the best available science. To that end, the District has developed web based tools to standardize the methodology for calculating water level trends and to fully utilize the Norther Trinity GAM for planning and permit evaluation. Furthermore, the District is now one of the very few GCDs in the state with geophysical logging equipment, which will allow the District to map and better understand the subsurface within our boundaries.

The District also welcomed a new Board Member, Jarrod Reynolds, from Hood County. Although we were sad to say farewell to Director Massey, who was an original Board Member and the first Board President, Director Reynolds brings a wealth of knowledge, in regard to groundwater resources, to the Board.

Finally, I am happy to report that the District met or exceeded each Management Plan objective, as set forth in our Management Plan, for 2019. Furthermore, an independent auditor has reported favorably in regard to the District's financial position.

Below are a few highlights from 2019:

Staff:

- Continuation of Summer Internship Program – Three Summer interns.
- Upon receiving his Professional Geoscientist license, Blaine Hicks was promoted to Staff Geologist.
- Kyle Russell was promoted to Permitting and Registration Coordinator.
- Jill Garcia was hired to fill the vacant Education and Outreach Coordinator position.
- Leisha Mazanec was hired to fill the vacant Field Technician position.

Other Notable Accomplishments:

- Adopted District Rules in August of 2019.
- Purchased geophysical logging rig.
- Developed several web based tools to utilize the Northern Trinity GAM and to standardize water level trend analysis methodology.
- Jarrod Reynolds joined us as a member of the Board representing Hood County.

District staff is pleased to submit the remainder of this report, to the Board, to highlight the fulfillment of our objectives.

Doug Shaw
General Manager

Brief History 2019

- ✓ In 2006, based on data from the Texas Water Development Board (TWDB) and the Texas Commission on Environmental Quality (TCEQ), the counties of Montague, Wise, Parker, and Hood were included in the designation of the North Texas Priority Groundwater Management Area (PGMA).

- ✓ In 2007, the 80th Texas Legislature created the Upper Trinity Groundwater Conservation District (UTGCD).

- ✓ In November 2007, over 78 percent of voting residents within the District's four counties approved creation of the groundwater conservation district.

- ✓ On November 30, 2009, the Board of Directors of the UTGCD revised and adopted the Temporary Rules for Water Wells; they allow the District to enforce spacing regulations between wells and minimum distance from property boundaries for water wells drilled after January 1, 2009.

- ✓ In 2017, UTGCD purchased property in Springtown, Parker County to build a new District office and education center, and in 2018 the District moved into the new facility.

- ✓ On October 15, 2018, the Board of Directors adopted a revised District Management Plan. Its Objectives and Performance Standards are discussed on the following pages.

- ✓ On August 19, 2019, UTGCD adopted updated Rules for Water Wells in Hood, Montague, Parker, and Wise Counties, Texas, which now include permitting requirements for nonexempt water wells.

Mission Statement

The Mission of the Upper Trinity Groundwater Conservation District is to develop rules to provide protection to existing wells, prevent waste, promote conservation, provide a framework that will allow availability and accessibility of groundwater for future generations, protect the quality of the groundwater in the recharge zone of the aquifer, ensure that the residents of Montague, Wise, Parker, and Hood Counties maintain local control over their groundwater, respect and protect the property rights of landowners in groundwater, and operate the District in a fair and equitable manner for all residents of the District.

District Staff

Doug Shaw
General Manager

Kyle Russell
Assistant General Manager

Ann Devenney
Office Manager

Blaine Hicks, P.G.
Staff Geologist

Jill Garcia
Education/PR Coordinator

Laina Furlong
Office Assistant

Jennifer Hachtel
Data Coordinator

Leisha Mazanec
Field Technician

Jacob Dove
Field Technician

Jay Love
Reporting Compliance Coordinator

Board of Directors

The Board of Directors of the Upper Trinity Groundwater Conservation District is composed of two members, per county, appointed by their county's Commissioners' Court. In a Regular Board Meeting on July 15, 2019, the Board of Directors elected District Officers to serve two-year terms ending July 2021. The appointments are as follows:

Tracy Mesler – President	Montague County
Richard English – Vice President	Hood County
Tim Watts – Secretary/Treasurer	Parker County
Mike Massey – Assistant Secretary (through May 2019)	Hood County
Jarrod Reynolds – Assistant Secretary (June 2019)	Hood County
Mike Berkley – Assistant Secretary	Montague County
Shannon Nave– Assistant Secretary	Parker County
Donald Majka – Assistant Secretary	Wise County
Brent Wilson– Assistant Secretary	Wise County

Board of Directors

The District's Management Plan sets forth a methodology for tracking the District's progress in achieving management goals. The Plan requires the District to prepare an Annual Report to the District's Board of Directors, which must contain an update on the District's performance in regard to achieving management goals and objectives. This report is intended to satisfy the annual reporting requirements of the District's Management Plan. After adoption by the Board of Directors, the Annual Report is made available to the public.

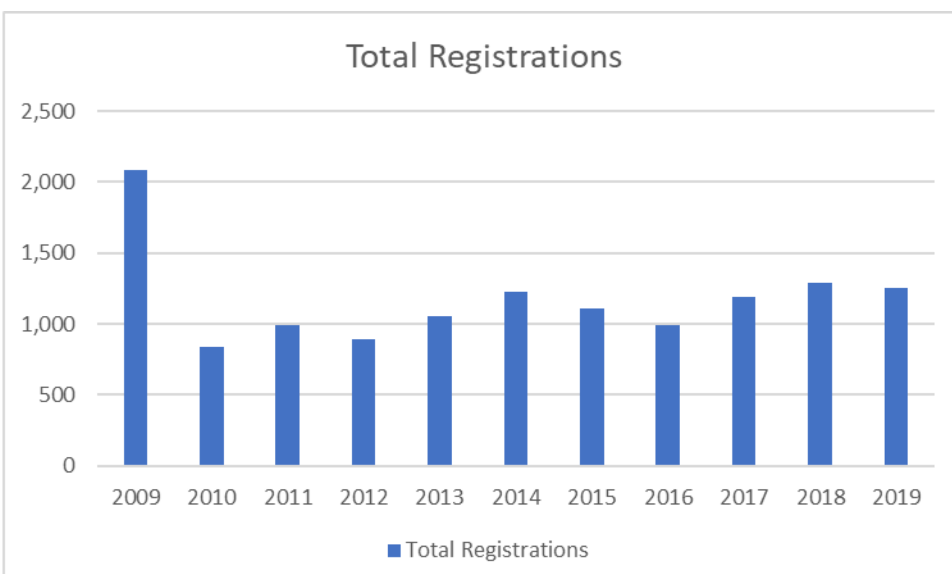
Well Registrations 2019

A1. Objective - Each year the District will require registration of all new wells within the District.

A.1 Performance Standard - Annual reporting of well registration statistics will be included in the Annual Report provided to the Board of Directors.

The Distric Rules for Water Wells require any water well drilled on or after January 1, 2009 to be registered with the District. Furthermore, the District requires owners of all operational nonexempt wells to register their wells and report monthly usage. Owners of any exempt well drilled prior to 2009 may voluntarily register their wells. The District received 38 less water well registrations in 2019 than in 2018. While Wise and Montague counties had fewer well registrations than the previous year, Parker and Hood had 87 and 4 more, respectively.

County	Exempt	Nonexempt	Existing	New	Total
Hood	88	3	7	84	**91**
Montague	84	0	7	77	**84**
Parker	670	29	104	595	**699**
Wise	375	3	25	353	**378**
Total	**1,217**	**35**	**143**	**1,109**	**1,252**



Groundwater Production Report 2019

A.2 Objective - Each year the District will monitor annual production from all non-exempt wells within the District.

A.2 Performance Standard - The District will require installation of meters on all non-exempt wells and reporting of production to the District. The annual production of groundwater from non-exempt wells will be included in the Annual Report provided to the Board of Directors.

The District has adopted rules requiring metering, reporting and fee payment for all wells determined to subject to those requirements (nonexempt wells). Owners/Operators of these nonexempt wells must report groundwater production semi-annually and pay water usage fees, set annually by the Board.

In 2019, Public Water Supply production accounted for approximately 90% of total groundwater extracted from nonexempt water wells within the District. The table below shows total groundwater production for each of the three categories of use (Public Water Supply, Oil and Gas, and Commercial/Business) in each of the four counties that comprise the District .

Public Water Supply	Gallons Reported	Category Percentage
Hood	1,566,161,513	42.24%
Montague	98,266,040	2.65%
Parker	1,142,787,714	30.82%
Wise	515,188,346	13.89%
Total:	**3,322,403,613**	**89.60%**

Oil & Gas Production	Gallons Reported	Category Percentage
Hood	21,550,976	0.58%
Montague	4,477,305	0.12%
Parker	26,076,702	0.70%
Wise	190,152,600	5.13%
Total:	**242,257,583**	**6.53%**

Commercial/Business	Gallons Reported	Category Percentage
Hood	84,378,728	2.28%
Montague	1,369,000	0.04%
Parker	31,860,999	0.86%
Wise	25,722,985	0.69%
Total:	**143,331,712**	**3.87%**

2019 Grand Total:	**3,707,992,908**	

Waste of Groundwater 2019

B.1 Objective - Annual evaluation of the rules to determine if any amendments are recommended to decrease waste of groundwater within the District.
B.1 Performance Standard - Annual discussion of the evaluation of the rules and a reporting of whether any of the District rules require amendment to prevent waste of groundwater to be included in the Annual Report provided to the Board of Directors.

Throughout the first 7 months of 2019, District staff and members of the Board held multiple meetings and hearings to prepare updated rules leading up the final adoption in August. During those meetings/hearings, discussions were held pertaining to the waste of groundwater with the following definition of waste included in the final version of the rules:

(59) "Waste" means one or more of the following:

(a) withdrawal of groundwater from a groundwater reservoir at a rate and in an amount that causes or threatens to cause an intrusion into the reservoir of groundwater unsuitable for agriculture, gardening, domestic, stock raising, or other beneficial purposes;

(b) the flowing or producing of water from the groundwater reservoir by artificial means if the groundwater produced is not used for a beneficial purpose;

(c) the escape of groundwater from a groundwater reservoir to any other reservoir or geologic strata that does not contain groundwater;

(d) pollution or harmful alteration of groundwater in a groundwater reservoir by saltwater or by other deleterious matter admitted from another stratum or from the surface of the ground;

(e) willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well unless such discharge is authorized by permit, rule, or other order issued by the Texas Commission on Environmental Quality under Chapter 26 of the Texas Water Code;

(f) groundwater pumped for irrigation that escapes as irrigation tailwater onto land other than that of the owner of the well unless permission has been granted by the occupant of the land receiving the discharge;

(g) for groundwater produced from an artesian well, "waste" has the meaning assigned by Section 11.205, Texas Water Code;

(h) operating a deteriorated well; or

(i) producing groundwater in violation of any District rule governing the withdrawal of groundwater through production limits on wells, managed depletion, or both.

Furthermore, District staff continues to monitor and evaluate the activities of well owners within the District and enforce the District's rules to promote conservation and prevent waste of groundwater. Usually, once an issue is brought to the owner's attention, the matter is corrected immediately. However, District staff will continue to evaluate whether amendments to the District's rules are necessary to decrease waste of groundwater.

Water Use Fees 2019

B.2 Objective - The District will encourage the elimination and reduction of groundwater waste through the collection of a water-use fee for non-exempt production wells within the District.

B.2 Performance Standard - Annual reporting of the total fees paid and total groundwater used by non-exempt wells will be included in the Annual Report provided to the Board of Directors.

UTGCD's Board of Directors set the fee for groundwater usage at a rate of .22 cents per thousand gallons ($.22/1,000 gallons) for all commercial, municipal, and industrial users within the District that are not exempt from the metering, monitoring, reporting or payment requirements as set forth in the temporary rules adopted by the District.

In 2019, the District invoiced a total of $868,277 for nonexempt water use fees, however total nonexempt groundwater production actually totaled a value of $815,758. Furthermore, actual groundwater use fees collected totaled $863,789 (the discrepancy between that value and the total in the table is due to rounding errors). The difference between the total amount invoiced and what was actually collected is due to issues such as reported emergency use being exempt from fee payment, an Public Water Supply well owner in Parker County reporting use but failed to pay fees, and an oil and gas company in Hood County submitted payment for several year of unreported production. Staff has provided a detailed explanation of these discrepancies as subtext to the table below.

In 2019, the total water use fees collected was slightly less than the $900,000 collected in 2018, however this value is well within the range of what has been collected since 2015. Prior to 2015, the annual water use fees paid to the District was significantly higher due to O&G production in the area; the peak year was in 2011 when the District collected over $1.5 million in annual water use fees.

Use Category		Hood	Montague	Parker	Wise	Total
Public Water Supply	GW Production	1,566,151,513	98,266,040	1,142,787,714	515,188,346	**3,322,403,613**
	Fees Collected	$344,538*	$21,613**	$246,242***	$113,310****	**$725,703**
Oil & Gas	GW Production	21,550,976	4,477,305	26,076,702	190,152,600	**242,257,583**
	Fees Collected	$57,989*****	$985	$5,737	$41,834	**$106,544**
Commercial/Business	GW Production	84,378,728	1,369,000	31,860,999	25,722,985	**143,331,712**
	Fees Collected	$18,563	$301	$7,009	$5,659	**$31,533**
Total	GW Production	**1,672,091,217**	**104,112,345**	**1,200,725,415**	**731,063,931**	**3,707,992,908**
	Fees Collected	**$421,090**	**$22,899**	**$258,989**	**$160,802**	**$863,781**

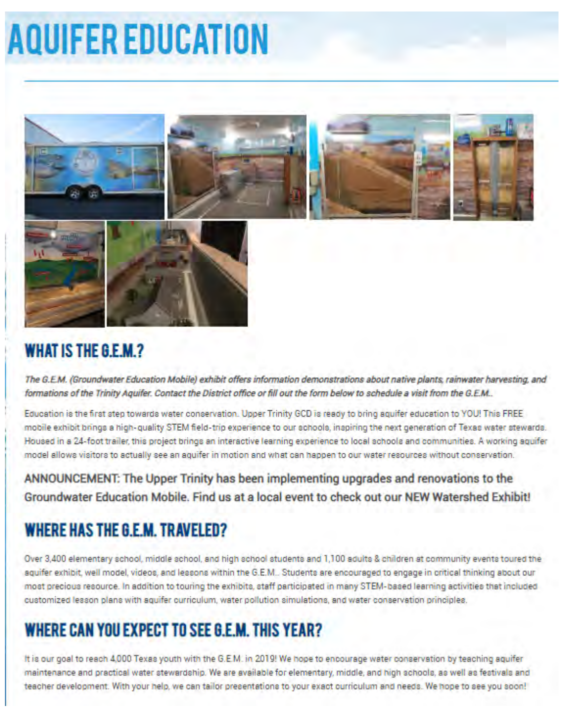
*Includes deduction of fees for 77,700 gallons in emergency water use for the City of Tolar
**Includes deduction of fees for 26,000 gallons of water use fees for the Red River Authority of Texas
***Includes deduction of fees for 3,000,000 gallons of emergency water use for the City of Aledo, 5,200 gallons of emergency water use for the Town of Annetta, 10,000 gallons of emergency water use for the City of Hudson Oaks, and 92,000 gallons of emergency water use for the City pf Reno.
****Includes deduction of water use fees for 100,000 gallons of emergency use for the City of Rhome and 44,010 gallons of emergency water use for Slidell Water Supply Corporation.
*****Includes the addition of fees for 242,033,727 gallons of unreported water use during 2016, 2017, and 2018 for EOG Resources.

B.3 Objective - Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater by including information on groundwater waste reduction on the District's website.

B.3 Performance Standard - Each year, a copy of the information provided on the groundwater waste reduction page of the District's website will be included in the District's Annual Report to be given to the District's Board of Directors.

The Upper Trinity Groundwater Conservation District's website provides information about eliminating waste on the "Education" page, which can be found at http://uppertrinitygcd.com/education/. The website is promoted through the District's news releases, advertising, social media, and brochures.

Additionally, local educators and event coordinators can schedule a free on-site visit of the Groundwater Education Mobile (GEM) through the "Education" page. In 2019, over 3,900 elementary school, middle school, and high school students and over 800 people at community events toured the aquifer exhibit, well model, watershed model, and geology lessons within the GEM. Students are encouraged to engage in critical thinking about our most precious resource. In addition to touring the exhibits, staff participated in many STEM-based learning activities that included customized lesson plans with hydrogeology curriculum, content development seminars with Region 11, water pollution simulations, and water conservation principles. UTGCD makes the GEM available to North Texas schools and entities interested in water conservation and aquifer resources. The District continually strives for educational excellence as renovations to the GEM continue from 2019 to 2020. TEKS aligned additions to the trailer will include the following: a "Geology of North Texas" exhibit, a rainwater harvesting exhibit, and additional watershed exhibits. District staff hopes to reach over 4,000 students within the next year while continuing to represent a conservation presence at community events.


AQUIFER EDUCATION

WHAT IS THE G.E.M.?

The G.E.M. (Groundwater Education Mobile) exhibit offers information demonstrations about native plants, rainwater harvesting, and formations of the Trinity Aquifer. Contact the District office or fill out the form below to schedule a visit from the G.E.M..

Education is the first step towards water conservation. Upper Trinity GCD is ready to bring aquifer education to YOU! This FREE mobile exhibit brings a high-quality STEM field-trip experience to our schools, inspiring the next generation of Texas water stewards. Housed in a 24-foot trailer, this project brings an interactive learning experience to local schools and communities. A working aquifer model allows visitors to actually see an aquifer in motion and what can happen to our water resources without conservation.

ANNOUNCEMENT: The Upper Trinity has been implementing upgrades and renovations to the Groundwater Education Mobile. Find us at a local event to check out our NEW Watershed Exhibit!

WHERE HAS THE G.E.M. TRAVELED?

Over 3,400 elementary school, middle school, and high school students and 1,100 adults & children at community events toured the aquifer exhibit, well model, videos, and lessons within the G.E.M.. Students are encouraged to engage in critical thinking about our most precious resource. In addition to touring the exhibits, staff participated in many STEM-based learning activities that included customized lesson plans with aquifer curriculum, water pollution simulations, and water conservation principles.

WHERE CAN YOU EXPECT TO SEE G.E.M. THIS YEAR?

It is our goal to reach 4,000 Texas youth with the G.E.M. in 2019! We hope to encourage water conservation by teaching aquifer maintenance and practical water stewardship. We are available for elementary, middle, and high schools, as well as festivals and teacher development. With your help, we can tailor presentations to your exact curriculum and needs. We hope to see you soon!

https://uppertrinitygcd.com/education/aquifer-trailer/

Regional Water Planning Participation 2019

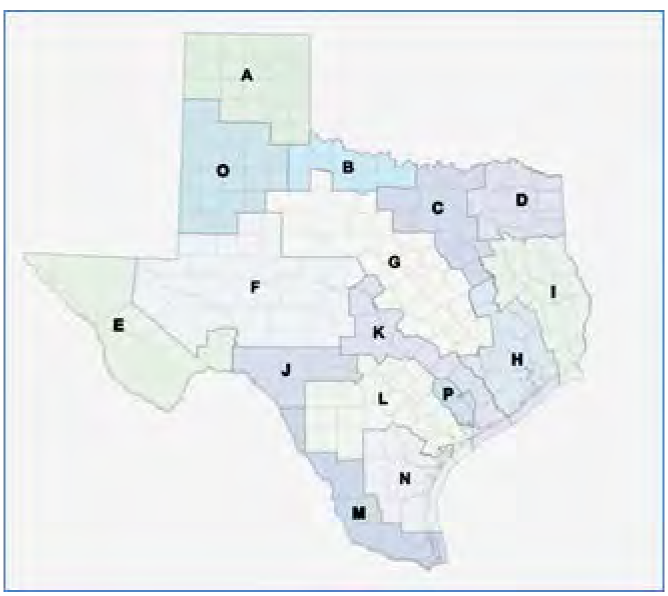
C.1 Objective - Each year the District will participate in the regional water planning process by attending at least one of the Region B, C or G Regional Water Planning Group Meetings to encourage the development of surface water supplies to meet the needs of water user groups within the District.

C.1 Performance Standard - The attendance of a District representative at any Regional Water Planning Group meeting will be noted in the Annual Report provided to the Board of Directors.

Throughout the year, the District's staff attended various water-planning meetings. Staff and Board members also participated in meetings and/or conferences concerning public outreach or other groundwater issues. A record of attendance at regional water planning meetings by District Representatives follows.

Date	Event	Location	Representative
2/6/19	RWPG-B	Wichita Falls, TX	Tracy Mesler, Doug Shaw
2/25/19	RWPG-C	Arlington, TX	Doug Shaw
3/20/19	RWPG-G	Waco, TX	Doug Shaw
5/22/19	RWPG-G	Waco, TX	Doug Shaw
6/24/19	RWPG-C	Arlington, TX	Doug Shaw
6/26/19	RWPG-B	Wichita Falls, TX	Tracy Mesler, Doug Shaw
9/25/19	RWPG-G	Waco, TX	Doug Shaw
10/7/19	RWPG-C	Arlington, TX	Doug Shaw
10/23/19	RWPG-B	Wichita Falls, TX	Tracy Mesler, Doug Shaw
11/20/19	RWPG-G	Waco, TX	Doug Shaw

Regional Water Planning Group Map



Drought Conditions 2019

D.1 Objective - Monthly review of drought conditions within the District using the Texas Water Development Board's Monthly Drought Conditions Presentation available at: http://www.twdb.texas.gov/surfacewater/conditions/report/index.asp

D.1 Performance Standard - An annual review of drought conditions within the District will be included in the Annual Report provided to the Board of Directors and on the District website.

The National Drought Mitigation Center defines drought as "a deficiency of precipitation over an extended period of time (usually a season or more) resulting in a water shortage." (Source: https://drought.unl.edu/Education/DroughtBasics.aspx). The District reviews the Texas Water Conditions Report published by the Texas Water Development Board every month. The information below is excerpted from their reports. The surface water basins/subbasins in Upper Trinity GCD remained in the Normal to High range (>70%) all year.

Beginning on the next page, you will find the TWDB's monthly Texas Water Conditions Report (TWCR).

Texas Water Conditions Report

Texas Water Development Board

January 2019

RAINFALL

Rainfall is the primary source influencing water conditions in Texas. Observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) for January indicate that total rainfall in January [Figure 1(a)] over the western half of the state was mostly below-average compared to historical data from 1981–2010. There were isolated patches of above-average rainfall in the northeastern High Plains, eastern Trans Pecos, and northeastern Lower Rolling Plains climate divisions. Above average rainfall occurred over northern and southern regions of the South Central climate division, southern regions of the North Central climate division, northern and southeastern regions of the East Texas climate division, northern regions of the Upper Coast climate division, and southeastern regions of the Southern climate division [Figure 1(b)].

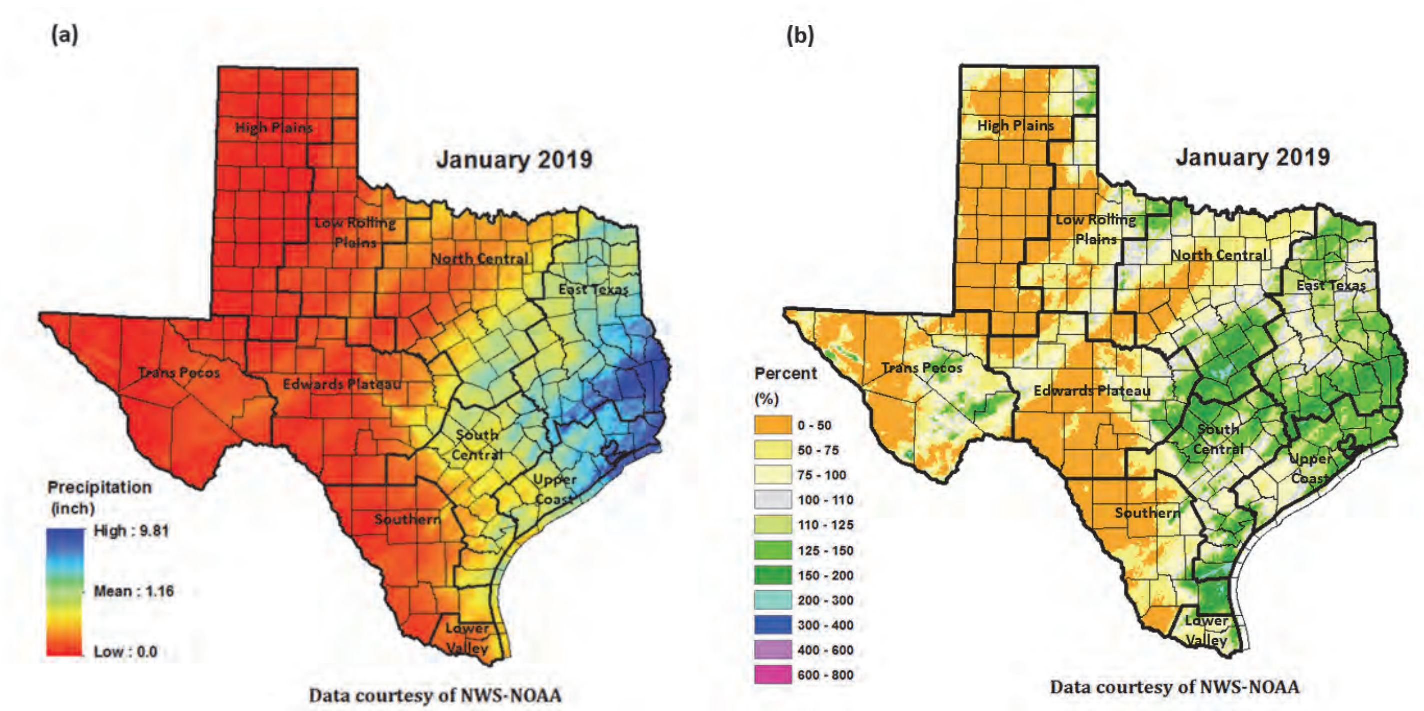


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for January 2019

RESERVOIR STORAGE

At the end of January 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 28.20 million acre-feet or 87 percent of total conservation storage capacity (Figure 2). This is approximately 0.3 million acre-feet less than a month ago and 2.4 million acre-feet more than end-January 2018.

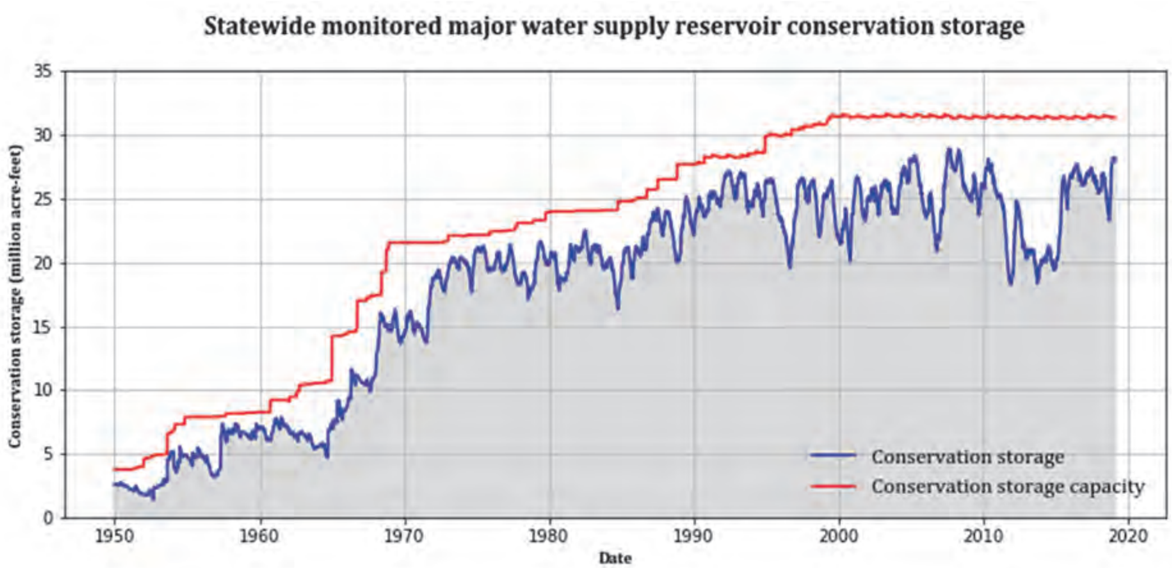


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 79 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 15 were above 90 percent full. These high storage reservoirs are in the North, Central, and East Texas climate divisions. However, Palo Duro Reservoir was only 1 percent full and another five reservoirs [Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (16 percent full) Greenbelt (20 percent full), and E. V. Spence (27 percent full)] remained below 30 percent full. There were 12 reservoirs with low storage (below 70 percent full) located in the Panhandle, West, and South Texas regions. Elephant Butte Reservoir (located in New Mexico) was only 7 percent full.

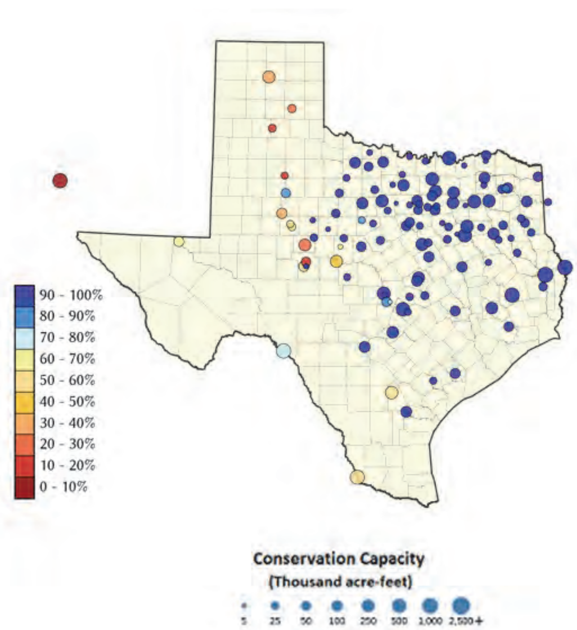


Figure 3: Reservoir conservation storage expressed as percent full (%)

*Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (99 percent full), East Texas (100 percent full), North Central (99 percent full), South Central (100 percent full), and Low Rolling Plains (76 percent full) regions (Figure 3). The High Plains (32 percent full) and Trans-Pecos (16 percent full) regions had the lowest storage. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the north central, eastern, and south central regions of the state is normal to high (>70 percent full). The Upper/Mid Rio Grande had extremely low storage, the Canadian River basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

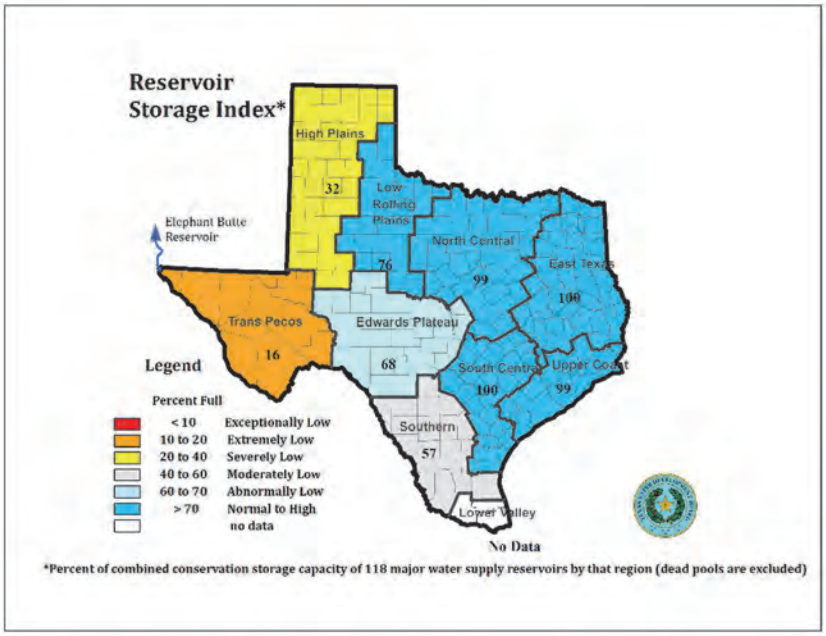


Figure 3: Reservoir Storage Index by climate division at 1/31/2019

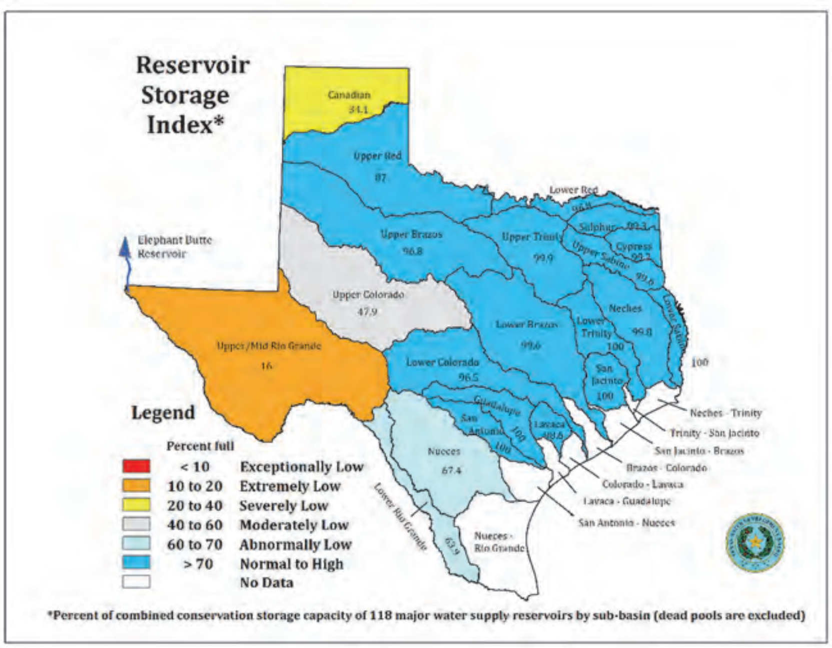


Figure 4: Reservoir Storage Index by river basin/sub-basin at 1/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

February 2019

RAINFALL

Rainfall is the primary source influencing water conditions in Texas. Observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) for February indicate that total rainfall in February [Figure 1(a)] over the western and central regions of the state was below 50 percent of average compared to historical data from 1981–2010 [Figure 1(b), light brown shading]. There were isolated patches of above-average rainfall in the northern High Plains, western Trans Pecos, northern East Texas, central Upper Coast, and southern South Central climate divisions [Figure 1(b), green shading].

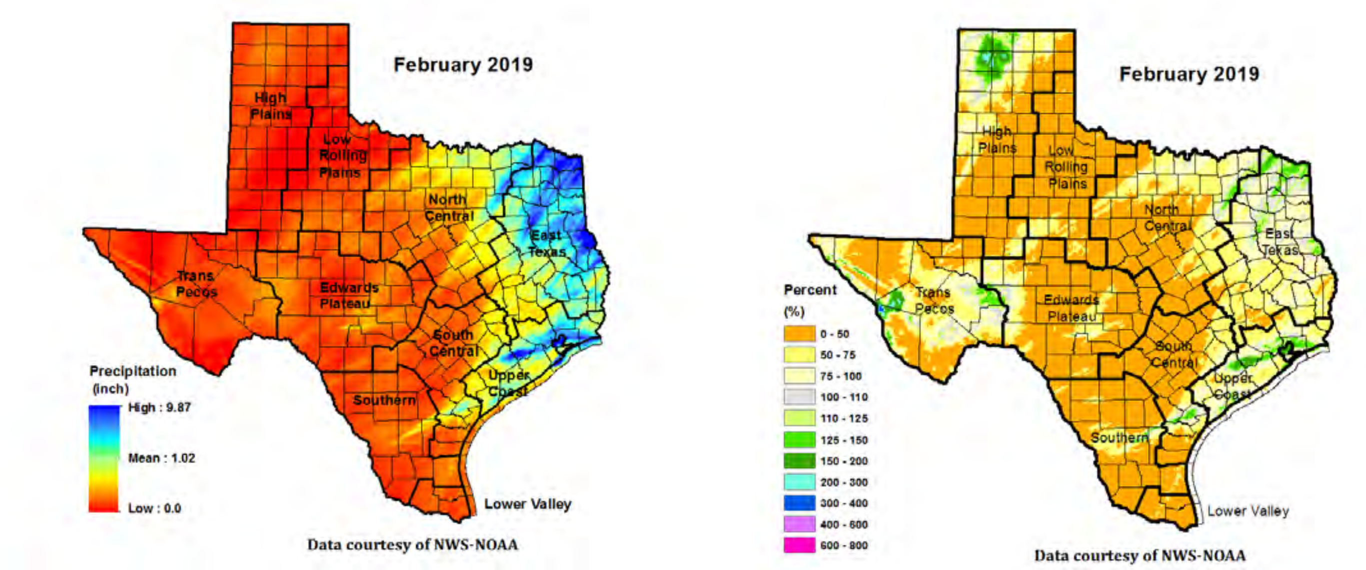


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for February 2019

RESERVOIR STORAGE

At the end of February 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 27.01 million acre-feet or 84 percent of total conservation storage capacity (Figure 2). This is approximately 1.2 million acre-feet less than a month ago and 0.05 million acre-feet less than end-February 2018.

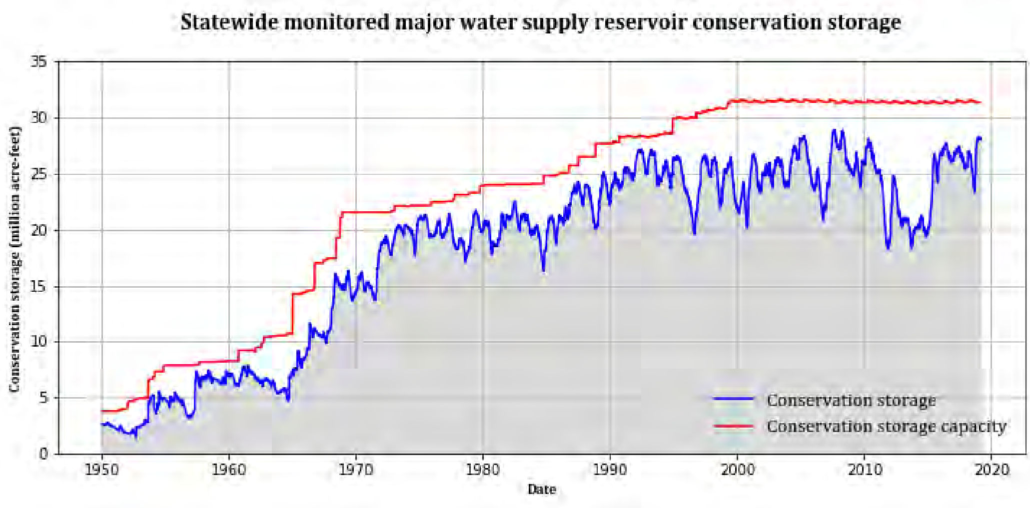


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 73 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 23 were above 90 percent full. These high storage reservoirs are in the North, Central, and East Texas climate divisions. However, Palo Duro Reservoir was only 1 percent full and another five reservoirs [Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (15 percent full) Greenbelt (20 percent full), and E. V. Spence (27 percent full)] remained below 30 percent full. There were 12 reservoirs with low storage (below 70 percent full) located in the Panhandle, West, and South Texas regions. Elephant Butte Reservoir (located in New Mexico) was 9 percent full, which is a 2-percentage point increase over storage in January.

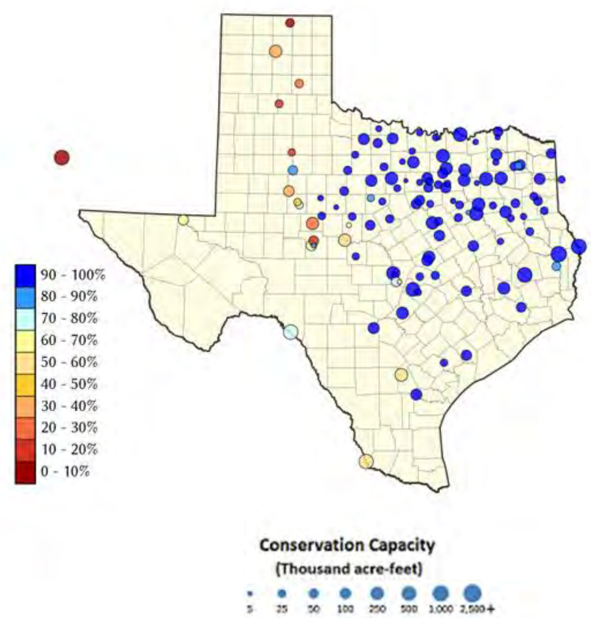


Figure 3: Reservoir conservation storage expressed as percent full (%)

*Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (98.5 percent full), East Texas (99.3 percent full), North Central (99.1 percent full), South Central (99.9 percent full), and Low Rolling Plains (75.2 percent full) regions (Figure 3). The High Plains (31.6 percent full) and Trans-Pecos (17.2 percent full) regions had the lowest storage. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the north central, eastern, and south central regions of the state is normal to high (>70 percent full). The Upper/Mid Rio Grande had extremely low storage, the Canadian River basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

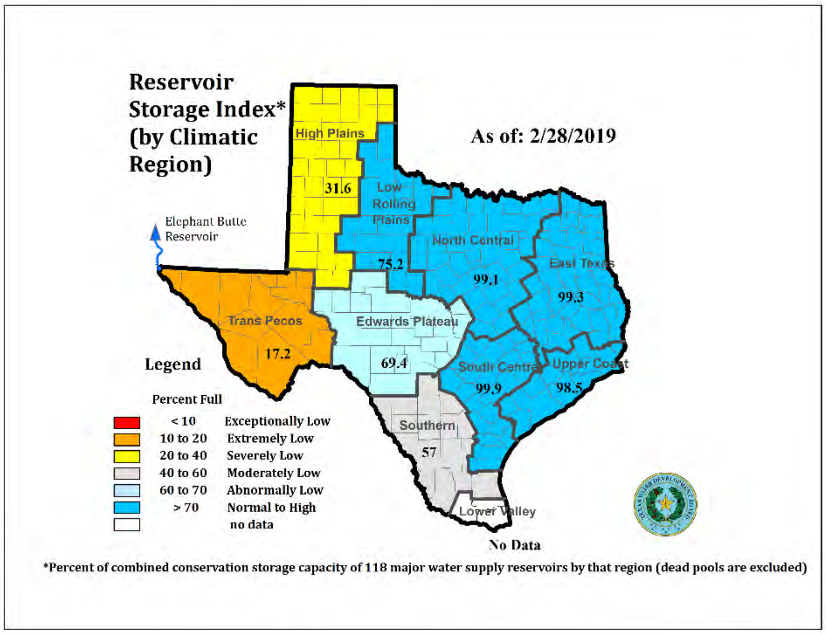


Figure 3: Reservoir Storage Index by climate division at 2/28/2019

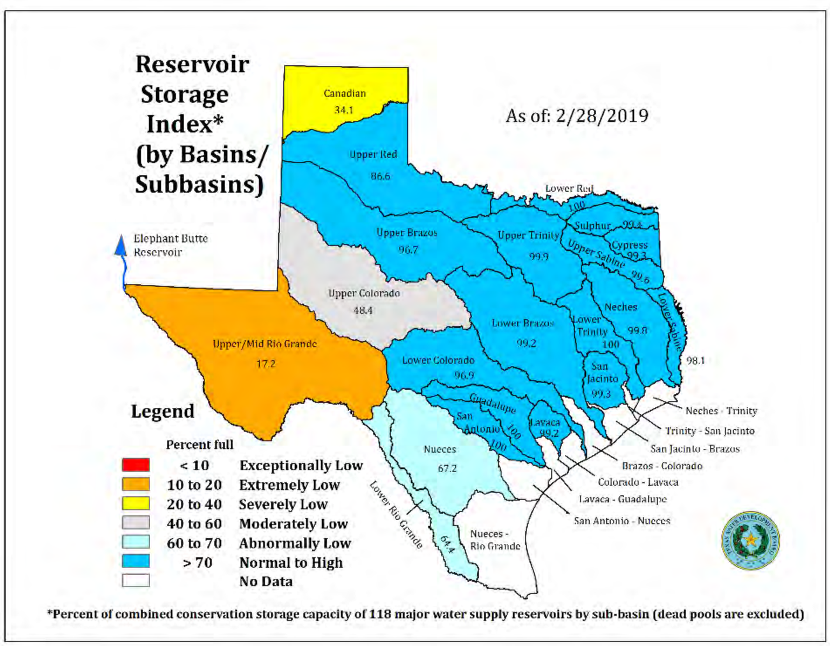


Figure 4: Reservoir Storage Index by river basin/sub-basin at 2/28/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

March 2019

RAINFALL

Rainfall is the primary source influencing water conditions in Texas. Observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that total rainfall for March [Figure 1(a)] over a swath of the state extending from the western through the southeastern part of the state was below-average compared to historical data from 1981–2010. Rainfall in the western Trans Pecos region was much above average. There was above-average rainfall in the High Plains, the southern regions of the Southern climate division and in the Lower Valley [Figure 1(b)].

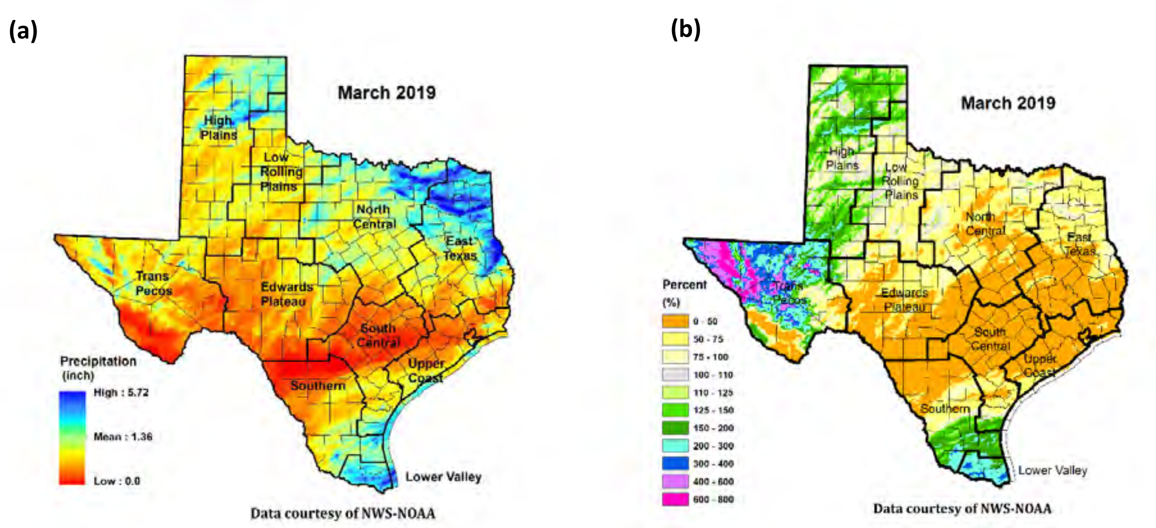


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for March 2019

RESERVOIR STORAGE

At the end of January 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 28.1 million acre-feet or 87 percent of total conservation storage capacity (Figure 2). This is approximately 0.08 million acre-feet less than a month ago and 1.1 million acre-feet more than end-March 2018.

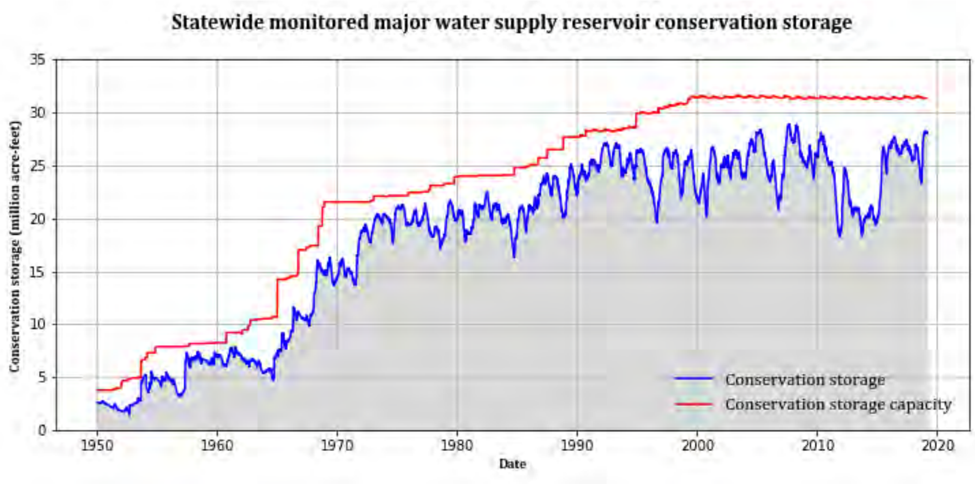


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 67 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 28 were above 90 percent full. Palo Duro Reservoir was only 1 percent full and another five reservoirs [Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (15 percent full) Greenbelt (21 percent full), and E. V. Spence (27 percent full)] remained below 30 percent full. There were 12 reservoirs with low storage (below 70 percent full) located in the Panhandle, West, and South Texas regions. Elephant Butte Reservoir (located in New Mexico) was at 11 percent full, which is an improvement of 4 percentage points from the end of February 2019.

