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March 2018 Potentiometric Map of the Middle Trinity Aquifer, Central Texas

Brian B. Hunt

Brian A. Smith

Robin Gary

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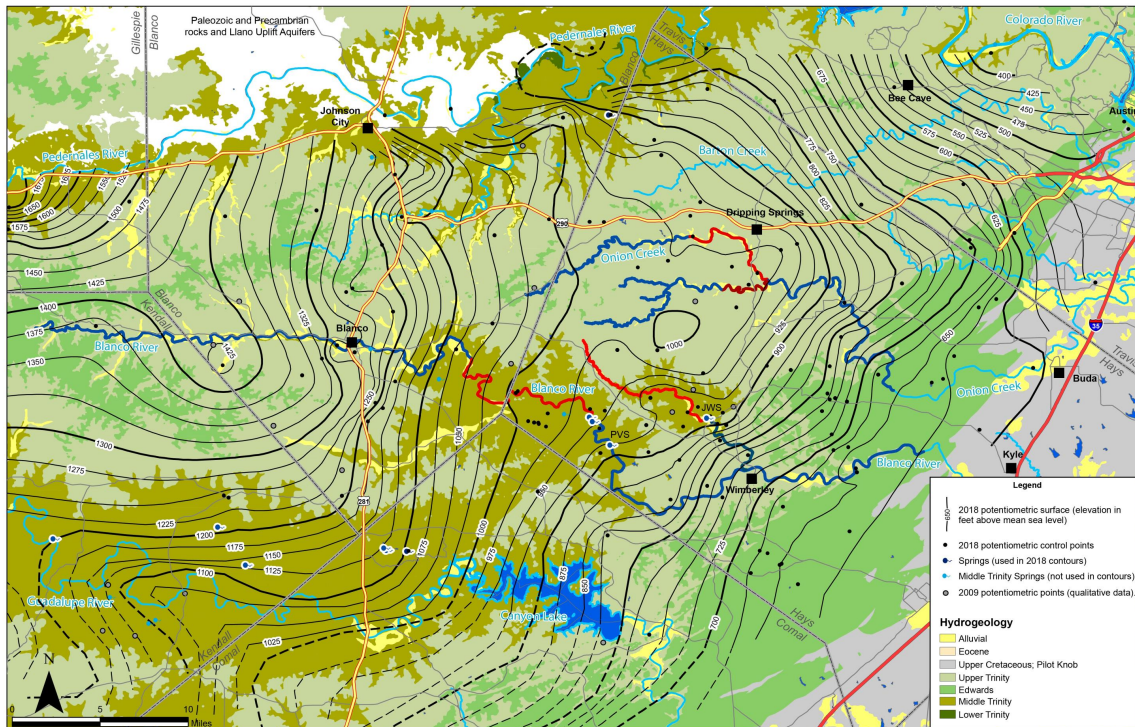
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MARCH 2018 POTENTIOMETRIC MAP OF THE MIDDLE TRINITY AQUIFER, CENTRAL TEXAS



BSEACD Report of Investigations 2019-0109
January 2019

Barton Springs/Edwards Aquifer Conservation District
1124 Regal Row
Austin, Texas



Ron Fieseler (standing) and Brian Hunt measuring a water level at Arnosky Farms in Blanco County.

Disclaimer

All of the information provided in this report is believed to be accurate and reliable; however, the Barton Springs/Edwards Aquifer Conservation District and the report's authors assume no liability for any errors or for the use of the information provided.

Cover. March 2018 potentiometric map of the Middle Trinity Aquifer, central Texas.

MARCH 2018 POTENTIOMETRIC MAP OF THE MIDDLE TRINITY AQUIFER, CENTRAL TEXAS

Brian B. Hunt, P.G., Brian A. Smith, Ph.D., P.G., Robin Gary, and Justin Camp
Barton Springs/Edwards Aquifer Conservation District

A COLLABORATIVE REPORT WITH:

Marcus O. Gary, Ph.D., P.G.
Edwards Aquifer Authority

Jeffery Watson, P.G.
Hays Trinity Groundwater Conservation District

Ronald G. Fieseler, P.G.
Blanco-Pedernales Groundwater Conservation District

Paul Tybor, P.G.
Hill Country Underground Water Conservation District

Doug Wierman, P.G.,
Texas State, Meadows Institute

MARCH 2018 POTENTIOMETRIC MAP OF THE MIDDLE TRINITY AQUIFER, CENTRAL TEXAS

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Figure 6. Hydrograph of the USGS flow data from the Blanco River at Wimberley and the Henly Middle Trinity Monitor well (Figure 1).

Figure 7. Potentiometric map of the Middle Trinity Aquifer.

Figure 8. A comparison of potentiometric maps from 2018 (top; this study) and 2009(bottom; after Hunt et al., 2010).