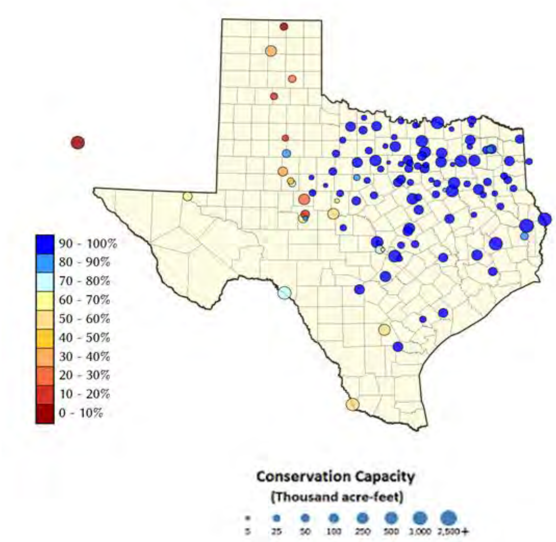


Figure 3: Reservoir conservation storage expressed as percent full

*Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (98 percent full), East Texas (98.5 percent full), North Central (98.8 percent full), South Central (99.7 percent full), and Low Rolling Plains (75 percent full) climate divisions (Figure 3). Storage in the High Plains region was severely low (31.9 percent full) and storage in the Southern climate division was moderately low (56.4 percent full). Storage was extremely low (19.2 percent full) in the Trans Pecos climate division. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state is normal to high (>70 percent full). The Upper/Mid Rio Grande had extremely low storage, the Canadian River Basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

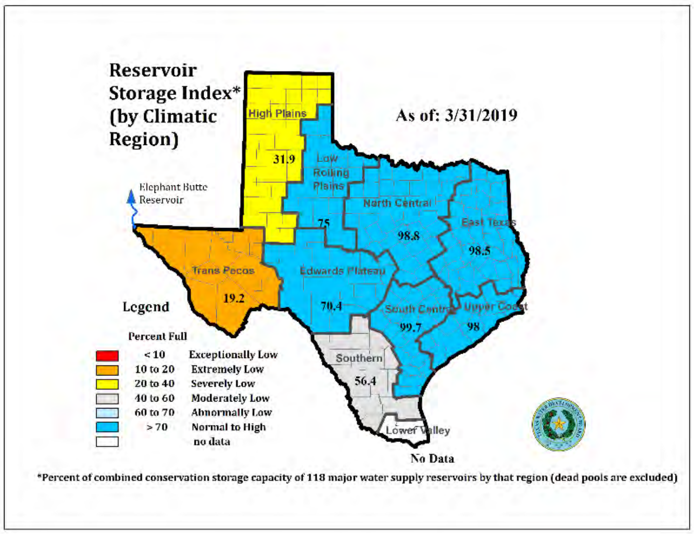


Figure 3: Reservoir Storage Index by climate division at 3/31/2019

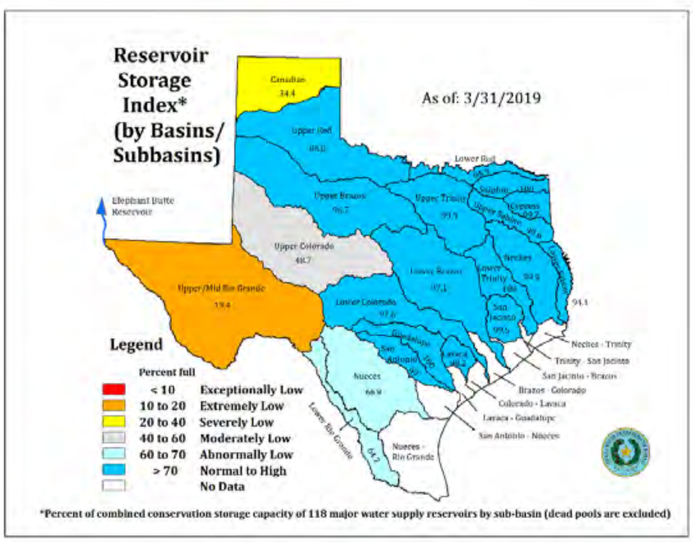


Figure 4: Reservoir Storage Index by river basin/sub-basin at 3/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

April 2019

RAINFALL

Rainfall is the primary source influencing water conditions in Texas. Observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that total rainfall for April [Figure 1(a)] over the North Central, East Texas, northern South Central, western Edwards Plateau, northeastern Trans Pecos, and the Low Rolling Plains climate divisions was above-average compared to historical data from 1981–2010. Rainfall exceeded 10” in portions of the East Texas and North Central climate divisions. Rainfall in the northern High Plains, southwestern Trans Pecos, southwestern Southern, Lower Valley, and the Upper Coast climate divisions was below-average [Figure 1(b)].

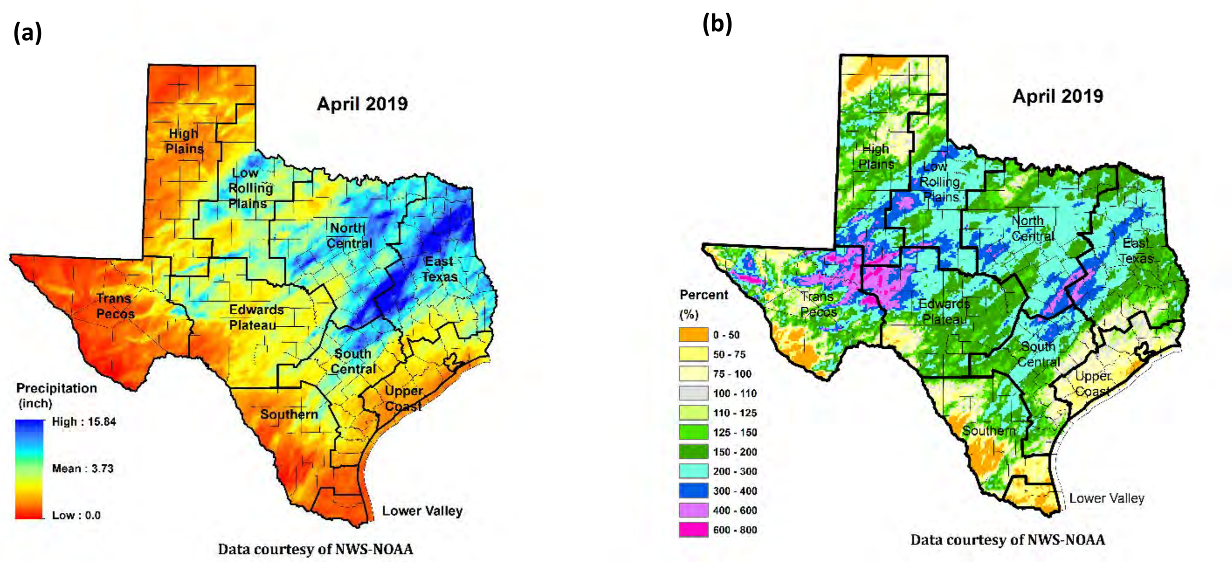


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for April 2019

RESERVOIR STORAGE

At the end of April 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 28.34 million acre-feet or 88 percent of total conservation storage capacity (Figure 2). This is approximately 0.25 million acre-feet more than a month ago and 1.68 million acre-feet more than end-April 2018.

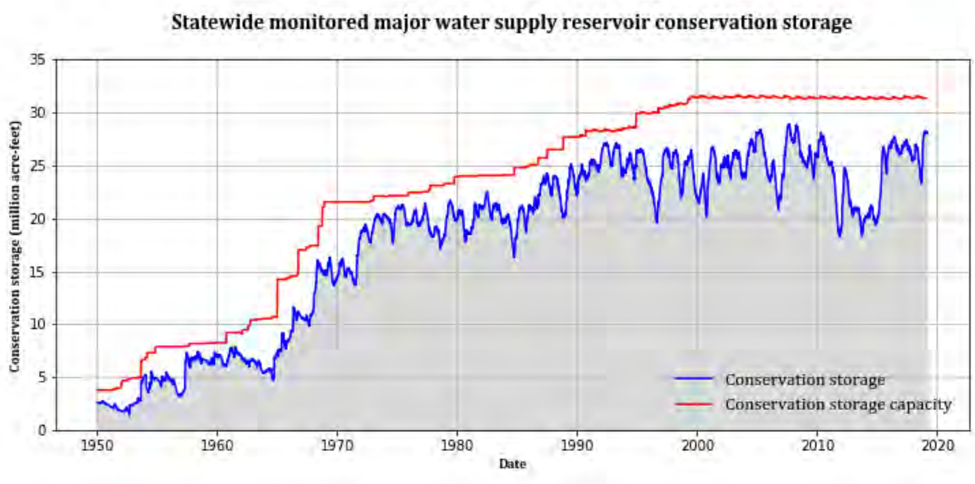


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 83 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 15 were above 90 percent full. Palo Duro Reservoir was only 0.5 percent full and another five reservoirs [Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (17 percent full) Greenbelt (21 percent full), and E. V. Spence (27 percent full)] remained below 30 percent full. There were 12 reservoirs with low storage (below 70 percent full) located in the Panhandle, West, and South Texas regions. Elephant Butte Reservoir (located in New Mexico) was at 16 percent full, which is an improvement of 5 percentage points from the end of March 2019.

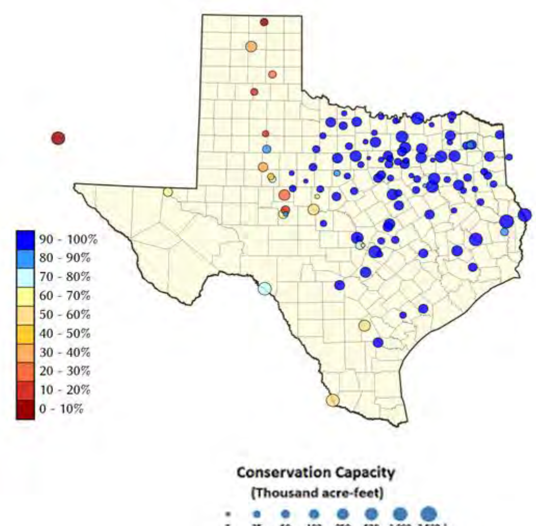


Figure 3: Reservoir conservation storage expressed as percent full

*Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (97.1 percent full), East Texas (98.5 percent full), North Central (99.9 percent full), South Central (99.7 percent full), and Low Rolling Plains (75.9 percent full) climate divisions (Figure 3). Storage in the High Plains region was severely low (32.1 percent full) and storage in the Southern climate division was moderately low (54.8 percent full). Storage was severely low (23.3 percent full) in the Trans Pecos climate division. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state is normal to high (>70 percent full). The Upper/Mid Rio Grande and the Canadian River Basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

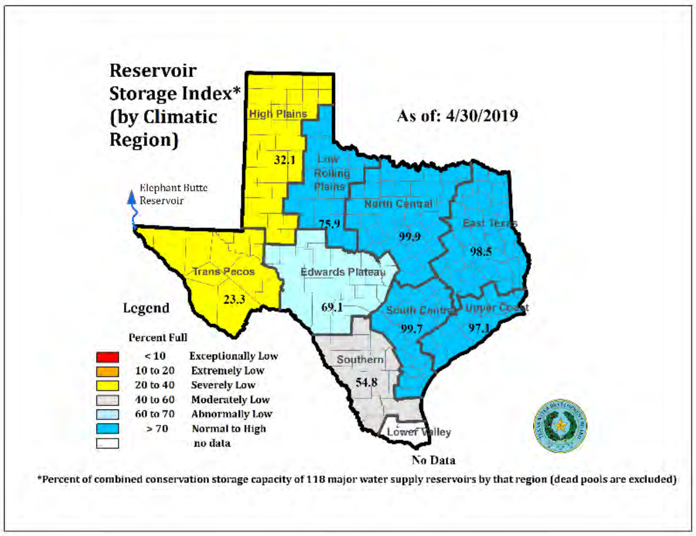


Figure 3: Reservoir Storage Index by climate division at 4/30/2019

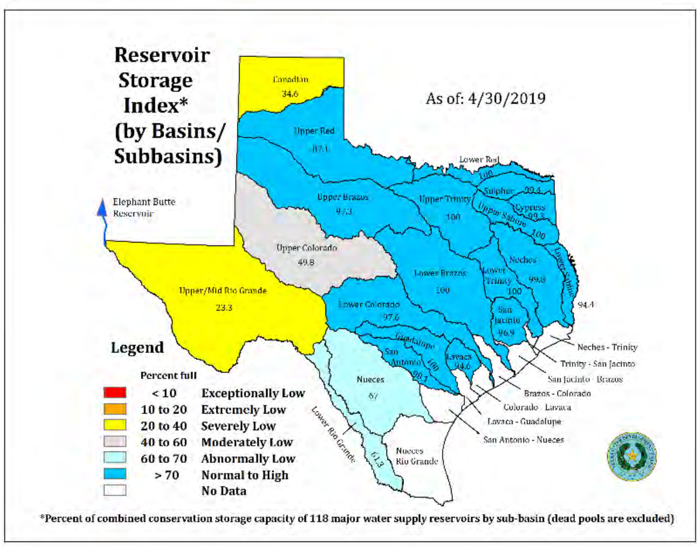


Figure 4: Reservoir Storage Index by river basin/sub-basin at 4/30/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

May 2019

RAINFALL

Rainfall is the primary source influencing water conditions in Texas. Observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that total rainfall for May [Figure 1(a)] over the North Central, East Texas, northern and central South Central, Edwards Plateau, northern and central Upper Coast, northern and western Southern, eastern Trans Pecos, southern and central Low Rolling Plains, northern, north central and southern High Plains climate divisions was above-average compared to historical data from 1981–2010. Rainfall exceeded 15" in portions of the East Texas and Upper Coast climate divisions. Rainfall in the south-central High Plains, southwestern and northern Trans Pecos, southwestern and southeastern Southern, and the Lower Valley climate divisions was below-average [Figure 1(b)].

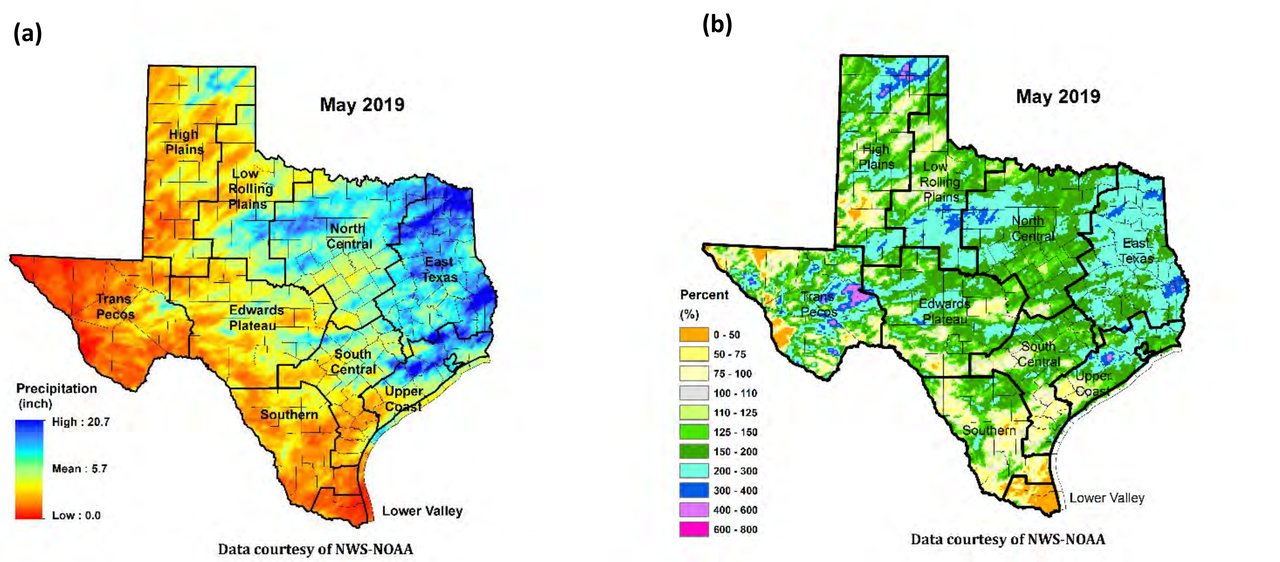


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for May 2019

RESERVOIR STORAGE

At the end of May 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 28.7 million acre-feet or 89 percent of total conservation storage capacity (Figure 2). This is approximately 0.29 million acre-feet more than a month ago and 2.4 million acre-feet more than end-May 2018.

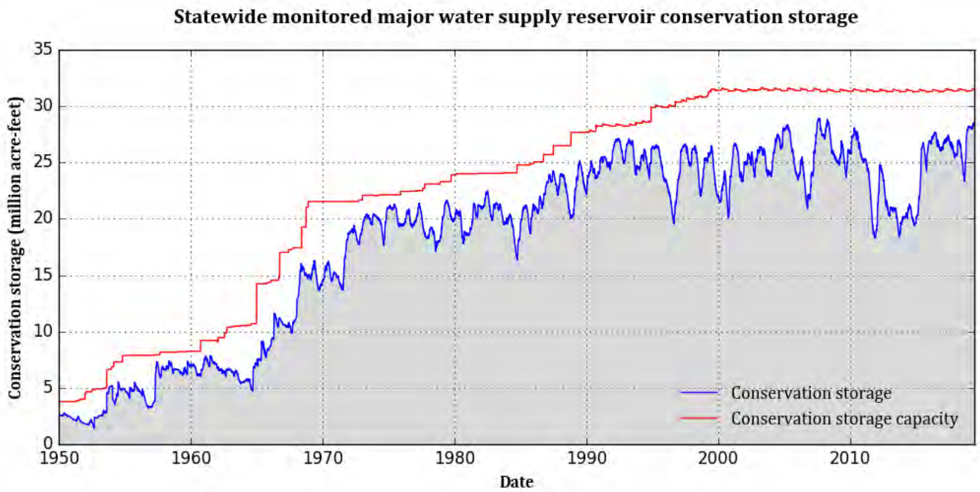


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 86 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 13 were above 90 percent full. Six reservoirs [Palo Duro Reservoir (17 percent full), Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (24 percent full) Greenbelt (22 percent full), and E. V. Spence (29 percent full)] remained below 30 percent full. Notable though was the 17-percentage point increase in storage in Palo Duro Reservoir from end-April 2019. There were 9 reservoirs with low storage (below 70 percent full) located in the Panhandle, West, and South Texas regions. Elephant Butte Reservoir (located in New Mexico) was at 25 percent full, which is an improvement of 9 percentage points from the end of April 2019.

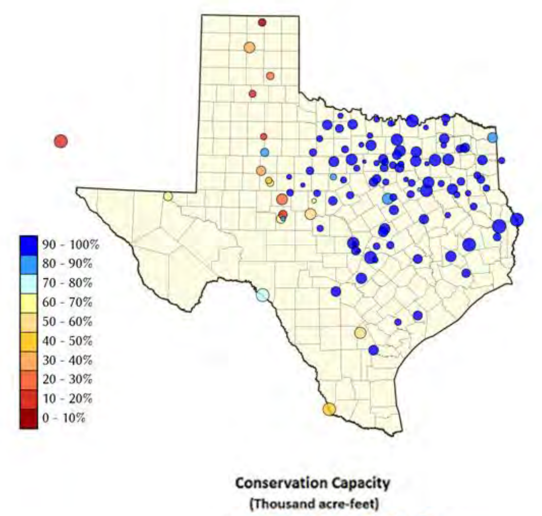


Figure 3: Reservoir conservation storage at end-May expressed as percent full (%)

Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (95.4 percent full), East Texas (99.8 percent full), North Central (99.9 percent full), South Central (99.9 percent full), and Low Rolling Plains (76.7 percent full) climate divisions (Figure 3). Storage in the High Plains region was severely low (35.7 percent full) and storage in the Southern climate division was moderately low (50.3 percent full). Storage was severely low (30.5 percent full) in the Trans Pecos climate division. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state was normal to high (>70 percent full). The Upper/Mid Rio Grande and the Canadian River Basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

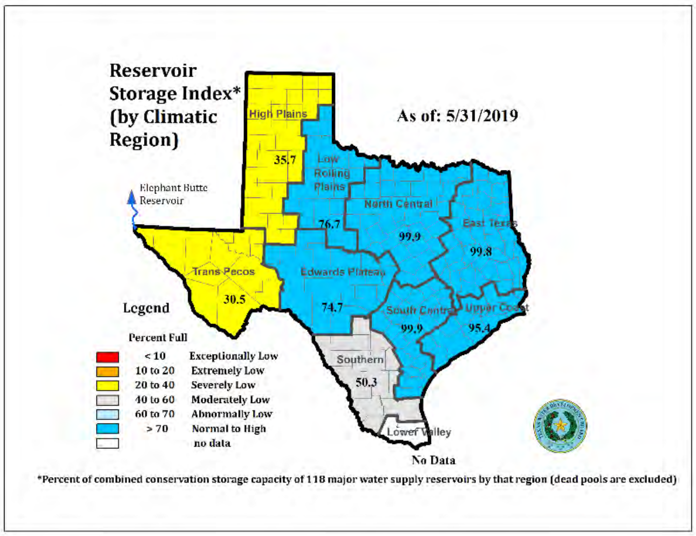


Figure 3: Reservoir Storage Index by climate division at 5/31/2019

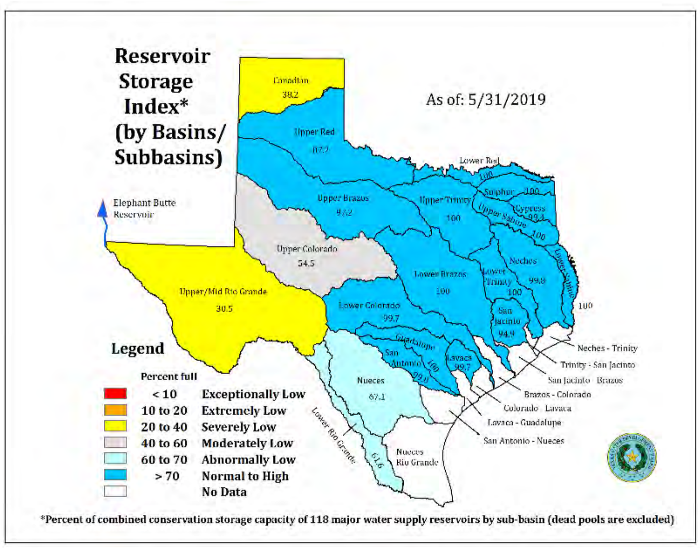


Figure 4: Reservoir Storage Index by river basin/sub-basin at 5/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas **W**ater **C**onditions **R**eport

Texas Water Development Board

June 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that total rainfall for June [Figure 1(a)] over the Lower Valley, East Texas, South Central, southwestern Edwards Plateau, Upper Coast, southern Trans Pecos, central Low Rolling Plains, and northern Plains climate divisions was above-average compared to historical data from 1981–2010. Rainfall exceeded 20” in portions of the East Texas and Upper Coast climate divisions. Rainfall in the southern High Plains, western and northern Trans Pecos, and the Southern climate divisions was below-average [Figure 1(b)].

(a) **(b)**

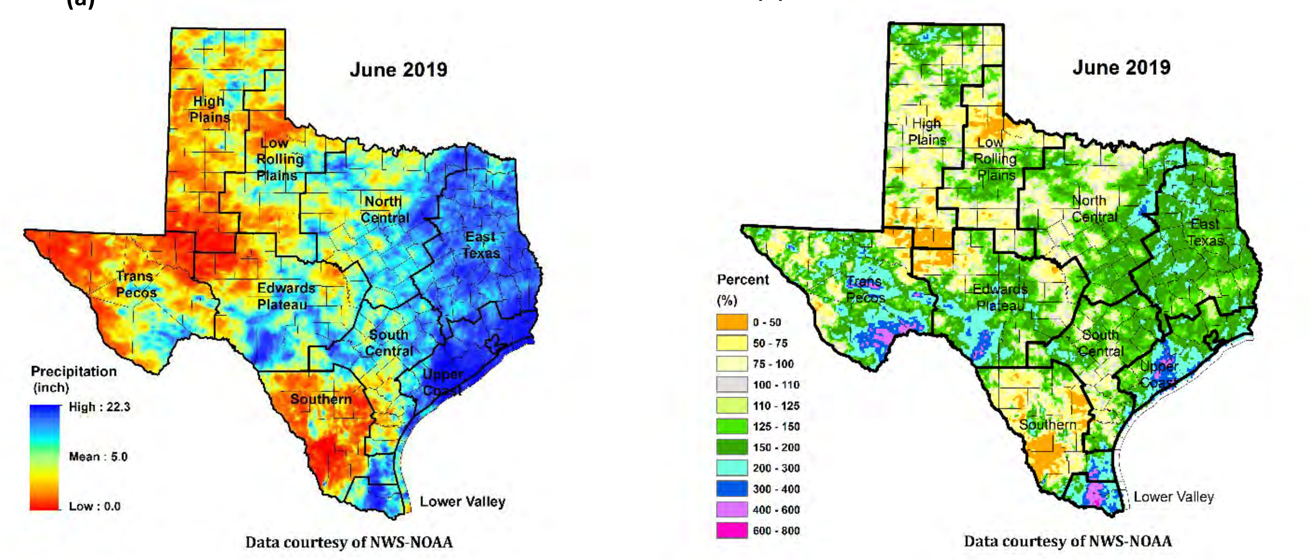


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for June 2019

RESERVOIR STORAGE

At the end of June 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 28.6 million acre-feet or 89 percent of total conservation storage capacity (Figure 2). This is approximately 0.09 million acre-feet less than a month ago and 3.3 million acre-feet more than end-May 2018.

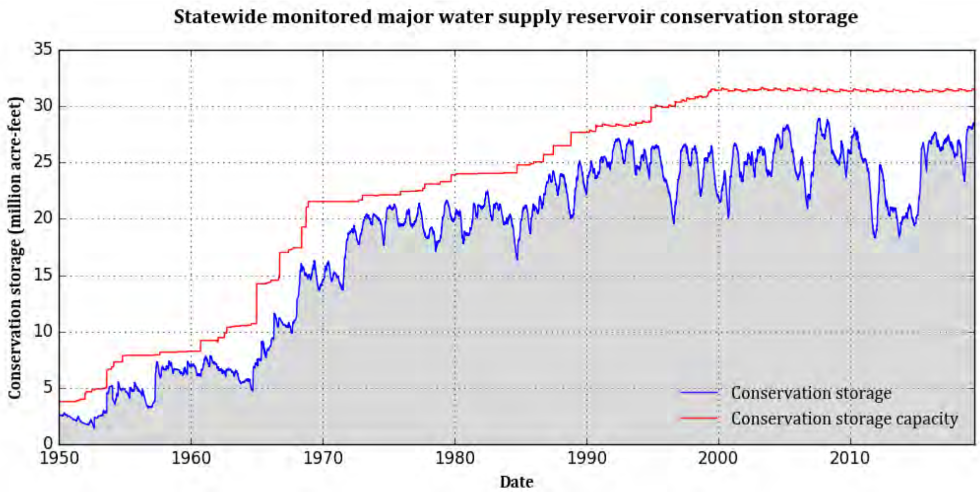


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 75 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 24 were above 90 percent full. Five reservoirs [Palo Duro Reservoir (13 percent full), Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (25 percent full) and Greenbelt (22 percent full) remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 28 percent full, which is an improvement of 3 percentage points from the end of May 2019.

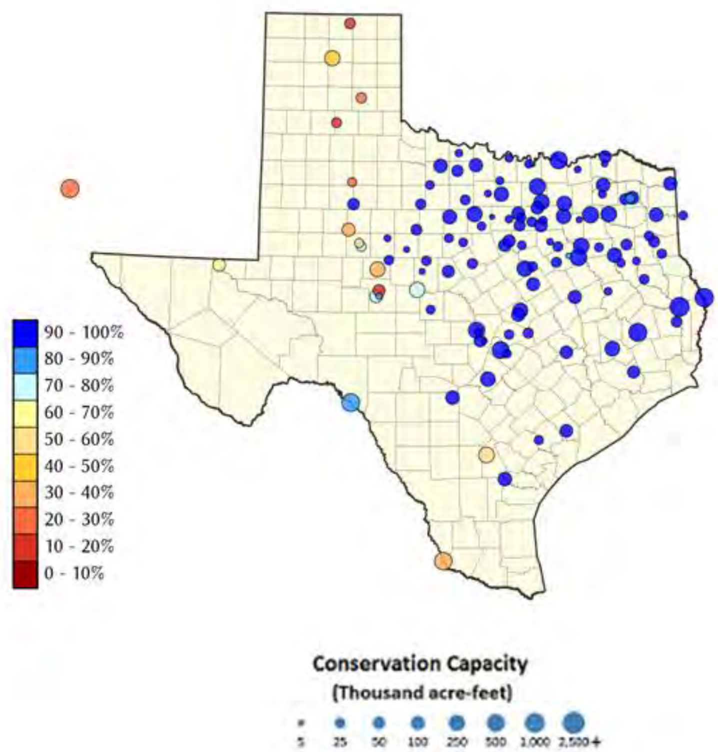


Figure 3: Reservoir conservation storage at end-June expressed as percent full (%)

*Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (94.6 percent full), East Texas (98.9 percent full), North Central (99.9 percent full), South Central (99.9 percent full), Edwards Plateau (77.4), and Low Rolling Plains (76.6 percent full) climate divisions (Figure 3). Storage in the Southern climate division was moderately low (47.6 percent full). Storage was severely low in the Trans Pecos (33.4 percent full) and High Plains (36.3 percent full) climate divisions. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state was normal to high (>70 percent full). The Upper/Mid Rio Grande and the Canadian River Basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

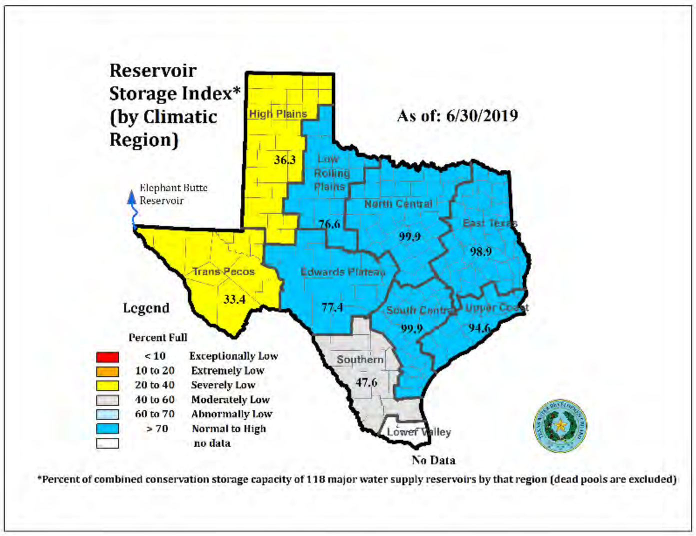


Figure 3: Reservoir Storage Index* by climate division at 6/30/2019

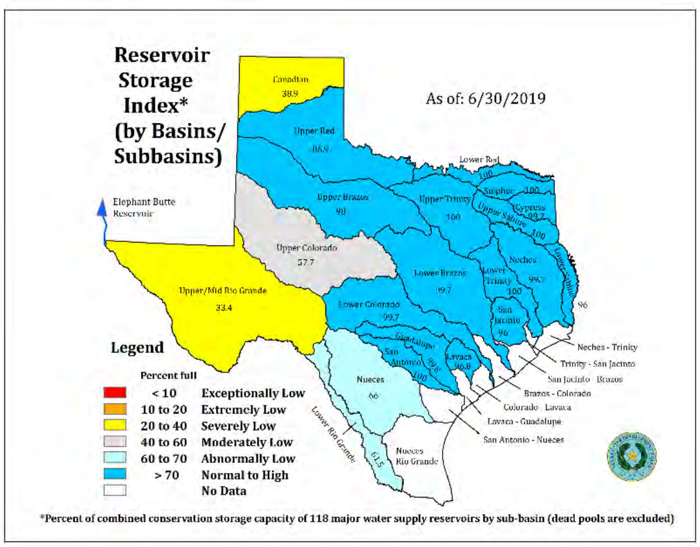


Figure 4: Reservoir Storage Index by river basin/sub-basin at 6/30/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

July 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that much of the state received little or no rainfall in July [orange and red shading in Figure 1(a)]. Monthly rainfall for July was below-average, compared to historical data from 1981–2010, for much of the state [Figure 1(b)], except for the northern Upper coast, and south-eastern East Texas, western High Plains, central North Central, and the Trans Pecos climate division. Rainfall in the northern Upper Coast exceeded 16”.

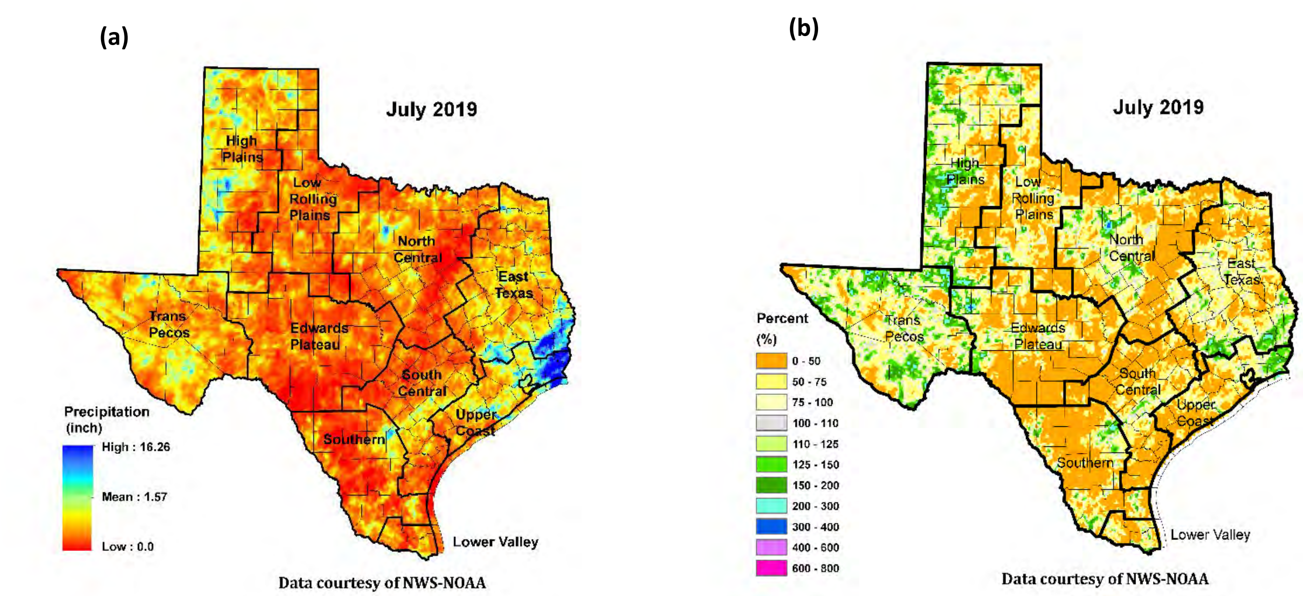


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for July 2019

RESERVOIR STORAGE

At the end of July 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 27.8 million acre-feet or 86 percent of total conservation storage capacity (Figure 2). This is approximately 0.7 million acre-feet less than a month ago and 3.2 million acre-feet more than end-June 2018.

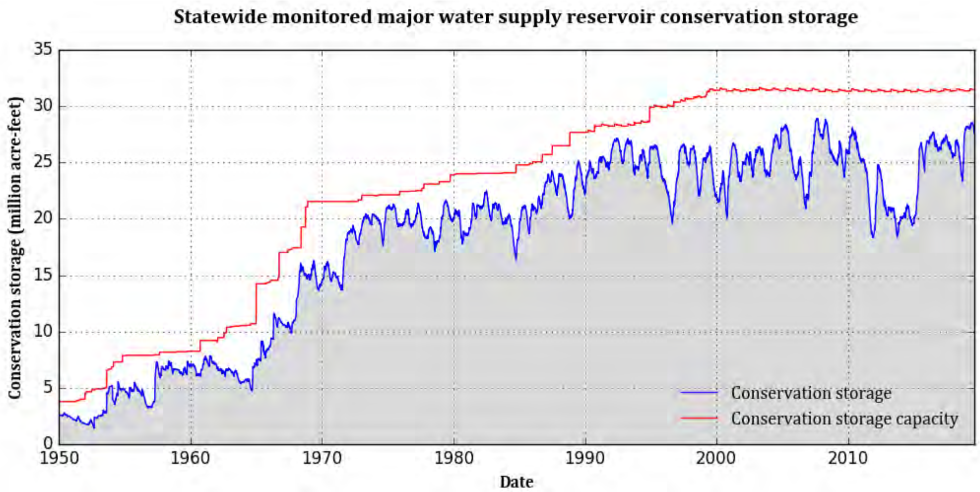


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 29 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 68 were above 90 percent full. Six reservoirs [Palo Duro Reservoir (11 percent full), Mackenzie (12 percent full), O. C. Fisher (13 percent full), White River (23 percent full) Greenbelt (21 percent full), and Falcon (26 percent full)] remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 28 percent full, which was unchanged from the end of June 2019.

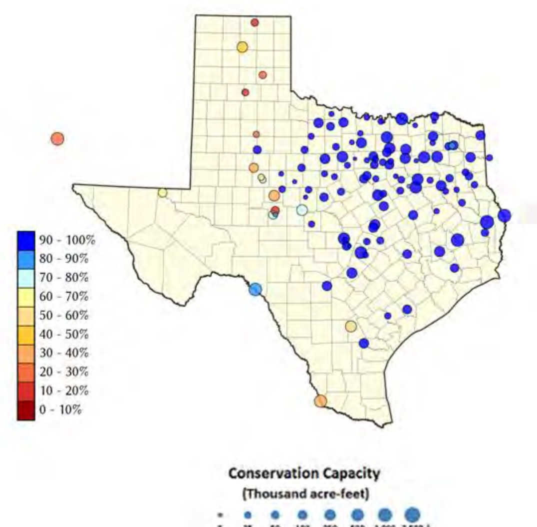


Figure 3: Reservoir conservation storage at end-July expressed as percent full (%)

Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (91.3 percent full), East Texas (95.2 percent full), North Central (98.1 percent full), South Central (97.6 percent full), Edwards (76.7 percent full), and Low Rolling Plains (75.3 percent full) climate divisions (Figure 3). Storage in the High Plains region was severely low (35.4 percent full) and storage in the Southern climate division was moderately low (43.7 percent full). Storage was severely low (32.9 percent full) in the Trans Pecos climate division. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state was normal to high (>70 percent full). The Upper/Mid Rio Grande and the Canadian River Basin had severely low storage, the Upper Colorado and the Lower Rio Grande had moderately low storage, and the Nueces had abnormally low storage.

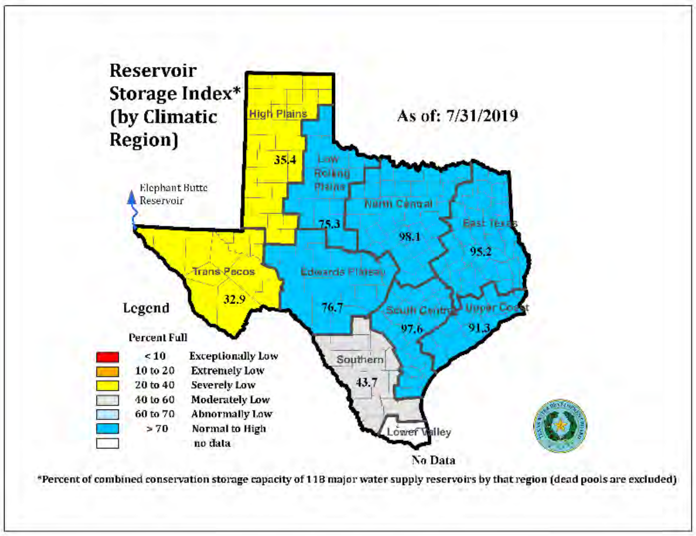


Figure 3: Reservoir Storage Index by climate division at 7/31/2019

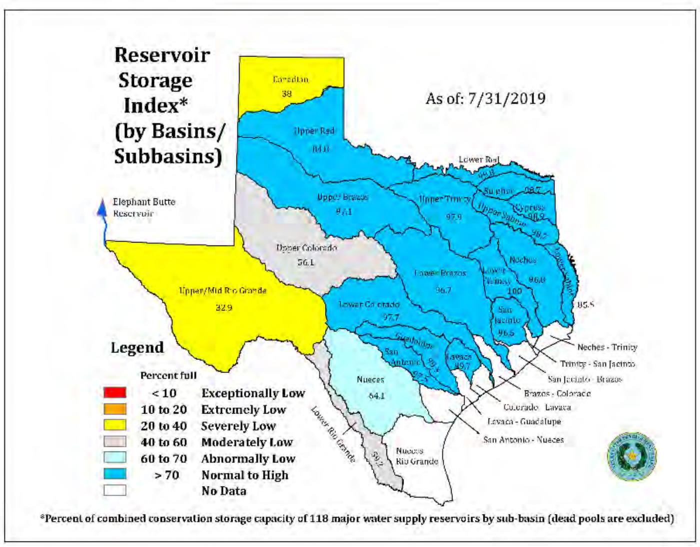


Figure 4: Reservoir Storage Index by river basin/sub-basin at 7/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

August 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that much of the state except for north Texas, the Upper Coast, and southeast Texas received little or no rainfall in August [orange and red shading in Figure 1(a)]. Monthly rainfall for August was below-average, compared to historical data from 1981–2010, for much of the state [Figure 1(b)], except for southern East Texas, lower Upper Coast, northern North Central, northern High Plains, and the Trans Pecos climate division. Rainfall in East Texas and the northern Upper Coast exceeded 16”.

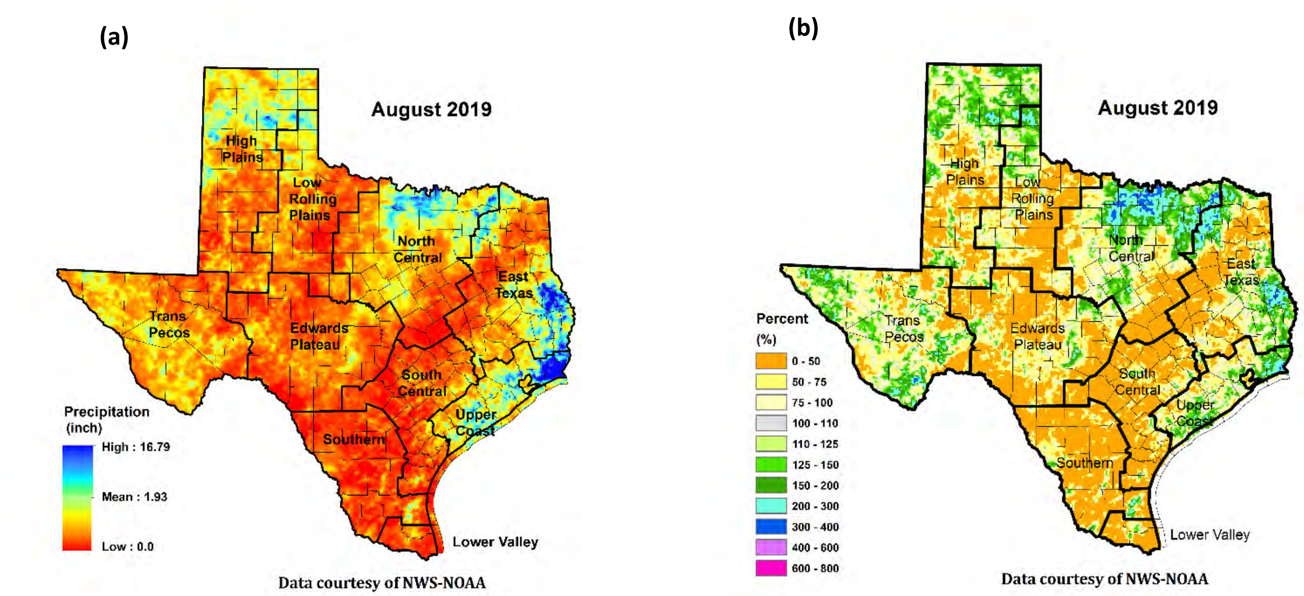


Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for August 2019

RESERVOIR STORAGE

At the end of August 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 26.7 million acre-feet or 83 percent of total conservation storage capacity (Figure 2). This is approximately 1.1 million acre-feet less than a month ago and 3.3 million acre-feet more than end-August 2018.

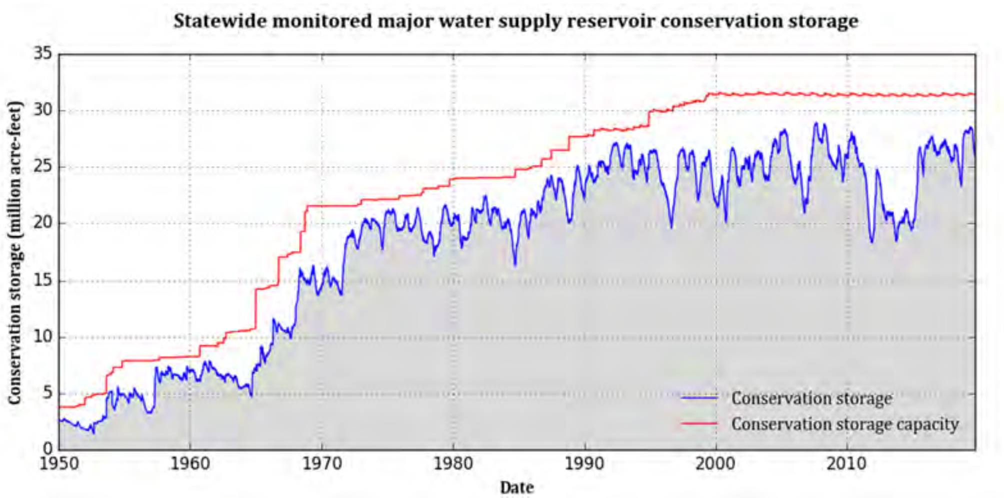


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 11 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 68 were above 90 percent full. Eight reservoirs [E.V. Spence (29 percent full), Falcon (23 percent full), Greenbelt (20 percent full), J.B. Thomas (29 percent full), Mackenzie (12 percent full), O. C. Fisher (12 percent full), Palo Duro Reservoir (9 percent full), and White River (21 percent full)] remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 23 percent full, which was down five percentage points from the end of July 2019.

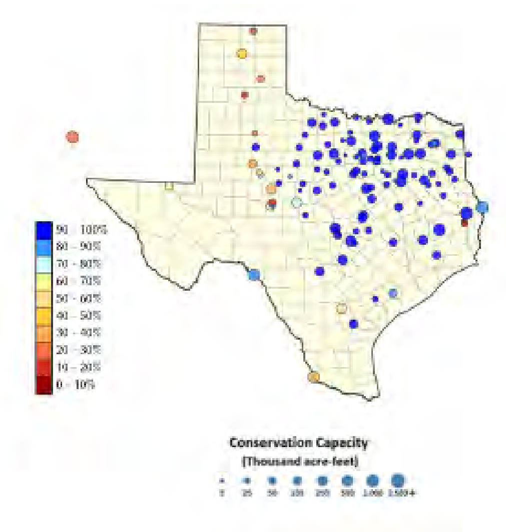


Figure 3: Reservoir conservation storage at end-August expressed as percent full

Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (88.2 percent full), East Texas (91.3 percent full), North Central (95.2 percent full), South Central (95 percent full), Edwards (74.4 percent full), and Low Rolling Plains (72.8 percent full) climate divisions (Figure 3). Storage in the High Plains region was severely low (34.7 percent full) and storage in the Southern climate division was moderately low (40.3 percent full). Storage was severely low (28.9 percent full) in the Trans Pecos climate division. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state was normal to high (>70 percent full). The Upper/Mid Rio Grande and the Canadian River Basin had severely low storage, the Upper Colorado and the Lower Rio Grande had moderately low storage, and the Nueces had abnormally low storage.

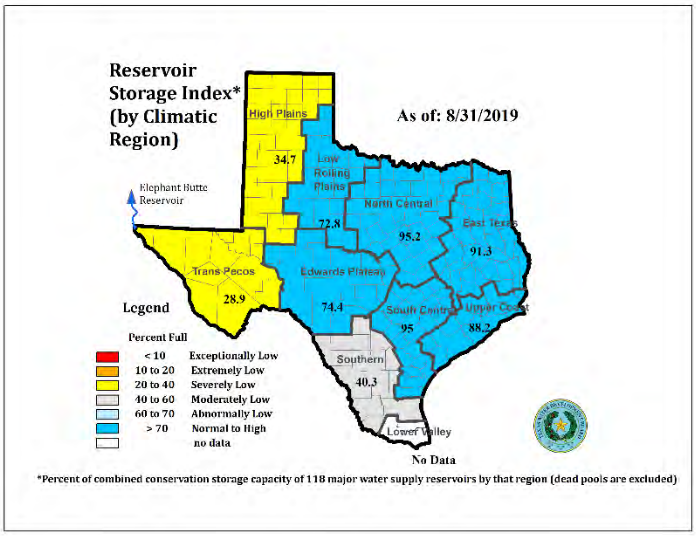


Figure 3: Reservoir Storage Index by climate division at 8/31/2019

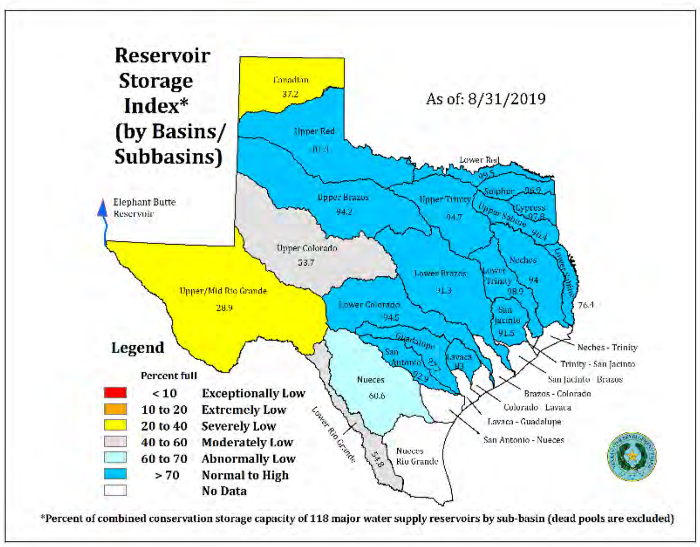


Figure 4: Reservoir Storage Index by river basin/sub-basin at 8/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

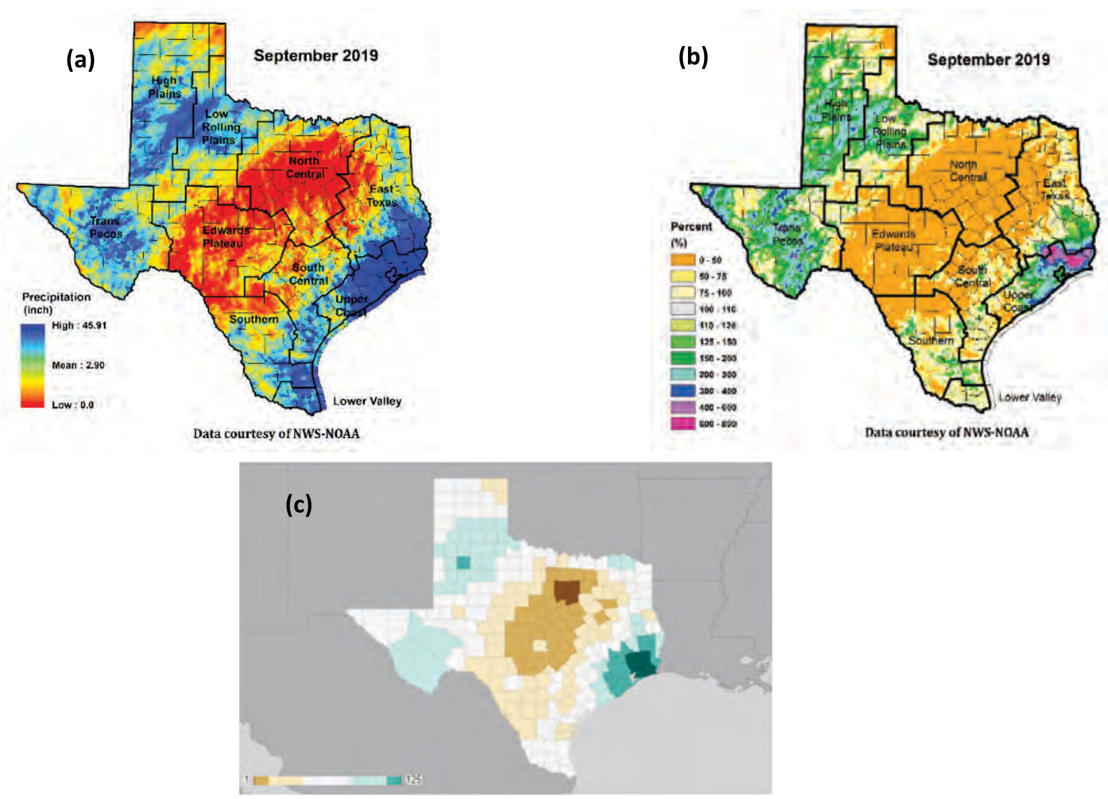
Texas **W**ater **C**onditions **R**eport

Texas Water Development Board

September 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that the central part of the state received little or no rainfall in September [orange and red shading, Figure 1(a)] while the western, southern and southeastern regions of the state received considerable rainfall [blue shading, Figure 1(a)]. Monthly rainfall for September was below-average, compared to historical data from 1981–2010, for much of the state [brown and yellow shading, Figure 1(b)], except for southeast Texas, the Trans Pecos, and the High Plains climate divisions [green, blue, and purple shading, Figure 1(b)]. Rainfall in portions of southeast Texas exceeded 40”. September rainfall records, released by the National Centers for Environmental Information, indicate that Jefferson, Chambers, Hardin, and Liberty counties had their wettest [dark green shading, Figure 1(c)], and Park, Hood, Tarrant, and Johnson counties had their driest [dark brown shading, Figure 1(c)], month on record (based on rainfall records from 1895 - 2019).



Source: https://www.ncdc.noaa.gov/cag/county/mapping/41/pcp/201909/1/rank

Figure 1: (a) Monthly accumulated rainfall, (b) Percent of normal rainfall, and (c) Precipitation rank for September 2019

RESERVOIR STORAGE

At the end of September 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 25.9 million acre-feet or 80 percent of total conservation storage capacity (Figure 2). This is approximately 0.7 million acre-feet less than a month ago and approximately 1 million acre-feet more than end-September 2018.

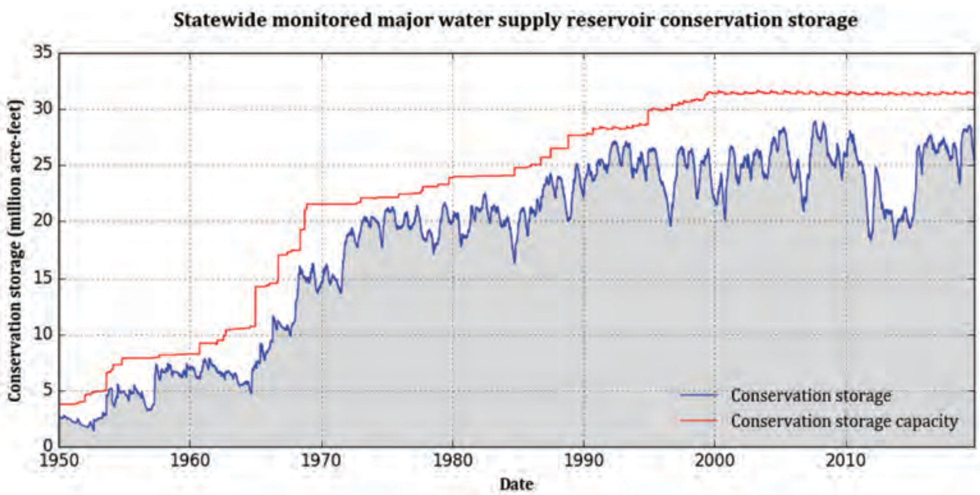


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 5 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 57 were above 90 percent full. Eight reservoirs [E.V. Spence (28 percent full), Falcon (24 percent full), Greenbelt (20 percent full), J.B. Thomas (28 percent full), Mackenzie (12 percent full), O. C. Fisher (12 percent full), Palo Duro Reservoir (7 percent full), and White River (21 percent full)] remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 22 percent full, which was down one percentage points from the end of August 2019.

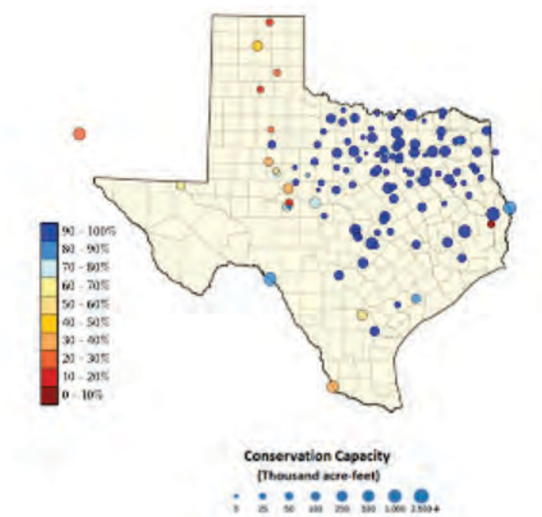


Figure 3: Reservoir conservation storage at end-September expressed as percent full (%)

Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (84.2 percent full), East Texas (89 percent full), North Central (91.6 percent full), South Central (90 percent full), and Edwards (71.7 percent full) climate divisions (Figure 3). Conservation storage in the Low Rolling Plains climate division was abnormally low (67.6 percent full). Storage in the High Plains and the Trans Pecos climate divisions was severely low (34.3 and 27.4 percent full, respectively). Storage in the Southern climate division was moderately low (40.9 percent full). Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state was normal to high (>70 percent full). The Upper/Mid Rio Grande and the Canadian River Basin had severely low storage, the Upper Colorado, the Lower Rio Grande, and the Nueces had moderately low storage.

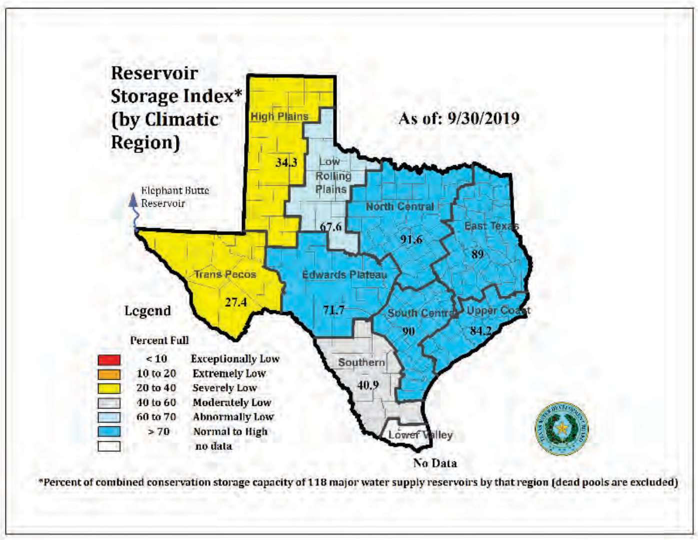


Figure 3: Reservoir Storage Index* by climate division at 9/30/2019

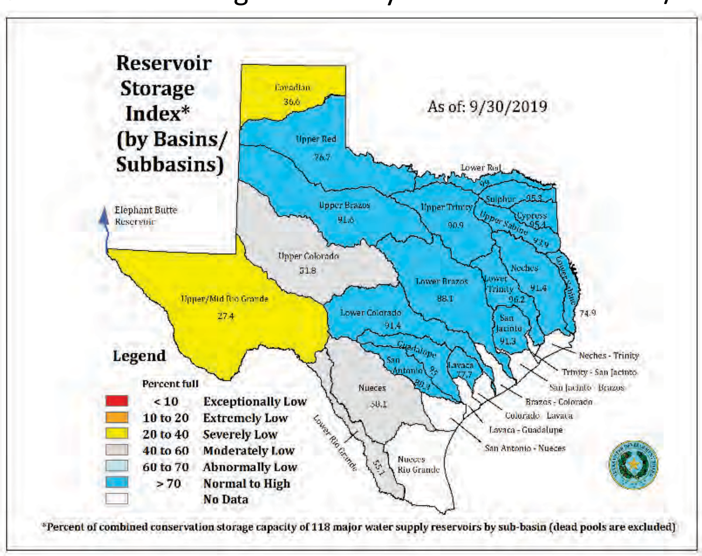


Figure 4: Reservoir Storage Index by river basin/sub-basin at 9/30/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

October 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that the rainfall in the Low Rolling Hills region, as well as the southern High Plains, Trans Pecos, the north and western portions of the Edwards Plateau, and the southern portion of the Southern climate division received little to no rainfall [yellow, orange and red shading, Figure 1(a)]. Portions of the northern High Plains, and the majority of the North Central, South Central, East, and Upper Coast received considerable rainfall, with some regions in east Texas receiving rainfall exceeding 15” [dark blue shading, Figure 1(a)]. Monthly rainfall for October was below-average [yellow and orange shading, Figure 1(b)], compared to historical data from 1981–2010, over much of the state. Exceptions being the north central High Plains where rainfall amounts were 3 to 4 times higher than average. Pockets of higher than average rainfall spanned the south central and north western parts of the Trans Pecos, the Lower Valley, East Texas and the Upper Coast.

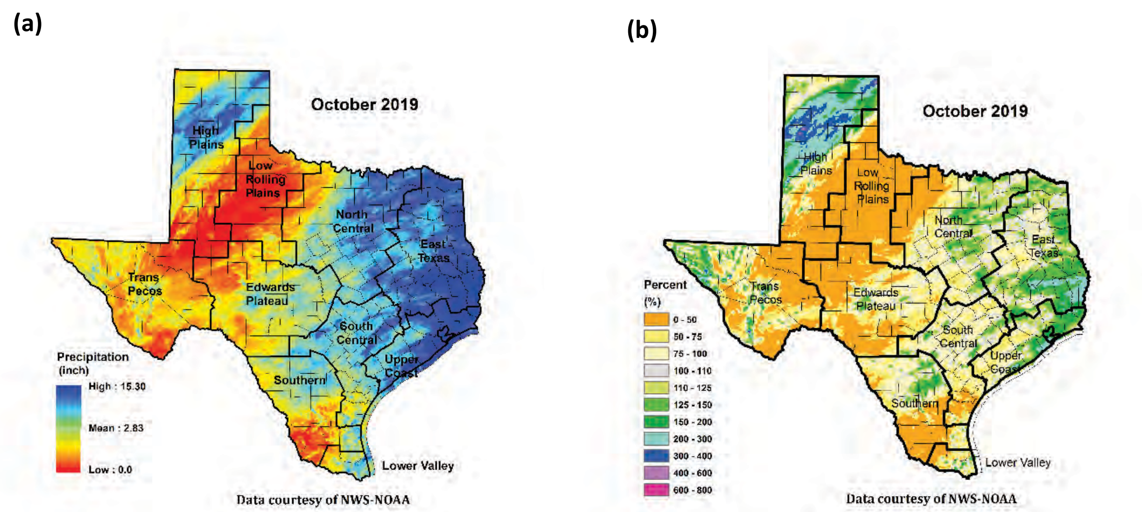


Figure 1: (a) Monthly accumulated rainfall, (b) Percent of normal rainfall

RESERVOIR STORAGE

At the end of October 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 25.7 million acre-feet or 80 percent of total conservation storage capacity (Figure 2). This is approximately 0.3 million acre-feet less than a month ago and approximately 1.6 million acre-feet less than end-October 2018.

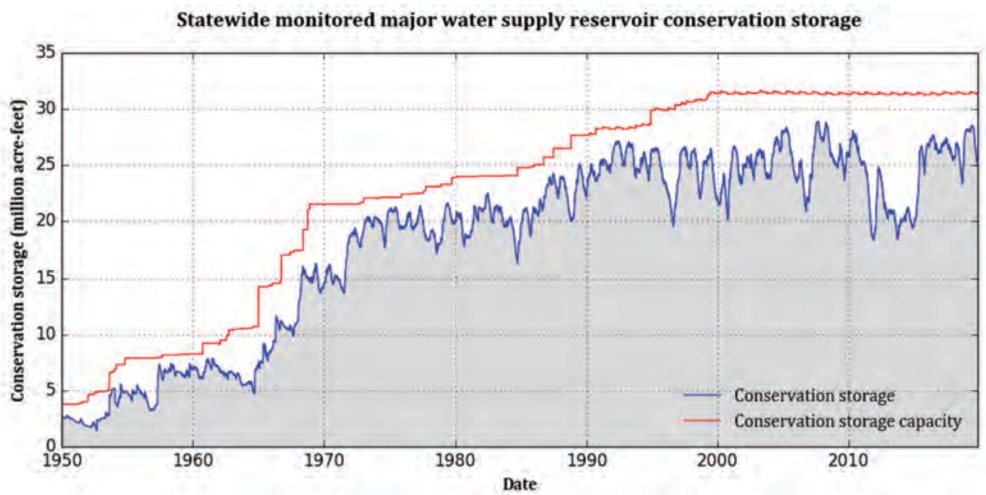


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 9 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 42 were above 90 percent full. Nine reservoirs [E.V. Spence (27 percent full), Falcon (23 percent full), Greenbelt (20 percent full), J.B. Thomas (26 percent full), Mackenzie (12 percent full), O. C. Fisher (11 percent full), Palo Duro Reservoir (7 percent full), and White River (20 percent full)] remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 22 percent full.

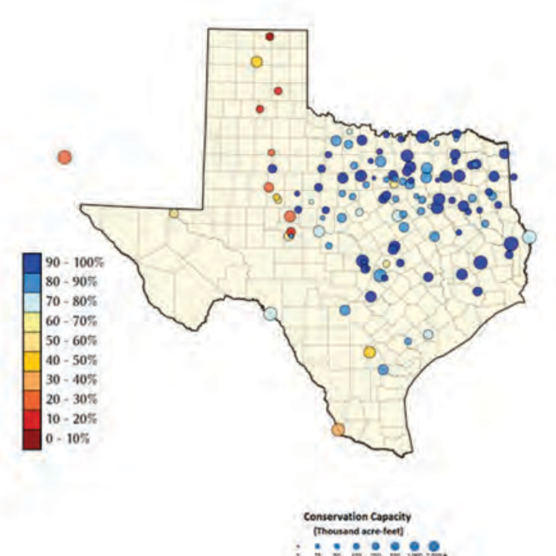


Figure 3: Reservoir conservation storage at end-October expressed as percent full (%)

Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (86.1 percent full), East Texas (89.3 percent full), North Central (90.8 percent full), South Central (87.9 percent full), and Edwards (70.9 percent full) climate divisions (Figure 3). Conservation storage in the Low Rolling Plains climate division was abnormally low (65.2 percent full). Storage in the High Plains and the Trans Pecos climate divisions was severely low (34.9 and 27.7 percent full, respectively). Storage in the Southern climate division was moderately low (39.9 percent full). Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state was normal to high (>70 percent full). The High Plains, Trans Pecos and Southern River Basin had severely low storage, the Low Rolling Plains had abnormally low storage.

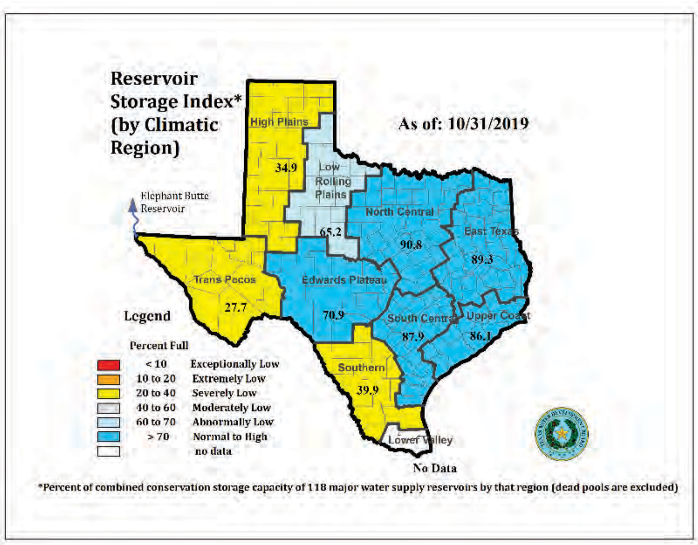


Figure 3: Reservoir Storage Index* by climate division at 10/31/2019

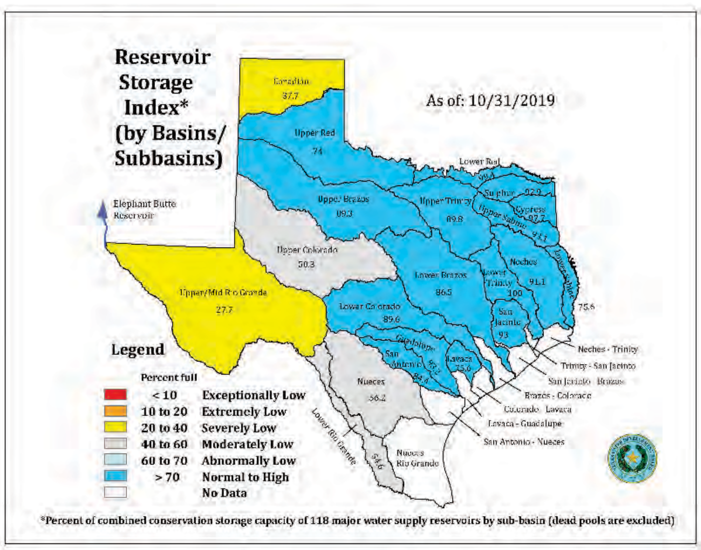


Figure 4: Reservoir Storage Index by river basin/sub-basin at 10/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

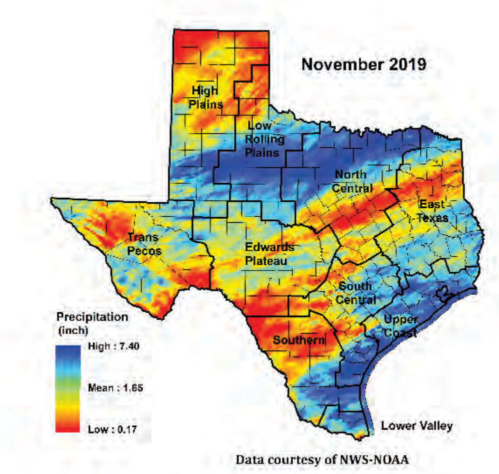
Texas Water Development Board

November 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that several climate divisions received little to no rainfall [yellow, orange and red shading, Figure 1(a)]. These regions include the northern portions of the Low Rolling Hills and High Plains, portions of the northern and southern Trans Pecos, central and southern portions of the Edwards Plateau, the northcentral portion of the Southern, the central and southern regions of the North Central, and northern portions of East Texas climate divisions. The lower portions of the High Plains, the majority of the Low Rolling Plains and Upper Coast, the northern half of the North Central, the southeast portions of the Southern, parts of South Central and East Texas, and scattered areas of the Trans Pecos and Edwards Plateau received considerable rainfall, with some regions receiving more than 7” [dark blue shading, Figure 1(a)]. Monthly rainfall for November was below-average [yellow and orange shading, Figure 1(b)], compared to historical data from 1981–2010, over much of the state. Exceptions being southern regions of the South Central and Southern, and the Lower Valley, which received above average rainfall. Some areas of the Trans Pecos, High Plains and Low Rolling Plains received 2 to 4 times the average, and in some very select areas of the Trans Pecos and Low Rolling Plains exceeded that receiving 6 to 8 times the average rainfall amounts for November.

(a)



(b)

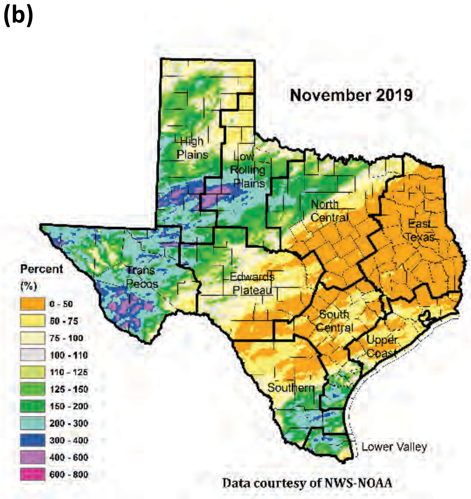


Figure 1: (a) Monthly accumulated rainfall, (b) Percent of normal rainfall

RESERVOIR STORAGE

At the end of November 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 25.7 million acre-feet or 80 percent of total conservation storage capacity (Figure 2). This is approximately 0.05 million acre-feet less than a month ago and approximately 2.3 million acre-feet less than end-November 2018.

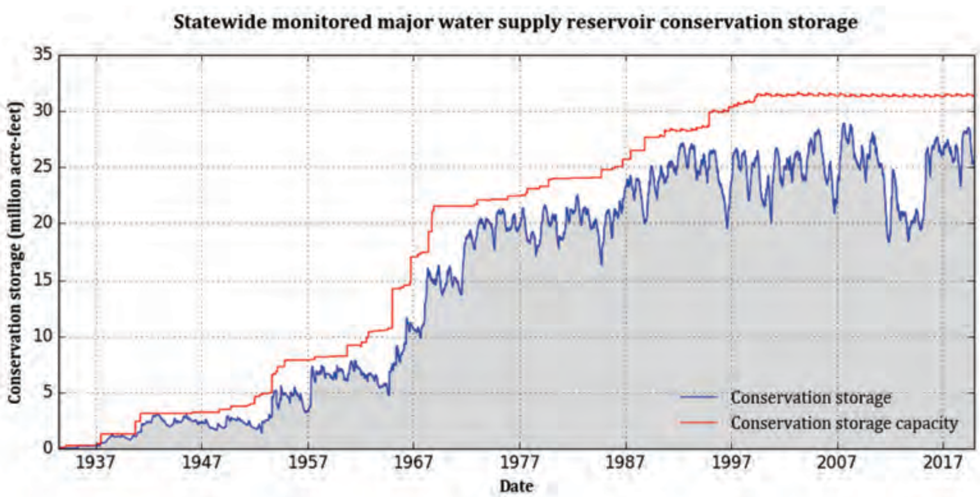


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 15 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 35 were at or above 90 percent full. Eight reservoirs [E.V. Spence (27 percent full), Falcon (23 percent full), Greenbelt (20 percent full), J.B. Thomas (26 percent full), Mackenzie (12 percent full), O. C. Fisher (11 percent full), Palo Duro Reservoir (6 percent full), and White River (19 percent full)] remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 25 percent full.

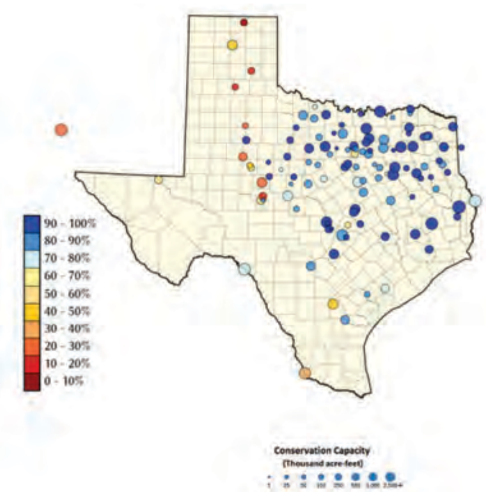


Figure 3: Reservoir conservation storage at end-November expressed as percent full (%)

Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (84.3 percent full), East Texas (89 percent full), North Central (90.9 percent full), South Central (86.2 percent full), and Edwards (70.2 percent full) climate divisions (Figure 4). Conservation storage in the Low Rolling Plains climate division was abnormally low (66.4 percent full). Storage in the High Plains, Trans Pecos, and Southern climate divisions was severely low (35, 30.7, and 39.9 percent full, respectively). Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 5). Storage in basins/sub-basins in the North, Central, and Eastern portions of the state was normal to high (>70 percent full). Storage in the Upper Colorado, Nueces, and Lower Rio Grande basins was moderately low. Meanwhile the Canadian, and the Upper Mid Rio Grande had severely low storage.

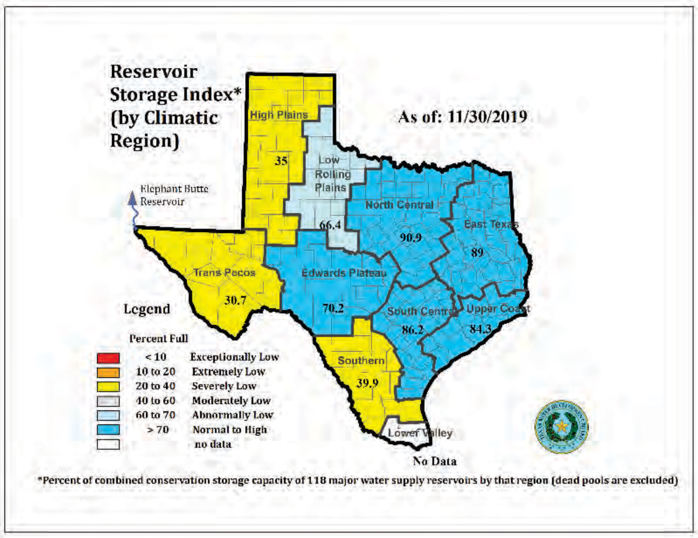


Figure 4: Reservoir Storage Index* by climate division at 11/30/2019

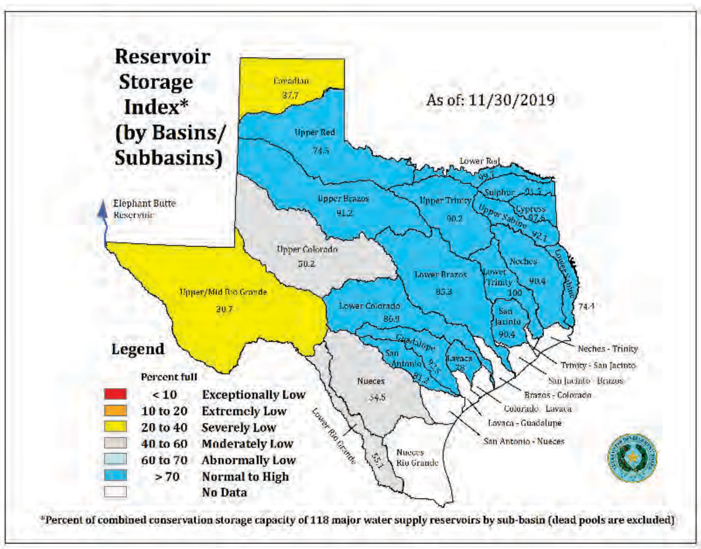


Figure 5: Reservoir Storage Index by river basin/sub-basin at 11/30/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Texas Water Conditions Report

Texas Water Development Board

December 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that during the month of December several climate divisions received little to no rainfall [yellow, orange and red shading, Figure 1(a)] while other climate divisions had rainfall reaching 5.7 inches in some areas [dark blue shading, Figure 1(a)]. The central Low Rolling Plains, most of the Trans Pecos, the Southern, and central and western portions of the South Central climate division received little to no rain fall this month. The northern and central portions of the High Plains received some rainfall, as did much of the North Central, Upper Coast and East Texas, northern and southern portions of the Low Rolling Plains, central and eastern Trans Pecos, northern Edwards Plateau, and eastern portions of the Southern and Low Valley climate divisions. Monthly rainfall for November was below-average [yellow and orange shading, Figure 1(b)], compared to historical data from 1981–2010, over much of the state. Exceptions being the southeastern Southern region, the southern South Central region, northwestern Edwards Plateau, central and eastern Trans Pecos, southern Low Rolling Plains and the northern High Plains.

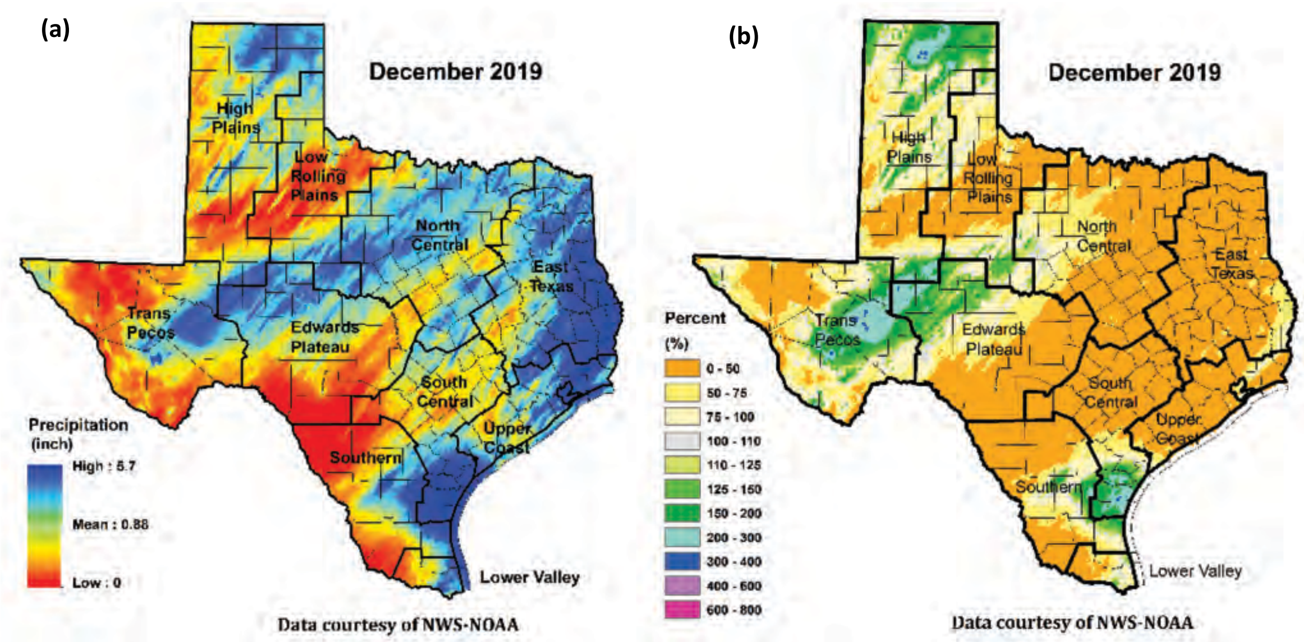


Figure 1: (a) Monthly accumulated rainfall, (b) Percent of normal rainfall

RESERVOIR STORAGE

At the end of December 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 25.6 million acre-feet or 80 percent of total conservation storage capacity (Figure 2). This is approximately 0.002 million acre-feet more than a month ago and approximately 2.6 million acre-feet less than end-December 2018.

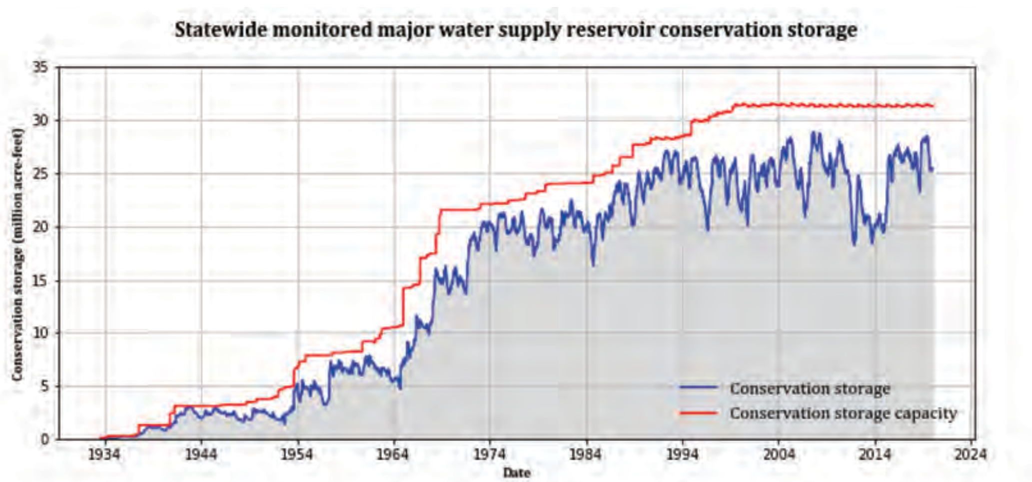


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 16 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 35 were at or above 90 percent full. Nine reservoirs [E.V. Spence (27 percent full), Falcon (23 percent full), Greenbelt (20 percent full), J.B. Thomas (25 percent full), Mackenzie (12 percent full), O. C. Fisher (11 percent full), Palo Duro Reservoir (5 percent full), and White River (19 percent full)] remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 28 percent full.

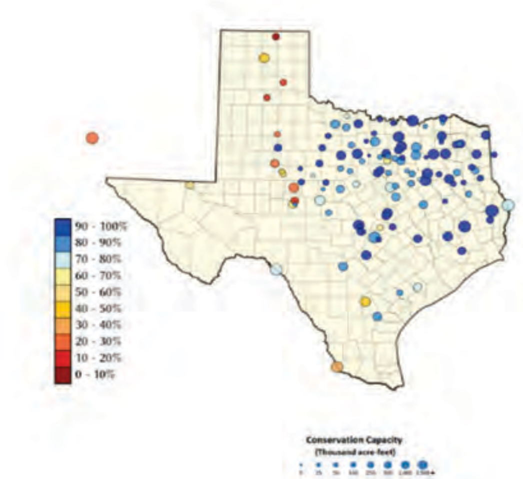


Figure 3: Reservoir conservation storage at end-December expressed as percent full (%)

*Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (81.8 percent full), East Texas (89.2 percent full), North Central (90.6 percent full), South Central (84.6 percent full), and Edwards (70.2 percent full) climate divisions (Figure 4). Conservation storage in the Low Rolling Plains climate division was abnormally low (65.7 percent full). Storage in the High Plains and Trans Pecos climate divisions was severely low (35 and 33.4, respectively). Storage in the Southern climate division was moderate (40.1 percent full). Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 5). Storage in basins/sub-basins in the North, Central, and Eastern portions of the state was normal to high (>70 percent full). Meanwhile the Canadian, and the Upper Mid Rio Grande had severely low storage.

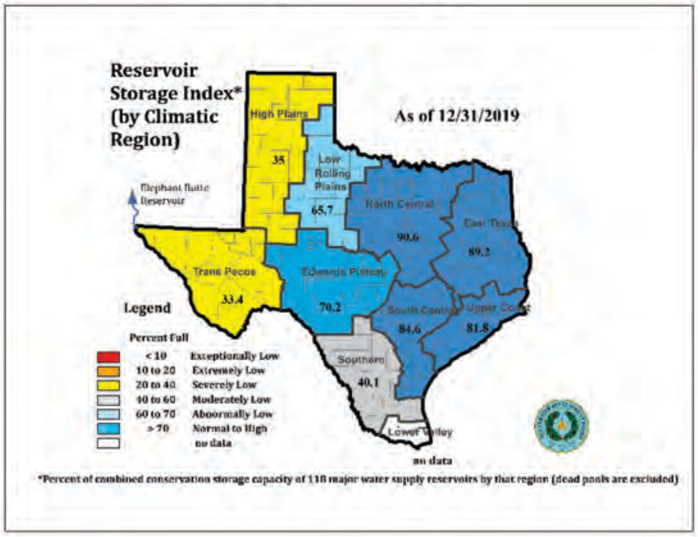


Figure 4: Reservoir Storage Index* by climate division at 12/31/2019

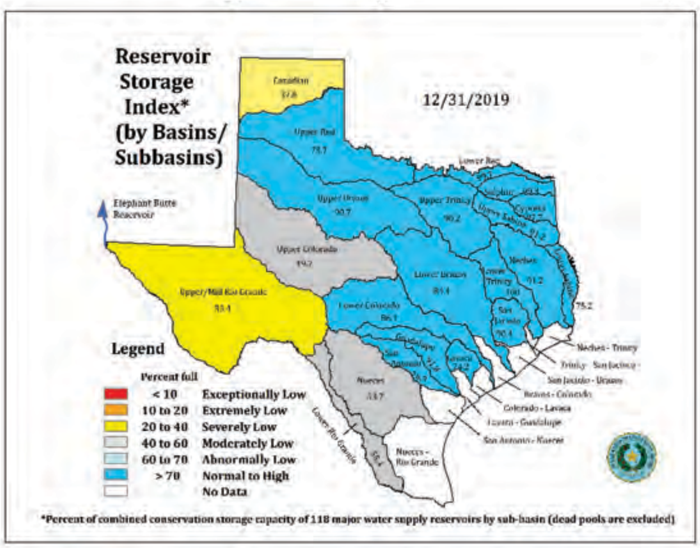


Figure 5: Reservoir Storage Index by river basin/sub-basin at 12/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

Making Headlines 2019

E.1 Objective - The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in the District counties.

E.1 Performance Standard - Each year, a copy of the conservation article will be included in the District's Annual Report to be given to the District's Board of Directors.

E.2 Objective - The District will annually submit an article regarding rain water harvesting for publication to at least one newspaper of general circulation in the District counties.

E.2 Performance Standard - Each year, a copy of the rain water harvesting article will be included in the District's Annual Report to be given to the District's Board of Directors.

E.3 Objective - Each year, the District will include an informative flier on water conservation within at least one mail out to groundwater non-exempt water users distributed in the normal course of business for the District.

E.3 Performance Standard - Each year, a copy of the water conservation mail-out flyer will be included in the District's Annual Report to be given to the District's Board of Directors.

There are several newspapers in the District that routinely publish information provided by the District, including meeting notifications and conservation ideas. In addition, District staff routinely submits articles for publication and sends out updates and newsletters related to general updates on the District, water level monitoring, new well registrations, groundwater production, water conservation and rainwater harvesting. The following pages are examples of information released by the District to fulfill our management objectives in 2019.

E.1:

- Article, submitted by the District, printed in Nocona News in January of 2019 regarding clarification of proposed District Rules.
- Article, submitted by the District, printed in Nocona News in November of 2019 regarding winter water conservaiton tips and tips for winterizing your well and water lines.

E.2:

- Article, submitted by the District, printed in the Bowie News and Weatherford Democrat, in June of 2019 and in the Azle News in August of 2019 regarding rainwater harvesting.

E.3:

- District Newsletter, sent out to all nonexempt well owners and many others in September of 2019.
- District update regarding rule changes sent out to all nonexempt well owners in November of 2019.

Court approves deputies training

By Tracy R. Mesler

MONTAGUE – Faced with problems finding applicants who meet his department's standards for ethics, morals and background, Sheriff Marshal Thomas received permission from the county commissioner's Monday to create a job training program whereby existing jailers and communications officers can become certified deputies.

Sheriff Thomas noted he had three openings in his patrol division. While he and Chief Deputy Jack Lawson, who was also in attendance, had reviewed many applications, those applicants did not meet the standards they have set.

"Like I said when I ran, I'd rather patrol myself," he said, than have accept less than acceptable employees.

So he was proposing a program whereby the county would pay wages for existing departmental employees to attend a law enforcement academy.

What the existing employee (they have to have worked at least a year for the department) would sign a contract with the Sheriff's Department. The county would pay their tuition to law enforcement academy and continue to pay their current wages during that four-month training. In exchange the employee would be contractually obligated to work for the county for four years after graduating and passing the state certification exam.

"If for some reason they left after a year, they would owe 75% of their training, and their wages for that time," the sheriff said. If they left after two years of work, they would owe 50% of those expenses the county had paid. And if they left after three years, they would owe 25%.

County Attorney Clay Riddle had already reviewed the proposed contracts and agreements and approved them.

So, the court quickly approved the program with both the sheriff and the commissioners conceding that there probably would be some modifications as everyone worked through the process for the first time.

Dragging trailer house frame sparks fires, arrest

City and county law enforcement were called to the scene of multiple grass fires last Monday on FM 103.

Upon arriving at the scene, members of the Nocona Rural Fire Department found six grassfires, one of which was rapidly approaching the home of Jim Kennedy just north of the FM 103-Grayson Road intersection.

They also discovered that the cause of the fires was a motorist dragging a mobile home frame on its wheel hubs resulting in showers of sparks that started fires.

Two of Nocona Rural's brush trucks became stuck as they pulled into pastures to extinguish the blazes. Both were extracted thanks to the assistance of a grateful landowner and his tractor.

Meanwhile Nocona Police Chief Kent Holcomb quickly came to the scene, stopping the motorist, Michael Lynn Darragh, 33, of Nocona, until DPS and sheriff's deputies could arrive.

Darragh was taken into custody by the DPS on outstanding warrants from Cooke County for failing to appear on charges of driving while intoxicated.

According to first responders, DPS also wrote several citations regarding pulling the unlicensed trailer out frame.

Darragh was transferred to Cooke County to answer to charges there.

NHS/Tech grad joins Zachary law offices

The Law Office of Zachary N. Renfro, P.C. is pleased to announce that Judy Hamilton Price will be joining the firm beginning February 1, 2019. We will continue to serve our community by providing a full service law practice, and we could not be more excited to add Judy to the team.

A graduate of Nocona High School Judy is the daughter of former Montague County Sheriff Chris Hamilton and wife Kayla Hamilton, also NHS graduates.

Mrs. Price is a 2015 graduate of the Texas Tech University School of Law. She has worked for the past three years as an assistant district attorney in Wichita County.

Sweepstakes winners.

-- Photo by Tracy Mesler

Maxey Johnson, Saint Jo 4H, center left, was awarded the 2019 Montague County Youth Fair Homemaking Sweeptakes award for the junior division. To her left Karlee Brown of Nocona 4H holds her Senior Sweepstakes plaque as members of the Homemaking Division Committee made the presentations Saturday evening.

Explains proposed rules

UTGCD presents acreage facts

By Doug Shaw
General Manager
Upper Trinity GCD

SPRINGTOWN — As most residents of the District are aware, the Upper Trinity Groundwater Conservation District (UTGCD) is proposing several changes to the rules regulating water well in Hood, Montague, Parker, and Wise Counties, the bulk of which is implementing a permitting system as required by state law.

However, it has come to the attention of District's Staff and Board of Directors that much of the information going around is not completely accurate, so this is the District's attempt and clarify what is actually being proposed.

It is worth mentioning up front that the UTGCD has no intention and is not proposing to require meters or permits for private domestic (household) wells or any wells used for agriculture purposes. Any rumors you may have heard to the contrary are 100% false.

The other hot topic of discussion is related to the proposed increase in the minimum tract size requirement, from 2 to 5 acres, for new wells.

The driving factor behind this proposed change is to ensure that water continues to be available to the homes and businesses in our area by promoting more sustainable growth. Currently, a large number of new developments depend on private water wells at each lot as the sole source of water. This has led to more water wells being drilled in the UTGCD than in any other part of the state each year for at least the last decade. Our board meetings each month are filled with homeowners who are experiencing troubles with their water wells because of falling water levels in our aquifers.

The idea behind the proposed change is to help mitigate the impacts of large numbers of water wells clustered together in these types of subdivisions, which can have immediate impacts to the aquifer within the boundaries of the development and over a longer period of time regional impacts.

Furthermore, without infrastructure in place, if at any point in the future the groundwater resources below these subdivision declines, even temporarily, to the point where the water wells have trouble providing for normal household activity, the property values of those homes could be impacted tremendously, and the cost to install public water supply infrastructure after the fact would fall to the homeowners and likely be prohibitive.

Below are some facts regarding the proposed increase in the UTGCD's minimum tract size requirement:

* The proposed increase to the minimum tract size requirement to 5 acres will not impact properties that already exist and have no access to water from a public water supplier. In other words, if you own a 2-acre tract of land and water from a public water system is not currently physically available on the property or a water main is not located on or adjacent to your property, then the 2-acre tract will always be eligible to drill a new water well.

* If you own a tract of land less than 5-acres with an existing well and your existing well needs to be replaced, the District will approve the drilling of a replacement well.

* The UTGCD is proposing to allow for the subdivision of lots no less than 2-acres in size for family members. In other words, If you own a larger piece of property and wish to split off a tract of land for a family member, the UTGCD is proposing to allow for wells to be drilled on newly configured tracts of land at least 2-acres in size under this scenario.

* For new housing subdivisions where the water supply will be a separate private well on every lot, the UTGCD is allowing until Sept. 1, 2019, for developers to submit preliminary plats with lots at least 2-acres in size to the appropriate platting authority. If you are looking to develop a piece of land, you have until Sept. 1 to submit a preliminary plat to the appropriate platting authority, after which all lots on that plat will be eligible to drill a new well.

* Of course, developers can continue to choose to put in a central public water and sewer system or tie into an existing public system instead of putting a separate private well on each lot and continue to develop lots of any size as allowed by the particular county or city in which they are located.

* For new subdivisions with wells to be drilled on every lot, the proposed rules outline a process in which the authorization to drill new water wells on lots less than 5-acres, but no less than 2-acres, will be granted if a site-specific groundwater study indicates the proposed subdivision is sustainable. In addition to the site-specific aquifer properties, this process will also take into account outdoor water use restrictions enforceable through homeowners associations or deed restrictions. In other words, if the science proves that an area can support the long-term sustainability of developments of 2-acre lots, based on the groundwater resources in that particular area or enforceable water conservation measures put in place, the UTGCD will allow for the drilling of wells on those tracts of land.

* Finally, to create a smoother transition process and to help offset any potential economic impact, the UTGCD has proposed a 5-year transition period to allow for the authorization to drill wells on lots no less than 3.5-acres in size, if the County Commissioners Court in the county where the tract exists adopts a resolution requesting that the District allow for the drilling of wells on lots that size. This means, the UTGCD would adopt a 5-acre minimum, but if a particular County fells the immediate economic impact would be too great, they could request a transition period to allow for 3.5-acre lots.

The UTGCD will be holding a Public Hearing beginning at 4:00 p.m. on Jan. 28 at the District office in Springtown located at 1859 West Highway 199. Please do not hesitate to contact District staff at (817) 523-5200, with any questions.

2018 County Youth Fair

Make sure you get home

Don't drive impaired this Thanksgiving

MONTAGUE — Turkey and stuffing. Sweet potatoes and green bean casserole. Pumpkin and apple pies. We've all got our Thanksgiving favorites. But the best part of Thanksgiving isn't what's on the table; it's who's at your table. If you want to make sure that the people you love arrive to your table safely, urge them not to drive impaired by alcohol or drugs this Thanksgiving holiday.

Over the past 5 years, more people have died in motor vehicle crashes — and more have died in crashes involving alcohol — around the Thanksgiving holiday than over any other holiday period. More than the Fourth of July, Christmas, and even New Year's Eve, which are more commonly associated with alcohol. There are also signs that an increasing number of people are driving when impaired by marijuana and other drugs.

One reason for the large number of Thanksgiving impaired-driving deaths may be that the days around the holiday are increasingly seen as a time to drink alcohol and use drugs, specifically marijuana. The night before Thanksgiving (which some call "Thanksgiving Eve") has become a time for going out and drinking. Cooking with marijuana (Danksgiving) is apparently a new trend. In any case, no event should ever end with getting behind the wheel if impaired by alcohol or drugs.

Texas A&M AgriLife Community Health Educator Melanie Potter, Montague County and the Watch UR BAC Project at Texas A&M AgriLife Extension reminds you that whatever your Thanksgiving holiday plans, make sure you're planning a sober ride. Remind your family and friends about the safe options available to them. Or offer to be the designated driver. Then you'll really have something to be grateful for on Thanksgiving: a home full of family and friends who made it to the table because they chose to drive sober.

Turbines concern

Continued from Page 1
dreds of documented cases of wind towers collapsing, blades flying off, hub assemblies catching fire, or the spinning turbine tossing large chunks of ice. All of which makes the need for regulation a safety concern.

A landowner north of Muenster awoke one day to find a 200-lb. chunk of ice had smashed through his barn. "It could have been his house, or a school bus driving down the road," said surveyor Jack Schoppa of Saint Jo.

Brian Barton of Bowie was blunt in his summation of the situation.

"This is a binary decision. Other you are aligned for public safety are you are not."

County Judge Rick Lewis, noting he agreed philosophically that for the safety of motorists and neighboring property owners, something needs to be done, other than two narrow exceptions, he is unaware of what the county can do other than consult with the county's outside attorneys.

The three existing provisions are:

—under the county's road regulations, the county to require setbacks from the easement of up to 50 feet. Which still places wind turbines too close to public traffic, the judge was quick to admit.

—under the provisions of a property tax abatement, the county can make setbacks part of the contractual agreement. But in the case of this particular wind farm, there has been no discussion from the proponents about tax abatements, therefore not opening that avenue for setback provisions.

—under the county's subdivision rules, the court can put such restrictions in place. But as the court learned earlier this year, the rules only apply with someone is dividing property into more than one parcel of land. A landowner leasing all his property for a wind farm would not expose the property to the provisions of the subdivision rules

Mayfield urged the court to continue to explore more expansive regulations that would apply to all tracts of land leased for wind farms.

Judge Lewis offered to contact Bob Bass, co-owner of Allison and Bass, the county's outside legal firm.

But when Comm. Mayfield said he also wanted to talk some more with Bass, the judge suggested the commissioner begin the discussions, and bring back an estimate for what the accompanying legal fees might be at the court's next meeting on Dec. 9.

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TPA MEMBER 2019 TEXAS PRESS ASSOCIATION

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The publisher reserves the right to refuse any or all material or advertising deemed to be detrimental to the newspaper of the community.