Figure 9. Colored structure contour map of the top of the Cow Creek Formation with mapped faults (white), other anticline features (dashed) compared to the potentiometric surface (black lines).

MARCH 2018 POTENTIOMETRIC MAP OF THE MIDDLE TRINITY AQUIFER, CENTRAL TEXAS

INTRODUCTION

The Middle Trinity Aquifer is the primary groundwater resource for the central and western portions of Hays County. Groundwater levels and potentiometric surface maps provide critical information about the hydrologic relationships of recharge, discharge, and storage within an aquifer, and the direction of groundwater flow.

This report provides a potentiometric map of the Middle Trinity Aquifer for March 2018 and documents the data used to generate the map. The purpose of the report is to provide potentiometric data for future hydrogeologic investigations and evaluations of water resources. The potentiometric map and data will be useful for computer modeling, sustainable yield determinations, aquifer characterization, and resource protection.

BACKGROUND

Hydrogeologic Setting

The study area is primarily Hays County with portions of Travis, Comal, and Blanco counties spanning the Texas Hill Country (HC) and the Balcones Fault Zone (Escarpment) physiographic provinces characterized by faulting (**Figure 1**). A detailed description of the background hydrogeology is beyond the scope of this report and the reader is referred to Wierman et al. (2010); Hunt et al. (2017), and Smith et al. (2018) for hydrogeologic background information.

The data collected in this report is from wells and springs of the Middle Trinity Aquifer, which is composed of Lower Cretaceous carbonate units (**Figure 2**). The Middle Trinity Aquifer is composed of, from stratigraphically highest to lowest, the Lower Glen Rose, Hensel, and Cow Creek formations. The Hammett Shale is a regional confining unit that underlies the Middle Trinity Aquifer and separates it from the underlying Lower Trinity Aquifer. The lower Trinity Aquifer is composed of the Sligo and Hosston formations.

Overlying the Middle Trinity Aquifer is the Upper Glen Rose formation that is also considered the Upper Trinity Aquifer. Argillaceous and evaporite-rich sediments between the Middle and Upper Trinity aquifers provide hydrologic isolation between these two systems. Stratigraphically above the Upper Trinity Aquifer is the Edwards Aquifer and associated units, which are in turn overlain and confined by Upper Cretaceous limestones and clays (**Figure 2**). Recent studies have demonstrated that the upper-most 100-150 ft of the Upper Glen Rose is in hydrologic communication with the Edwards Aquifer in the Balcones Fault Zone (Wong et al., 2014).

Figure 3 shows the structure contour of the top of the Cow Creek formation throughout the study area and is representative of the structural influence on the Middle Trinity Aquifer as a whole. The units dip to the east in most of Hays and Travis Counties, while the units dip more to the southeast in Comal and Kendall Counties. This general change in structural dip could be the result of the influence of the San Marcos Arch.

In the eastern portion of the study area the Balcones Fault Zone (BFZ) dramatically changes the structural gradient and the dip direction in some cases. The en-echelon faulting produces relay-ramp structures that provide lateral continuity of the geologic units from the HC into the BFZ (**Figure 3**).

Accordingly, the Middle Trinity Aquifer system in this area can be characterized as two interconnected aquifer zones: 1) the Hill Country (HC) Middle Trinity to the west, and 2) the Balcones Fault Zone (BFZ) Middle Trinity to the east (Hunt et al., 2017b).

The HC Middle Trinity Aquifer units are variably exposed and is characterized by losing and gaining streams, springs, and karst features. Geochemistry varies from fresh to locally brackish (> 1000 mg/L TDS) with matrix, fracture, and karstic porosity and permeability possible. Groundwater ages vary from modern or young (tritium present, 50-100% modern carbon) to old (no tritium; <50% modern carbon) (Hunt et al., 2017b). Relay-ramp structures provide lateral geologic and hydrologic continuity from the HC Middle Trinity into the BFZ Middle Trinity (Hunt et al., 2015). The BFZ Middle Trinity is deeply confined and dominated by matrix and fracture porosity and permeability. Geochemistry is commonly brackish and dominated by evaporite mineralogy and older groundwater. The natural discharge areas from this system are unknown (Hunt et al., 2017b; Smith et al., 2018). **Figure 4** presents a schematic conceptual model of the Middle Trinity Aquifer in the study area.

Previous Work

Very few regional synoptic Middle Trinity Aquifer potentiometric maps exist in the literature for the study area. A potentiometric map representing conditions during 1975 was produced by Mace et al., 2000 for the purposes of model calibration. Bush *et al.* (1993) published a regional potentiometric map. In March 2009 a regional synoptic water-level map of the Middle Trinity was produced by Hunt et al., 2010. The 2009 synoptic potentiometric map was very similar to the 1975 map in the overall geometry of the contours and gradient. A map by Watson et al., 2014 produced a potentiometric map around the Jacob's Well area in central Hays County. That map provides more detail around JWS and the area that transitions from the HC to the BFZ Middle Trinity Aquifer.