The Nocona News is not responsible for copy errors, typographical errors or unintentional errors that may occur in advertising, other than to correct in the next issue after it is brought to their attention. First insertion of all types of advertising is proof of publication, and all adjustments will be made in reference to the first appearance only.

And all the fixings . . .

-- Photo by Tracy Mesler

A good crowd enjoyed a traditional Thanksgiving dinner at The Carpenter's Shop Senior Citizens Center last Thursday.

Tips for winterizing your home for winter

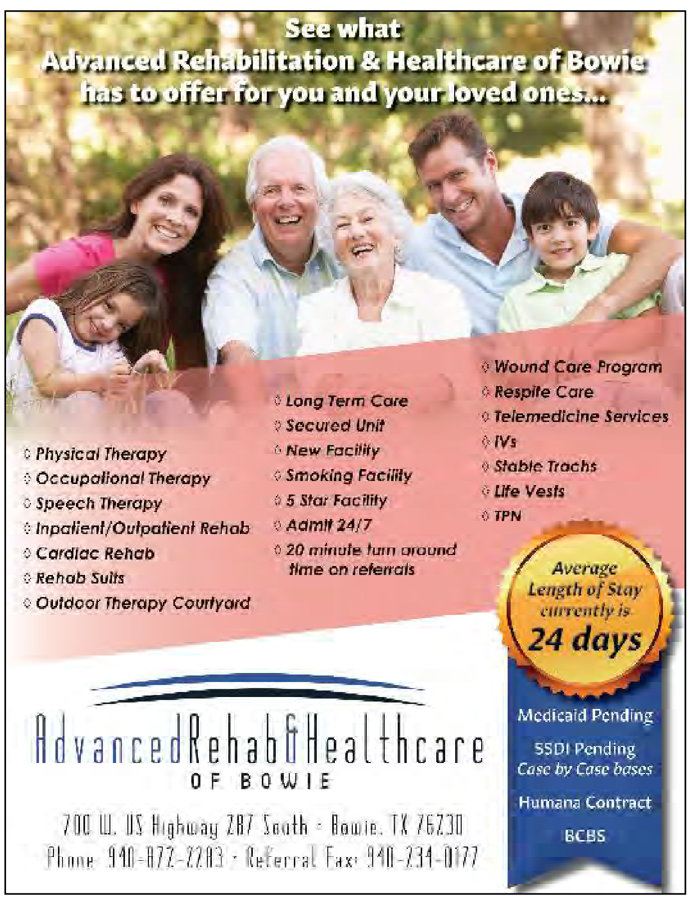
Winter seems to have come early to Texas this year, although average household water use is typically much lower in the colder months, there are still a number of things that can be done to help promote water conservation. Check out our recommendations for indoor and outdoor home preparation to save water and money this holiday season.

The winter months are a great time to identify and repair indoor water leaks from toilets and faucets. These leaks can happen suddenly with changing temperatures and locating them early saves significant amounts of water and money. Adding some food coloring or dye tablets to toilet tanks is an easy way to identify leaks which can add up to a significant amount of wasted water – contact District staff for more information regarding dye tablets and how to identify leaks in your toilet. Also, winter months are the perfect time to consider installing other water saving devices such as lower flow toilets, shower heads, and faucets which can all significantly decrease your household water consumption which means a lower water bill.

It is very important to remember maintenance for the outside of your home as well. Make sure to check or install faucet coverings and insulation around all outdoor water fixtures. When temperatures drop below freezing outdoor fixtures can freeze which can crack or burst resulting in a huge headache for you as well as a tremendous waste of water.

For those of you with private water wells, remember to avoid storing pesticides, fertilizers and other chemicals left over from the spring or summer near your wellhead. While a wellhouse may seem a tempting storage location, a garage or structure

— See "Winter" Page 4



Obituaries

Elva Beck

WICHITA FALLS -- Elva Lou Beck went Home to be with Our Lord on Nov. 18, 2019, at the age of 87.

She had been under Hospice Care of Wichita Falls for twelve days for congestive heart failure.

Lou loved life, loved making flower arrangements for her husband and her parent's gravestones; she loved crafting, sewing and quilting. She enjoyed going to the monthly luncheon with her classmates of 1947 at Nocona High School. Lou retired from the State Highway Department in 1988.

Lou Beck was born April 22, 1932, to the late Charles Alford Zahn (1911-1988) and Roxie Lou (Johnson) Zahn (1916-2008) of Montague. She is also preceded in death by Cleta Faye (Zahn) Morrison of Wichita Falls, Loretta Ann (Zahn) Whitaker, (1936-2008) of Montague and Vicki Verlon Dale (Zahn) Richey , of Decatur.

Lou's husband of 64 years, Bobby Gene Beck, preceded her in death on Oct 10, 2014. They were married on March 18, 1950, in Montague.

She is survived by her sons Wayne Beck, (wife Tommie), and Dane Beck both of Wichita Falls; her grandchildren, David Girard (wife Sunny), Crystal Gilmore, (husband Ryan), Allison Beck (Jason Hill) and Rob Beck (wife April), all of Wichita Falls. From these four grandchildren, Lou was made a great-grandmother to thirteen great-grandchildren. Lou will be greatly missed.

A graveside service was held on Nov. 23 at 10 a.m. at the Montague Cemetery. Services were under the direction of Lunn's Colonial Funeral Home. Visitations was held on Friday Nov. 22 from 6 until 7 p.m. at Lunn's Colonial Funeral Home in Wichita Falls.

Condolences may be sent to the family at www.lunnscolonial.com.

Joyce Penaluna

Joyce Nell Penaluna, 82, died 14on Nov. 18, 2019, in Sanger.

She was born on July 27, 1937, in Spanish Fort to her parents Sam & Geneva Brown Sterling.

Joyce worked for a few years as a teacher, after that she was a homemaker for the remainder of her years taking care of her family whom she loved very much.

She married the love of her life Herman Penaluna on Dec. 24, 1956, in Gainesville. She was a member of the First Baptist Church in Nocona.

She is survived by her son, Steven Penaluna of Nocona; one grandchild; and three great-grandchildren. She is preceded in death by her parents, and husband.

There was a visitation on Friday, Nov. 22, from 6-7 p.m. at Jerry Woods Funeral Home Chapel. A funeral service was held on Saturday, Nov. 23, at 2 p.m. at Jerry Woods Funeral Home Chapel with Rev. Dave Woodbury officiating. Interment followed in Nocona Cemetery.

Memorial donations may be made to the Alzheimer's Assn.

Byron Smith

GRAHAM — Byron Patrick Smith, 59, died at his home in Graham on Nov. 22.

He was born on Dec. 30, 1959, in Artesia, NM to Byron & Patricia "Pat" Green Smith.

Byron worked mostly as a software engineer in computer programming. He was a member of the Cowboy Gathering in Graham.

He was married to Angela Taylor for 33 years, they parted as friends two years ago.

Byron is survived by his children, Jake Smith and girlfriend Jamie Stokes of Graham, Taylor Irwin and husband Frankie of Graham; sisters, Sue Fox of Hobbs, N.M., and Maggie Murray of Santa Fe, N.M.; brother, Chris Smith of Artesia, N.M.; and many aunts, uncles, nieces & nephews.

He is preceded in death by his parents.

There was a funeral service on Tuesday, Nov. 26, at 2 p.m. at Jerry Woods Funeral Home Chapel with Minister Michael Cyr officiating. Interment followed in Starkey Cemetery, Montague County.

Pallbearers were Cody Dooley, Aaron Irwin Sr., Mike Beasley, Cody Russell, Jonas Gonzalez and Frankie Irwin.

**

"The nicest thing I can say about her is all her tattoos are spelled correctly."
—Truvy, Steel Magnolias

**

Winter

Continued from Page 2

further away from your water source is recommended. Additionally, consider using items such as older towels or fabric to help insulate your wellhead and pipes.

Lastly, it is never too early to start planning for the warmer months. Composting leftover food, those troublesome leaves that have littered your yard and other organic material for use in your garden or landscaping will help retain soil moisture and add much needed nutrients to your plants. And, don't forget to add mulch to your landscaping once the temperatures start to rise.

With these tips, any homeowner can easily transition their home into the winter and spring months, avoiding costly repairs while practicing water conservation.

Protecting the water supply is everyone's responsibility. For more information about rainwater harvesting and other water saving ideas, please visit the Upper Trinity Groundwater Conservation District's website (www.uppertrinitygcd.com) where you will find helpful links, videos, articles, and tools to help conserve water. Please contact our office at (817) 523-5200 and Jill Garcia, Education and PR Coordinator for more information.

APPLY NOW FOR ANGEL TREE

The Nocona Angel Tree program is available to assist families during the upcoming Christmas season. If you're in need of help in providing clothing or toys for your children (age 6 months to 14 years old on Christmas Day) please fill out this form completely and bring it to:

FARMERS INSURANCE, 113 Cooke Street Nocona Texas, on or before Monday, December 2nd at 5:30 p.m.

To qualify for assistance YOU MUST BRING WITH YOU:

- This form (completed)
- Your Picture I.D. (Texas Driver's license or State Issued ID)
- Proof of household income (pay stub, utility bill, tax return, government documents)

Please Note: Children Must Be Living In Your Home: Nocona, Prairie Valley or Montague School District

Applications will be accepted November 1 through December 2nd.

Days & hours of operation are Monday – Friday 8:30 am - 5:30 pm.

(If you miss the deadline we will most likely not be able to assist you.)

Note: If you're having trouble filling out this form or just need additional information please call (940) 825-6069 during the times and days noted above. If you are approved to receive assistance the gifts will be delivered on December 20th between 5-7pm . You will NOT be notified in any way other than a delivery if approved or denied.

Politics preparing to roll

Continued from Page 1

ner of Canyon. The Democratic candidate is Greg Sagan of Amarillo.

Thornberry defeated Sagan in 2018 with 81.5% of the vote in 2018. Sagan received 16.9% while Libertarian candidate Calvin DeWeese received 1.5%.

Additionally, Bowie Elementary School counselor Mark Neese has announced his candidacy and is currently circulating a petition to secure the signatures of 500 qualified voters so to be placed on the ballot.

APPLICATIONS FOR THE FIREMAN'S TOY BOX ARE NOW AVAILABLE @ THE CITY OFFICE WITH CINDY MCCRAKEN. ALL APPLICATIONS ARE DUE BACK AT THE CITY OFFICE NO LATER THAN 4 P.M. ON DEC. 5.

Decision 2018

The Nocona News has been authorized to announce the following candidates for Montague County Democratic and Republican Party Primaries on March 3, 2020.

County Sheriff

Marshal Thomas

Republican candidate for County Sheriff

—Political advertising paid for by Marshal Thomas, Montague, TX

97th District Attorney

Bill Knowlton

Republican candidate for 97th District Attorney

—Political advertising paid for by Bill Knowlton, Henrietta, TX.

Your Local Places of Worship

Bethel Baptist Church
310 7th St. - 825-3577
Sunday School 9:45 a.m.
Morning Worship 11 a.m.
Evening Service 6 p.m.

Nueva Vida Bautista
609 Montague - 825-3924
Bible Study 10 a.m.
Worship Service 11 a.m.

Bible Baptist Temple
700 E. Willow - 825-4940
Sunday School 10 a.m.
Morning Worship 11 a.m.

Bible Way Mission
Cherry & Henrietta Sts.
Sunday School 10 a.m.
Morning Worship 11 a.m.
Evening Service 7 p.m.

Central Christian Church
300 Cooke St. - 825-3794
Sunday School 9:45 a.m.
Morning Worship 11 a.m.

Illinois Bend Church
Sunday School 10 a.m.
Morning Worship 11 a.m.
Evening Worship 6 p.m.
Wednesday Service 7 p.m.

Jean's Men's Bible Class
105 Main St. - 825-3432
Sunday Morning 9:30 a.m.

Ringgold Methodist Church
Sunday School 10:30 a.m.
Morning Service 11 a.m.

Church of Christ
311 Cooke - 825-3136
Bible School 9:30 a.m.
Morning Assm. 10:30 a.m.
Evening Assm. 5:30 p.m.
Wednesday Assm. 7 p.m.

Northside Landmark Missionary Baptist Church
Corner of Grayson & Mimosa
Sunday School 10 a.m.
Morning Worship 11 a.m.
Evening Worship 6:30 p.m.

Church of the Nazarene
300 E. Elm St. - 825-6031
Sunday School 9:45 a.m.
Morning Worship10:45 a.m.
Evening Worship 6 p.m.

First Assembly of God
West Pine Street - 825-4742
Sunday School 9:30 a.m.
Morning Worship10:30 a.m.
Evening Worship 6 p.m.

Molsbee Chapel Church
Molsbee Chapel Rd.
825-4580
Sunday School 10:00 a.m.
Morning Worship11:00 a.m.
Evening Worship 6:00 p.m.
Wednesday 6:00 p.m.

Shepherd of the Hills Baptist Church
FM 1956 at FM 3301
Sunday School 9:45 a.m.
Church 10:55 a.m.
Evening 6:30 p.m.

First Baptist Church
511 Cooke St. - 825-3885
Sunday School 9:30 a.m.
Worship Service 10:45 a.m.
Evening Worship 6 p.m.
Wednesday Service 6 p.m.

Christ Community Church
101 Bois D'Arc St.
825-3791
Sunday Worship 10 a.m.
Wednesday Study:6:30 p.m.

Shady Grove Community Church
Worship Service 11 a.m.

First Presbyterian Church
406 11th St.
Worship Service 9:00 a.m.

First Baptist of Montague
Sunday School 9:45 a.m.
Morning Worship 11 a.m.
Evening Worship 6 p.m.

Montague Holiness Church
Sunday School 9:45 a.m.
Worship Service 11 a.m.
Sunday Evening 6:30 p.m.

Bonita Baptist Church
Sunday School 10 a.m.
Worship Service 11 a.m.
Evening Worship 6 p.m.

Ringgold Baptist Church
Sunday School 10 a.m.
Morning Worship 11 a.m.
Evening Worship 6 p.m.

Valley View Baptist Church
FM 103 North of Nocona
966-3318
Sunday School 10 a.m.
Morning Worship 11 a.m.
Evening Worship 6 p.m.

Nocona Hills Community Church
Nocona Drive 825-5285
Sunday School -- 9:00 a.m.
Sun. Workship -- 10:00 a.m.
Mon. Bible Study --2:00 p.m.

United Methodist Church Montague
Worship Service 9 a.m.
Sunday School 10 a.m.

United Methodist Church
202 Grayson - 825-3785
Sunday Worship 9:45 a.m.
Morning Worship 11 a.m.

Abundant Life Church
7th at Pecan Sts. - 825-6549
Sunday School 9:45 a.m.
Worship Service 11 a.m.
Evangelic Service 6 p.m.
First Presbyterian Church
406 11th St. - 825-4168
Sunday School 9:30 a.m.
Worship Service 10:30 a.m.

St. Joseph's Catholic
109 Denison - 825-6331
Sunday Mass 10 a.m.
First Wednesday Mass 6 p.m.
CCD Classes Wed. 6 p.m.

Thank the Following Merchants for Providing This Service Schedule

Creating a rainwater harvester is not complex

06/29/2019 COUNTY LIFE 0

By: Upper Trinity Groundwater Conservation District, Jill Garcia

With almost 15 inches of rain within the last two months we've definitely experienced a wetter than average spring, but summer is now in full swing throughout Texas and that could mean drier times ahead.

With fresh groundwater in ever-increasing demand, a simple task homeowners and citizens can implement is rainwater harvesting.

Participating in rainwater harvesting can:

• Offset lowering aquifer water levels
• Lower water utility bills and
• Reduce polluted runoff

Read the full story in the weekend Bowie News.

PREVIOUS ARTICLE **NEXT ARTICLE**

STAY CONNECTED

https://www.weatherforddemocrat.com/news/local_news/saving-and-conserving-through-summer-rainwater-harvesting/article_de05f7c9-ef7f-5596-a80f-83ef036ffe71.html

Saving and conserving through summer rainwater harvesting

By Jill Garcia Upper Trinity Groundwater Conservation District
Jun 29, 2019

With almost 15 inches of rain within the last two months, we've definitely experienced a wetter than average spring, but summer is now in full swing throughout Texas and that could mean drier times ahead. With fresh groundwater in ever-increasing demand, a simple task homeowners and citizens can implement is rainwater harvesting. Participating in rainwater harvesting can:

• Offset lowering aquifer water levels.

• Lower water utility bills.

• Reduce polluted runoff.

The phrase may sound intimidating, but by incorporating some easy-to-use equipment around your home, you can collect precipitation that falls during those unpredictable Texas storms, and utilize it later. The financially advantageous incentives available through harvesting are two-fold. Apart from lower monthly water bills, the state of Texas allows for property tax exemptions for activities such as rainwater harvesting and some municipalities offer other incentives.

Using rainwater for landscaping is also an excellent way to keep your plants green and growing. By reducing the rapid runoff for your roof, collections can reduce fertilizer and soil runoff, meaning your garden and landscaping will stay healthier longer. In many cases the use of rainwater is preferred for local plants because it is typically free of chemicals added to water from a centralized system as well as other salts and minerals which can be harmful to plants and could damage root systems.

If you're hoping to map out exactly how much water would be necessary for your household, below is a link to a handy calculator to help determine how much rainwater is harvestable based on your roof size. Simply enter the dimensions of your roof, as well as the amount of rainwater that has fallen, and voila! This volume of water can be applied to your garden, landscape or utilized for other purposes.

Creating a rainwater harvesting system doesn't have to be complicated. Something as simple as purchasing or building a rainwater barrel can be inexpensive, easy-to-use and can make an immediate difference with longstanding benefits. For someone that wants to make a more substantial investment, paired with ample storage, fairly simple filtration systems can provide potable water to be used inside your home.

With this information, take the time to outfit your homestead, and help save water in North Texas. Protecting the water supply is everyone's responsibility.

For more information about rainwater harvesting and other water saving ideas, visit the Upper Trinity Groundwater Conservation District's website, www.uppertrinitygcd.com, where you will find helpful links, videos, articles, and tools to help conserve water, or call 817-523-5200.

Jill Garcia is the education and public relations coordinator for UTGCD.

Harvesting rainwater is not difficult

Wednesday, August 7, 2019

Upper Trinity Groundwater Conservation District notes that capturing rainwater can save money while working conservation wonders.

Almost 15 inches of rain fell over May and June – much more than usual in late spring, noted UTGCD's Jill Garcia.

Certainly, however, drier days are ahead and, with the ever-increasing demand for fresh water locally, the simple task of collecting water can be beneficial in many ways, she said:

* offset lowering aquifer water levels

* lower water bills

* reduce polluted runoff

Those who collect rainwater can receive some property tax exemptions from the state, Garcia noted.

Rainwater is ideal for landscapes, she said.

Reducing rapid runoff from roofs will spare nearby ground fertilizer and soil issues.

Properly collected rainwater is likely free from chemicals, salts, and minerals that can harm plants and roots.

You can estimate how much rainwater your roof produces at www.water-cache.com/resources/rainwater-collection-calculator.

The collection process is not difficult, Garcia said, noting that rain barrels are inexpensive and easy-to-use.

An immediate benefit can be recognized, she said.

For those interested in making a more substantial collection investment that would allow for water use inside homes, filtration systems are available.

For more info, contact UTGCD at (817) 523-5200.

Category: News


ALSO INSIDE
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RENO PD ARREST TWO IN AGGRAVATED ASSAULT 3A
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Dorris brothers bringing their childhood chemistry to Azle Football

Azle McDonald's hosting September blood drive

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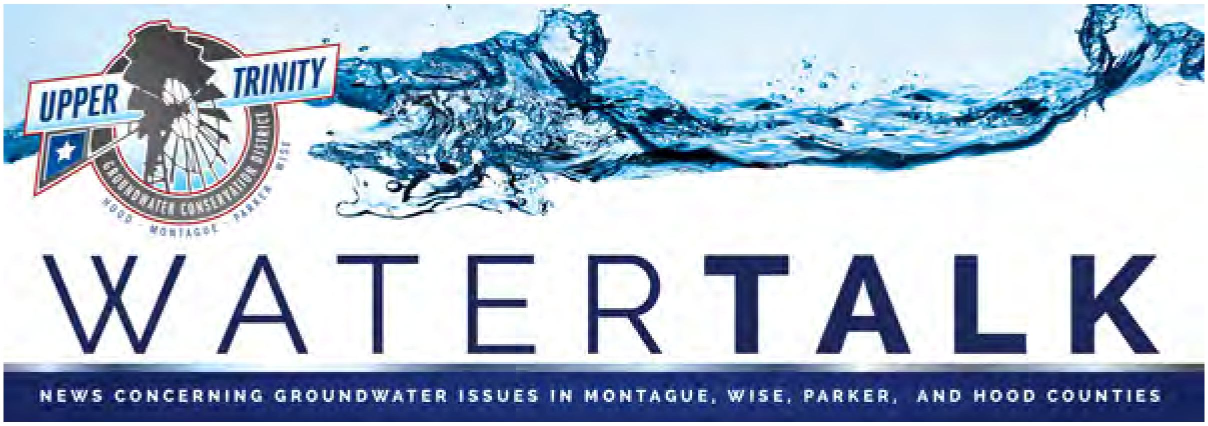


latest **news**

TAGD 2019 Groundwater Summit

Upper Trinity staff members attended the Texas Alliance of Groundwater Districts Groundwater Summit August 20th - 22nd. The speakers and presentations highlighted legislative changes to groundwater made during the 86th Regular Legislative Session, potential recharge projects, and GCD's accommodating Texas' booming population growth.

One of the featured panelists included Dr. Robert Mace, a professor at Texas State University and the current interim Executive Director at the Meadows Center for Water and the Environment. A speaker at one of the most attended panels throughout the convention, Dr. Mace highlighted the advantages of using groundwater data efficiently to spearhead new projects and funding. His celebrated quote "Data is Sexy" entertained the audience while opening a dialogue for other attendees to ask fellow panelists about the future of smaller GCD's and their ability to adapt to ever increasing demands from their communities.

events

September:

2nd- Labor Day (Office Closed)

16th- Board Meeting
5pm, District Office, Springtown, TX

October:

14th- Columbus Day (Office Closed)

21st- Board Meeting
5pm, District Office, Springtown, TX

31st- Water Usage Reports & Fees due for the first 2018 Semi-Annual reporting period (Jan 1-June 30)

November:

Other featured speakers at the conference included the Chancellor of the Texas A&M University system, John Sharp, Texas Representatives Poncho Nevarez, Tracy King, and Lyle Larson. All provided support and guidance in their keynote speeches, including highlighting the importance of groundwater education in Texas, and recently passed Texas House and Senate bills. The Upper Trinity plans on implementing this new information with their continued service to the district.

Parker County Monitoring Well Easement Update

The Upper Trinity has been working with several Parker County landowners, developers, and HOA's to attain sites for the purpose of drilling monitoring wells within the county for the long term observation of water levels throughout the counties. The District currently measures water levels in well over 100 wells throughout the District, but to assure the best management of groundwater in the District, we are always looking for more information. This project will further assist the District with attaining quality water level data and information to help improve groundwater conceptual and flow modeling. These types of projects would not be possible without the interest and cooperation of local citizens.

18th- Board Meeting

28th- Thanksgiving (Office Closed)

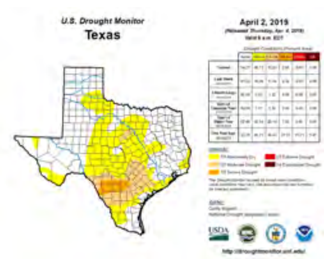
December:

16th- Board Meeting *5pm, District Office, Springtown, TX*

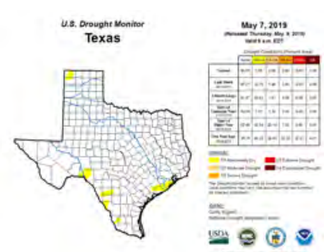
25th- Christmas (Office Closed)

*Board Meetings are held at our District office at **1859 W Hwy 199, Springtown, TX at 5:00pm**. They are open to the public and free to attend.*

drought **status**



April 2nd, 2019



May 7th, 2019

UTGCD Board of Directors voted to adopt new Rules for Water Wells in Hood, Montague, Parker and Wise Counties. The majority of the rule revisions relate to the implementation of a permitting system for non-exempt wells (large commercial and public water supply wells). The finalization of the proposed district rules has come after 10 months worth of public hearings, and input from the public as well as governmental entities from within the four counties. Below is table showing the District's updated well spacing requirements.

Maximum Allowed Well Production	Minimum Tract Size	Spacing from Other Well Sites	Spacing from Property Line
The maximum amount of groundwater the well can actually produce as equipped in gallons per minute (gpm).	The minimum tract size that may be considered an appropriate site for a well.	The minimum distance, in feet, that a new well or proposed well site may be located from an existing registered or permitted well, existing unregistered well identified by the General Manager under Rule 4.3(b), or approved well site.	The minimum distance, in feet, that a new well or proposed well site may be located from the nearest property line of the tract of land on which it is to be located.
<17.36 gpm	Minimum Tract Size is 2 Acres	150 ft.	50 ft.
17.36 - 30 gpm		500 ft.	150 ft.
30 - 50 gpm		1,000 ft.	250 ft.
50 - 80 gpm		1,750 ft	500 ft.
80 – 100 gpm		2,500 ft.	750 ft.
>100 gpm		3,250 ft.	1,000 ft.

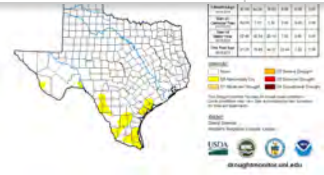
A copy of the revised rules can be obtained at the District Office or at the website below:

https://uppertrinitygcd.com/rules/

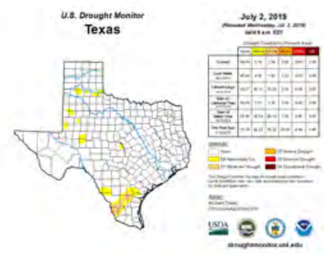
If you have any questions, please do not hesitate to contact District Staff.

Upper Trinity Summer Internship Program

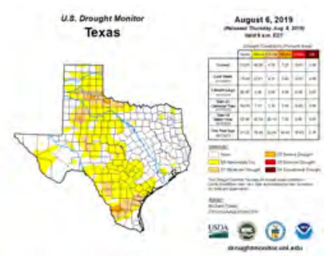
Three students from Tarleton State University had the opportunity to work alongside geologists and data managers at the Springtown offices of the UTGCD this summer. The intern candidates for this year included Jay Love (Geology, B.S) , Grace Ferrell (Wildlife Management), and Carter Bobo (Wildlife Management). Kyle Russell, Registration and Permit Coordinator, oversaw the interns daily office work from May to August.



June 4th, 2019



July 2nd, 2019



August 6th, 2019

District Staff

Doug Shaw,
General Manager

Ann Devenney,
Office Manager

Jennifer Hachtel,
Data Support

Laina Furlong,
Office Assistant

Jill Garcia,
Education & PR Coordinator

Apart from data entry and database management in the office, all three students accompanied field technicians and staff geologists on field work expeditions, learning valuable insights about well monitoring, completions, and UTGCD's newly acquired logging equipment. The Upper Trinity plans to continue its internship program next year, and will be looking for qualified applicants during the spring of 2020. Submit your resumes online through our social media outlets, or to jill@uppertrinitygcd.com.

Permitting Coordinator

Leisha Manzanec,
Field Technician

Jacob Dove,
Field Technician

Blaine Hicks,
Staff Geologist

DON'T FORGET!

It's is important that well owners get their well water tested at least once a year. The District offers free water testing for E. coli and coliform bacteria. We also have a list of NELAP certified laboratories available if you are interested in other types of testing. Call our office at **817-523-5200** for more information.

Protecting Your Rights

Is your well registered? What about your neighbors? Friends and family? Registering your well is the most effective way to protect your spacing rights!

was NOT automatically registered with the District. Registering your well allows the District to ensure that no new wells are drilled too close to yours, which could potentially have a negative impact on your water.

Registering your existing well is **FREE.**

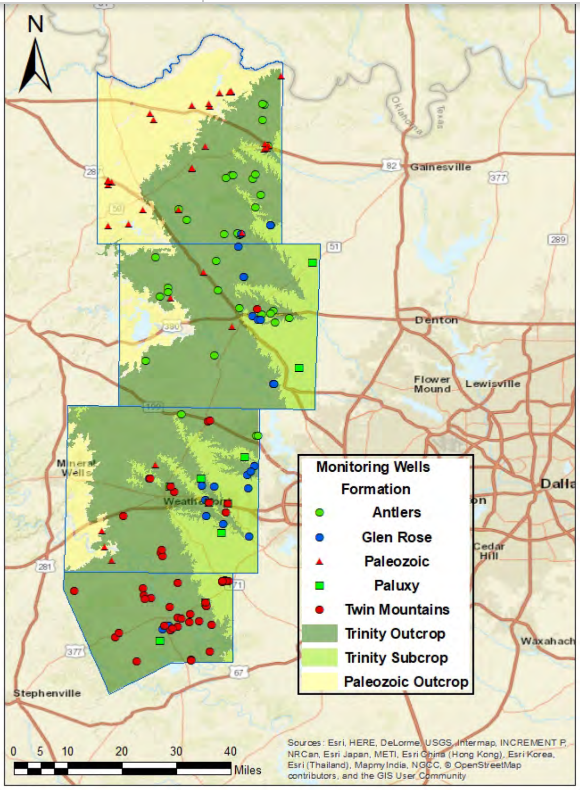
Don't wait! Call our office at 817-523-5200 to find out more or head over to our website to fill out our Existing Well Application.

Well-shed Maintenance 101

Well pump sheds are simple to construct and provide protection for your well from the elements. If your well is protected by a small structure or building, however, there are easy ways to ensure your groundwater stays fresh and clean! Remember to remove all hazardous materials away from your wellhead, including paints, fertilizers, weed killers, and automotive oils. Keeping these items away from your well ensures water health and well-head longevity.

Monitoring Well Program

Are you a well owner interested in learning what the water level in your well is? Are you interested in how the water level changes over time? Consider joining our monitoring well program. Our field technicians visit quarterly to take measurements and help well owners understand more about the groundwater in their area. Check out the maps below or our maps page on our website to see where we currently have monitoring wells and fill out this form to apply. OR come by the office and let us show you our NEW Monitoring Wells!



Water Production Report Dates & Reminders

Water Production Report Dates			
Reporting Period	**Due Date**	**Usage Dates**	**Late Payment Penalties**
Semi- Annual 2	Janary 31	July 1 - December 31	30 days over due: the greater of $25.00 or 10% of the water use fees
Semi- Annual 1	July 31	January 1 - June 30	60+ days overdue: up to three times the amount of the water use fees

District Wells & Aquifer Health Update

Check out the number of well registrations in the Upper Trinity since January 1st, 2019. Below that are average water level trends in your county. Check your county's aquifer health and remind yourself that groundwater conservation is everyone's responsibility!

	Hood	Parker	Wise	Montague	Totals
New	48	315	216	37	616
Existing	4	39	8	2	53
Non-Exempt	1	6	1	0	8
Exempt	51	348	223	39	661
County Totals	52	354	224	39	669

Summary of District Water Level Data (2010-2018) as presented in the District's 2018 Annual Report.

		Outcrop					Subcrop				
	County	Antlers	Paluxy	Glen Rose	Twin Mountains	Cross Timbers	Antlers	Paluxy	Glen Rose	Twin Mountains	Cross Timbers
1-Year Water Level Change	Montague	0.7	-	-	-	0.8	0.4	-	-	-	4.8
	Wise	-1.9	-	-	-	-	0.6	-	-	-	-
	Parker	0.2	0.4	2.6	11.2	2.1	3.1	-	-1.0	-1.7	-
	Hood	-	-3.1	-16.2	-1.4	-	-	-	-2.7	3.0	-
5-Year Water Level Change	Montague	8.9	-	-	-	13.2	17.6	-	-	-	6.6
	Wise	5.8	-	-	-	-	10.3	-	-	-	-
	Parker	8	-3.1	6.5	3.8	5.9	4.3	-	-1.9	-5.4	-
	Hood	-	7.5	-15.2	3.4	-	-	-	-1.1	6.4	-
Cumulative Water Level Change (2010 -2018)	Montague	2.3	-	-	-	42.7	5.7	-	-	-	-9.2
	Wise	-2.5	-	-	-	-	10.8	-	-	-	-
	Parker	-6.1	-6.8	7.4	-2.7	2.5	5.4	-	-4.0	0.5	-
	Hood	-	4.9	-3.3	-0.2	-	-	-	5.4	5.9	-

Note: All valuees are in feet of water level change. Positeve values indicate a water level rise. Negative values indicate a water level decline.

Mobile Education Exhibit

The UTGCD is committed to enhancing public knowledge and awareness in regards to the groundwater resources in the District. To that end, new Education and PR Coordinator, Jill Garcia, has been attending various events, both community and school events, with the District's Mobile Education Exhibit or Aquifer Trailer. The Aquifer Trailer is designed to help the public visualize how an aquifer is formed, how it works, how a well is constructed and how it brings water to the surface, why groundwater conservation districts exist and how they were formed, as well as tips and tricks about water conservation and harvesting. We attend events to educate the public, to stay connected to the community, and to keep up to date on the current happenings in each county.

We are also pleased to announce the addition of new G.E.M. exhibits! In the coming months, look for rainwater harvesting, geological history, and watershed management activities to be featured in the trailer. Below are some of the events in which UTGCD staff have had the opportunity to teach children and adults about groundwater in North Texas:

- July
  - Decatur Public Library- Decatur, TX
  - Newark Public Library, TX
  - AgriLife-Educator Workshop- Bridgeport, TX
  - Wise County STEAM Camp- Decatur, TX
- August
  - Azle Educator Fair- Azle, TX
  - Bowie Outdoor Expo- Bowie, TX
  - Taste of Wise County- Decatur, TX

We here at Upper Trinity GCD are doing our part to protect groundwater for the future and want to teach others to do the same! If you have any questions about the events attended or would like to schedule the Trailer for an event, please contact Jill Garcia at **jill@uppertrinitygcd.com** or call our office at **817-523-5200**.

Keep up to date by following us on social media!

Our mailing address is:
|P.O. Box 1749 Springtown, TX 76082|
Our physical address is:
|1859 W. Hwy 199 Springtown, TX 76082|

View this email in your browser

On October 21, 2019 in a Regular Board Meeting, the Board of Directors of the Upper Trinity Groundwater Conservation District (the "District") adopted the fee for groundwater usage for 2020 at a rate of 22 cents per thousand gallons ($0.22/1,000 gallons) for all commercial, municipal, and industrial users within the District which are not exempt from the metering, monitoring, reporting or payment requirements set forth in the rules adopted by the District.

Groundwater Production Report Dates

Groundwater Production Reports and fees for non-exempt wells are due to the District on the following dates:

Reporting Period	Date Due	Usage Dates	Late Payment Penalties
Semi-Annual 2	January 31	July 1 – December 31	30 days overdue: the greater of $25.00 or 10% of the water use fees.
Semi-Annual 1	July 31	January 1 – June 30	60+ days overdue: up to three times the amount of the water use fees.

New Requirements

As you are likely aware, the District recently adopted permanent rules, with the most notable change being the implementation of a permitting system for wells that are non-exempt from metering and reporting - wells that provide water for public water supply, commercial use, and oil & gas production. The new system includes two different types of permits:

- **Historic Use Permit**

submitted by 12/31/2019
    - Based on maximum historic use (or an extrapolated historic use) for a well or well system
- **Operating Permit**
    - Applies to future wells
    - Based on allocation of GW related to surface acreage owned or controlled by the applicant

Under the recently adopted rules, owners/operators of all existing, or recently approved, non-exempt water wells will be eligible to apply for a Historic Use Permit.

Please keep an eye for additional more detailed information regarding the process and timeline for Historic Use Permit applications.

Water Conservation Best Management Practices (BMPs)

Below is a link to the TWDB's website where you will ind best management practices to help water providers in the of industrial, commercial and municipal water to ensure they are doing all they can to conserve our most precious resource:

hp://w ww.twdb.texas.gov/conservaon/BMP s/index.asp

Groundwater Monitoring Program

F.1 Objective - Within 3 years of Groundwater Management Plan adoption develop a Groundwater Monitoring Program within the District.

F.1 Performance Standard - Upon development, attachment of the District Groundwater Monitoring Program to the District's Annual Report to be given to the District's Board of Directors.

F.2 Objective - Upon approval of the District Monitoring Program – conduct water level measurements at least annually on groundwater resources within the District.

F.2 Performance Standard - Annual evaluation of water-level trends and the adequacy of the monitoring network to monitor aquifer conditions within the District and comply with the aquifer resources desired future conditions. The evaluation will be included in the District's Annual Report to be given to the District's Board of Directors. The District may also take into consideration any measurements made by the TWDB groundwater measurement team.

F.3 Objective - Monitor non-exempt pumping within the District for use in evaluating District compliance with aquifer desired future conditions.

F.3 Performance Standard - Annual reporting of groundwater used by nonexempt wells will be included in the Annual Report provided to the District's Board of Directors.

F.1 & F.2:

A brief history of the monitoring program is presented here followed by a description of activities conducted in 2019.

In 2010, the District developed and instituted a Groundwater Monitoring Program in compliance with Objective and Performance Standard F.1. Phase I of the program secured 108 monitor wells within the District where water levels are measured quarterly using the Steel Tape Method, the Air Line Method, and/or the Electrical Line Method in compliance with Objective F.2. District staff was trained by personnel from the Texas Water Development Board on correct procedures for measurement of water levels. Participating well owners volunteered their wells to allow District staff to take water-level measurements. The District actively pursued additional monitoring wells to improve our ability to monitor groundwater conditions, comply with GMA-8 requirements, and meet the mission of the District as a whole. All activities regarding the District Groundwater Monitoring Program were presented for review and consent to the District Board.

A review of the Phase I Monitor Well System of wells indicated that gaps existed in the monitoring well network both spatially and vertically within the Trinity Aquifer and the Paleozoic aquifers (Cross Timbers). In response, the District contracted with INTERA Inc. to augment the monitor well network in a Phase II process. In 2011, the consultant completed a draft report that documented the hydrogeologic framework for the aquifers within the District with emphasis on the Paleozoic aquifers and also developed the strategy for assessing the Phase I monitoring well network and selecting the Phase II wells to meet the performance objectives and mission of the District. The monitoring strategy was focused to develop the data required to evaluate aquifer conditions within the boundaries of the District relative to the Trinity Aquifer DFCs and for potential future Cross Timbers aquifers DFC. This report is included as Appendix 2.

Based upon the data analysis presented in the Phase II report, 65 wells of the original 108 Phase I wells were suggested for retention in the network. An additional 120 optimally located wells were targeted for inclusion in the monitoring network. During 2013, District Staff and INTERA focused on securing agreements with owners of the identified wells. However, the process of acquiring new wells at optimal locations proved more difficult than anticipated and, as a result, progress was slower than originally expected. As of the end of December 2013, 24 new wells had been added to the monitoring network as part of the Phase II efforts.

In 2015, District staff conducted an internal assessment of the program which resulted in several wells being removed from the program due to new owners electing not to participate in the monitoring program, changes in well configuration resulting in an inability to access the well, and well collapse. Many of the wells removed from the program had not been actively monitored for several years yet had been included in the trend analysis presented to the Board in previous annual reports. Figure A below shows all wells in which the District, at some point, has collected water level data.

In the spring of 2015, the District purchased and installed the first 14 pressure transducers, which have been recording daily water level readings since that time. A few of these transducers have been strategically relocated, and two had to be removed for a short period of time due to malfunctioning equipment, both cases have been resolved by sending the device back to the manufacturer for repair.

In the last few years, the District has installed pressure transducers in a few other wells with and two wells with well sounders. In 2018, the District also drilled two monitoring wells which are located at the District office site. Those wells are equipped with pressure transducers which take water level readings every 15 minutes and are connected to the TWDB's TexMesoNet, data from those wells can be found at https://texmesonet.org. Locations and associated aquifers for all wells equipped with constant monitoring devices (transducers/sounders) can be seen in Figure B. District staff visits these locations to download data on a quarterly basis. Moving forward, it is likely in the best interest of the District to continue to identify the best candidate wells for transducers to bolster the monitoring program.

In the spring of 2018, the District had INTERA begin the development of a web based water level trend analysis/DFC tracking tool to be used to streamline the process of analyzing the District's water level data and to help minimize human error in that process. This tool was used to analyze the water level data collected from the wells in the District monitoring well program in order to provide insight into long-term water-level changes in the District.

Table 1 summarizes the average water-level changes obtained from the trend analysis, by county and aquifer (outcrop and subcrop). Appendix 1, attached to this report, includes a summary report for each aquifer/county/outcrop-subcrop split with greater detail, including the Well ID and the number of wells used in the analysis. The results in Table 1 represent water level changes over a defined time period for each of the defined aquifer units (outcrop and subcrop) in each of the 4 counties.

Table 1. Average Trend of Water-Level Changes since 2010 and Number of Wells for used for Analysis

		Outcrop					Subcrop				
	County	Antlers	Paluxy	Glen Rose	Twin Mountains	Cross Timbers	Antlers	Paluxy	Glen Rose	Twin Mountains	Cross Timbers
Desired Future Conditions	Montague	-18	-	-	-	-	-	-	-	-	-
	Wise	-34	-	-	-	-	-142	-	-	-	-
	Parker	-11	-5	-10	-1	-	-	-1	-28	-46	-
	Hood	-	-5	-7	-4	-	-	-	-28	-46	-
1-Year Water Level Change	Montague	0.6	-	-	-	0.8	-	-	-	-	4.8
	Wise	-1.1	-	-	-	-	6.8	-	-	-	-
	Parker	2.3	0.4	2.6	11.2	2.1	-	-	-1.0	-1.7	-
	Hood	-	-3.1	-16.2	-1.4	-	-	-	-2.7	3.5	-
5-Year Water Level Change	Montague	13.2	-	-	-	13.2	-	-	-	-	6.6
	Wise	8.3	-	-	-	-	6.5	-	-	-	-
	Parker	5.6	-3.1	6.5	3.8	5.9	-	-	-1.9	-5.4	-
	Hood	-	7.5	-15.2	3.4	-	-	-	-1.1	6.2	-
Cumulative Water Level Change (2010 to Present)	Montague	3.9	-	-	-	42.7	-	-	-	-	-9.2
	Wise	0.0	-	-	-	-	7.0	-	-	-	-
	Parker	-1.7	-6.8	7.4	-2.7	2.5	-	-	-4.0	0.5	-
	Hood	-	4.9	-3.3	-0.2	-	-	-	5.4	5.8	-
DFCs vs Cumulative Change	Montague	21.9	-	-	-	-	-	-	-	-	-
	Wise	34.0	-	-	-	-	149.0	-	-	-	-
	Parker	9.3	-1.8	17.4	-1.7	-	-	-	24.0	46.5	-
	Hood	-	9.9	3.7	3.8	-	-	-	33.4	51.8	-

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

So, in the table above

- Desired Future Condition is the current adopted DFC for each of the defined formations. Remember the DFC requires no more than a certain level of water level decline (values in the table), from 2010 water levels, by 2070.
- 1-year water level change represents the change in water levels from the 2018 "aquifer year" to the 2019 "aquifer year".
- 5-year water level change represents the change in water levels from the 2014 "aquifer year" to the 2019 "aquifer year"
- Cumulative water level change (2010 to present) represents the change in water levels from the 2010 "aquifer year" to the 2019 "aquifer year".
- DFC vs. Cumulative change is simply a comparison of the cumulative water level change to the DFC

One of the key reasons the District monitors water levels is to track compliance with adopted desired future conditions (DFCs). The current DFCs are shown in Table 1 and describe water-level changes between 2010 and 2070. Since water level changes before water year 2010 do not apply to DFC compliance, they are removed from the analysis.

During collection of water levels, District staff note if the water level measurement was taken while the well is pumping or has recently been pumping. Water levels taken during pumping can be valuable for characterizing aquifer properties but are not appropriate for evaluating water level trends. These measurements are removed from this analysis, but they are maintained in the District's water level database.

Water levels in wells commonly fluctuate throughout a year, which can be due to changes in demands on the aquifer, changes in rainfall, or a combination of these and other factors. Typically, water levels are lower during summer months when demands are highest. The levels then recover between late fall and early spring when demands are lower. In order to ensure that water level measurements can be reasonably compared to each other, the data used in the analysis is limited to measurements taken between October and April. Each measurement is then assigned to a "water year" (WY). For example, water level measurements between October 2010 and April 2011 are assigned as WY 2010.

Although all wells in the District's monitoring program are measured multiple times per year, or continuously monitored with a transducer or other device, this analysis uses the shallowest measurement in each well in each water year (as defined above) to develop water level trends. This ensures that water levels compared across years are as analogous as possible.

The result of this process is a set of single water level measurements for each water year in each well. Where water level measurements are available for two consecutive water years, the water level change is calculated. For example, a calculated water level change for WY 2011 requires a water level measurement for the well in both WY 2010 and WY 2011.

District staff maintains aquifer assignments for each well in the monitoring program as well as whether the well represents outcrop/unconfined conditions or subcrop/confined conditions. Using these assignments, the average water level change associated with each DFC is calculated. Based on the current DFCs, the water level trends are divided by county, aquifer and outcrop/subcrop designation. One feature of this approach is that a different set of wells may be used to characterize water level changes for each year depending on availability of water level measurements. This allows for the District to make use of data from new wells added to the monitoring program or historical data for wells no longer monitored.

Currently, District staff continue to review all well registration applications to evaluate the potential for addition of that well to the monitoring well program. The District is incrementally expanding and improving the monitoring network to characterize groundwater conditions more effectively throughout the District. The District has also been actively working with landowners and developers in the District to acquire sites to drill monitoring well.

F.3:

In 2015, the District staff reviewed the best available information to develop estimated exempt groundwater use volumes by county. These estimates were presented to the District's Board of Directors in the 2015 Annual Report and were also provided to the Texas Water Development Board (TWDB). The TWDB then took those estimates and developed projections for exempt groundwater use for the years 2020, 2030, 2040, 2050, 2060 & 2070. In developing this data for the TWDB, District staff was asked to estimate exempt use for both the Trinity Aquifer group and the Paleozoic formations; only estimates for the Trinity Group were reported in the 2015 Annual Report.

For the 2018 exempt use estimates, staff took the TWDB estimate for 2015 and projection for 2020, and used a linear function to calculate estimated 2018 groundwater use by county. Also, it is noteworthy to mention that staff has included estimated exempt use from the Paleozoic formations in this report, as mentioned earlier only estimates from the Trinity Group were used in the 2015 report.

Non-exempt use was also estimated at the same time, this is largely based on metered volumes reported to the District by non-exempt well owners. Table 6 provides a best estimate of exempt and non-exempt groundwater use for the District in 2018 utilizing data from the following sources:

- The Region B, C, and G 2011and 2016 Regional Water Plans;
- The report developed under contract to the TWDB titled "Total Projected Water Use in the Texas Mining and Oil and Gas Industry;
- Exempt pumping estimates from the TWDB

- Water Use Survey data from the TWDB
- Metered data reported to the District.

Table 2. Estimated Exempt and Non-exempt Groundwater Use for the District by County

Category	Groundwater Use (AFY)[1]				
	Hood	Montague	Parker	Wise	Total
Exempt Use	6,169	1,570	6,097	5,294	**19,129**
Non-Exempt Use	5,131	320	3,685	2,244	**11,379**
Total	**11,300**	**1,890**	**9,782**	**7,538**	**30,508**

(1) AFY = acre-feet per year

Figure A. All wells in the District with Water Level Data

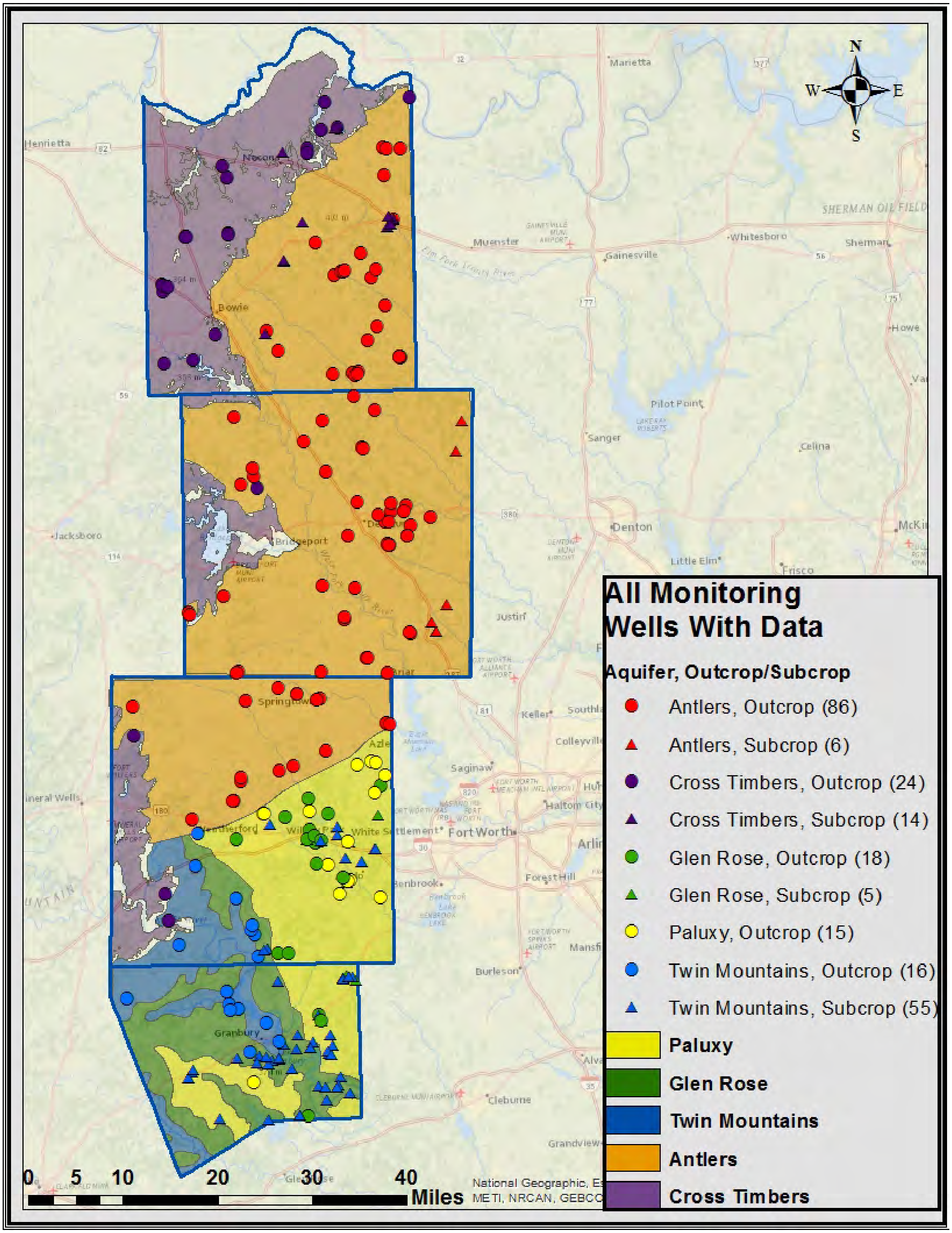
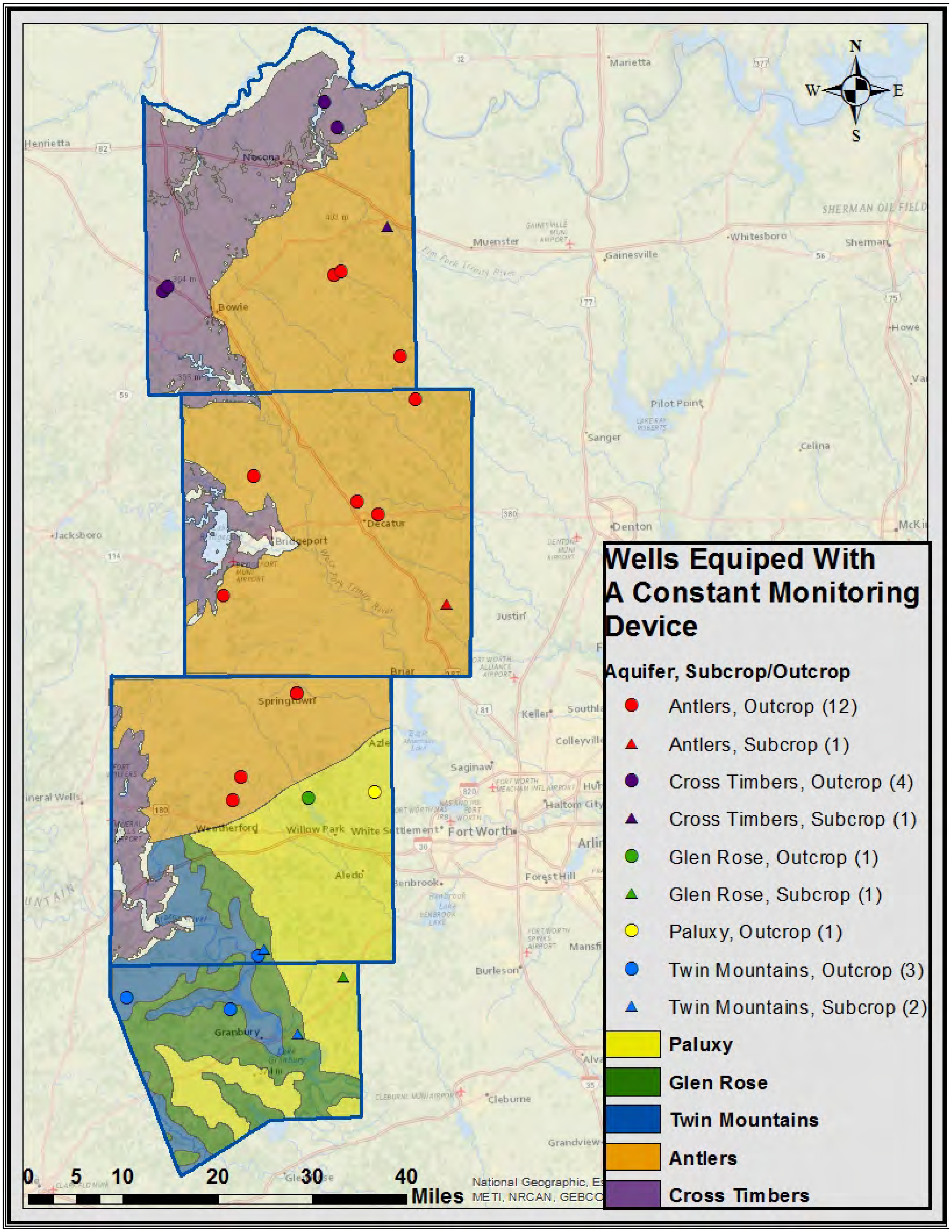


Figure B. Wells in the District's Monitoring Well Network Equipped with A Constant Monitoring Device



APPENDIX 1

Summary of Desired Future Conditions and Water Level Trends

Upper Trinity Groundwater Conservation District

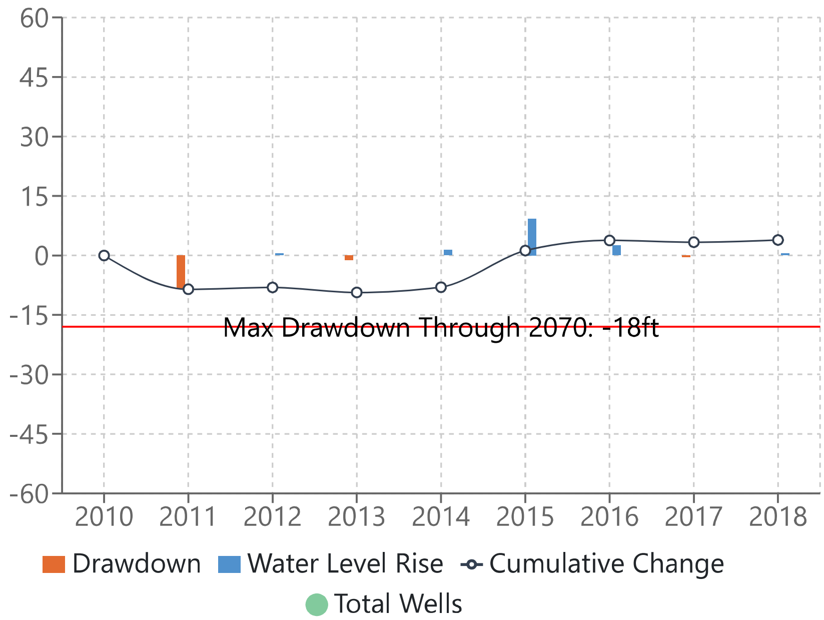
September 10, 2020

		Outcrop					Subcrop				
	County	Antlers	Paluxy	Glen Rose	Twin Mountains	Cross Timbers	Antlers	Paluxy	Glen Rose	Twin Mountains	Cross Timbers
Desired Future Conditions	**Montague**	-18	-	-	-	-	-	-	-	-	-
	Wise	-34	-	-	-	-	-142	-	-	-	-
	Parker	-11	-5	-10	-1	-	-	-1	-28	-46	-
	Hood	-	-5	-7	-4	-	-	-	-28	-46	-
1-Year Water Level Change	**Montague**	0.6	-	-	-	0.8	-	-	-	-	4.8
	Wise	-1.1	-	-	-	-	6.8	-	-	-	-
	Parker	2.3	0.4	2.6	11.2	2.1	-	-	-1.0	-1.7	-
	Hood	-	-3.1	-16.2	-1.4	-	-	-	-2.7	3.5	-
5-Year Water Level Change	**Montague**	13.2	-	-	-	13.2	-	-	-	-	6.6
	Wise	8.3	-	-	-	-	6.5	-	-	-	-
	Parker	5.6	-3.1	6.5	3.8	5.9	-	-	-1.9	-5.4	-
	Hood	-	7.5	-15.2	3.4	-	-	-	-1.1	6.2	-
Cumulative Water Level Change (2010 to Present)	**Montague**	3.9	-	-	-	42.7	-	-	-	-	-9.2
	Wise	0.0	-	-	-	-	7.0	-	-	-	-
	Parker	-1.7	-6.8	7.4	-2.7	2.5	-	-	-4.0	0.5	-
	Hood	-	4.9	-3.3	-0.2	-	-	-	5.4	5.8	-
DFCs vs Cumulative Change	**Montague**	21.9	-	-	-	-	-	-	-	-	-
	Wise	34.0	-	-	-	-	149.0	-	-	-	-
	Parker	9.3	-1.8	17.4	-1.7	-	-	-	24.0	46.5	-
	Hood	-	9.9	3.7	3.8	-	-	-	33.4	51.8	-

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Montague County-Antlers-Outcrop



	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-18	Not Applicable	Not Applicable
1-Year Water Level Change	0.6	19	4062, 2898, 2096, 196, 2097, 200, 2899, 2897, 2813, 8882, 1495, 1500, 304, 1501, 1410, 1497, 632, 8890, 9505
5-Year Water Level Change	13.2	22	200, 2096, 196, 2097, 3973, 8882, 1495, 1501, 1500, 1497, 632, 4062, 2898, 2897, 2813, 304, 1410, 8890, 4107, 2899, 4402, 9505
Cumulative Water Level Change (2010 to Present)	3.9	22	200, 2096, 196, 2097, 3973, 1495, 304, 1501, 1500, 1497, 8882, 632, 4062, 2898, 2897, 2813, 1410, 8890, 4107, 2899, 4402, 9505
DFCs vs Cumulative Change	21.9	Not Applicable	Not Applicable

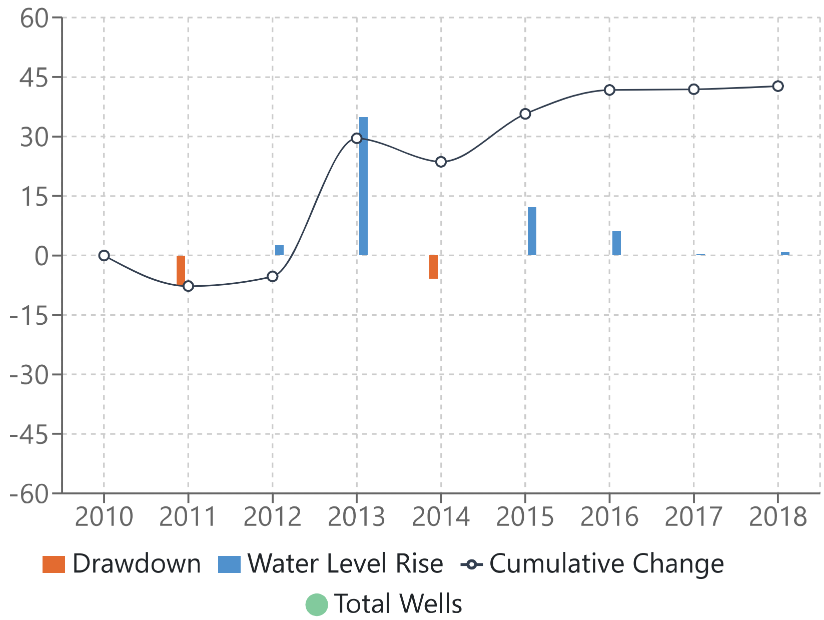
Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends

Upper Trinity Groundwater Conservation District

September 10, 2020

Montague County-Cross Timbers-Outcrop

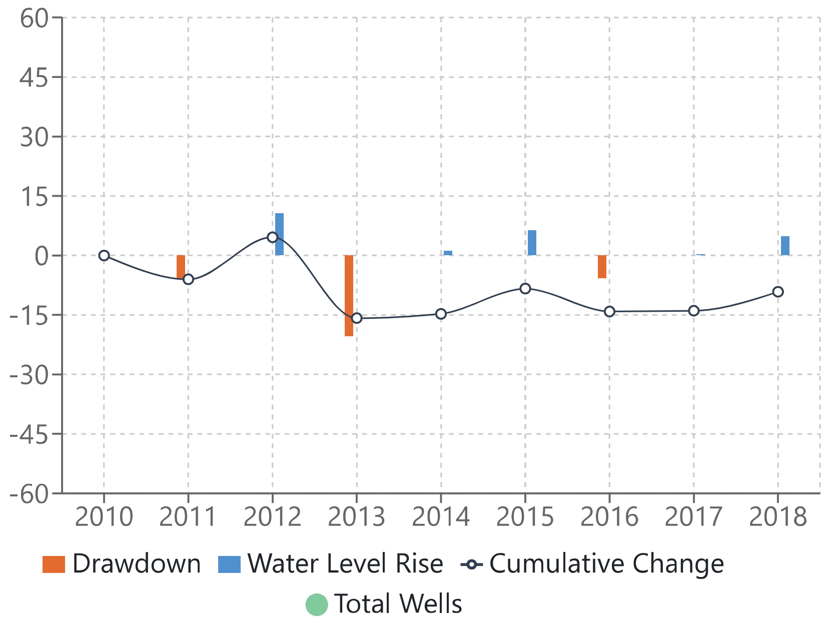


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions		Not Applicable	Not Applicable
1-Year Water Level Change	0.8	15	6433, 5199, 2196, 2608, 8866, 6604, 6605, 6208, 1015, 1016, 1295, 593, 592, 1298, 8881
5-Year Water Level Change	13.2	16	1295, 1298, 8881, 592, 6433, 5199, 2608, 8866, 6604, 6605, 2196, 593, 9366, 6208, 1015, 1016
Cumulative Water Level Change (2010 to Present)	42.7	16	2608, 8866, 1295, 1298, 8881, 592, 6433, 5199, 6604, 6605, 2196, 593, 9366, 6208, 1015, 1016
DFCs vs Cumulative Change	Not Avaliable	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Montague County-Cross Timbers-Subcrop

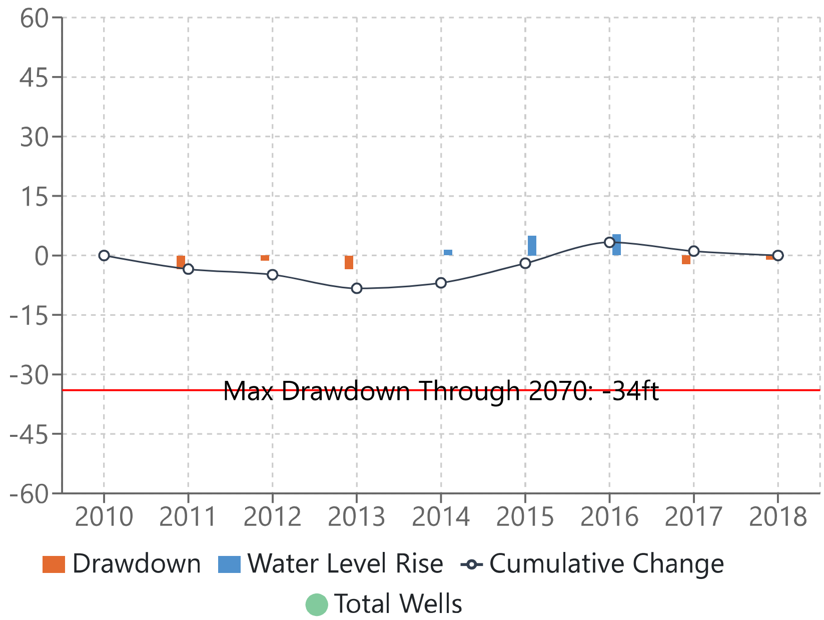


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions		Not Applicable	Not Applicable
1-Year Water Level Change	4.8	11	4401, 4202, 638, 636, 633, 637, 635, 666, 3970, 1296, 2728
5-Year Water Level Change	6.6	15	634, 638, 633, 637, 636, 1297, 1296, 2413, 4202, 635, 2427, 3970, 666, 2728, 4401
Cumulative Water Level Change (2010 to Present)	-9.2	15	634, 638, 637, 635, 1297, 1296, 2413, 633, 636, 4202, 2427, 3970, 666, 2728, 4401
DFCs vs Cumulative Change	Not Avaliable	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Wise County-Antlers-Outcrop

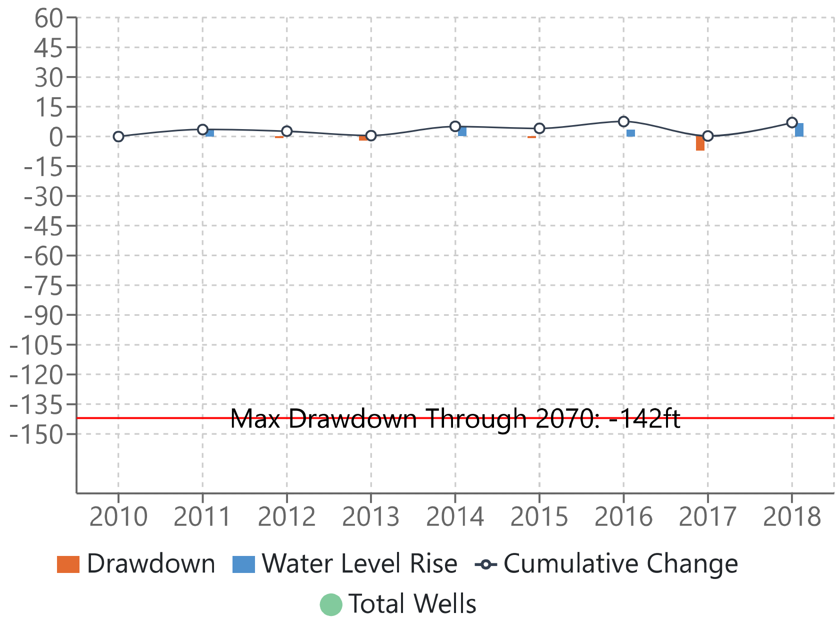


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-34	Not Applicable	Not Applicable
1-Year Water Level Change	-1.1	25	7010, 1106, 7011, 3308, 1114, 8863, 1076, 1075, 4404, 4344, 8883, 1010, 1011, 3841, 8887, 1138, 1128, 10425, 1102, 1759, 1108, 1115, 3056, 3055, 8886
5-Year Water Level Change	8.3	28	8885, 8863, 8883, 1010, 8887, 8886, 1075, 4404, 4405, 4344, 3056, 1759, 3055, 7011, 7010, 2010, 1076, 1106, 3308, 1114, 3841, 1138, 1128, 1102, 1108, 1115, 1011, 10425
Cumulative Water Level Change (2010 to Present)	0.0	32	2531, 2010, 8863, 1076, 1075, 9429, 1010, 1011, 9428, 10187, 8887, 8886, 8885, 8883, 4404, 4405, 4344, 3056, 1759, 3055, 7011, 7010, 1106, 3308, 1114, 3841, 1138, 1128, 1102, 1108, 1115, 10425
DFCs vs Cumulative Change	34.0	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Wise County-Antlers-Subcrop

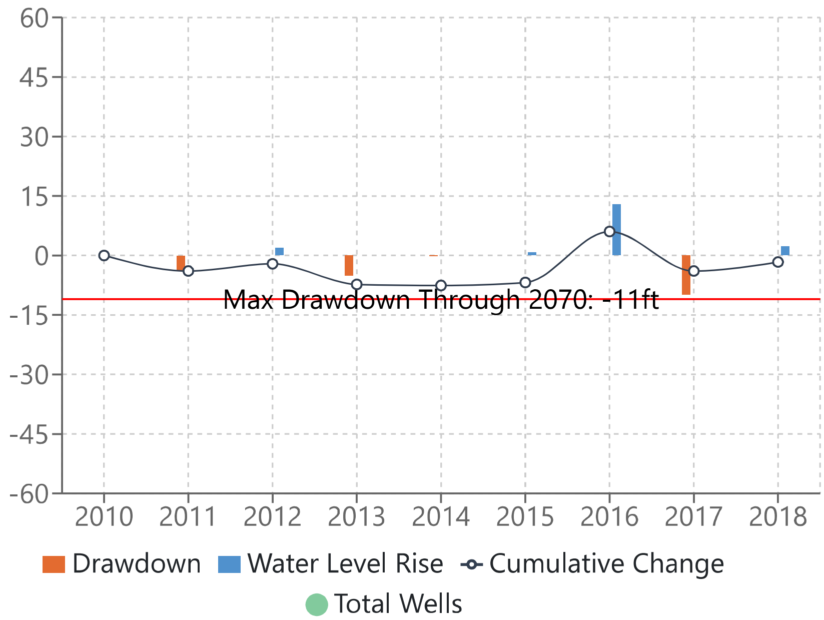


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-142	Not Applicable	Not Applicable
1-Year Water Level Change	6.8	2	8884, 8888
5-Year Water Level Change	6.5	2	8884, 8888
Cumulative Water Level Change (2010 to Present)	7.0	2	8884, 8888
DFCs vs Cumulative Change	149.0	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Antlers-Outcrop

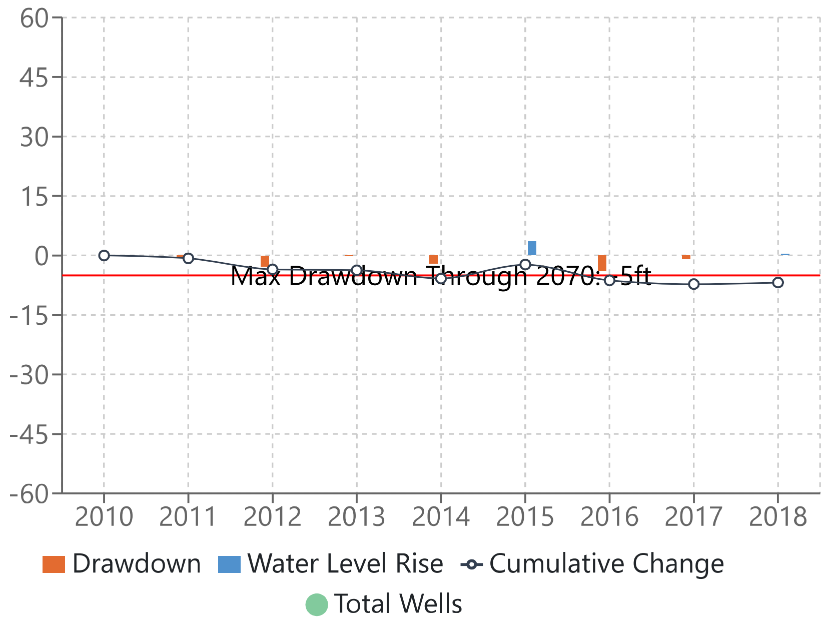


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-11	Not Applicable	Not Applicable
1-Year Water Level Change	2.3	11	8864, 10885, 1809, 10884, 975, 996, 985, 565, 2200, 630, 8872
5-Year Water Level Change	5.6	11	8864, 975, 996, 985, 1809, 630, 8872, 2200, 10885, 10884, 565
Cumulative Water Level Change (2010 to Present)	-1.7	11	8864, 975, 996, 985, 8872, 1809, 630, 2200, 10885, 10884, 565
DFCs vs Cumulative Change	9.3	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Paluxy-Outcrop

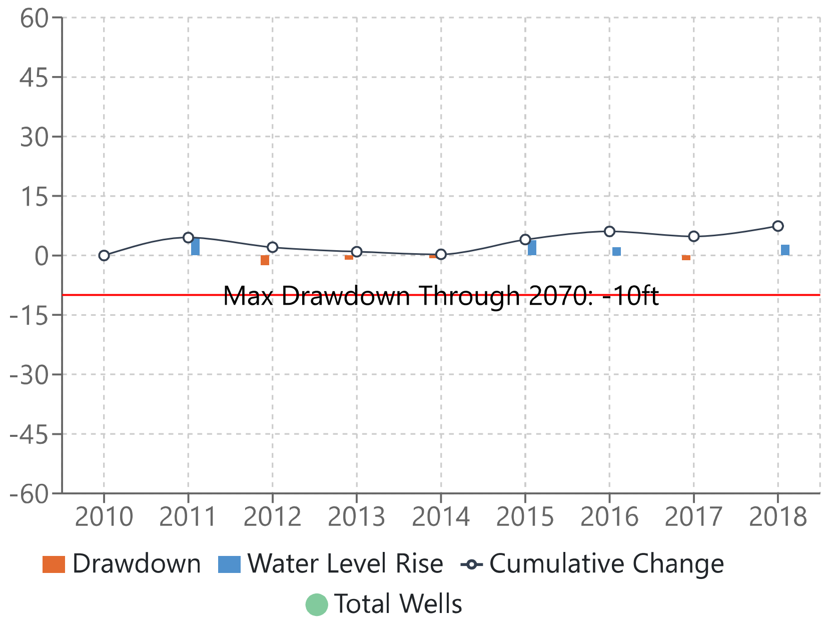


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-5	Not Applicable	Not Applicable
1-Year Water Level Change	0.4	10	4365, 995, 6178, 2596, 8718, 8568, 5212, 6638, 1653, 4993
5-Year Water Level Change	-3.1	10	995, 4365, 5212, 6638, 1653, 6178, 4993, 2596, 8718, 8568
Cumulative Water Level Change (2010 to Present)	-6.8	10	995, 4365, 5212, 6638, 1653, 6178, 4993, 2596, 8718, 8568
DFCs vs Cumulative Change	-1.8	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Glen Rose-Outcrop

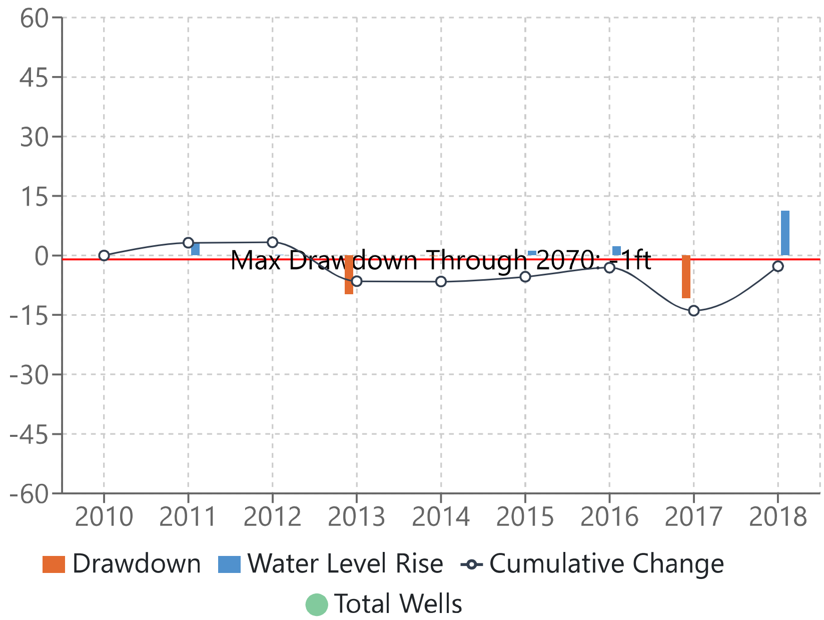


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-10	Not Applicable	Not Applicable
1-Year Water Level Change	2.6	6	8873, 8874, 8875, 1660, 8889, 8878
5-Year Water Level Change	6.5	8	6338, 8873, 8874, 8875, 905, 8889, 8878, 1660
Cumulative Water Level Change (2010 to Present)	7.4	8	8873, 8874, 8875, 905, 8889, 8878, 6338, 1660
DFCs vs Cumulative Change	17.4	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Twin Mountains-Outcrop

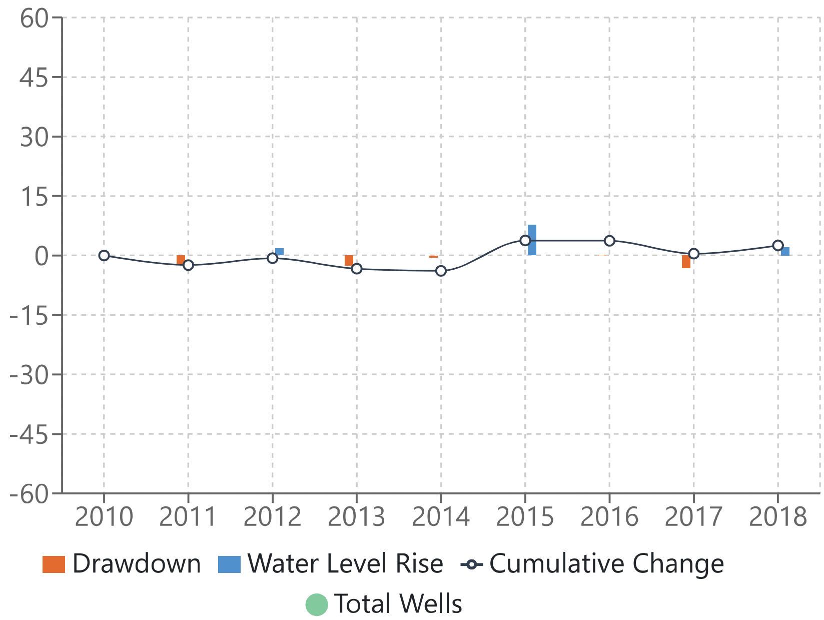


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-1	Not Applicable	Not Applicable
1-Year Water Level Change	11.2	3	1774, 8880, 2484
5-Year Water Level Change	3.8	5	979, 1774, 978, 8880, 2484
Cumulative Water Level Change (2010 to Present)	-2.7	5	979, 1774, 978, 8880, 2484
DFCs vs Cumulative Change	-1.7	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Cross Timbers-Outcrop

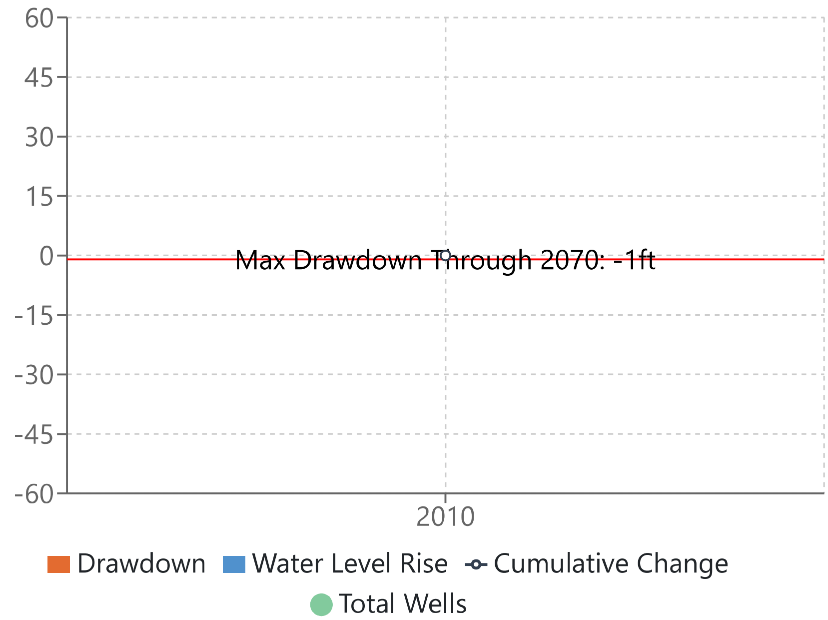


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions		Not Applicable	Not Applicable
1-Year Water Level Change	2.1	2	8877, 4416
5-Year Water Level Change	5.9	2	8877, 4416
Cumulative Water Level Change (2010 to Present)	2.5	2	8877, 4416
DFCs vs Cumulative Change	Not Avaliable	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Paluxy-Subcrop

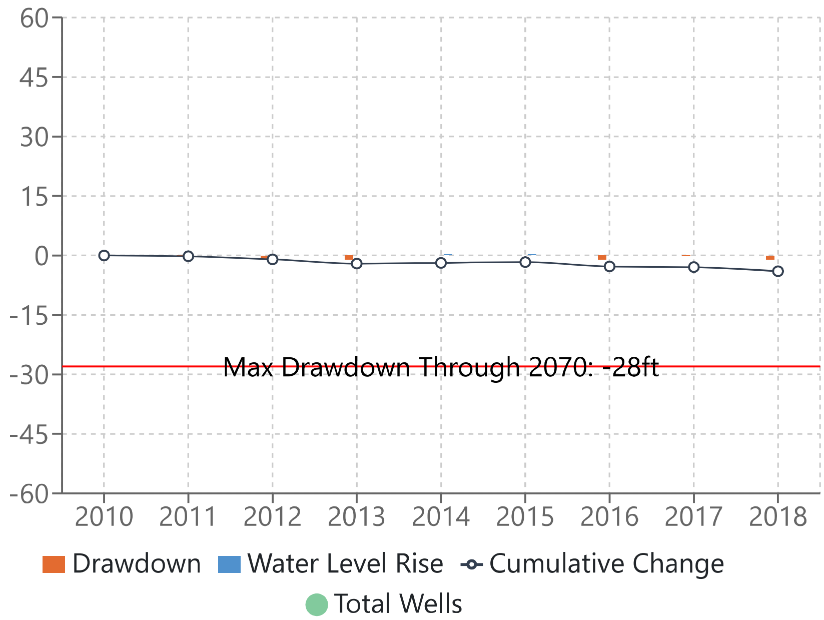


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-1	Not Applicable	Not Applicable
1-Year Water Level Change		Not Avaliable	Not Avaliable
5-Year Water Level Change		Not Avaliable	Not Avaliable
Cumulative Water Level Change (2010 to Present)		Not Avaliable	Not Avaliable
DFCs vs Cumulative Change	NaN	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Glen Rose-Subcrop

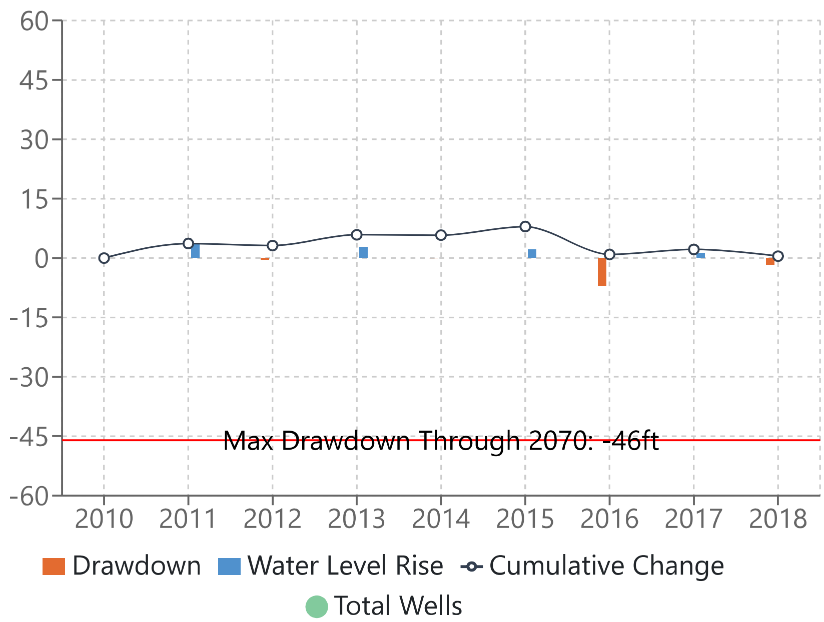


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-28	Not Applicable	Not Applicable
1-Year Water Level Change	-1.0	1	8876
5-Year Water Level Change	-1.9	1	8876
Cumulative Water Level Change (2010 to Present)	-4.0	1	8876
DFCs vs Cumulative Change	24.0	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Parker County-Twin Mountains-Subcrop

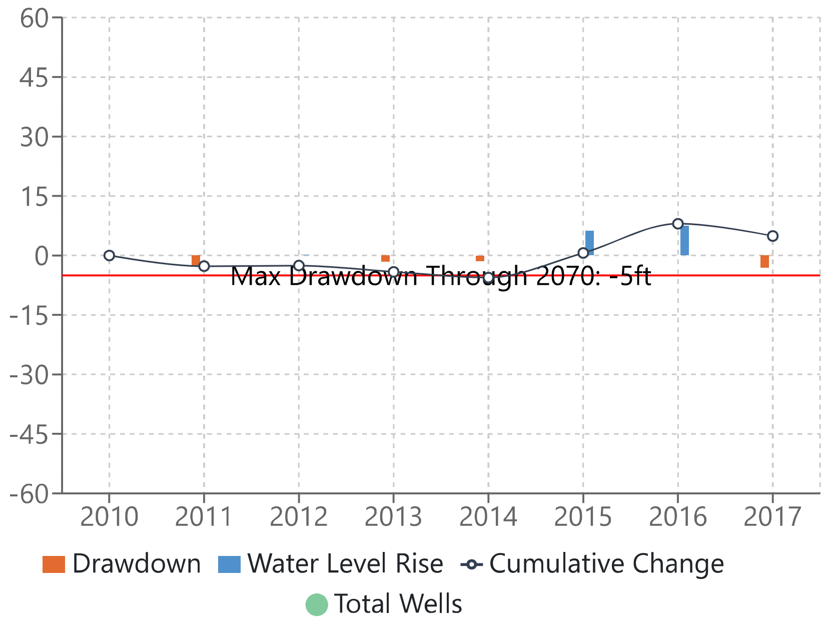


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-46	Not Applicable	Not Applicable
1-Year Water Level Change	-1.7	4	6534, 8879, 4142, 4144
5-Year Water Level Change	-5.4	4	6534, 8879, 4142, 4144
Cumulative Water Level Change (2010 to Present)	0.5	5	6534, 1761, 8879, 4142, 4144
DFCs vs Cumulative Change	46.5	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Hood County-Paluxy-Outcrop

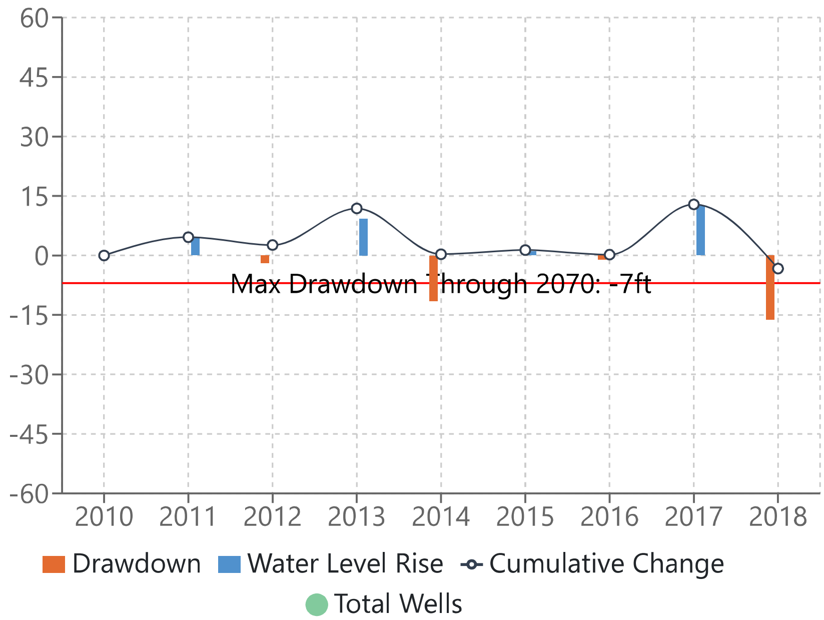


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-5	Not Applicable	Not Applicable
1-Year Water Level Change	-3.1	1	8870
5-Year Water Level Change	7.5	1	8870
Cumulative Water Level Change (2010 to Present)	4.9	1	8870
DFCs vs Cumulative Change	9.9	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Hood County-Glen Rose-Outcrop

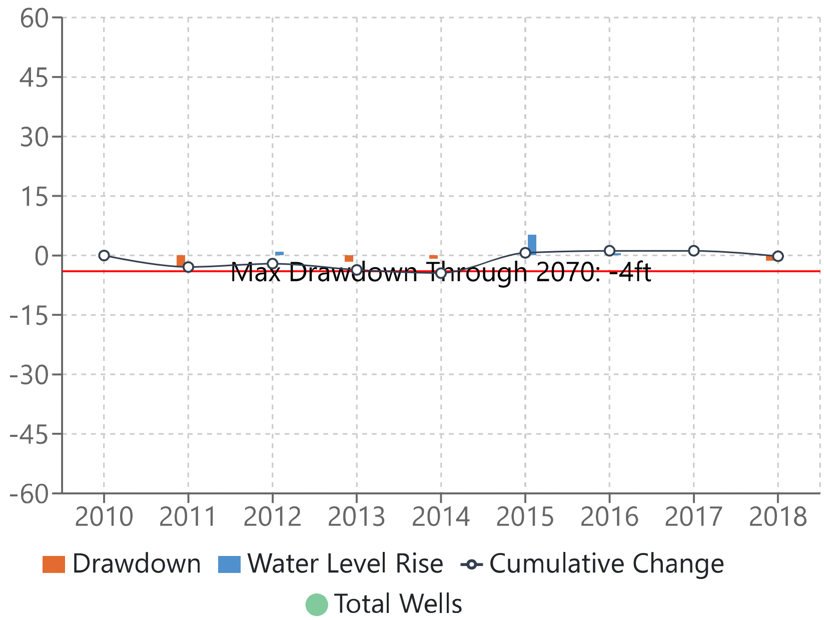


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-7	Not Applicable	Not Applicable
1-Year Water Level Change	-16.2	2	10, 3
5-Year Water Level Change	-15.2	2	10, 3
Cumulative Water Level Change (2010 to Present)	-3.3	2	10, 3
DFCs vs Cumulative Change	3.7	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Hood County-Twin Mountains-Outcrop

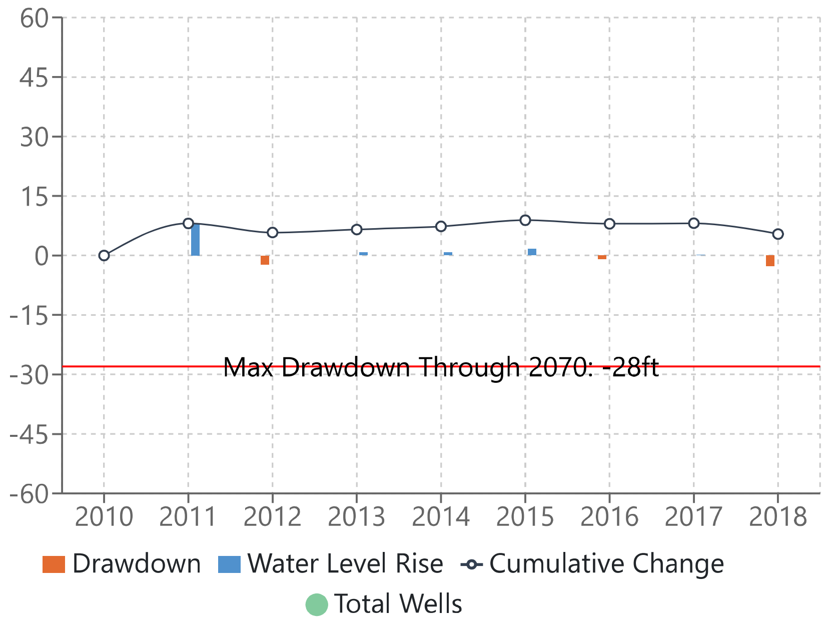


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-4	Not Applicable	Not Applicable
1-Year Water Level Change	-1.4	6	1009, 8867, 2181, 990, 8869, 8868
5-Year Water Level Change	3.4	7	8867, 981, 990, 8869, 8868, 2181, 1009
Cumulative Water Level Change (2010 to Present)	-0.2	7	1009, 8867, 981, 990, 8869, 8868, 2181
DFCs vs Cumulative Change	3.8	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Hood County-Glen Rose-Subcrop

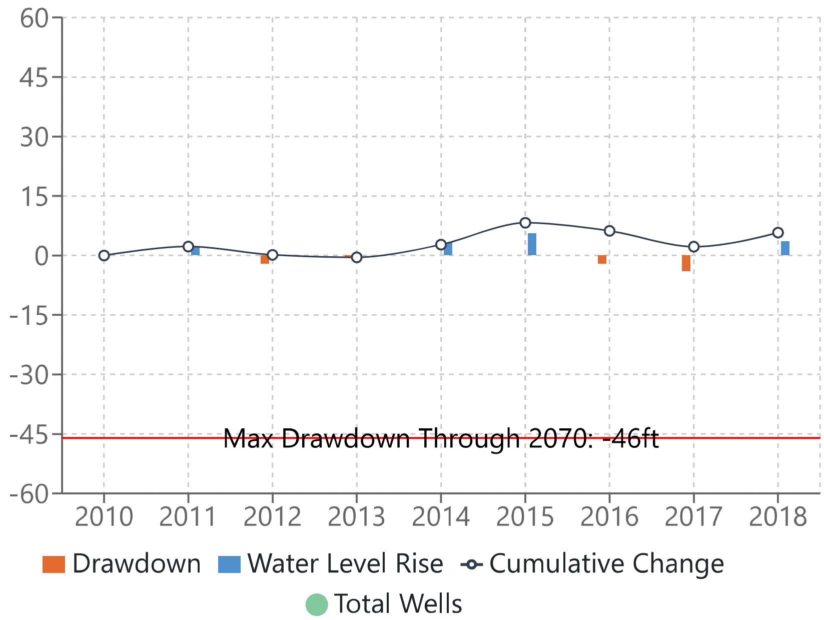


	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-28	Not Applicable	Not Applicable
1-Year Water Level Change	-2.7	3	312, 311, 310
5-Year Water Level Change	-1.1	3	312, 311, 310
Cumulative Water Level Change (2010 to Present)	5.4	3	312, 311, 310
DFCs vs Cumulative Change	33.4	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

Summary of Desired Future Conditions and Water Level Trends
Upper Trinity Groundwater Conservation District
September 10, 2020

Hood County-Twin Mountains-Subcrop



	Water Level Change (feet)	Number of Wells Used	IDs for Wells Used
Desired Future Conditions	-46	Not Applicable	Not Applicable
1-Year Water Level Change	3.5	13	1002, 984, 4, 11, 7100, 8865, 8891, 2341, 17, 239, 243, 322, 325
5-Year Water Level Change	6.2	22	1001, 1002, 999, 4, 11, 17, 240, 239, 243, 8871, 324, 322, 325, 327, 581, 984, 2341, 1006, 8865, 993, 8891, 7100
Cumulative Water Level Change (2010 to Present)	5.8	23	1002, 1003, 4, 11, 8865, 993, 17, 240, 239, 243, 8871, 324, 325, 327, 322, 1001, 999, 581, 984, 2341, 1006, 8891, 7100
DFCs vs Cumulative Change	51.8	Not Applicable	Not Applicable

Note: All Values are in feet of water level change. Positive values indicate a water level rise. Negative values indicate a water level decline.

APPENDIX 2

Upper Trinity Groundwater Conservation District
Water Level Monitoring Program

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1.0 Introduction

The District is undertaking the establishment of a monitor well network at key locations throughout the four counties to monitor water levels and aquifer conditions over time. The collection of District-scale hydrogeologic data such as water levels is key to the District's Mission and all resulting policies, management objectives and rules. Information from the well network will be assimilated along with groundwater production and use reports and estimates, well location and completion data, information on aquifer recharge rates and other hydrogeologic properties, and other information in a database that the District is continuing to develop to better understand and manage the groundwater resources of the area. Information gleaned from these efforts will be used by the District in the future establishment of desired future conditions (DFC) for the aquifers, in the monitoring of actual conditions of the aquifers, in the improvement of a future groundwater availability model (GAM), in making planning decisions, and in the development of permanent District rules that may include a permitting system for water wells.

The Upper Trinity Groundwater Conservation District (UTGCD) has completed Phase I of their Monitor Well Program. There are currently 108 wells identified by the UTGCD as monitor wells and the monitor well database contains a total of 146 wells. The District started quarterly monitoring of the Phase I monitoring network in the fourth quarter of 2010. **Figure 1** plots the wells in the UTGCD monitor well database along with the surface geology in the District. From a review of Figure 1 it can be seen that the distribution of wells both areally and by aquifer is not uniform across the District.

Building on the success of the Phase I monitor well network, the District recognized that the Phase I monitoring network and data collected to date must be evaluated in context to a monitoring strategy based upon meeting the management goals of the District. To this end, the District developed a set of goals for the Phase II monitoring plan which are listed below:

1. Analysis of all data collected to date including water levels and locations of the wells;
2. Expansion of the current monitoring program to collect data in locations not adequately represented in Phase I;
3. Determine appropriate layers of the District's aquifers that need study (including the Paleozoic);
4. Provide a model for the District's Board and staff to expand its monitoring program.

Based upon the stated objectives, INTERA developed a work scope for the performance of Phase II which is based upon a task structure comprised of five tasks. The five tasks are listed below:

- Task 1 – Development of a Hydrogeologic Framework for Management
- Task 2 – Development of a Monitoring Strategy
- Task 3 –Analysis of Phase I Monitor Wells and Collected Data
- Task 4 – Recommendations for Phase II Monitor Wells
- Task 5 – Phase II Monitor Well Survey and Initial Sampling

The task structure follows a sequential process by which the background data and the monitoring strategy (Tasks 1 and 2) are developed first. These are followed by Task 3 which is an assessment of the Phase I wells based upon the monitoring strategy laid out in Task 2. Based upon that analysis, the Phase I monitor well network will be augmented through the search for new monitor wells and potentially through the deletion of some Phase I wells considered of limited value. Finally, in Task 5 the new wells are brought into the network through a site visit, initial measurement and documentation.

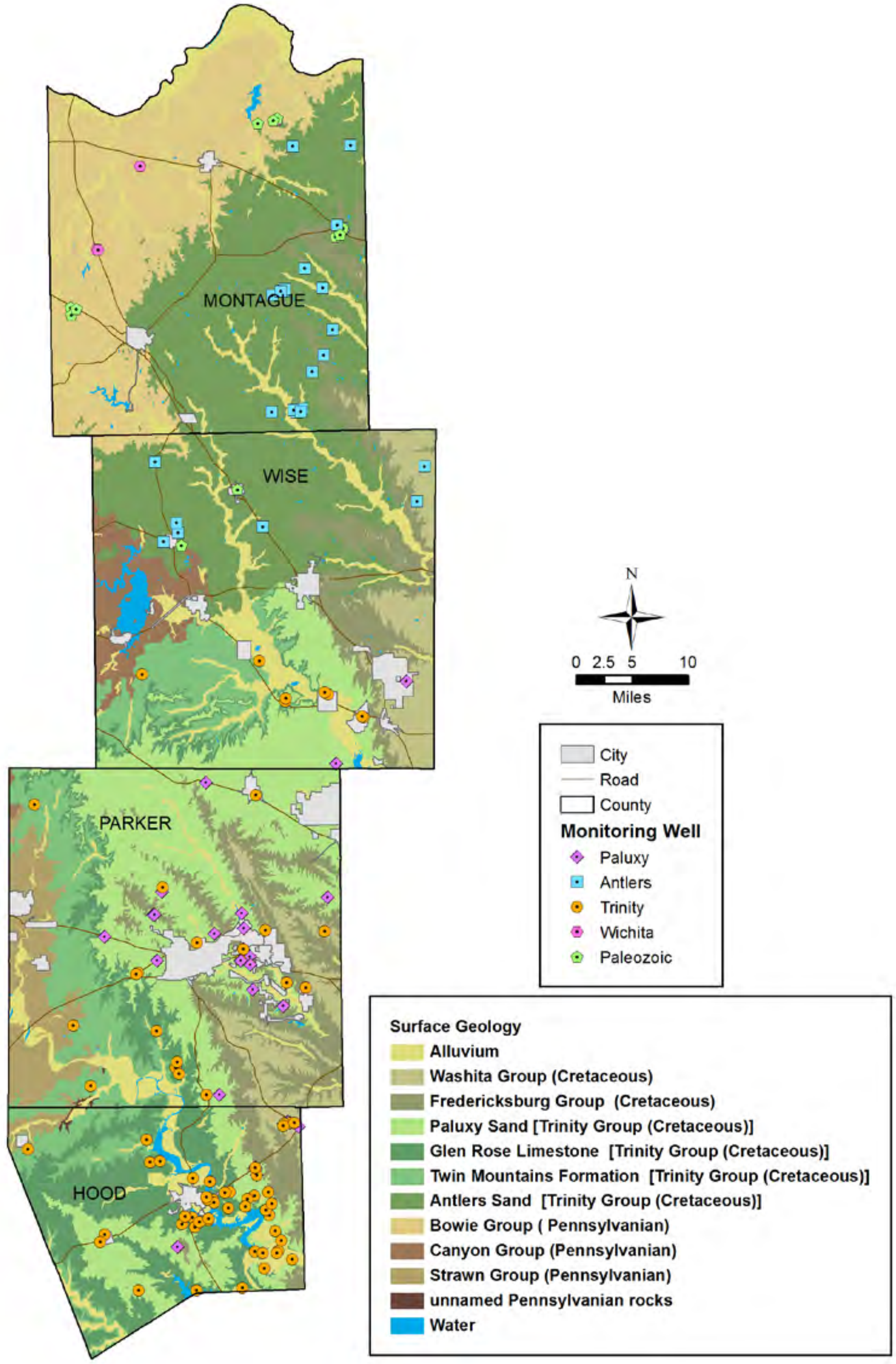

Figure 1. UTGCD Phase I Monitor Wells by Stratum and District Surface Geology.

This report is organized by chapters documenting each of the five tasks described above. This draft version of the report only documents efforts completed for Tasks 1 and 2. This document serves as the Task 1 and 2 milestone submittal. It has been delivered as an electronic file (pdf) and as a hard copy to promote comments from the Board and staff that can be used in the implementation of the remaining tasks.

2.0 Development of a Hydrogeologic Framework for Management

The objective of Task 1 is to develop an initial hydrogeologic framework for aquifer management within the District. Because the Paleozoics aquifer systems (Wichita, Bowie, Cisco and Canyon and Strawn Groups) are important in the District, this framework will include these aquifers as well as the Northern Trinity aquifer and associated formations as defined by the Texas Geologic Atlas Sherman and Dallas Sheets (McGowen et al., 1967; Barnes, 1972). The deliverable is a set of geologic cross-sections across the District. The geologic interpretations presented in this section are the product of Allan Standen (PG # 1227) in cooperation with INTERA personnel.

2.1 Overview of District Hydrogeology

Groundwater resources in the four counties making up the District include the Cretaceous-age Trinity Aquifer, several water-bearing units of Pennsylvanian- and Permian-age, referred to as the Paleozoic aquifers, and alluvial deposits (Figure 1). The Trinity Aquifer is recognized by the TWDB as a major aquifer in Texas. The Paleozoic aquifers are not recognized by the TWDB as either major or minor aquifers. No minor aquifers, as defined by the TWDB, are located in the District. The TWDB defines a major aquifer as one that supplies large quantities of water over large areas of the state and defines a minor aquifer as one that supplies relatively small quantities of water over large areas of the state or supplies large quantities of water over small areas of the state (Ashworth and Hopkins, 1995). A generalized stratigraphic section representative of the hydrogeology of the District is provided in **Table 1**. To properly design a monitoring network, one of the key components is an understanding of the hydrostratigraphic units which comprise the resource. This, in addition to an understanding of the groundwater use patterns by hydrostratigraphic unit (sub-aquifer), provides the data needed to make sure monitoring is occurring in the correct horizons. At this point, only the Trinity Aquifer has been considered in GMA-8 joint planning. However, the Paleozoic aquifer system which has not been included in the past must be for the next round of planning.

2.1.1 Geologic Setting

The oldest geologic units comprising aquifers in the District are the Paleozoic aquifers which are composed fluvial-deltaic and fluvial deposits originating from the Ouachita and Arbuckle mountains to the north and east of the District. These deposits were influenced by deep-seated structural features which influenced deposition through Cretaceous time. **Figure 2** shows the principal pre-Pennsylvanian structural features in the District and areas to the west. Important features for District aquifers are the Muenster Arch in Montague County which is an area of faulting and uplift and the Mineral Wells Fault Zone which is in south Wise County. These features have been shown to impact deposition through the Pennsylvanian and Permian and possibly into the Cretaceous (Trinity Aquifer).

The Paleozoic aquifers within the District were deposited on the eastern shelf of the Permian Basin. The Paleozoic aquifers are composed of a sequence of fluvial-deltaic deposits. The Paleozoic aquifers in the District are comprised from oldest to youngest of the Strawn, Canyon, Cisco, Bowie and Wichita Groups. The age of the Paleozoic aquifers at surface tends to get older as one moves north through the District to the south. The Strawn Group is primarily a fluvial-deltaic system comprised of several sandstone units inter-layered with shales.

Table 1. General Stratigraphy (Bené and others 2004; McGowen and others, 1967; 1972; Brown and others, 1972).

<table>
<tr><th rowspan="2">System</th><th rowspan="2">Hydrogeologic Characteristic</th><th rowspan="2">Group</th><th colspan="2">Formation</th></tr>
<tr><th>North</th><th>South</th></tr>
<tr><td></td><td>Water-Bearing</td><td></td><td colspan="2">alluvial deposits</td></tr>
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(locally productive)</td><td>Washita</td><td colspan="2">Weno
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Fort Worth
Duck Creek
Kiamichi</td></tr>
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(locally productive)</td><td rowspan="3">Fredericksburg</td><td rowspan="2">Goodland</td><td>Edwards</td></tr>
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<tr><td>Walnut Clay</td><td>Walnut Clay</td></tr>
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<tr><td>Glen Rose</td></tr>
<tr><td>Twin Mountains</td></tr>
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<tr><td>Bowie</td><td colspan="2">Archer City
Markley</td></tr>
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<tr><td colspan="2">Brazos River</td></tr>
<tr><td colspan="2">Mingus</td></tr>
<tr><td colspan="2">Buck Creek Sandstone</td></tr>
<tr><td colspan="2">Grindstone Creek</td></tr>
<tr><td colspan="2">Lazy Bend</td></tr>
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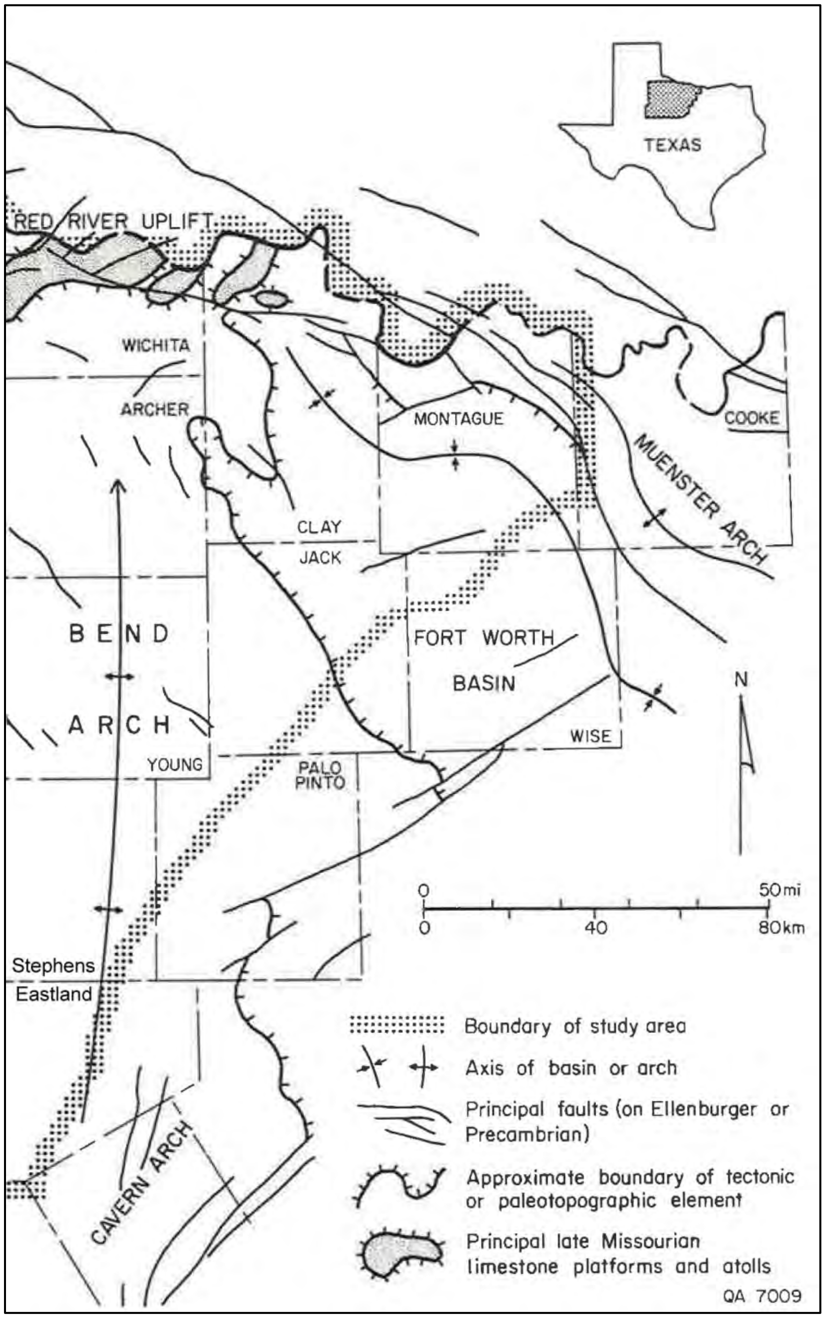

Figure 2. Principal Pre-Pennsylvanian structural features (after Brown et al. 1990)

The Canyon Group is a fluvial-deltaic system composed of sandstones and shales but which also has limestones reflecting a lower energy depositional environment. The Cisco Group is composed of fluvial-deltaic and marine deposits. The Cisco has many sandstone units that are poorly mapped because they are intermittent but has extensive limestone units (Brown et al., 1990). The Bowie Group represents a continental depositional facies and is typically composed of more coarse grained sediments than the underlying Cisco. The Wichita Group (Nocona Formation) is also a continental deposit and is composed of highly heterogeneous deposits of sand, gravel and shale. The Cretaceous Trinity Group unconformably overlies the Paleozoic aquifers system in the District, meaning that a period of erosion occurred after deposition of the Paleozoic aquifers and before the deposition of the Trinity aquifer. The Paleozoic aquifers generally dip in a westerly direction while the Cretaceous Trinity Group dips to the east-southeast. The Trinity Group was deposited from a sediment source feeding from the west and north into the East Texas Basin. Each of these aquifers will be discussed below.

2.1.1 Trinity Aquifer

The Trinity Aquifer, shown in Figure 1, is defined by the TWDB as a major aquifer composed of several individual aquifers contained within the Trinity Group. In the District, the Trinity Aquifer consists of the aquifers of the Paluxy Sand, the Glen Rose Formation, the Twin Mountains Formation, and the Antlers Formation. The Antlers Formation is the coalescence of the Paluxy and Twin Mountains formations north of the line where the Glen Rose Formation thins to extinction. This occurs approximately in central Wise County (Figure 1). The Cretaceous-age Fredericksburg and Washita Groups are generally considered confining units and they overlie the downdip portion of the Trinity Aquifer in the easternmost areas of the District.

The Paluxy Sand consists of sand, silt, and clay, with sand dominating. The sand and silts in the aquifer are primarily fine-grained, well sorted, and poorly cemented (Bené and others, 2004). Coarse-grained sand is found in the lower sections grading up to fine-grained sand with shale and clay in the upper section (Nordstrom, 1982). In general, natural groundwater flow in the Paluxy Sand is east to southeast (Langley, 1999). Wells completed into the Paluxy Sand typically yield small to moderate quantities of water that is fresh to slightly saline (Nordstrom, 1982). Where the Glen Rose Formation is absent, the Paluxy Sand is equivalent to the upper sands of the Antlers Formation (Baker and others, 1990).

The Glen Rose Formation consists primarily of limestone with some shale, sandy-shale, and anhydrite. In general, the aquifer yields small quantities of water in localized areas (Baker and others, 1990). Groundwater flow in the Glen Rose Formation is generally to the east and southeast.

The Twin Mountains Formation consists predominantly of medium- to coarse-grained sand, silty clay, and conglomerates. A massive sand is found in the lower portion of the formation while less sand is found in the upper portion of the aquifer due to increased interbedding of shale and clay (Nordstrom, 1982). In general, wells are primarily completed into the lower part of the aquifer. Where the Glen Rose Formation is absent, the Twin Mountains Formation is equivalent to the lower sands of the Antlers Formation (Baker and others, 1990). Typically, wells completed into the Twin Mountains Formation yield fresh and slightly saline water in moderate to large quantities (Nordstrom, 1982). Groundwater flow in this formation is generally to the east and southeast.

Typically, the Antlers Formation consists of a basal conglomerate and sand overlain by poorly consolidated sand interbedded with discontinuous clay layers (Nordstrom, 1982). Considerably more clay is found in the middle portion of the formation than in the upper and lower portions. Limestone is also found in the middle portion near the updip limit of the Glen Rose Formation. Generally, groundwater flow in the Antlers Formation is to the east and southeast. Well yield in the Antlers Formation is similar to that in the Twin Mountains Formation with downdip wells generally more productive than those in the outcrop areas.

2.1.2 Paleozoic Aquifers

Several Pennsylvanian- and Permian-age formations in the District are capable of producing usable quantities of groundwater. These formations are referred to collectively as the Paleozoic aquifers (see Figure 1). Literature regarding these formations is very limited and, therefore, information regarding their hydrologic characteristics is also limited. The Paleozoic aquifers are a significant source of groundwater in northern and western portions of Montague County, west-central Wise County, and western Parker County where the Trinity Aquifer is absent. Based on information in the TWDB groundwater database as of November 2009, the percentage of wells in the District completed into the Paleozoic aquifers is 78.2, 14.8, 5.4, and 0.0 percent for Montague, Wise, Parker, and Hood counties, respectively.

From youngest to oldest, the formations of the Wichita, Bowie, Cisco, Canyon, and Strawn groups make up the Paleozoic aquifers. The Wichita Group consists of the Nocona Formation (mudstone with sandstone and siltstone in thin lenticular beds throughout). The Bowie Group is composed of the Archer City Formation (predominantly mudstone with thin siltstone beds and sandstone) and the Markley Formation (mudstone with local thin beds of sandstone in upper portion and mudstone and shale with some coal and limestone below). The Cisco is comprised of the undivided Thrifty and Graham formations (predominantly mudstone and shale with thin sandstone beds and some sandstone sheets locally and two limestone members).

The underlying Canyon Group is comprised of the Colony Creek Shale (shale with some siltstone, local thin to medium beds of sandstone, and limestone lentils), the Ranger Limestone (predominantly limestone with local thin shale beds), the Ventioner Formation (shale and mudstone with numerous sandy and silty lenses and thin to medium beds), the Jasper Creek Formation (upper portion predominantly shale with thin siltstone beds throughout and isolated massive sandstone lenses and lower portion shale with thin limestone lentils and local thin and lenticular thick sandstone beds), the Chico Ridge Limestone (predominantly limestone with local shale beds), the Willow Point Formation (shale and claystone locally silty and sandy with local thin beds of sandstone and several limestone beds in lower portion and a single coal bed), and the Palo Pinto Formation (predominantly limestone and marl with some sandstone and shale and found west of the District). Sandstone lenses found in the Canyon Group are locally important to the occurrence of groundwater though are hard to map (Bayha, 1967).

The Strawn Group consists of the Mineral Wells Formation (shale containing local sandstone beds and a few limestone beds), the Brazos River Formation (sandstone with local lenses of conglomerate and mudstone), the Mingus Formation (sandy shale with one thin coal seam and some limestone beds), the Buck Creek Sandstone (sandstone), the Grindstone Creek Formation (shale, in part sandy, with local thin coal beds and sandstone lentils and limestone beds with some shale), and the Lazy Bend Formation (shale, in part sandy or silty, with local coal beds and limestone beds). While the Paleozoic aquifers are described as having many formations based upon outcrop, correlation of sandstone units in particular is very problematic in the subsurface.

The Paleozoic aquifers are the primary source of water in Montague County (Bayha, 1967) as indicated by the high percentage of wells completed into these aquifers in the county. Bayha (1967) indicates that groundwater is difficult to trace in these aquifers due to the complex depositional sequence.

2.1.2 Alluvial Deposits

Some alluvial deposits of Pleistocene to Recent age are capable of producing water in the District, especially along the Red River in Montague County and the Brazos River in Parker County. The majority of these sediments are stream deposits but some are of windblown origin. The alluvial deposits, consisting of sand, gravel, silt, and clay, yield small to large quantities of fresh water. Based on information in the TWDB groundwater database as of November 2009, the percentage of wells in the District completed into alluvial deposits is 10.0, 0.4, 3.0, and 0.1 percent for Montague, Wise, Parker, and Hood counties, respectively.

2.2 Approach for Development of the Hydrogeologic Sections

The construction of Paleozoic and Cretaceous formation cross-sections for the District required integration of subsurface information from numerous data sources and types. Available state agency published references (Texas Water Development Board (TWDB) and Bureau of Economic Geology (BEG)) were reviewed to identify and capture useful descriptions of stratigraphic marker beds and/or stratigraphic picks. The Sherman, Dallas and Abilene Geologic Atlas of Texas (GAT) sheets provided the geospatial distribution of the surface formation outcrops to connect with the top and base of subsurface picks.

The Paleozoic geologic surface outcrops are youngest in northern Montague County (Permian) and get progressively older (Pennsylvanian, Strawn) moving south into Parker County. Paleozoic rocks generally dip to the northwest-west at about 80 to 100 feet per mile. Over 1,000 scout tickets and cable tool driller's reports were screened to select wells with good location and Paleozoic (Permian and Pennsylvanian) formation top and base picks. A total of 40 locations with Paleozoic formation picks were selected for the created cross-sections. The number and geographic distribution of scout tickets and cable tool driller's reports decreased dramatically from Montague County south towards Hood County. Paleozoic formation top picks (Bowie Group, Gunsight Limestone, Canyon Group picks included the Home Creek, Ranger and Palo Pinto limestones and Strawn Group pick included the Caddo formation) were derived from the scout ticket and cable tool driller's reports which were compared with Paleozoic formation picks from BEG Report of Investigations 197, by Brown et. al., 1990. Formation picks from these two sources were compatible and in agreement.

The deeper Paleozoic picks for the Ranger, Palo Pinto and the Caddo formations are not illustrated in the constructed cross-sections because they were below the zone of interest for groundwater resources (upper 1,000 feet). However, these Paleozoic picks were used to construct subsurface formation surfaces. The geospatial subsurface thickness variations and extents of these Paleozoic formations are poorly known within the study area. Cross-section Paleozoic thicknesses in areas without data used outcrop thicknesses from the respective GAT sheets as a default.

Over 8,000 wells from the TWDB WIID website (groundwater database and submitted driller's reports) were screened by well depth (deepest) and the quality of the driller's reports lithologic description. A total of 102 driller's reports were selected to construct the cross-sections. Four Cretaceous formation top surfaces were mapped; the Paluxy Sand, Glen Rose Limestone, Twin Mountain Formation and the Antlers Sand. Cretaceous rocks generally dip to the east-southeast at about 40 to 60 feet per mile. A literature review of available older publications (Hendricks, 1957, Scott and Armstrong, 1932, Scott, 1930 and Stramel, 1951) as well as more recent publications (Baker, et. al., 1990, Duffin and Beynon, 1992, Harden, et al., 2004, Langley, 1999, McGowen et al, 1991 and Nordstrom, 1982) suggested that the Hensell and Hosston (aquifer units in the Travis Peak Formation) were not mappable geologic units within the study area. The older publications and the GAT sheet explanation provided detailed lithologic descriptions based on outcrops which were useful in the identification of formation tops and bases from the driller's report descriptions. The Hensell and Hosston were not positively identified within any of the 102 driller's reports which is consistent with the published geological reports in the area.

Brown, 1990 text and figures (1 and 6) provided general, structural subsurface guidance for the surface construction of the Paleozoic formations. A total of thirteen cross-sections (A - A' through M - M') were constructed for the District (see **Figure 3** for locations). The Paleozoic (Permian and Pennsylvanian Formations) interpretations in these cross-sections are based on very limited subsurface well data and should not be used or considered to replace or supersede more detailed regional structural studies. This study was intended to assist the District in understanding the stratigraphic framework and the designing of a water level monitoring system of their groundwater resources.

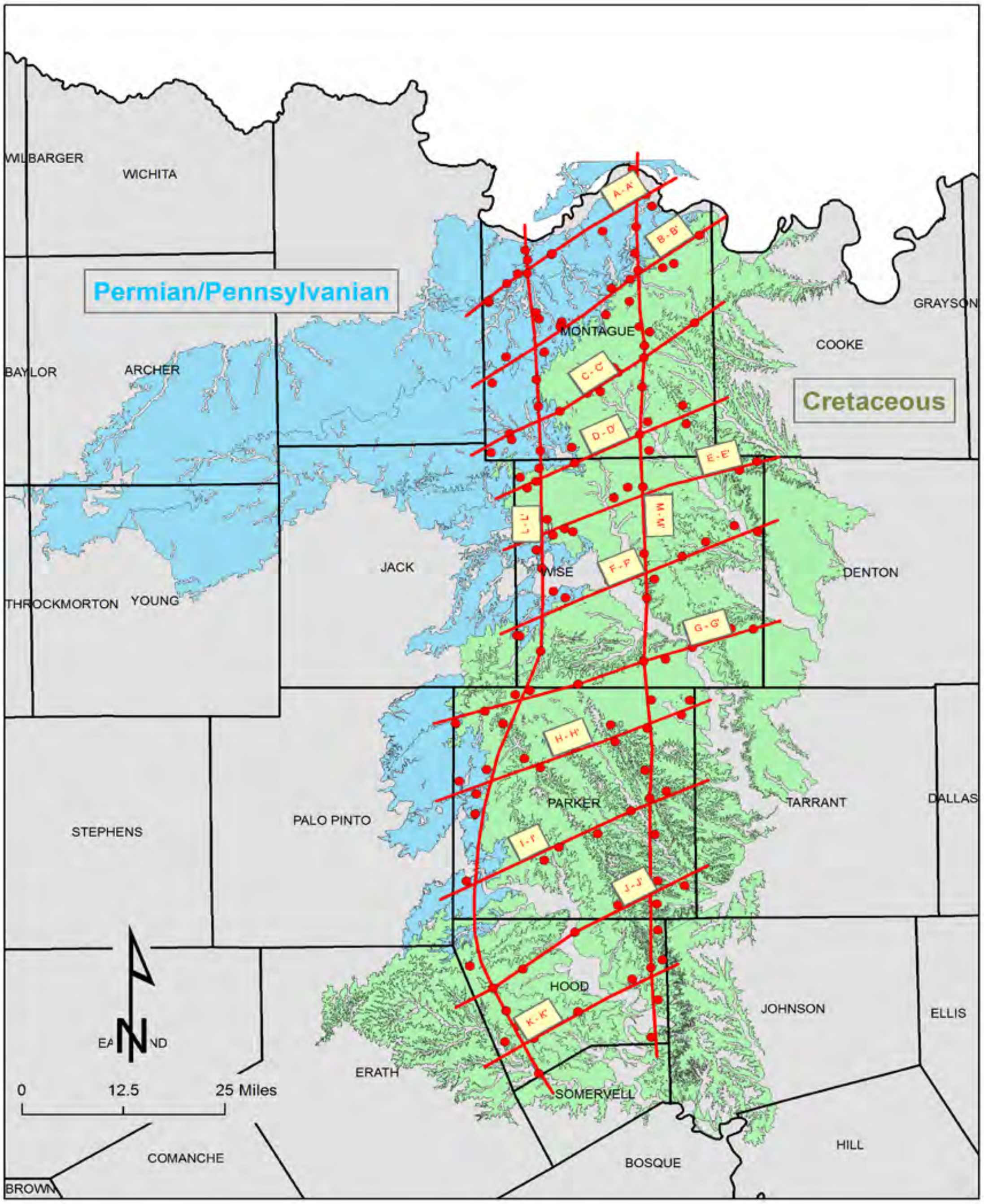

Figure 3. Cross-Section Base Map

2.3 Subsurface Data Sources and Reference Material Reviewed

Multiple subsurface data sources were investigated and used to construct the cross-sections for the UTGCD.

- The Bureau of Economic Geology (BEG) has a large collection of subsurface data including geophysical logs (1940's to present), scout tickets (1950's to 1990's) and cable tool driller's reports (1910 to 1960's).
- BEG publication, Brown et al, 1990, provided detailed information for the shallow Paleozoics in Montague County.
- UTGCD well data provided on CD.
- TWDB website (WIID) Texas Department of Licensing and Regulations (TDLR) submitted driller's reports (2001 to 2011) and groundwater well database driller's reports (1940s to present).
- University of Texas, Austin Thesis and Dissertations
- Texas Water Development Board (TWDB) publications

In addition to the subsurface data sources used to develop the correlations, many publications were reviewed for relevant information to help in the cross-section development and to understand the basic geology of the Trinity Aquifer and the Paleozoic Aquifers. The primary references reviewed include the following:

Baker, B., Duffin, G., Flores, R., and Lynch, T., 1990, Evaluation of Water Resources in Part of North-Central Texas, Report 318, Texas Water Development Board, 67 p

Bayha, D. C., 1967, Occurrence and Quality of Ground Water in Montague County Texas, Texas Water Development Board, Report 58, 102 p.

Barnes, V. E., 1988, Dallas Sheet, Geologic Atlas of Texas, 1:250,000, Bureau of Economic Geology

Brown, Jr., L. F., Goodson, J. L., Goodson, Harwood, P., and Barnes, V. E. Barnes, 2001, Abilene Sheet, Geologic Atlas of Texas, 1:250,000, Bureau of Economic Geology.

Brown, L. F., Solis-Iriarte, R. F. and Johns, D. A., 1990, Regional Depositional Systems Tracts, Paleogeography and Sequence Stratigraphy, Upper Pennsylvanian and Lower Permian Strata, North and West Central Texas, Report of Investigations No. 197, Texas Bureau of Economic Geology, 27 plates, 116 p.

Bullard, F. M. and Cuyler, R. H., 1930, A Preliminary Report on the Geology of Montague County, Texas, Bureau of Economic Geology, Part 1, pages 57 – 76.

Duffin, G. L. and Beynon, B. E., 1992, Evaluation of Water Resources in parts of the Rolling Prairies of North-Central Texas, Report 337, Texas Water Development Board, 93 p.

Harden, R. W. & Associates, Freese & Nichols Inc., HDR Engineering Inc., LBG-Guyton Associates, USGS, and Yelderman, J. Jr., 2004, Northern Trinity / Woodbine Aquifer Groundwater Availability Model, prepared for Texas Water Development Board, 391 p.

Hendricks, L., 1957, Geology of Parker County, Bureau of Economic Geology, Publication Number 5724, 67 p.

Langley, L., 1999, Updated Evaluation of Water Resources in Part of North-Central Texas, Report 349, Texas Water Development Board, 72 p.

McGowen, J. H., Hentz, T. F., Owen, D. E., Pieper, M. K., Shelby, C. A. and Barnes, V. E., 1991, Sherman Sheet, Geologic Atlas of Texas, 1:250,000, Bureau of Economic Geology

Nordstrom, P. L., 1982, Occurrence, Availability and Chemical Water Quality of Ground Water in the Cretaceous Aquifers of North Central Texas, Volumes 1 and 2, Report 269, Texas Water Development Board.

Scott, G. and Armstrong, J. M., 1932, The Geology of Wise County, The University of Texas, Bulletin 3224, pages 5 – 73.

2.4 Review of the Hydrogeologic Framework as Defined by Cross-Sections

Each of the thirteen cross-sections is depicted in Figures 4 through 16 and each will briefly be discussed below.

A – A' (Figure 4) - Cross-section has a southwestern to northeastern strike which parallels the outcrops of the Permian Archer City and Nocona formations. These Paleozoic formations possibly have been deformed by the Muenster Arch in the northeastern half of this cross-section.

B – B', (Figure 5) - Cross-section has a southwestern to northeastern strike which parallels the outcrops of the Permian Archer City and the Bowie Group Markley formations and includes the easterly dipping Cretaceous Trinity Aquifer, Antlers Formation. The Paleozoic formations possibly have been deformed by the Muenster Arch in the northeastern half of this cross-section.

C – C', (Figure 6) - Cross-section has a southwestern to northeastern strike which parallels the outcrops of the Bowie Group Markley Formation and includes the easterly dipping Cretaceous Trinity Aquifer, Antlers Formation.

D – D', (Figure 7) - Cross-section has a southwestern to northeastern strike which approximately parallels the outcrops of the Bowie Group Markley and Thrifty and Graham formation and includes the easterly dipping Cretaceous Trinity Aquifer, Antlers Formation.

E – E', (Figure 8) - Cross-section has a southwestern to northeastern strike which approximately parallels the outcrops of the Canyon Group undivided (Ventioner Formation) and includes the easterly dipping Cretaceous Trinity Aquifer, Antlers Formation.

F – F', (Figure 9) - Cross-section has a southwestern to northeastern strike which approximately parallels the outcrops of the Canyon Group undivided (Jasper Creek Formation) and includes the easterly dipping Cretaceous Trinity Aquifer, Antlers Formation transitioning into the Twin Mountain Formation. This cross-section is just north of the Mineral Wells – Newark East Fault system.

G – G', (Figure 10) - Cross-section has a southwestern to northeastern strike which approximately parallels the outcrops of the Strawn Group Mineral Wells Formation and includes the easterly dipping Cretaceous Trinity Aquifer, Twin Mountain Formation and overlying Paluxy Formation. This cross-section is in very close proximity and parallels the Mineral Wells – Newark East Fault system.

H – H', (Figure 11) - Cross-section has a southwestern to northeastern strike which approximately parallels the outcrops of the Strawn Group Mineral Wells and Brazos River formations and includes the easterly dipping Cretaceous Trinity Aquifer, Twin Mountain Formation and overlying Paluxy Formation.

I – I', (Figure 12) - Cross-section has a southwestern to northeastern strike which approximately parallels the outcrops of the Strawn Group Grindstone Creek and Lazy Bend formations and includes the easterly dipping Cretaceous Trinity Aquifer, Twin Mountain Formation and overlying Paluxy Formation.

J – J', (Figure 13) - Cross-section has a southwestern to northeastern strike and includes the easterly dipping Cretaceous Trinity Aquifer, Twin Mountain Formation and overlying Paluxy Formation

K – K', (Figure 14) - Cross-section has a southwestern to northeastern strike and includes the easterly dipping Cretaceous Trinity Aquifer, Twin Mountain Formation and overlying Paluxy Formation.

L – L', (Figure 15) - Cross-section has a north to south strike on the western side of the District. The Paleozoic formations (Permian and Pennsylvanian) seem to form a basin in this region of the District with the Paleozoic Formations becoming shallower to the south.

M – M', (Figure 16) - Cross-section has a north to south strike on the eastern side of the District. This section also shows a potential sub-basin in the Paleozoic formations (Permian and Pennsylvanian) with the formations becoming shallower to the south. General locations of the Muenster Arch and Mineral Wells – Newark East Fault system are noted in the cross-section.

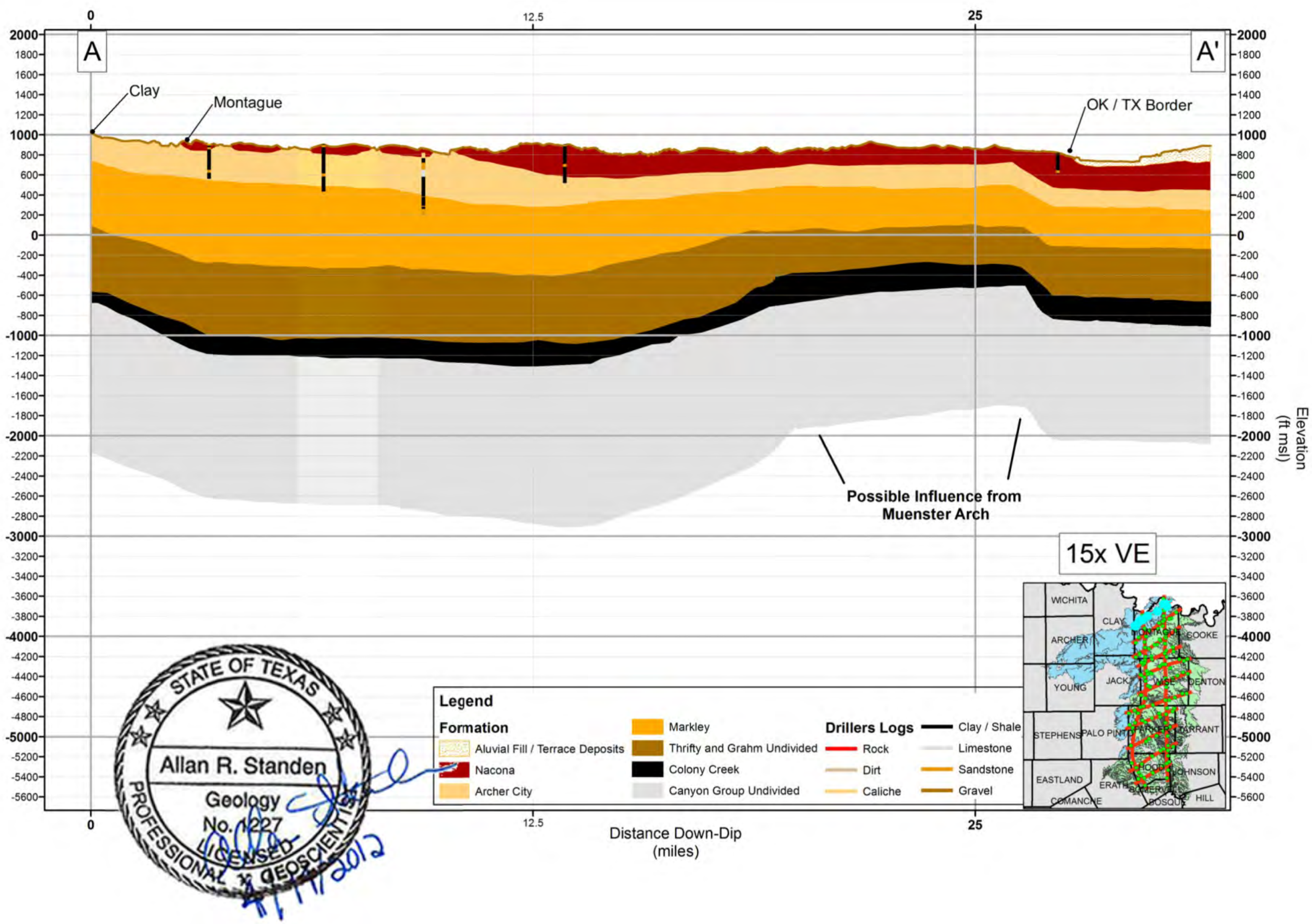

Figure 4. Hydrogeologic Cross-Section A – A.

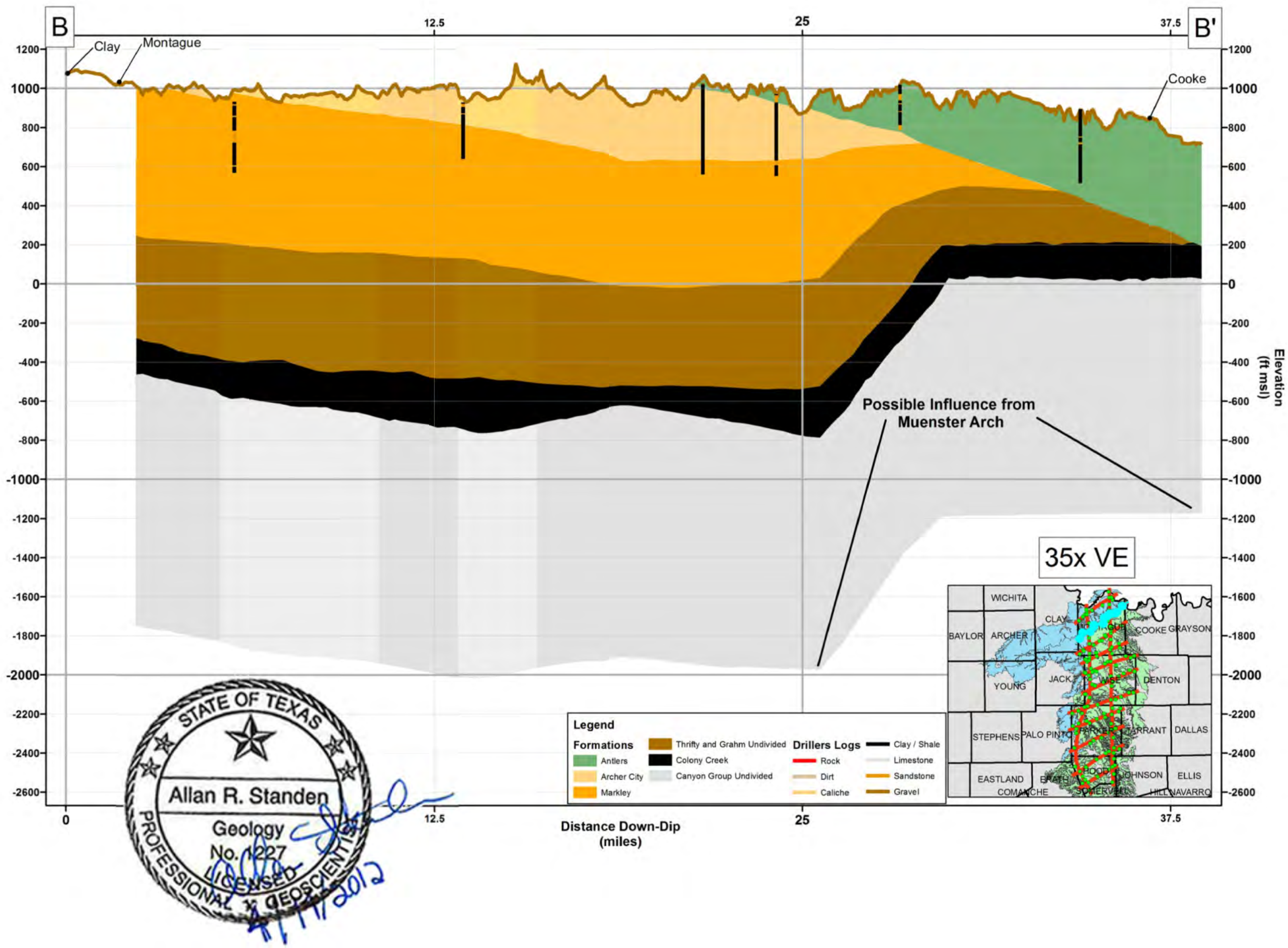

Figure 5. Hydrogeologic Cross-Section B – B.

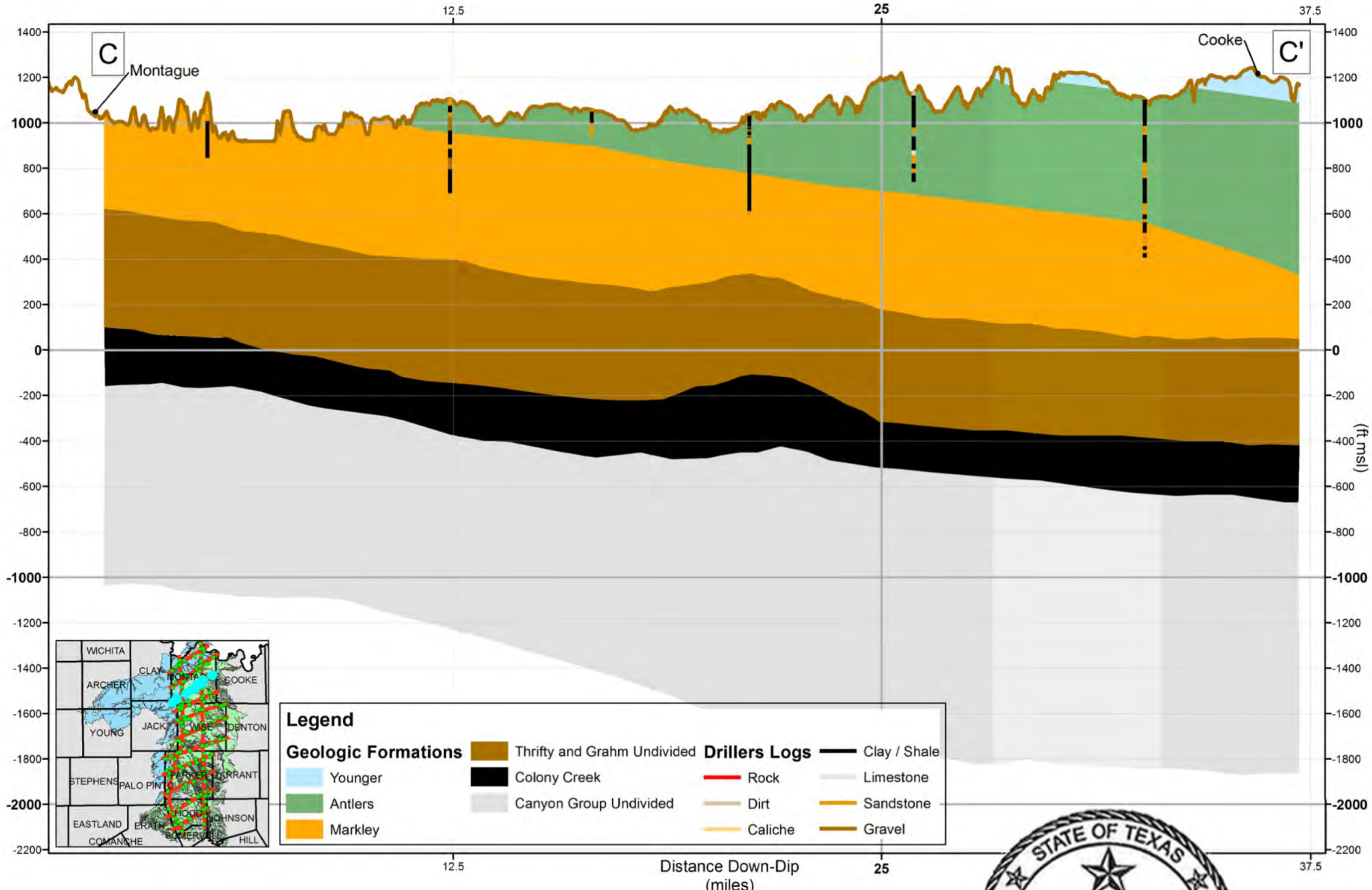

Figure 6. **Hydrogeologic Cross-Section C – C.**

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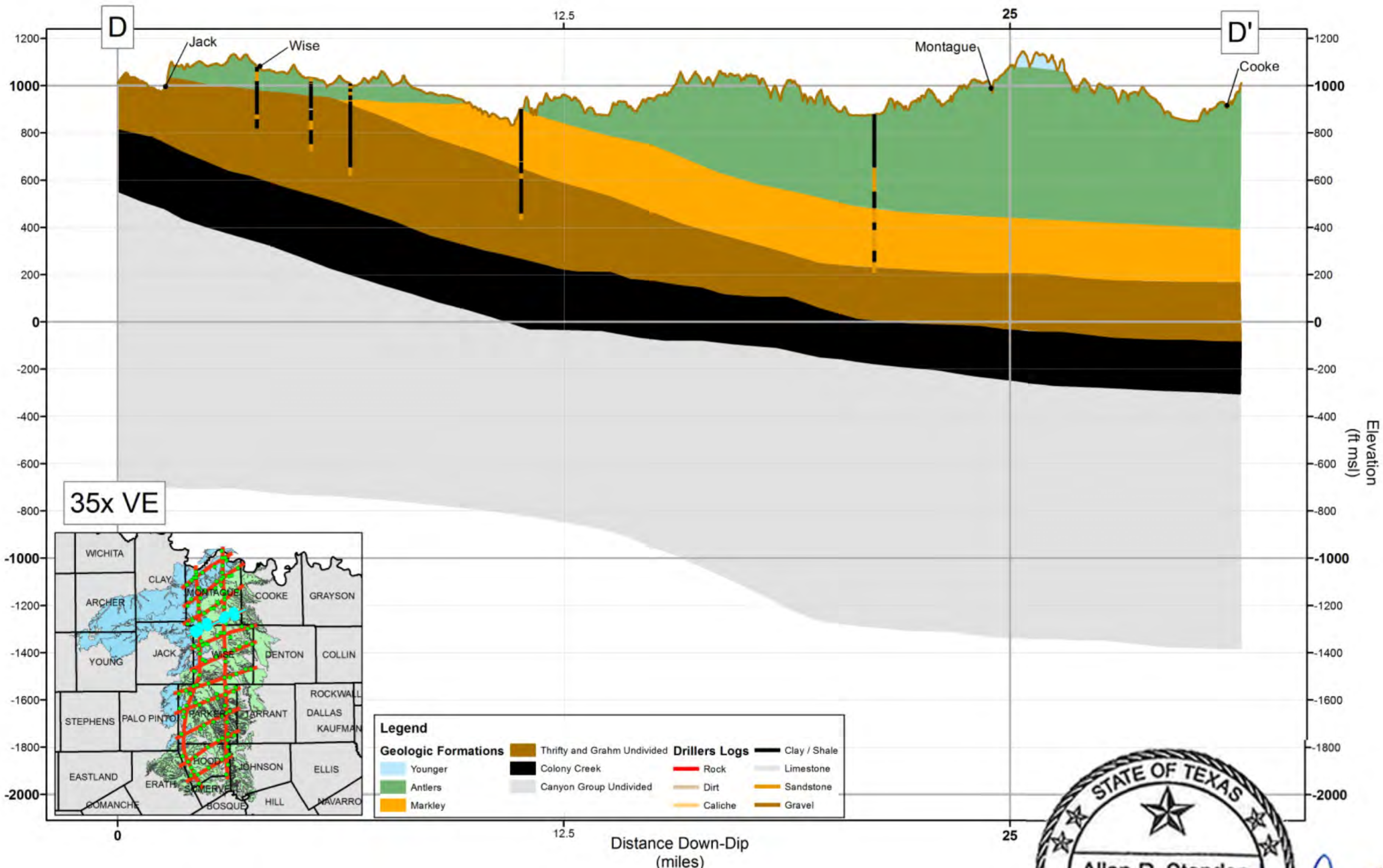

Figure 7. Hydrogeologic Cross-Section D – D.

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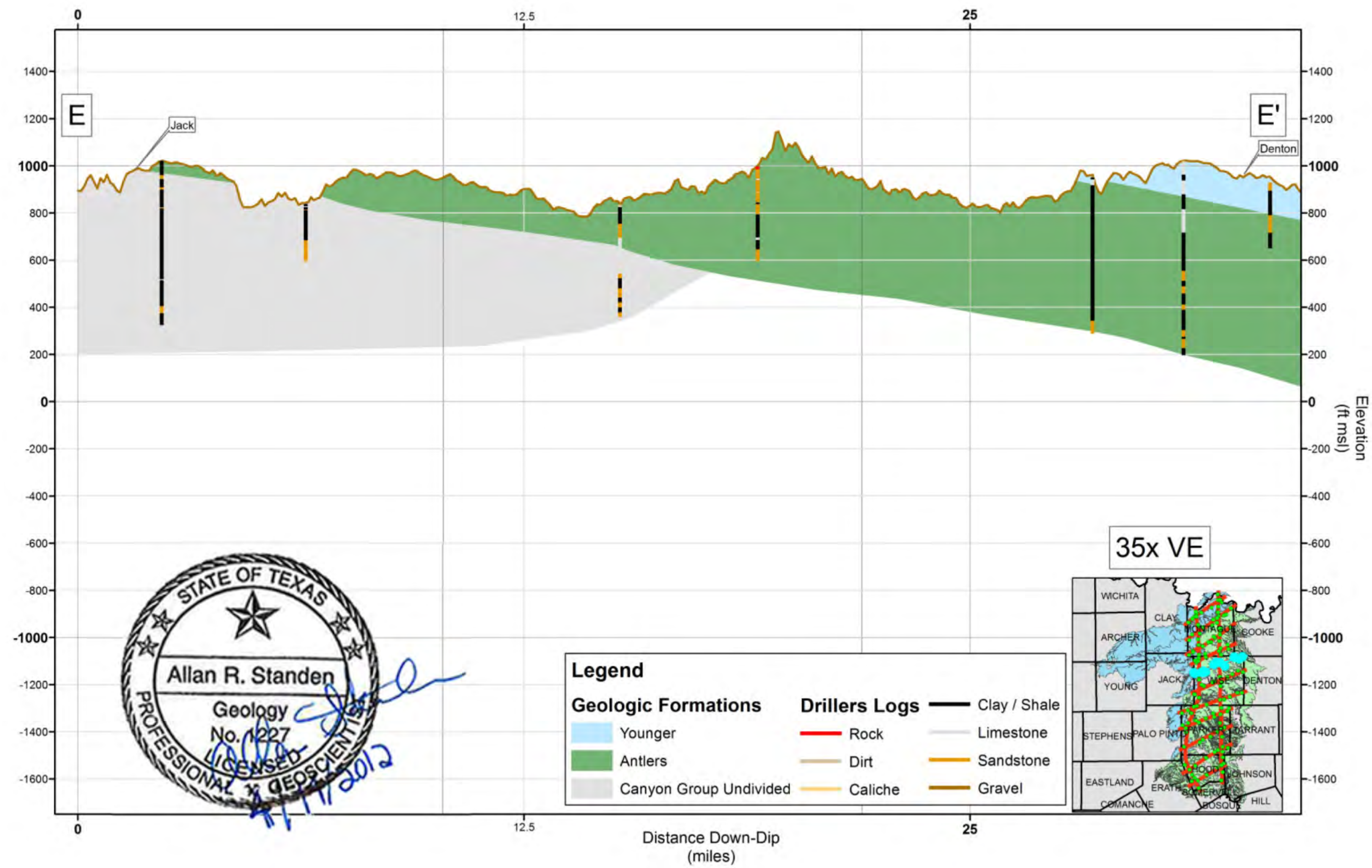


Figure 8. Hydrogeologic Cross-Section E – E.

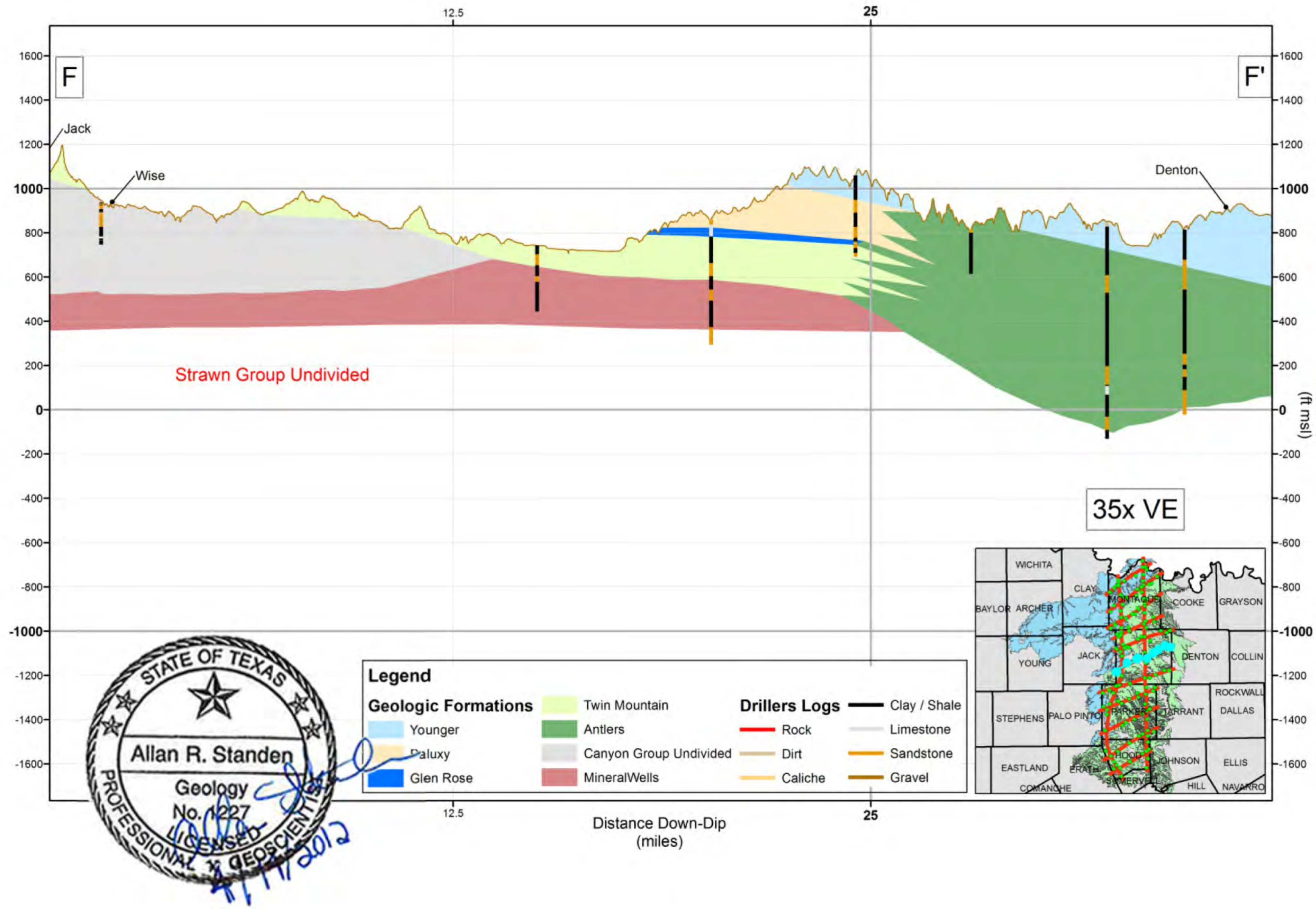


Figure 9. Hydrogeologic Cross-Section F – F.

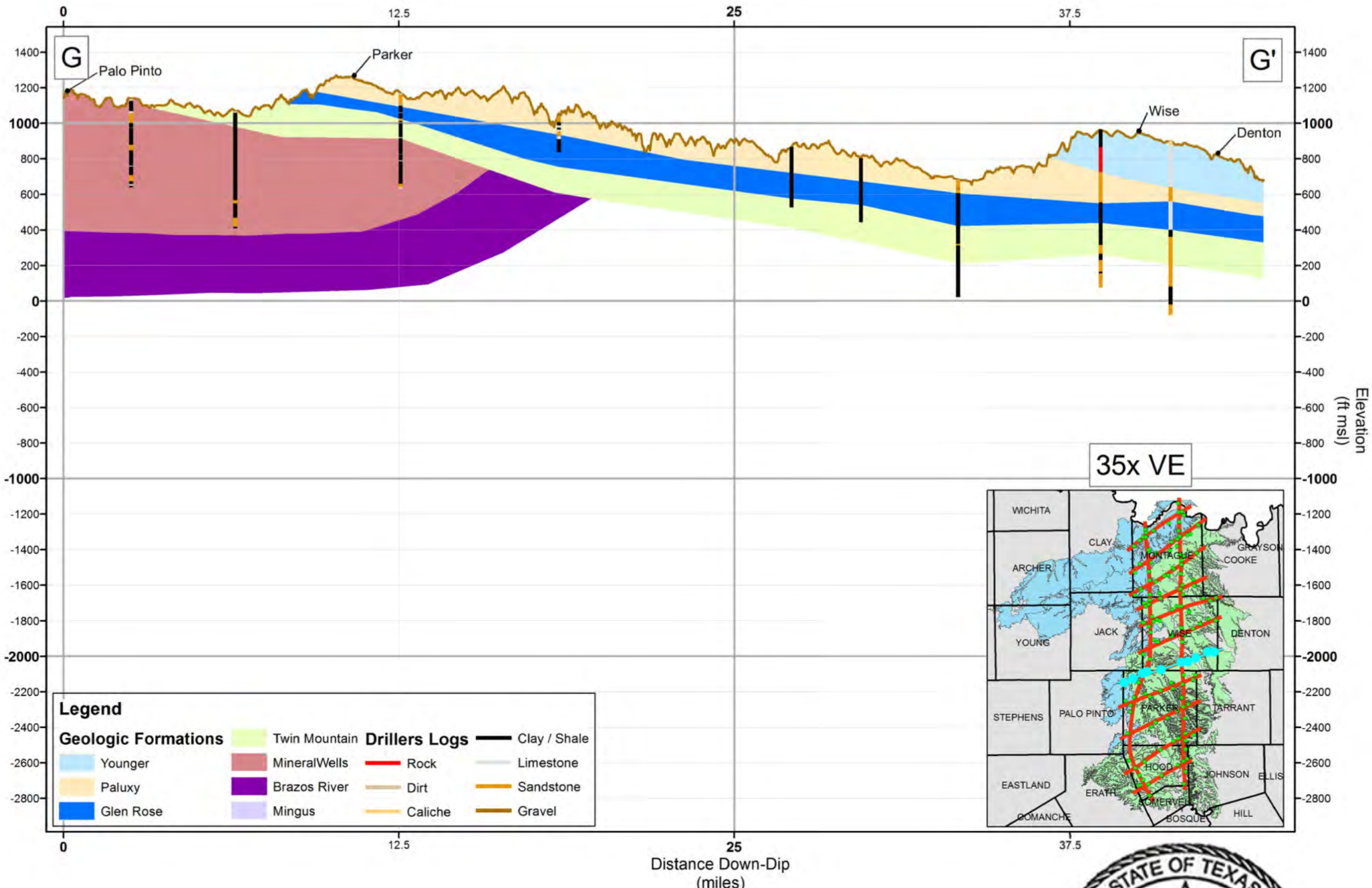
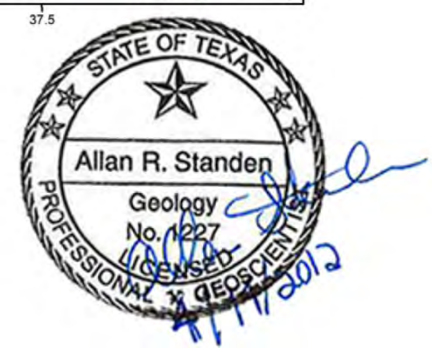


Figure 10. **Hydrogeologic Cross-Section G – G.**



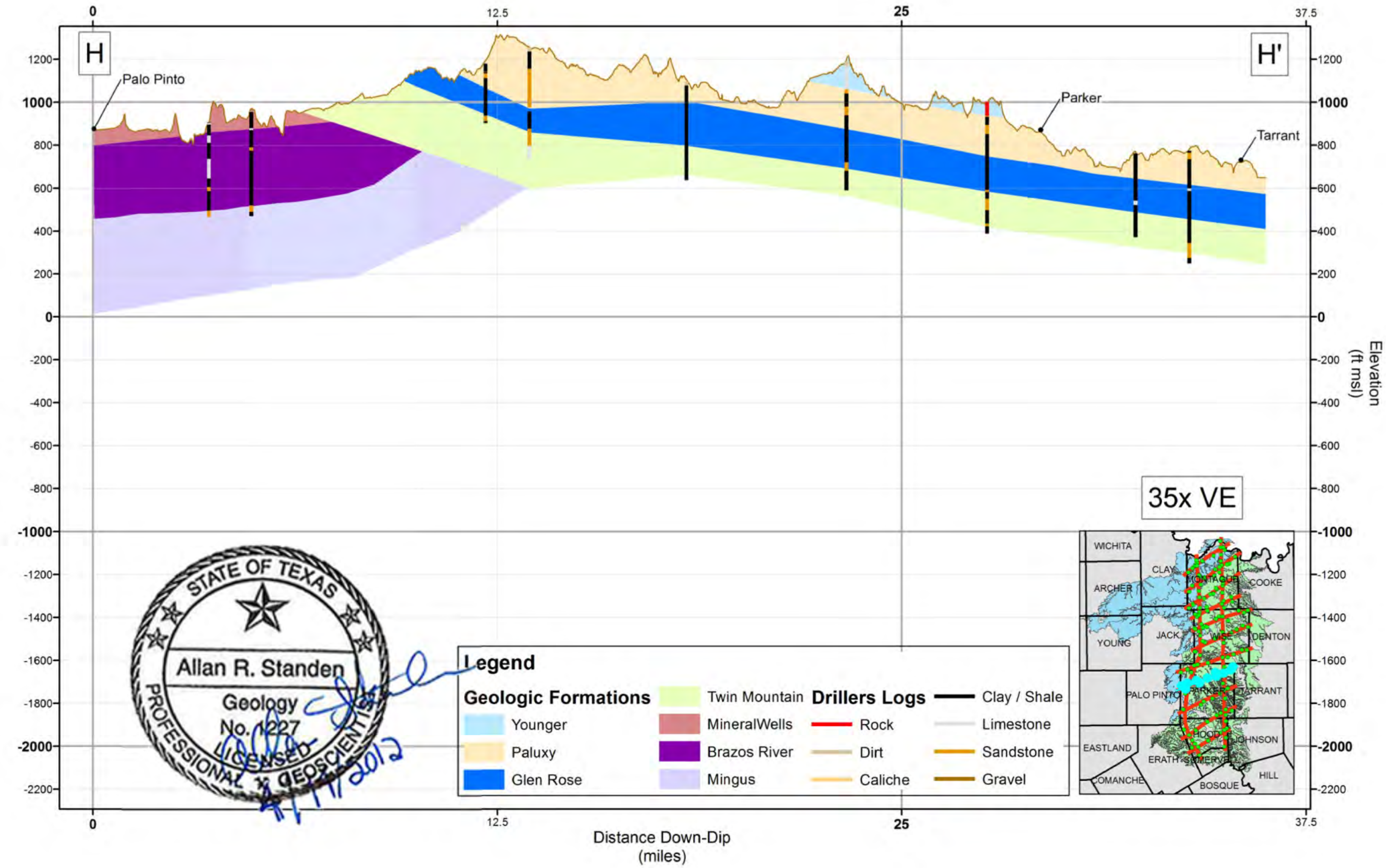


Figure 11. Hydrogeologic Cross-Section H – H.

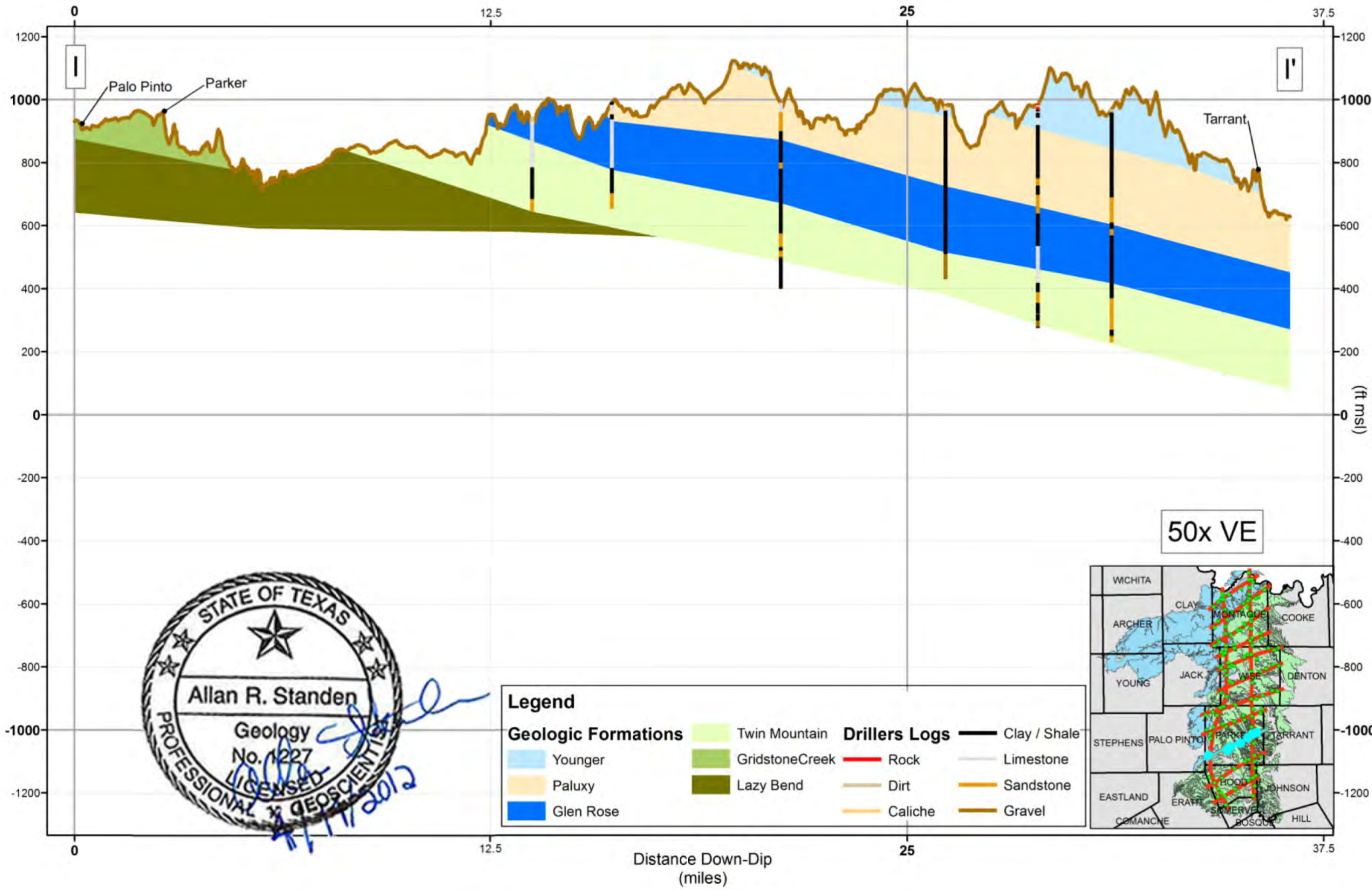


Figure 12. Hydrogeologic Cross-Section I – I.

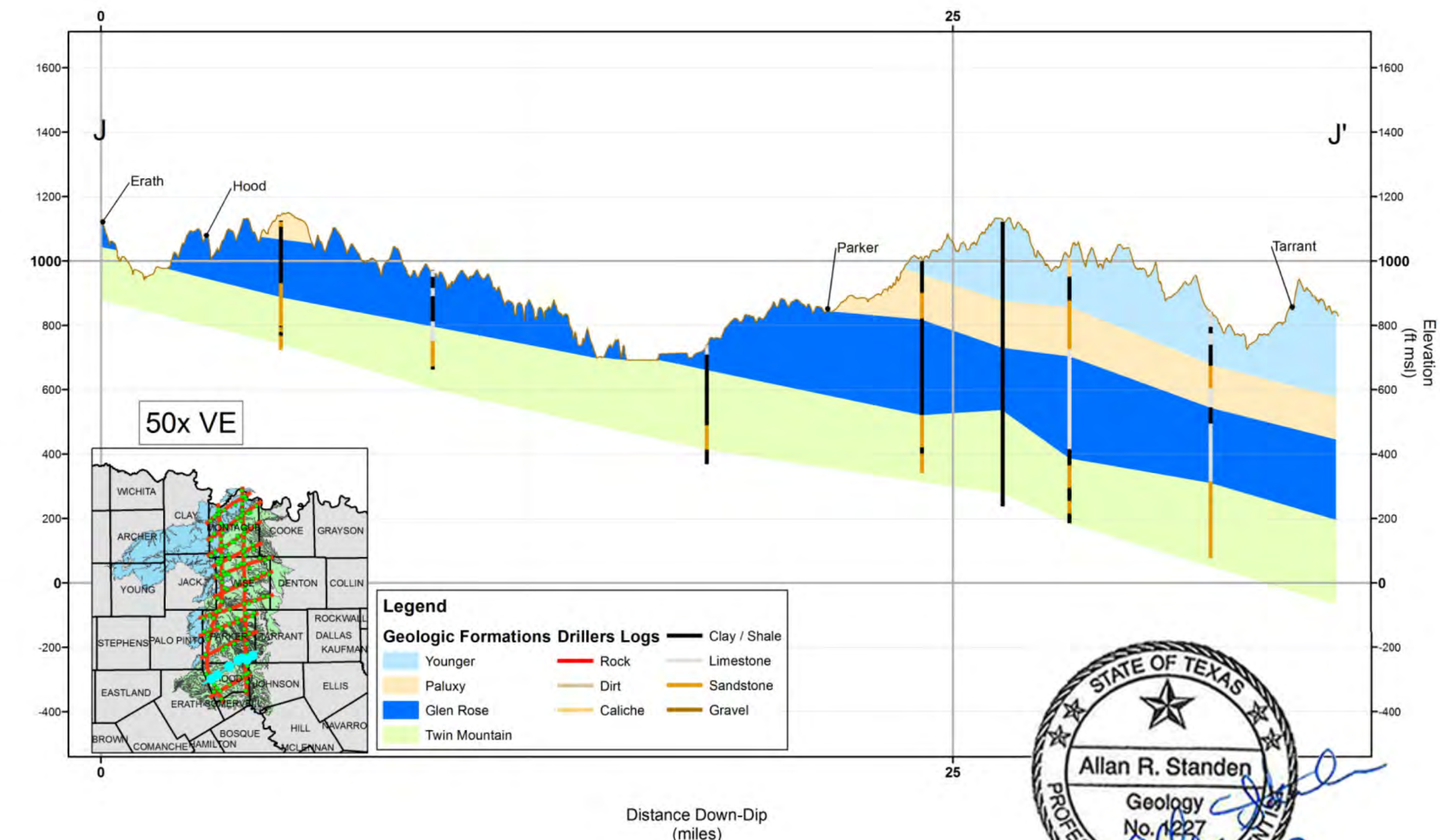


Figure 13. Hydrogeologic Cross-Section J – J.

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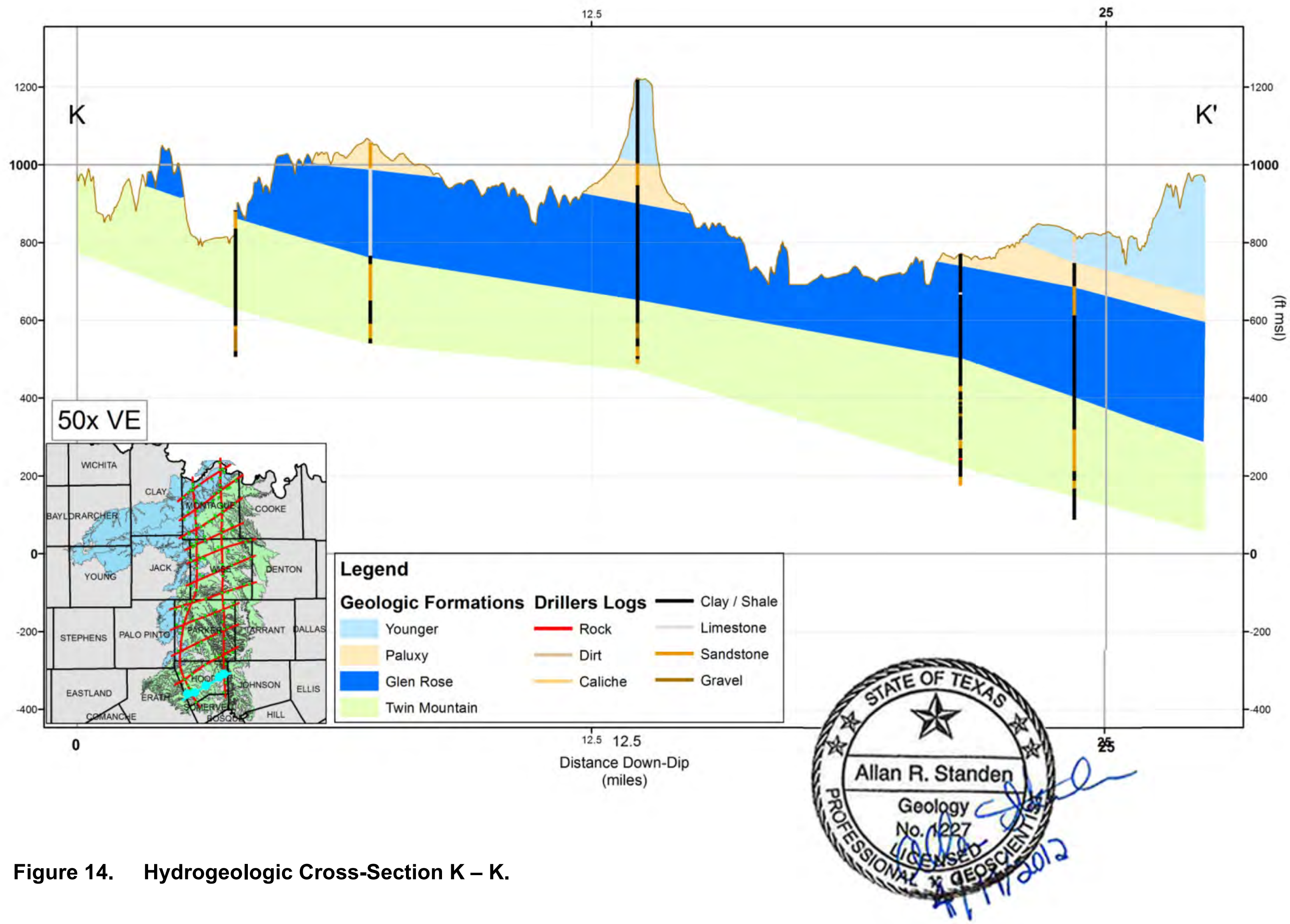

Figure 14. Hydrogeologic Cross-Section K – K.

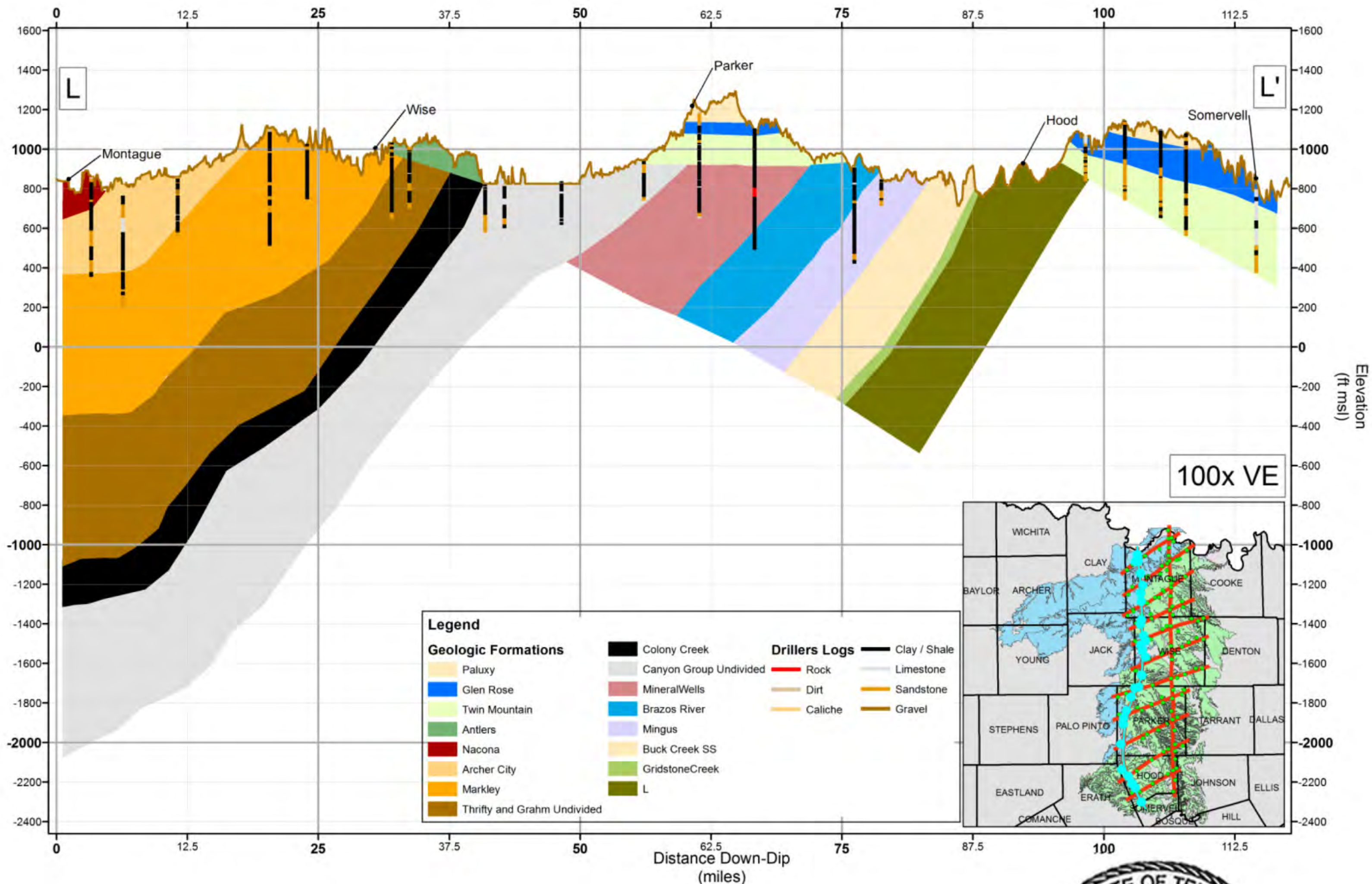

Figure 15. Hydrogeologic Cross-Section L – L.

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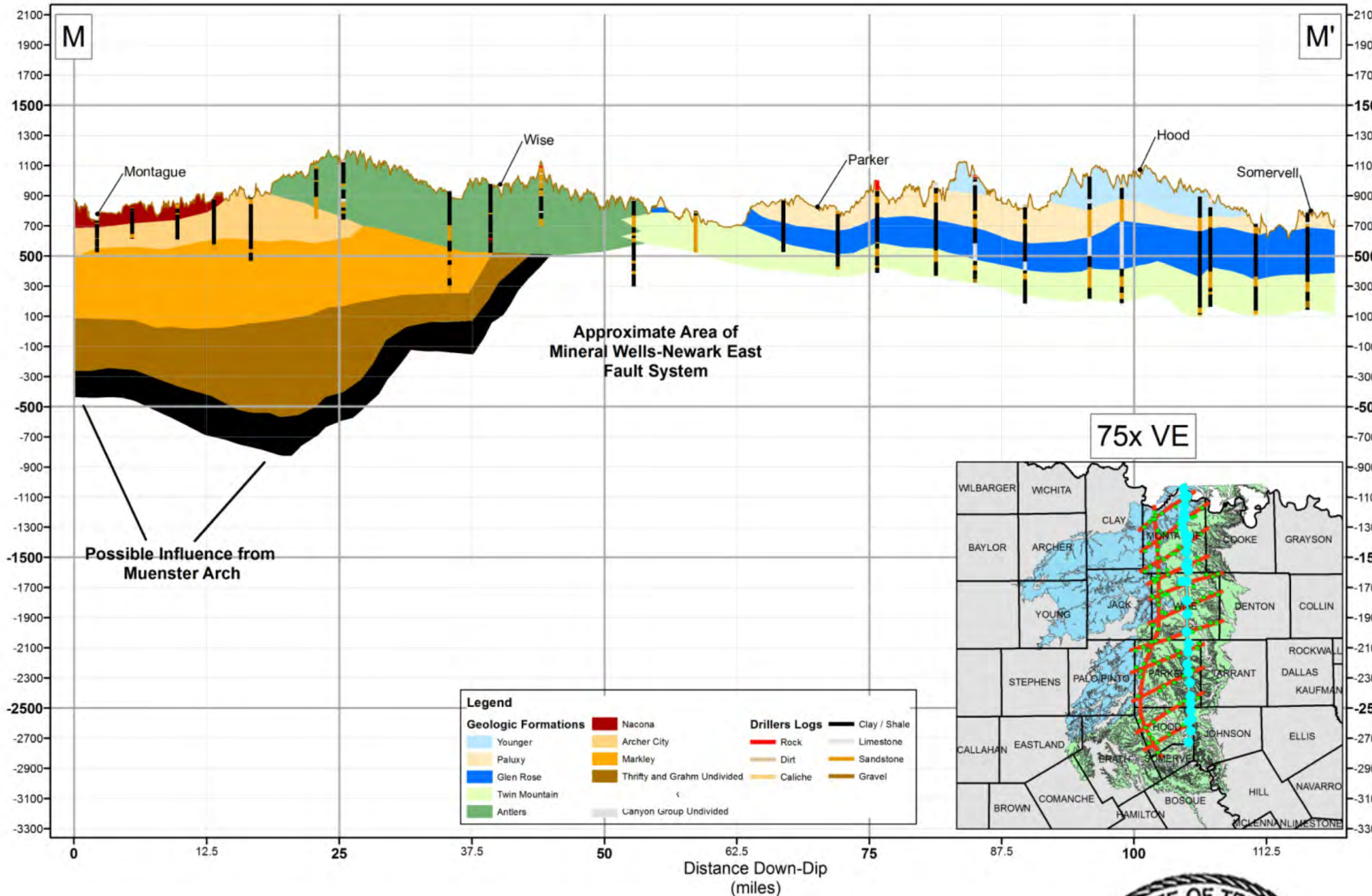

Figure 16. **Hydrogeologic Cross-Section M – M.**

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3.0 Development of the UTGCD Monitoring Strategy

The purpose of Task 2 is to document a monitoring strategy for the District that defines the objectives and goals of the monitoring network, provides a context for evaluating Phase I monitor wells, and helps guide the expansion of the monitoring network in Phase II. The process of developing the monitoring strategy has been divided into three primary activities:

- Refine monitoring plan objectives and goals;
- Define monitoring constraints, if they exist; and
- Develop the strategy for expansion of the monitor well network and program

These activities are documented in this section.

3.1 Monitoring Plan Objectives and Goals

There are many objectives that can be defined for a monitoring program, derived from several separate but overlapping requirements of a District. In our review of the potential monitoring requirements, it was determined that monitoring objectives could be derived from several sources including:

- Chapter 36 (The Water Code) of the Texas Administrative Code;
- Current and future District rules;
- Groundwater Management Plan; and
- Fundamental hydrogeologic characterization of aquifer conditions.

A review of the requirements that precipitate monitoring will be followed by a list of potential monitoring objectives.

3.1.1 Chapter 36 of the Texas Administrative Code

At a fundamental level, all monitoring requirements are derived from the statute defining the Groundwater Conservation Districts (TAC 36).

TAC 36.101 – Rulemaking Authority - Under TAC 36.101 the District has the authority to develop rules. The District is still in the early stages of its development of a comprehensive system to manage the groundwater resources located within its boundaries. The District is acutely aware that the path it ultimately pursues for the permitting and regulation of water wells may have a significant impact on the manner in which water is provided to support human, animal, and plant life, land development, public water supplies, commercial and industrial operations, agriculture, and other economic growth in the District. The District Board takes its responsibilities very seriously with regard to these decisions and the impacts they may have on the property rights of the citizens of the District, and desires to undertake its approach to the development of a permitting and regulatory system in a careful, measured, and deliberate manner. In that regard, the District is determined to accumulate as much data and information as is practicable on the groundwater resources located within its boundaries before developing permanent rules and regulations that would impose permitting or groundwater production regulations on water wells.

The District began its initial studies and analysis of the aquifers and groundwater use patterns in early 2008 in an attempt to both catch up with then-ongoing discussions regarding the development of desired future conditions of the aquifers by the existing groundwater conservation districts in GMA-8, and to develop some baseline information on which decisions could be made for the development of temporary rules governing water wells. In August 2008, the District adopted its first set of temporary rules, which pioneer the District's information-gathering initiative. The District recognizes that the collection of District-scale hydrogeologic information such as groundwater levels, stratigraphy and hydraulic properties is critical to making sound policy and rules. As a result, both the Phase I and Phase II Monitoring Programs are being developed to support these fundamental requirements of the District.

TAC.36.1071 – Management Plan - The 75th Texas Legislature established a comprehensive regional and statewide water planning process in 1997. A critical component of that far-reaching overhaul of the Texas' water planning process included a requirement that each groundwater conservation district develop a management plan that defines the water needs and supply within each district and defines the goals the district will use to manage the groundwater in order to meet the stated needs or demonstrate that the needs exceed available groundwater supplies. Information from each district's management plan is incorporated into the regional and state water plans. The management plan is also used as the basis for the development of the district's permitting and groundwater management rules. A key component of the management plan is the establishment of a set of performance standards and management objectives which the District will use to demonstrate that they are achieving management goals set forth in the plan.

TAC.36.108 – Joint Planning in Management Area - This statute requires joint planning among districts located within the same Groundwater Management Area ("GMA"). Among other activities conducted pursuant to this joint planning process, the districts within each GMA must establish desired future conditions for all relevant aquifers located in whole or in part within the GMA. The desired future conditions established through this process are then submitted to the Texas Water Development Board ("TWDB"), which is required to provide each district with estimates concerning the amount of groundwater that can be produced from each relevant aquifer annually within each county located in the GMA in order to achieve the desired future conditions established for each aquifer. This quantified annual water budget for each aquifer is known as the "Modeled Available Groundwater" or "MAG" amount. Chapter 36 requires that technical information, such as the desired future conditions of the relevant aquifers within a district's jurisdiction and the amount of managed available groundwater from such aquifers, be included in the district's management plan. In addition, it is a requirement of the District to be able to demonstrate that they are achieving the DFC which can only be done through a monitoring program.

Other key aspects of this statute that are relevant to monitoring include the ability for a District to consider aquifer conditions and how they may vary geographically across a District. Statute TAC.36.108.D-1(1) states that districts can set DFCs differently in each aquifer, subdivision of an aquifer or geologic strata. This allows the District to adopt dissimilar regulatory approaches for wells completed in separate aquifers or in different geographic regions of the District, in order to address critical areas or to otherwise tailor regulations that are more suitable for a particular aquifer or area. For example, groundwater management strategies employed for the outcrop of the aquifer may differ from those utilized in subcrop areas. This regulatory flexibility may be appropriate to a District but requires hydrogeologic data including monitoring data to define these portions of the aquifer that may warrant such treatment.

3.1.2 Current or Future District Rules

In August 2008, the District adopted its first set of temporary rules, which pioneer the District's information-gathering initiative. Among other things, the rules require most large wells to be registered with the District, have meters installed to record the amount of groundwater produced, and submit records of the amounts produced to the District. Large well owners are also required to submit fee payments to the District based upon the amount of groundwater produced.

In addition, all new wells are required to be registered with the District and comply with the minimum well spacing requirements of the District. The minimum well spacing requirements were developed by the District to try to limit the off-property impacts of new wells to existing registered wells and adjoining landowners. They include minimum tract size requirements, spacing requirements from the property line on the tract where the well is drilled, and spacing requirements from registered wells in existence at the time the new well is proposed. The spacing distances were developed through hydrogeologic modeling of the varying sizes of the cones of depression of various well capacities, and such distances naturally increase with increases in well capacities. The District's spacing requirements should go a long way toward limiting well interference problems between new wells and between new and existing wells.

The District's monitoring network can be assimilated with groundwater production and use reports and estimates, well location and completion data, information on aquifer recharge rates and other hydrogeologic properties, and other information, in a database that the District is developing to enable it to better understand and manage the groundwater resources of the area. Information gleaned from these efforts will be used by the District in the future in the establishment of desired future conditions for the aquifers, in the monitoring of actual conditions of the aquifers and calibration of modeled conditions, in making planning decisions, and in the development of permanent District rules. These rules may include a permitting system for water wells and the potential for managing the District aquifers in a series of management zones recognizing the potential variability within the aquifers and their use.

3.1.3 Groundwater Management Plan

The Groundwater Management Plan provides several policy statements or management goals and performance standards that relate to the District Monitoring Plan. Specifically, the District's Mission statement states that the District will manage groundwater in a fair and equitable manner such that availability and accessibility of groundwater will remain for future generations. In addition the statement explicitly provides a desire to protect the quality of the groundwater in the recharge zone of the aquifer. This mission statement implies an understanding of the conditions of the aquifer (both water levels and water quality) that can only be accomplished through a deliberate monitoring program.

In the goals, management objective and performance standards section of the Management Plan the District sets specific goals and objectives specific to monitoring to comply with 31TAC(a)(1)(H) ((Implementing TWC §36.1071(a)(8)). These are reproduced below.

F.1 <u>Objective</u> - Within 3 years of Groundwater Management Plan adoption develop a Groundwater Monitoring Program within the District.

F.1 <u>Performance Standard</u> - Upon development, attachment of the District Groundwater Monitoring Program to the District's Annual Report to be given to the District's Board of Directors.

F.2 <u>Objective</u> - Upon approval of the District Monitoring Program – conduct water level measurements at least annually on groundwater resources within the District.

F.2 <u>Performance Standard</u> - Annual evaluation of water-level trends and the adequacy of the monitoring network to monitor aquifer conditions within the District and comply with the aquifer resources desired future conditions. The evaluation will be included in the District's Annual Report to be given to the District's Board of Directors. (See Table 5, in the main document)

F.3 <u>Objective</u> - Monitor non-exempt pumping within the District for use in evaluating District compliance with aquifer desired future conditions.

F.3 Performance Standard - Annual reporting of groundwater used by non-exempt wells will be included in the Annual Report provided to the District's Board of Directors. (See Table 2in the main document)

3.1.4 Fundamental Hydrogeologic Characterization of Aquifer Conditions

In addition to the requirements of monitoring described above, the management of groundwater implies groundwater monitoring and the collection of hydrogeologic data to characterize groundwater conditions. These generally support all of the implied or explicit objectives or requirements for monitoring and basic data collection defined in the preceding three sections. The objectives which may be classified as supporting hydrogeologic characterization include:

- Characterize current baseline groundwater levels in aquifers within the District;
- Characterize trends in aquifer levels in the District;
- Characterize hydraulic gradients within the District, i.e.:
  - Horizontal within aquifers
  - Vertical between aquifers
- Identify aquifers or aquifer zones that may respond distinctively to development and thus may be candidates for different management rules, e.g.:
  - Shallow versus deep (unconfined versus confined)
- Characterize aquifer response to pumping;
- Quantify available groundwater in the District;
- Identify areas susceptible to drought or significant drawdown from increased pumping during drought;
- Monitor aquifer water quality and trends in water quality, e.g.:
  - Isotopic fingerprinting of methane and other higher hydrocarbons (C_2-C_6) in areas of intense fracing operations
  - Characterization of brackish resources in the District
- Identify zones prone to surface contamination;
- Estimate recharge;
- Estimate groundwater and surface water interaction.

3.1.5 Summary of Monitoring Goals and Objectives

From the review of potential monitoring objectives and requirements provided in the sections above, one can conclude that there are many reasons for monitoring, many of which overlap. All of these monitoring objectives are worthy of consideration and relevant to the management of groundwater resources. While all identified objectives may be considered given the general mission statement for the District, it makes sense to prioritize the most important objectives above those that are not required through rule, statute or Management Plan requirements.

We consider the following monitoring objectives to be most important because they are either implicitly or explicitly required based upon the Districts rules or Management Plan.

- Establish current baseline groundwater levels in aquifers within the district;
- Establish trends in aquifer levels in the District;
- Define unique aquifer areas that could be established as separate groundwater management areas and therefore be handled differently in future rules, e.g.:
  - Shallow versus deep
  - Aquitards versus Aquifers
  - Paleozoic aquifer system versus the Trinity aquifer
- Provide adequate information to define future DFCs both in the Trinity and the Paleozoic Aquifers;

- Better inform what is sustainable pumping
- To be used to develop a better groundwater availability model

- Provide a means for definition of Desired Future Conditions within the district and a method for compliance demonstration.

There are several other monitoring requirements that are likely important to the District but may be of lower priority. These could include:

- Establish water quality within the District and trends in water quality;
- Determine areas prone to water quality degradation;
- Determine areas prone to drought to perhaps assist in drought planning;
- Provide a basis for drought management planning and drought impacts on groundwater conditions; and
- Define the base of freshwater in the District as well as the extent of brackish resources;
- Monitor the base of useable water as defined by the Railroad Commission, especially in areas of high density oil and gas exploration and production;
- Develop some isotope signature data in the deep aquifers in areas of high density oil and gas exploration and production;
- Monitor recharge in the shallow unconfined aquifer systems;
- Monitor aquifer levels at the borders of the District to define potential impacts from pumping outside of the District.

3.2 Monitoring Constraints

There are several constraints that one may consider applicable to the expansion of an existing monitoring network. These may include:

- Staff resources available to monitor network (number of wells);
- Costs associated with monitoring (number of wells);
- Current DFC and inherent assumptions and
- New versus existing wells.

Each of the more important constraints to our analysis will be described in the following sections.

3.2.1 Number of Wells

There exists a physical limit as to the number of wells that District staff can visit in a quarter and measure water level while still performing their other duties. This constraint has been brought up with the Board and the General Manager and at this time it is the District's opinion that they could double the number of wells in the current network. For purposes of this analysis, we are assuming that another 80 wells could be brought into the network in addition to those currently in the network. This number could change as we go through the analysis phase of this study. It is also assumed that the resources required to manage the larger network are available to current District staff.

3.2.2 Cost Constraints

It will be assumed that costs associated with the addition of 80 monitor wells will be acceptable from a District perspective. In addition, we will assume that each existing well will require an equal resource commitment for sampling.

3.2.3 Desired Future Condition and Basis

The current Northern Trinity Aquifer DFC is based upon the Northern Trinity GAM (Bené and others, 2004). In the GAM, the Trinity Aquifer is divided into four model layers generally representing the dominant hydrostratigraphy of the Trinity Aquifer in Central and North-Central

Texas; the Upper Trinity (Paluxy and Glen Rose aquifers), the Middle Trinity (Hensell aquifer) and the Lower Trinity (Hosston aquifer). The GAM models the Paluxy aquifer as model layer 3, the Glen Rose aquifer as model layer 4, the Hensell aquifer as model layer 5, and the Hosston aquifer as model layer 7. Model layer 6 represents the Pearsall/Cow Creek/Hammett members of the Travis Peak Formation, which are conceptualized as a confining unit. The relationship between these model layers and the hydrostratigraphy in the District is illustrated in **Table 2**. Table 2 shows that the GAM layering is inconsistent with the District hydrostratigraphy and this discrepancy becomes worse as one moves into the Antlers Formation in the Northern parts of the District. The Hensell and Hosston aquifers are generally not defined in the District but are combined as the Travis Peak Formation. As one moves north of the middle of Wise County, the Glen Rose (model layer 4) also becomes unidentifiable as a distinct unit and is generally lumped with the Antlers Formation. In regions of the District north of Decatur, the entire Trinity Aquifer sequence is generally mapped as the Antlers Formation.

Because the GAM was used as a means of defining desired future conditions as well as estimating the modeled available groundwater, the following discussion of the DFC uses terms of hydrostratigraphic nomenclature and model layers consistent with the GAM.

Table 2. Relationship Between District Trinity Aquifer Hydrostratigraphy and the Current Northern Trinity Aquifer GAM.

District Geology		GAM Model	
Montague and northern Wise counties	**Hood, Parker, southern Wise counties**	**Model Stratigraphy**	**Model Layer**
Antlers Formation	Paluxy Sand	Paluxy aquifer	3
	Glen Rose Formation	Glen Rose aquifer	4
	Twin Mountains Formation	Hensell aquifer	5
		Pearsall/Cow Creek/Hammett/ Sligo confining unit	6
		Hosston aquifer	7

The desired future conditions were specified based upon average drawdown from the year 2000 through the year 2050 on a county and aquifer (model layer) basis. **Table 3** defines the desired future conditions for the four counties comprising the District for the Northern Trinity Aquifer. For example, for the Hosston aquifer in Hood County, the specified management goal (desired future condition) is defined "from estimated year 2000 conditions, the average drawdown of the Hosston Aquifer should not exceed approximately 56 feet after 50 years" (Wade, 2009). All of the desired future conditions are specified in Wade (2009) in a similar format. These are summarized in **Table 3**.

Table 3. Desired Future Conditions and Managed Available Groundwater for the Northern Trinity Aquifer in the District.

County	Trinity Sub-Aquifer	Desired Future Condition(1)	Managed Available Groundwater (2) (AFY)
Hood	Paluxy	1	942
	Glen Rose	2	4
	Hensell	16	3,595
	Hosston	56	6,604
Hood County Total		NA	11,145
Parker	Paluxy	5	9,800
	Glen Rose	6	192
	Hensell	16	1,441
	Hosston	40	3,815
Parker County Total		NA	15,248
Wise	Paluxy	4	2,559
	Glen Rose	14	5
	Hensell	23	1,480
	Hosston	53	5,238
Wise County Total		NA	9,282
Montague	Paluxy	0	505
	Glen Rose	1	-
	Hensell	3	362
	Hosston	12	1,807
Montague County		NA	2,674
District Total		**NA**	**38,349**

OUTDATED

(1) Average drawdown in feet after 50 years from the year 2000
(2) from GAM Run 08-84mag (Wade, 2009)

From a monitoring network perspective, any aquifer DFC is very important in that it defines a constraint on how the monitoring network should be configured. The District Management Plan has explicit performance standards for evaluating the District monitoring program with respect to its adequacy to comply with the DFC. As a result, the monitoring network must be evaluated against the DFC. The current Trinity Aquifer DFC and MAG are couched in terms of GAM model layers that do not necessarily correlate to the District hydrogeology. However, the model layering must be used as a basis for evaluating and further developing the District monitoring network. We will also review the monitoring network using the hydrogeologic framework defined in Section 2.0.

GMA-8 did not propose a DFC for the Paleozoic aquifers systems in the District during Round 1 of the Joint-Planning Process. As a result, there is no equivalent DFC to be used to constrain the monitoring network. For the Paleozoic aquifers we will use the hydrogeologic framework defined in Section 2.0.

Finally, it has been documented by the District that the current Northern Trinity GAM has limitations to its use. As a result, four Districts within GMA-8 agreed to make revisions to the GAM over the course of the last 2 years. GAMs provide useful tools for supporting monitor well network development activities. The current Northern Trinity GAM is not ideal for these purposes for the UTGCD. However, we will try to use the GAM to the degree possible to understand the development of a monitor well network that can defensibly be used to evaluate aquifer conditions as they relate to the DFC.

3.2.4 New Versus Existing Wells

We are assuming that due to cost considerations, the Phase II wells will overwhelmingly consist of existing wells. It may be that once the analysis of the current network and the availability of existing wells are known, drilling a new well may be recommended to the District. However, new wells will only be recommended after the analysis has determined the need.

3.3 Monitoring Strategy

The monitoring strategy is meant to define the strategic concepts or framework that will guide the evaluation and augmentation of the Phase I monitoring network. While the summary in Section 3.1.5 shows that the individual objectives of a monitoring program can be numerous and varied, they all fall within a fundamental requirement: to be able to monitor the aquifer resources within the District at a scale commensurate with the management objectives or the future management objectives.

The current most important management objective stated for the District is the DFC Statement adopted by GMA-8 and instituted into the District Management Plan (Section 3.2.3 above). We will develop a strategy that keeps the DFC in center focus while also looking at other important aspects of District hydrogeology such as trends in water levels, current pumping distribution, shallow versus deep well screens and the hydrogeologic framework defined in Section 2.0.

The Paleozoic Aquifers do not currently have a DFC developed. The strategy that is developed for the Paleozoic aquifers will be informed by the development of the Trinity Aquifer monitoring strategy, with variation for the unique hydrogeology of the Paleozoic aquifers.

3.3.1 Trinity Aquifer Monitoring Strategy

Our strategy for the assessment of the current Phase I Trinity Aquifer monitoring network will also be used to guide the augmentation of the network in Phase II. The process will be sequential, as outlined in the following.

Step 1 – Establish Full Set of Potential Monitor Wells:

The first step will require two data sets. One is the existing Phase I monitor well network and data. The second will be a database with the available completion (screen location) information for all other potential wells. A potential well must have adequate location, elevation and completion information available, that any water level measurement can be accurately referenced to a common vertical datum, and definitely assigned to a particular aquifer or section of aquifer. It will also be important that the monitor well has a history of water level measurements. Because the DFC is based upon drawdown since the year 2000, it would be best if the time series starts by the year 2000, or can be reliably extrapolated back to that time.

In addition to these attributes, there are other practical considerations that can only be assessed once site visits have begun.

Step 2 – Develop DFC Zones:

The second step will be to divide the Trinity Aquifer within the District into 20 zones based upon the current DFC (termed DFC Zones). These zones are defined by the combination of Northern Trinity Aquifer GAM layer (based on the model grid discretization) and county. An initial assessment of the Phase I wells will be performed to determine whether a monitor well currently exists in each DFC Zone. If this is not the case, we try to find a candidate well for those "empty" zones.

Step 3 – Investigation of Monitor Well Location Based Upon DFC Methods:

Step 3 is an empirical study of the required or optimal number of monitor wells that may be required in a given DFC Zone to reproduce the DFC as calculated from the GAM. The TWDB calculated the DFC using the GAM by averaging drawdown calculated at each GAM model cell for a given model layer and county (DFC Zone) from the year 2000 to 2050. The GAM model grid is a one square mile grid. The District cannot support a monitoring program that would monitor every square mile of the District (3,208 square miles times four model layers equals 12,832 monitor wells). Therefore, the question that has to be addressed is how many monitor wells are required to provide good agreement with the model average methods used by GMA-8.

To test the number of required wells, we will simulate the performance of a hypothetical monitoring network using the existing DFC run. We will start by ensuring that each DFC Zone has at least one monitor well, from the Phase I wells and potential new monitor wells. At these well locations, we will extract the simulated head from the DFC run. These point "measurements" of head represent the simulated monitoring network. We will then estimate average drawdown in each DFC Zone based on these heads. The average will be calculated by interpolating the point "measurements" onto a one square mile grid, then taking the arithmetic mean of the grid values for each DFC Zone.

The DFC Zone drawdown averages estimated from the simulated monitoring network will be compared to the actual DFC run drawdown averages by DFC Zone. We expect there will be a difference between the two values, since the monitoring network has a limited head coverage compared to the GAM.

In a next iteration, we increase the number of monitor wells in those zones with the greatest difference between the estimate from the hypothetical monitoring network and the GAM. The new wells will be located based on an equal area, space filling approach or potentially by adding monitor points at locations where we have identified potential monitor wells. We will consider both options. This increase in well coverage will improve the performance of the monitor well network in those zones. Thus with each iteration, the hypothetical monitoring network will provide an average drawdown estimate that is closer to the DFC.

By this analysis, we hope to gain insight into the number (and potentially the strategy for location) of monitor wells that will adequately track the DFC. The best case we can expect out of this analysis approach is an optimal number of monitor wells in each DFC Zone.

An enhancement to the above analysis would be to look at the improvement (i.e., decrease in monitoring points) that may occur if we account for pumping in our monitor well selection process, instead of the initial space-filling approach. This would require calculation of a pumping density function (acre-feet per year per square-mile) that will be used to guide the location of additional monitor wells. Theoretically, this approach should improve our ability to reproduce the DFC with a smaller number of monitor points.

At the end of Step 3, we hope to have insight into the number of monitor wells it takes to satisfactorily reproduce the DFC average drawdown for each DFC Zone. We will also gain insight into the proposed approach for locating new wells based on pumping density.

Step 4 – Consideration of Water Level Trends:

In Step 4 we will use an analysis of water level trends to provide additional information for locating monitor wells. A monitor well program should be able to track large scale water level declines as a result of large pumping centers as well as regions of the aquifer that appear stable. Our objective is to characterize the trends in water levels at a scale much smaller than a county but not directly affected by pumping (i.e. not in a pumping well or directly adjacent to one).

We will use the data from the Phase I monitor wells in addition to any other available time series data to develop trends. We will focus our analysis on the time period from 2000 to present as this is the drawdown baseline used in the GMA-8 DFC calculations. We will look at two alternatives for this analysis. First, we will see if we have adequate time series data to investigate trends in each DFC Zone. Second, we will look at the dataset more globally and see if the data is defining areas of stable versus decreasing water level trends.

Step 5 - Initial Monitor Well Location Based Previous Analyses:

By this point in the analysis we will have developed some insight into:

- the number of wells needed to satisfactorily reproduce the DFC calculations;
- the influence of pumping on developing a better monitoring network; and
- trends in water levels across the District.

Based on this knowledge, we are ready to evaluate the Phase I wells and start identifying potential Phase II wells.

The first requirement will be the development of a District pumping dataset based upon the District's metered data and the District's best estimate of groundwater use. We will attempt to locate pumping as closely as possible to point locations. Once this is developed, we will use the actual District pumping data to develop a pumping density function for the District. We will then use the DFC Zones, the pumping data and the water level trend data to evaluate Phase I wells and to identify potential Phase II monitor wells.

Step 6 –Screen Monitor Well Locations Based on Updated Hydrogeology:

Because much of the focus at this point has been on the GAM model layering which is based on hydrostratigraphy that is not well matched to District conditions, the next step in the strategy is to compare the draft monitoring network to the hydrogeology developed as part of this scope of work (see Section 2). We will intersect all monitor well screens with the new hydrogeologic framework and make sure that these intervals are being adequately monitored.

Step 7 –Screen Monitor Well Locations Considering Shallow versus Deep:

Finally, we will review the draft monitoring network in terms of how well it does at monitoring aquifer conditions across the District in both shallow (unconfined to semi-confined) and deep (confined) portions of the aquifer system. We will also develop a registered well density coverage and assess whether the overall monitoring network does a good job of mimicking the density of groundwater use as it can be defined from registered wells.

3.3.2 Paleozoic Aquifer Monitoring Strategy

Our strategy for the Paleozoic Aquifers will be similar to that proposed for the Northern Trinity Aquifer with the exception that we will not be defining DFC Zones. Below each step will be discussed in terms of the Paleozoic Aquifers. We will develop similar zones based upon the hydrogeologic framework for assessment of the current Phase I Trinity Aquifer monitoring network. These zones will also be used to guide the augmentation of the network in Phase II. The process will be sequential.

Step 1 – Establish Universe of Potential Monitor Wells:

The same strategy and process used for the Trinity aquifer will be used for the Paleozoic aquifers (see Section 3.3.1, Step 1).

Step 2 – Develop Hydrostratigraphic-County Zones:

The second step will be to divide the Paleozoic aquifers into unique Hydrostratigraphic-County zones. Initially we will define five unique hydrostratigraphic units (Wichita, Bowie, Cisco, Canyon and Strawn) and four counties making 20 maximum combinations. In reality, there are fewer because each hydrostratigraphic unit does not reside in every county. An initial assessment of the Phase I wells will determine whether a monitor well is located in each of the Hydrostratigraphic-County zones. If this is not the case, we try to identify a potential well in each.

Step 3 – Investigation of Monitor Well Location Based Upon DFC Methods:

Step 3 cannot be performed for the Paleozoic aquifers because they have neither a DFC nor a GAM.

Step 4 – Consideration of Water Level Trends:

In Step 4 we will use an analysis of water level trends to provide additional information for locating monitor wells. In a monitor well program you want to be able to monitor large scale water level declines as a result of large pumping centers as well as monitor regions of the aquifer that appear stable. Our objective is to characterize the trends in water levels at a scale much smaller than a county but not directly affected by pumping (ie., not in a pumping well or directly adjacent to one).

We will use the data from the Phase I monitor wells in addition to any other available time series data to develop trends. We will look at two alternatives for this analysis. First, we will see if we have adequate time series data to investigate trends in each Hydrostratigrahic-County zone. Secondly, we will look at the dataset more globally and see how the data is defining areas of stable versus decreasing water level trends.

Step 5 - Initial Monitor Well Location Based Previous Analyses:

We will use the insight gained from Step 3 in the Trinity aquifer analysis along with the trend analysis data to evaluate the Phase I wells and to start identifying potential Phase II wells.

The first step of this analysis will be the development of a District pumping dataset based upon the District's metered data and the District's best estimate of groundwater use. We will attempt to locate pumping as closely as possible to point locations. Once this is developed, we will use the actual District pumping data to develop a pumping density function for the District. Once we have that we will use the Hydrotsratigraphic-County zones, the pumping data and the water level trend data to identify Phase I redundant wells and to identify potential Phase II monitor wells. In addition to the District database, we currently have the last 10 years of driller's reports for wells identified as being drilled for oil and gas exploration. We can also get the last 10 years of oil and gas well locations from the Railroad Commission for approximately $200. This data can help us see where oil and gas water use is most likely.

Step 6 –Screen Monitor Well Locations Based on Updated Hydrogeology:

Because we are using the hydrostratigrahic framework to develop the network, this step is unnecessary.

Step 7 –Screen Monitor Well Locations Based Upon Shallow versus Deep Screens:

Finally, we will review the draft monitoring network in terms of how well it does at monitoring aquifer conditions across the District in both shallow (unconfined to semi confined) and deep (confined) portions of the aquifer system. We will also develop a registered-well density coverage to assess whether the overall monitoring network does a good job of mimicking the density of groundwater use as it can be defined from registered wells.

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Upper Trinity Groundwater Conservation District

ANNUAL FINANCIAL REPORT

FOR THE YEAR ENDED DECEMBER 31, 2019

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
Annual Financial Report
For the Year Ended December 31, 2019

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INDEPENDENT AUDITORS' REPORT

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Report on the Financial Statements

We have audited the accompanying financial statements of the governmental activities and the major fund information of the Upper Trinity Groundwater Conservation District (the District) as of and for the year ended December 31, 2019, and the related notes to the financial statements, which collectively comprise the District's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statement in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

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Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the governmental activities and the major fund of Upper Trinity Groundwater Conservation District as of December 31, 2019, and the respective changes in financial position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis, budgetary comparison information, schedule of change in Net Pension Liability and Related Ratios, Schedule of Contributions, and Notes to Required Supplementary Information on pages 4 through 8, page 30, and pages 31 through 33, respectively, be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of the financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Boucher, Morgan & Young

Stephenville, Texas
July 21, 2020

MANAGEMENT’S DISCUSSION AND ANALYSIS

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
MANAGEMENT'S DISCUSSION AND ANALYSIS

As management of the Upper Trinity Groundwater Conservation District, we offer readers of the District's financial statement this narrative overview and analysis of the financial activities of the District for the fiscal year ended December 31, 2019. The District has implemented Governmental Accounting Standards Board Statement 34 –Basic Financial Statements and Management's Discussion and Analysis for State and Local Governments.

Financial Highlights:

> The assets and deferred outflows of the Upper Trinity Groundwater Conservation District exceeded its liabilities and deferred inflows at the close of the most recent fiscal year by $5,529,223.
>
> The District's total net position increased by $437,883 during the fiscal year.

Overview of Financial Statements:

This discussion and analysis is intended to serve as an introduction to the District's basic financial statements. The District's basic financial statements are comprised of three components: 1) government-wide financial statements, 2) fund financial statements, and 3) notes to the financial statements. This report also contains other supplementary information in addition to the basic financial statements themselves.

Government-wide financial statements – The government-wide financial statements are designed to provide readers with a broad overview of the District's finances, in a manner similar to a private-sector business.

The Statement of Net Position presents information on all of the District's assets and liabilities, with the difference between two reported as net position. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position of the District is improving or deteriorating.

The Statement of Activities presents information showing how the District's net position changed during the fiscal year. All changes in net position are reported when the underlying event giving rise to change occurs, regardless of the timing of related cash flow. Thus, revenues and expenses are reported in this statement for some items that will only result in cash flows in the future fiscal periods.

Both of the government-wide financial statements distinguish functions of the District that are principally supported by charges and fees. The governmental activity of the District is to develop and enforce rules to provide protection to existing wells, to prevent waste and promote groundwater conservation.

Fund financial statements – A fund is a grouping of related accounts that is used to maintain control over resources that have been segregated for specific activities or objectives. The District, like other state and local governments, uses fund accounting to ensure and demonstrate compliance with finance-related legal requirements. The funds of the District consist solely of the one governmental fund.

Governmental Funds – Governmental funds are used to account for essentially the same functions reported as governmental activities in the government-wide financial statements. However, unlike the government-wide financial statements, governmental fund financial statements focus on near-term inflows and outflows of spendable resources, as well as on balances of spendable resources available at the end of the fiscal year. Such information may be useful in evaluating a government's near-term financing requirements.

Because the focus of governmental funds is narrower than that of the government-wide financial statements, it is useful to compare the information presented for governmental funds with similar information presented for governmental activities in the government-wide financial statements. By doing so, readers may better understand the long-term impact of a government's near-term financing decisions. Both the governmental fund balance sheet and the governmental fund statement of revenues, expenditures and changes in fund balance provide a reconciliation to facilitate this comparison between governmental funds and governmental activities.

At the close of the current fiscal year, the District's governmental fund reported ending fund balance of $3,671,145 compared to the $3,327,403 in the prior year.

Notes to the Financial Statements – The notes provide additional information that is essential to a full understanding of the data provided in the government-wide and fund financial statements. The notes to the financial statements can be found on pages 17-28 of this report.

Governmental-Wide Financial Analysis

As noted earlier, net position may serve, over time, as a useful indicator of a government's financial position. In the case of Upper Trinity Groundwater Conservation District, assets and deferred outflows exceeded liabilities and deferred inflows by $5,529,223 as of December 31, 2019.

The largest portion of the District's net position is Unrestricted, while the remaining balance reflects its investment in capital assets.

Upper Trinity Groundwater Conservation District's Net position:

	Governmental Activities 2018	Governmental Activities 2019
Current assets	$ 3,441,006	$ 3,740,931
Capital assets	1,702,643	1,795,200
Total assets	5,143,649	5,536,131
Deferred outflows	39,942	57,891
Total assets and deferred outflows	5,183,591	5,594,022
Current liabilities	113,603	69,786
Non-current liabilities (assets)	(23,339)	(4,987)
Total liabilities	90,264	64,799
Deferred inflows	1,987	-
Total deferred inflows	1,987	-
Net position:		
Net investment in capital assets	1,702,643	1,795,200
Unrestricted	3,388,697	3,734,023
Total Net Position	$ 5,091,340	$ 5,529,223

As of December 31, 2019, the District is able to report positive balances in both categories of net position.

Analysis of the District's Operations – The following table provides a summary of the District's operations for the year ended December 31, 2019. Governmental-type activities increased the District's net position by $437,883.

Upper Trinity Groundwater Conservation District's Changes in Net position

	Governmental Activities 2018	Governmental Activities 2019
Revenues:		
Program Revenues:		
Water usage fees	$ 907,049	$ 868,277
New well registration fees	703,375	662,375
Other program revenue	28,494	35,439
Total program revenues	1,638,918	1,566,091
General Revenues:		
Miscellaneous revenue	5,790	5,972
Net Investment earnings	30,017	41,002
Total revenues	1,674,725	1,613,065
Expenses:		
Groundwater conservation	1,215,095	1,176,766
Total expenses	1,215,095	1,176,766
Change in net position	463,499	437,883
Net position - beginning of year, as previously reported	4,627,841	5,091,340
Net position - end of year	$ 5,091,340	$ 5,529,223

Financial Analysis of the Government's Funds

The net position increased in 2019 by $437,883 compared to a $463,499 increase in 2018. Decreased water use by non-exempt well owners, such as Public Water Supply caused a decrease in program revenue of approximately $72,827. Expenditures decreased from the previous year by $38,329.

Capital Assets

The Upper Trinity Groundwater Conservation District's investment in capital assets as of December 31, 2019, amounts to $1,795,200 (net of accumulated depreciation). This investment in capital assets includes land, vehicles, furniture, equipment, and software.

Capital Assets at Year-End Net of Accumulated Depreciation

	Governmental - Type Activities 2018	Governmental - Type Activities 2019
Land	$ 267,834	$ 267,834
Construction in progress	97,391	-
Building	1,057,880	1,021,918
Vehicles	36,789	86,787
Furniture and equipment	96,798	197,257
Software	145,951	221,404
Total	$ 1,702,643	$ 1,795,200

Depreciation expenses on all assets amounted to $107,752 for the year.

Economic Factors for Next Year

The original budget for the 2020 fiscal year shows projected revenues of $1,557,500 and expenditures of $1,675,250.

On November 18, 2019 the Board of Directors of UTGCD passed and adopted Resolution 19-007 Allocation of Funds for the District. They designated "Committed Funds" for Operating Reserve Fund and Legal Reserve and Litigation Fund. They also designated "Assigned Funds" for Monitoring Well Drilling Fund, Desired Future Conditions Preparation Fund, Facilities/Building Fund, and Technology Development Fund.

The Board believes it is very prudent to recognize the litigious nature of the process of DFC adoptions and issues related to rules which contain permit limitations on non-exempt water wells. In addition, the revenues from water usage could decline if certain situations occur. Therefore, the Board deems it wise to accumulate sufficient funds to cover operations and unexpected expenses should they lose any major fee payers.

The District's immediate and long-term financial goals are to fund necessary water conservation and monitoring programs with program revenues and to safeguard the cash on hand for future needs.

Political issues affecting the District include potential groundwater ownership legislative issues, definition of "brackish" water, and discussions of the authority of groundwater conservation districts.

There could be a continued decrease in groundwater used for oil and gas exploration or production if companies continue to move out of the Barnett Shale or if they increase their use of alternative water sources. Also, production of groundwater by public water systems could decrease if they increase conservation efforts or increase their supply of surface water.

Request for Information

This financial report is designed to provide our citizens, customers, investors and creditors with a general overview of the District's finances. If you have questions about this report or need any additional information, contact Upper Trinity Groundwater Conservation District in care of Doug Shaw, General Manager, 1859 W Hwy 199, P.O. Box 1749, Springtown, Texas 76082.

BASIC FINANCIAL STATEMENTS

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
STATEMENT OF NET POSITION
DECEMBER 31, 2019

	Governmental Activities
ASSETS	
Current assets:	
Cash and cash equivalents	$ 563,471
Certificates of deposit	2,620,453
Receivables, net of allowance	541,955
Prepaid expenses	9,581
Deposits	1,610
Undeposited funds	3,861
Total current assets	3,740,931
Capital assets:	
Nondepreciable	267,834
Depreciable, net	1,527,366
Total assets	5,536,131
DEFERRED OUTFLOWS:	
Deferred retirement contributions	31,439
Deferred investment experience	15,823
Deferred assumption/input changes	1,408
Deferred actual vs. assumption	9,221
Total deferred outflows	57,891
Total assets and deferred outflows	$ 5,594,022
LIABILITIES	
Current liabilities:	
Accounts and credit card payables	9,031
Payroll liabilities	18,915
Driller deposits	41,840
Total current liabilities	69,786
Non-current liabilities:	
Net pension liability (asset)	(4,987)
Total liabilities	64,799
NET POSITION	
Net investment in capital assets	1,795,200
Unrestricted	3,734,023
Total net position	$ 5,529,223

The accompanying notes are an integral part of the financial statements.

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
STATEMENT OF ACTIVITIES
FOR THE YEAR ENDED DECEMBER 31, 2019

		Program Revenues	Net (Expense) Revenue and Changes in Net Position
			Primary Government
	Expenses	Charges for Services	Governmental Activities
Primary Government			
Governmental Activities			
General government	$ 1,175,182	$ 1,566,091	$ 390,909
Total governmental	1,175,182	1,566,091	390,909
General revenues			
Miscellaneous revenue			5,972
Investment earnings			41,002
Total general revenues			46,974
Change in net position			437,883
Net position - beginning			5,091,340
Net position - ending			$ 5,529,223

The accompanying notes are an integral part of the financial statements.

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
BALANCE SHEET - GOVERNMENTAL FUND
DECEMBER 31, 2019

		General Fund
ASSETS		
Cash and cash equivalents	$	563,471
Certificates of deposit		2,620,453
Accounts receivable, net of allowance		541,955
Prepaid expenses		9,581
Security deposits		1,610
Undeposited funds		3,861
Total assets	$	3,740,931
LIABILITIES		
Accounts and credit cards payable	$	9,031
Payroll liabilities		18,915
Driller deposits		41,840
Total liabilities		69,786
FUND BALANCE		
Nonspendable		9,581
Committed		1,000,000
Assigned		967,750
Unassigned		1,693,814
Total fund balance		3,671,145
Total liabilities and fund balance	$	3,740,931

The accompanying notes are an integral part of the financial statements.

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
RECONCILIATION OF THE GOVERNMENTAL FUND BALANCE SHEET
TO THE STATEMENT OF NET POSITION
DECEMBER 31, 2019

Total Fund Balance - Governmental Fund		$ 3,671,145
Capital assets used in governmental activities are not financial resources and therefore are not reported in governmental funds balance sheet.		1,795,200
The statement of net position includes the District's proportionate share of the TCDRS net pension liability (asset) as well as certain pension related transactions accounted for as Deferred Inflows and Outflows of resources.		
Net pension asset (liability)	4,987	
Deferred retirement contributions	31,439	
Deferred investment experience	15,823	
Deferred actual vs. assumption	9,221	
Deferred assumption/input changes	1,408	62,878
Net Position of Governmental Activities		$ 5,529,223

The accompanying notes are an integral part of the financial statements.

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
STATEMENT OF REVENUES, EXPENDITURES, AND CHANGES IN FUND BALANCE
GOVERNMENTAL FUND
FOR THE YEAR ENDED DECEMBER 31, 2019

	General Fund
Revenues:	
Exception fees	$ 7,225
Export fees	730
Penalties assessed	19,984
Forfeited deposits	7,500
New well registration fees	662,375
Semi-annual program income	868,277
Total program revenue	1,566,091
Investment earnings	41,002
Other sources	5,972
Total revenues	1,613,065
Expenditures:	
General government	1,069,014
Capital outlay	200,309
Total expenditures	1,269,323
Net change in fund balance	343,742
Fund balance - beginning of year	3,327,403
Fund balance - end of year	$ 3,671,145

The accompanying notes are an integral part of the financial statements.

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
RECONCILIATION OF THE GOVERNMENTAL FUNDS STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE TO THE STATEMENT OF ACTIVITIES
DECEMBER 31, 2019

Total Net Change in Fund Balance - Governmental Fund	$	343,742
Current year capital outlays are expenditures in the fund financial statements, but they should be shown as increases in capital assets in the government-wide financial statements. The net effect of removing the 2019 capital outlays is to increase net position.		200,309
Depreciation is not recognized as an expense in governmental funds since it does not require the use of current financial resources. The net effect of the current year's depreciation is to decrease net position.		(107,752)
Net pension liabilities as well as the related deferred inflows and outflows of resources generated from those assets are not payable from current resources and therefore, are not reported in the govenrmental funds. These balances increased (decreased) by this amount.		1,584
Change in Net Position of Governmental Activities	$	437,883

The accompanying notes are an integral part of the financial statements.

NOTES TO FINANCIAL STATEMENTS

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
Notes to Financial Statements
December 31, 2019

1. Organization

The Upper Trinity Groundwater Conservation District (the "District") is a political subdivision of the State of Texas created under the authority of Article XVI, Section 59, Texas Constitution, and operating pursuant to the provisions of the Texas Water Code, Chapter 36, and Senate Bill 1983, Acts of the 80th Legislature, Regular Session, 2007. The creation of the District was confirmed in an election by the citizens of Montague, Wise, Parker and Hood counties, Texas, on November 6, 2007.

The mission of the Upper Trinity Groundwater Conservation District is to develop rules to provide protection to existing wells, prevent waste, promote conservation, provide a framework that will allow availability and accessibility of groundwater for future generations, protect the quality of the groundwater in the recharge zone of the aquifer, ensure that the residents of Montague, Wise, Parker, and Hood counties maintain local control over their groundwater, respect and protect the property rights of landowners in groundwater, and operate the District in a fair and equitable manner for all residents of the District.

2. Summary of Significant Accounting Policies

Generally Accepted Accounting Principles – Upper Trinity Groundwater Conservation District prepares its financial statements in accordance with accounting principles generally accepted in the United States of America, in conformity with authoritative pronouncements of the Governmental Accounting Standards Board (GASB).

A. Basis of Presentation – Government – Wide Statements

The government-wide financial statements (the statement of net position and the statement of changes in net position) report information on all the activities of the District. There are no governmental activities, which normally are supported by taxes and governmental revenues, and are reported separately from business-type activities, which rely to a significant extent on fees and charges for support.

The statement of activities demonstrates the degree to which the direct expenses of a given program are offset by program revenues. Direct expenses are those that are clearly identifiable with a specific program. Program revenues include charges to customers or applicants who purchase, use, or directly benefit from goods, services, meeting the operational or capital requirements of a particular program. Taxes and other items not properly included among program revenues are reported instead as general revenues.

B. Measurement focus, Basis of Accounting and Basis of Presentation

The government-wide statements are reported using the economic resources measurement focus and the accrual basis of accounting. Revenues are recorded when earned and expenses are recorded when a liability is incurred, regardless of the timing of related cash flow.

Governmental fund financial statements are reported using the current financial resources measurement focus and the modified accrual basis of accounting. Under the modified accrual basis of accounting, revenues are recognized as soon as they are measurable and available. Revenues are considered to be available when they are collectible within the current period or

2. Summary of Significant Accounting Policies (continued)

soon enough thereafter to pay the liabilities of the current period. Water usage fees for each six month period are due and payable one month after the period ends. The District recognizes all fees pertaining to the calendar year as revenues for that year.

Expenditures are generally recorded when the related fund liability is incurred.

The accounts of the Upper Trinity Groundwater Conservation District are organized and operated on the basis of funds. A fund is an independent fiscal and accounting entity with self-balancing set accounts. Fund accounting segregates funds according to their purpose and is used to aid management in demonstrating compliance with finance-related legal and contractual provisions. The minimum number of funds is maintained consistent with legal and managerial requirements.

The District reports the following major governmental fund: The *general fund* is the government's primary operating fund. It accounts for all financial resources of the general government, except those required to be accounted for in another fund.

There are no proprietary funds of the District generating significant operating revenues, such as charges for services, resulting from exchange transactions associated with the principal activity of the fund.

C. Cash and Cash Equivalents

For purposes of the statements of cash flows, the District considers highly liquid investments with a maturity of three months or less to be cash equivalent.

D. Capital Assets, Depreciation, and Amortization

The District's property, plant, and equipment with useful lives of more than one year stated as historical cost and comprehensively reported in the government-wide financial statements. The District generally capitalizes individual assets with an initial cost of $1,500 or more, or a grouping of like-kind assets with a total cost of $5,000 or more. Capital assets are depreciated using the straight-line method. When capital assets are disposed, the cost and applicable accumulated depreciation are removed from the respective accounts, and the resulting gain or loss is recorded in operations.

Estimated useful lives, in years, for depreciable assets are as follows:

Vehicles	5-7 years
Furniture and equipment	5-50 years
Software	3-10 years
Building	30 years

Maintenance and repairs which do not materially improve or extend the lives of the respective assets are charged to expense as incurred.

2. Summary of Significant Accounting Policies (continued)

E. Pensions

For purposes of measuring the net pension liability (asset), deferred outflows of resources and deferred inflows of resources related to pensions, and pension expense, information about the Fiduciary Net Position of the Texas County and District Retirement System (TCDRS) and additions to/deductions from TCDRS' Fiduciary Net Position have been determined on the same basis as they are reported by TCDRS. For this purpose, plan contributions are recognized in the period that compensation is reported for the employee, which is when contributions are legally due. Benefit payments and refunds are recognized when due and payable in accordance with the benefit terms. Investments are reported at fair value.

F. Budget

The District is legally required to adopt a budget and has done so in order to better manage its resources.

1. The budget is adopted on a basis consistent with accounting principles generally accepted in the United States of America (GAAP). Annual appropriated budgets are adopted for the general fund. All annual appropriations lapse at fiscal year end. The final amended expenditures budget for the general fund for the year ended December 31, 2019 totaled $1,569,250. The general fund revenues budgeted for the year were $1,591,700 which exceeded the budgeted expenditures, resulting in a surplus budget for the year.

2. The Board of Directors may approve budget amendments during the year. The Board approved budget amendments through the year as required.

3. Formal budgetary integration is employed as a management control device during the year for the general fund.

G. Net Position and Fund Equity

Net position represents the difference between assets and liabilities. The net investment in capital assets component of net position consists of capital assets, net of accumulated depreciation, reduced by the outstanding balances of any borrowing used for the acquisition, construction or improvement of those assets, and adding back unspent proceeds. Net position is reported as restricted when there are limitations imposed on its use either through the enabling legislation adopted by the District or through external restrictions imposed by creditors, grantors, or laws and/or regulations of other governments.

2. Summary of Significant Accounting Policies (continued)

Fund Balance Classification - The governmental fund financial statements present fund balances based on classifications that comprise a hierarchy that is based primarily on the extent to which the District is bound to honor constraints on the specific purpose for which amounts in the respective governmental funds can be spent. The classifications used in the governmental fund financial statements are as follows:

Nonspendable - Resources which cannot be spent because they are either a) not in spendable form or; b) legally or contractually required to be maintained intact.

Restricted – Resources with constraints placed on the use of resources are either a) externally imposed by creditors (such as through debt covenants), grantors, contributors, or laws or regulations of other governments; or b) imposed by law through constitutional provisions or enabling legislation.

Committed – Resources which are subject to limitations the government imposes upon itself at its highest level of decision making (resolution), and that remain binding unless removed in the same manner.

Assigned - Resources neither restricted nor committed for which a government has a stated intended use as established by the Board of Directors, or an official to which to the Board of Directors has delegated the authority to assign amounts for specific purposes.

Unassigned – Resources which cannot be properly classified in one of the other four categories. The General fund is the only fund that reports a positive unassigned fund.

H. Estimates

The preparation of financial statements in conformity with accounting principles generally accept in the United States of America required management to make estimates and assumptions that affect the amounts reported in the financial statements. Actual results may differ from those estimates.

I. Receivables

Gross accounts receivable of $563,238 are presented in the Balance Sheet and Statement of Net Position net of an allowance for doubtful accounts in the amount of $21,283.

3. Deposits and Investments with Financial Institutions

At year end, the book balance of the District's checking account and certificates of deposit was $3,183,924 which was all unrestricted. The bank balance of $3,187,990 which was partially covered with federal depository insurance ($2,857,275) and pledged collateral ($317,877) while the remaining $12,838 was not collateralized. The District believes it is not exposed to any significant credit risk on its cash and certificates of deposit balance.

3. Deposits and Investments with Financial Institutions (continued)

At the end of the period the District had no deposits which were exposed to significant custodial credit risk. Custodial credit risk is the risk that in the event of a bank failure, the government's deposits may not be returned to it. The District's funds are required to be deposited and invested under the terms of the depository contract.

The State Public Funds Investments Act authorizes the government to invest in obligations of the U.S. Treasury, obligations of states, agencies, counties, cities and other political subdivisions, secured certificates of deposit, repurchase agreements, bankers' acceptances, commercial paper, mutual funds, guaranteed investment contracts and investment pools. During the year ended December 31, 2019, the District did not own any types of securities other than those permitted by statute.

4. Risk Management

The District is exposed to various risks of loss related to torts; theft of, damage to and destruction of assets; errors and omissions; injuries to employees; natural disasters; and the litigious nature of the political environment in which it operates. The District is covered through third-party insurance policies, and risk is also mitigated by the protections afforded it through the Texas Water Code, Chapter 36, Sections 36.066, 36.251 and 36.253.

5. Changes in Capital Assets

Capital assets consist of the following:

	Balance 12/31/2018	Additions	Retirements/ Adjustments	Balance 12/31/2019
Governmental activities:				
Non-depreciable assets:				
Land	$ 267,834	$ -	$ -	$ 267,834
Construction in progress	97,391	4,442	(101,833)	-
Total non-depreciable assets	365,225	4,442	(101,833)	267,834
Capital assets being depreciated:				
Building	1,078,858	-	-	1,078,858
Vehicles	214,554	82,617	(22,523)	274,648
Furniture and equipment	149,263	113,250	-	262,513
Software	213,541	-	101,833	315,374
Total capital assets being depreciated	1,656,216	195,867	79,310	1,931,393
Less accumulated depreciation:				
Building	(20,978)	(35,962)	-	(56,940)
Vehicles	(177,765)	(32,619)	(22,523)	(187,861)
Furniture and equipment	(52,465)	(12,791)	-	(65,256)
Software	(67,590)	(26,380)	-	(93,970)
Total accumulated depreciation	(318,798)	(107,752)	(22,523)	(404,027)
Total capital assets being depreciated, net	1,337,418	88,115	56,787	1,527,366
Governmental activities capital assets, net	$ 1,702,643	$ 92,557	$ (45,046)	$ 1,795,200

Depreciation expenses charged to the general government operations was $107,752.

6. Compensated Absences

It is the District's policy that employees will not receive payment for unused sick pay benefits upon separation from service. Therefore, no liability is reported for unpaid accumulated sick leave.

However, unused vacation and comp time earned is accrued as of December 31 and is payable upon separation from service. As of December 31, 2019, the District's liability for unpaid vacation and comp time was $13,882.

7. Estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates.

8. Fund Balance Classifications

The Board passed a resolution during 2019 in order to commit a total of $1,000,000 for a legal reserve and litigation fund.

The Board has assigned the 2019 fund balance for the following purposes:

Monitoring well drilling fund	$500,000
Desired future conditions preparation fund	50,000
Facilities/building fund	50,000
Technology development fund	250,000

9. Retirement Plan

Plan Description

The District provides retirement benefits for all of its full-time and part-time employees through a nontraditional defined benefit plan in the state-wide Texas County and District Retirement System (TCDRS). The Board of Trustees of TCDRS is responsible for the administration of the state-wide agent multiple-employer public employee retirement. TCDRS in the aggregate issues a comprehensive annual financial report (CAFR) on a calendar year basis. The CAFR is available upon written request from the TCDRS Board of Trustees at P.O. Box 2034, Austin, TX 78768-2034.

Benefits Provided

The plan provisions are adopted by the governing body of the employer, within the options available in the Texas state statutes governing TCDRS (TCDRS Act). Members can retire at age 60 and above with 5 or more years of service, with 30 years of service regardless of age, or when the sum of their age and years of service equals 75 or more, when vested. Members are vested after 5 years of service but must leave their accumulated contributions in the plan to receive any employer-financed benefit. Members who withdraw their personal contributions in a lump sum are not entitled to any amounts contributed by their employer.

Benefit amounts are determined by the sum of the employee's contributions to the plan, with interest, and employer-financed monetary credits. The level of these monetary credits is adopted by the governing body of the employer within the actuarial constraints improved by the TCDRS Act so that the resulting benefits can expect to be adequately financed by the employer's commitment to contribute. At retirement, death or disability, the benefit is calculated by converting the sum of the employee's accumulated contributions and the employer-financed monetary credits to a monthly annuity using annuity purchase rates prescribed by the TCDRS Act. There are no automatic post-employment benefit changes, including automatic COLAs.

At the December 31, 2018 valuation and measurement date, the following employees were covered by the benefit terms:

Inactive employees or beneficiaries currently receiving benefits	2
Inactive employees entitled to but not yet receiving benefits	4
Active employees	9
	15

Contributions

The District has elected the annually determined contribution rate (Variable Rate) plan provision of the TCDRS Act. The plan is funded by monthly contributions from both employee members and the employer based on the covered payroll of employee members. Under the TCDRS Act, the contribution rate of the employer is actuarially determined annually.

The District contributed using the actuarially required contribution rate of 6.36% for the calendar year. The deposit rate payable by the employee members for calendar year 2019 is the rate of 5% as adopted by the governing body of the employer. The employee and employer deposit rates may be changed by the governing body of the District within the options available in the TCDRS Act.

9. Retirement Plan (continued)

Net Pension Liability

The District's Net Pension Liability (NPL) for the year ended December 31, 2019, was measured as of December 31, 2018, and the Total Pension Liability (TPL) used to calculate the Net Pension Liability was determined by an actuarial valuation as of that date.

Actuarial Assumptions:

The Total Pension Liability in the December 31, 2018 actuarial valuation was determined using the following actuarial assumptions:

Inflation	2.75% per year
Overall payroll growth	4.85% per year
Investment Rate of Return	8.0%, net of pension plan investment expense, including inflation

The annual salary increase rates assumed for individual members vary by length of service and by entry-age group. The annual rates consist of a general wage inflation component of 3.25% (made up of 2.75% inflation and .5% productivity increase assumptions) and a merit, promotion and longevity component that on average approximates 1.6% per year for a career employee.

Mortality rates for depositing members were based on 90% of the RP-2014 Active Employee Mortality Table for males and females as appropriate, projected with 110% of the MP-2014 Ultimate scale after 2014. Service retirees, beneficiaries and non-depositing members were based on 130% of the RP-2014 Healthy Annuitant Mortality Table for males and 110% of the RP-2014 Healthy Annuitant Mortality Table for females, both projected with 110% of the MP-2014 Ultimate scale after 2014. Disabled retirees were based on 130% of the RP-2014 Disabled Annuitant Mortality Table for males and 115% of the RP-2014 Disabled Annuitant Mortality Table for females, both projected with 110% of the MP-2014 Ultimate scale after 2014.

All actuarial assumptions that determined the total pension liability as of the December 31, 2018 valuation were based on the results of an actuarial experience study for the period January 1, 2013 – December 31, 2016, except where required to be different by GASB 68.

The long-term expected rate of return of 8.10% is determined by adding expected inflation to expected long-term real returns, and reflecting expected volatility and correlation. The capital market assumptions and information shown below are provided by TCDRS' investment consultant, Cliffwater LLC. The numbers shown are based on January 2019 information for a 10-10 year time horizon and are re-assessed at a minimum of every four years, and is set based on a 30-year time horizon; the most recent analysis was performed in 2017. See Milliman's TCDRS Investigation of Experience report for the period January 1, 2013 – December 31, 2016 for more details. Best estimates of geometric real rates of return (net of inflation, assumed at 1.70%) for each major asset class included in the target asset allocation (as adopted by the TCDRS board in April 2019) are summarized below:

9. Retirement Plan (continued)

Net Pension Liability (continued)

Asset Class	Benchmark	Target Allocation	Geometric Real Rate of Return (Expected minus inflation)
US Equities	Dow Jones U.S. Total Stock Market Index	10.5%	5.40%
Private Equity	Cambridge Associates Global Private Equity & Venture Capital Index	18.0%	8.40%
Global Equities	MSCI World (net) Index	2.5%	5.70%
Int'l Equities - Developed Markets	MSCI World Ex USA (net)	10.0%	5.40%
Int'l Equities - Emerging Markets	MSCI Emerging Markets (net) Index	7.0%	5.90%
Investment-Grade Bonds	Blomberg Barclays U.S. Aggregate Bond Index	3.0%	1.60%
Strategic Credit	FTSE High-Yield Cash-Pay Capped Index	12.0%	4.39%
Direct Lending	S&P/LSTA Leveraged Loan Index	11.0%	7.95%
Distressed Debt	Cambridge Associates Distressed Securities Index	2.0%	7.20%
REIT Equities	67% FTSE NAREIT All Equity REITs Index + 33% S&P Global REIT (net) Index	2.0%	4.15%
Master Limited Partnerships (MLPs)	Alerian MLP Index	3.0%	5.35%
Private Real Estate Partnerships	Cambridge Associates Real Estate Index	6.0%	6.30%
Hedge Funds	Hedge Fund Research, Inc. (HFRI) Fund of Funds Composite Index	13.0%	3.90%
Total		100.0%	

Discount Rate

The discount rate used to measure the Total Pension Liability was 8.1%. Using the alternative method, the projected fiduciary net position is determined to be sufficient compared to projected benefit payments based on the funding requirements under the District's funding policy and the legal requirements under the TCDRS Act.

1. TCDRS has a funding policy where the unfunded actuarial accrued liability (UAAL) shall be amortized as a level percent of pay over 20-year closed layered periods.
2. Under the TCDRS Act, the District is legally required to make the contribution specified in the funding policy.
3. The District assets are projected to exceed its accrued liabilities in 20 years or less. When this point is reached, the District is still required to contribute at least the normal cost.
4. Any increased cost due to the adoption of a COLA is required to be funded over a period of 15 years, if applicable.

Since the projected fiduciary net position is projected to be sufficient to pay projected benefit payments in all future years, the discount rate for purposes of calculating the total pension liability and the net pension liability of the District is equal to the long-term assumed rate of return on investments.

9. Retirement Plan (continued)

Net Pension Liability (continued)

	Increase (Decrease)		
	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) - (b)
Balance at 12/31/2017	$ 194,376	$ 217,715	$ (23,339)
Changes for the year:			
Service cost	48,441	-	48,441
Interest on total pension liability	19,544	-	19,544
Effect of plan changes	-	-	-
Effect of economic/demographic gains or losses	1,244	-	1,244
Effect of assumptions changes or inputs	-	-	-
Refund of contributions	-	-	-
Benefit payments	(3,138)	(3,138)	-
Administrative expenses	-	(213)	213
Member contributions	-	23,845	(23,845)
Net investment income	-	(3,498)	3,498
Employer contributions		29,233	(29,233)
Other	-	1,510	(1,510)
Net changes	$ 66,091	$ 47,739	$ 18,352
Balance at 12/31/2018	**$ 260,467**	**$ 265,454**	**$ (4,987)**

Sensitivity of the net pension liability to changes in the discount rate

The following presents the net pension liability of the District, calculated using the discount rate of 8.1%, as well as what the District's net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (7.1%) or 1-percentage point higher (9.1%) than the current rate:

	1% Decrease in Discount Rate (7.1%)	**Discount Rate (8.1%)**	**1% Increase in Discount Rate (9.1%)**
Total pension liability	$ 315,618	$ 260,467	$ 216,964
Fiduciary net position	265,454	265,454	265,454
Net pension liabiltiy (asset)	$ 50,164	$ (4,987)	$ (48,490)

9. Retirement Plan (continued)

Net Pension Liability (continued)

Pension Plan Fiduciary Net Position

Detailed information about the pension plan's Fiduciary Net Position is available in a separately-issued TCDRS comprehensive annual financial report. The most recent report may be obtained on the internet at www.tcdrs.org.

Pension Expense and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

For the fiscal year ended December 31, 2019, the District recognized pension expense of $29,658.

As of December 31, 2019, the District reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	Deferred Inflows of Resources	Deferred Outflows of Resources
Differences between expected and actual experience	$ 19,845	$ 29,066
Changes of assumptions	-	1,408
Net difference between projected and actual earnings	-	15,823
Contributions subsequent to the measurement date	N/A	31,439
Total	$ 19,845	$ 77,736

$31,439 reported as deferred outflows of resources related to pensions resulting from contributions subsequent to the measurement date will be recognized as a reduction of the net pension liability for the year ending December 31, 2020. Other amounts reported as deferred outflows and inflows of resources related to pensions will be recognized in pension expense as follows:

Valuation year ended December 31:	
2019	$ 6,180
2020	4,401
2021	3,988
2022	5,758
2023	1,126
Thereafter	4,999

REQUIRED SUPPLEMENTARY INFORMATION

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
STATEMENT OF REVENUES, EXPENDITURES AND
CHANGES IN FUND BALANCE - BUDGET AND ACTUAL
GENERAL FUND
FOR THE YEAR ENDED DECEMBER 31, 2019

	GAAP Basis			Variance
	Budgeted Amounts			Positive
	Original	Final	Actual	(Negative)
Revenues:				
Exception fees	$ 10,000	$ 10,000	7,225	(2,775)
Export fees	1,000	1,000	730	(270)
Penalties assessed	10,000	10,000	19,984	9,984
Forfeited deposits	5,000	5,000	7,500	2,500
New well registration fees	600,000	600,000	662,375	62,375
Permit application fees	62,500	62,500	-	(62,500)
Semi-annual program income	875,000	875,000	868,277	(6,723)
Total program revenue	1,563,500	1,563,500	1,566,091	2,591
Investment earnings	25,000	25,000	41,002	16,002
Other sources	3,200	3,200	5,972	2,772
Total revenues	1,591,700	1,591,700	1,613,065	18,774
Expenditures:				
General government	1,344,250	1,344,250	1,069,014	275,236
Capital outlay	225,000	225,000	200,309	24,691
Total Expenditures	1,569,250	1,569,250	1,269,323	299,927
Excess (Deficiency) of Revenues Over (Under) Expenditures	22,450	22,450	343,742	321,292
Fund balance - beginning of year	3,327,403	3,327,403	3,327,403	-
Fund balance - end of year	$ 3,349,853	$ 3,349,853	$ 3,671,145	$ 321,292

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
SCHEDULE OF CHANGE IN NET PENSION LIABILITY
AND RELATED RATIOS
Last 10 Years (will ultimately be displayed)

Total Pension Liability	**2018**	**2017**	**2016**	**2015**	**2014**
Service Cost	$ 48,441	$ 44,816	$ 42,402	$ 19,962	$ 21,024
Interest on total pension liability	19,544	14,109	10,705	6,204	4,158
Effect of plan changes	-	-	-	(3,620)	-
Effect of assumption changes or inputs	-	119	-	1,886	-
Effect of economic/demographic (gains) or losses	1,244	8,751	(25,799)	26,243	3,650
Benefit payments/refunds of contributions	(3,138)	(5,458)	(13,040)	(2,766)	-
Net Change in Total Pension Liability	66,091	62,337	14,268	47,909	28,832
Total Pension Liability, beginning	194,376	132,039	117,771	69,862	41,030
Total Pension Liability, ending (a)	$ 260,467	$ 194,376	$ 132,039	$ 117,771	$ 69,862
Fiduciary Net Position					
Emloyer contributions	$ 29,233	$ 26,740	$ 28,501	$ 13,860	$ 11,178
Member contributions	23,845	21,088	19,959	17,724	14,747
Investment income net of investment expenses	(3,498)	22,875	7,967	(1,459)	3,400
Benefit payments/refunds of contributions	(3,138)	(5,458)	(13,040)	(2,766)	-
Administrative expenses	(213)	(145)	(86)	(67)	(49)
Other	1,510	567	4,417	246	(3)
Net Change in Fiduciary Net Position	47,739	65,667	47,718	27,538	29,273
Fiduciary Net Position, beginning	217,715	152,048	104,330	76,792	47,519
Fiduciary Net Position, ending (b)	$ 265,454	$ 217,715	$ 152,048	$ 104,330	$ 76,792
Net Pension Liability (Asset), ending = (a) - (b)	$ (4,987)	$ (23,339)	$ (20,009)	$ 13,441	$ (6,930)
Fiduciary net position as a % of total pension liability	101.91%	112.01%	115.15%	88.59%	109.92%
Pensionable covered payroll	$ 476,893	$ 421,761	$ 399,176	$ 354,472	$ 294,939
Net pension liability as a % of covered payroll	-1.05%	-5.53%	-5.01%	3.79%	-2.35%

Note: This schedule is presented to illustrate the requirement to show information for 10 years. However, recalculations of prior years are not required, and if prior years are not reported in accordance with the standards of GASB 67/68, they should not be shown here. Therefore, we have shown only years for which the new GASB statements have been implemented.

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
SCHEDULE OF EMPLOYER CONTRIBUTIONS
Last 10 Fiscal Years (will ultimately be displayed)

Year Ending December 31	Actuarially Determined Contribution	Actual Employer Contribution	Contribution Deficiency (Excess)	Pensionable Covered Payroll	Actual Contribution as a % of Covered Payoll
2012	10,266	10,266	-	252,239	4.1%
2013	10,948	10,948	-	269,002	4.1%
2014	11,178	11,178	-	294,939	3.8%
2015	13,860	13,860	-	354,472	3.9%
2016	28,501	28,501	-	399,176	7.1%
2017	26,740	26,740	-	421,761	6.3%
2018	29,233	29,233	-	476,893	6.1%

UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT
Notes to Required Supplementary Information
December 31, 2019

Budget

Annual operating budget is adopted on a basis consistent with generally accepted accounting principles for a governmental fund. The budget lapses at fiscal year end.

The Board of Directors follows these procedures in establishing budgetary data reflected in the financial statements:

a. Prior to the beginning of the fiscal year, a proposed budget is submitted by the Finance Committee to the Board for approval.
b. During the year, the Board may amend the budget.
c. Budgetary control is maintained at the line item level, subject to adjustments permitted as described above.

Retirement Schedules

Valuation Date

Actuarially determined contribution rates are calculated as of December 31, two years prior to the end of the fiscal year in which contributions are reported.

Methods and Assumptions Used to Determine Contribution Rates

Actuarial Cost Method	Entry Age
Amortization Method	Level percentage of payroll, closed
Remaining Amortization Period	20.0 years (based on contribution rate calculated in 12/31/2018 valuation)
Asset Valuation Method	5-year smoothed market
Inflation	2.75%
Salary Increases	Varies by age and service. 4.9% average over career including inflation
Investment Rate of Return	8.00%, net of administrative and investment expenses, including inflation
Retirement Age	Members who are eligible for service retirement are assumed to commence receiving benefit payments based on age. The average age at service retirement for recent retirees is 61.
Mortality	130% of the RP-2014 Healthy Annuitant Mortality Table for males and 110% of the RP-2014 Healthy Annuitant Mortality Table for females, both projected with 110% of the MP-2014 Ultimate scale after 2014.
Changes in Assumptions and Methods Reflected in the Schdedule of Employer Contributions	2015: New inflation, mortality and other assumptions were reflected 2017: New mortality assumptions were reflected
Changes in Plan Provisions Reflected in the Schedule of Employer Contributions	2015: No changes in plan provisions were reflected in the Schedule. 2016: Employer contributions reflect that the current service matching rate was increased to 200%. 2017: New Annuity Purchase Rates were reflected for benefits earned after 2017. 2018: No changes in plan provisions were reflected in the Schedule.