Hydrologic Conditions

This study occurred as the region was experiencing a moderate (meteorological) drought as defined by the US Drought Monitor (**Figures 5 and 6**). However, the groundwater conservation districts of central Texas were in non-drought status during this study. This is in contrast to the conditions during the previous 2009 synoptic map (Hunt et al., 2010) when the area was under "extreme" to "exceptional" (meteorological) drought according to the U.S. Drought Monitor (**Figures 5 and 6**).

Stratigraphic Column

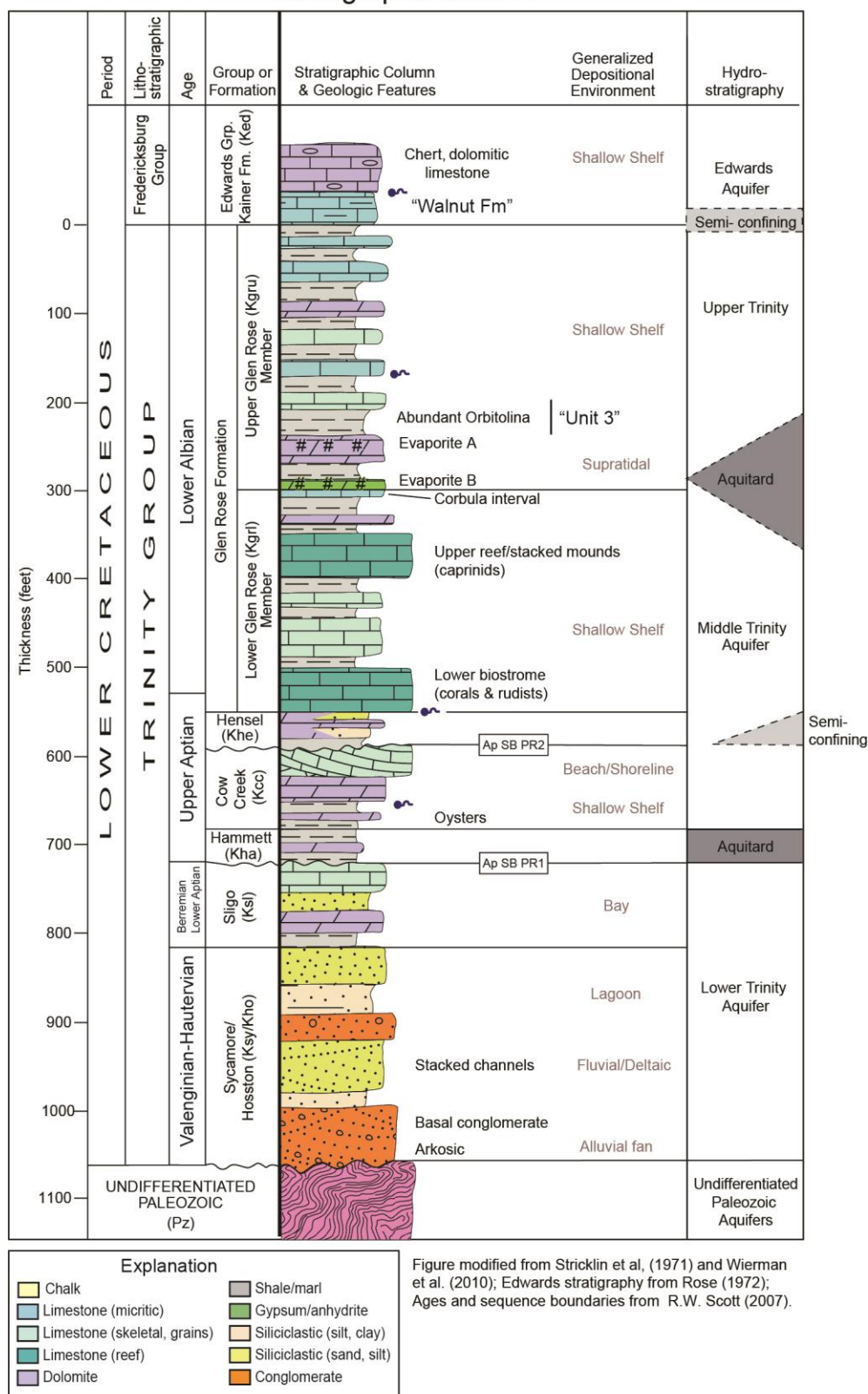


Figure 2. Stratigraphic and hydrostratigraphic column. From Hunt et al., 2017a.

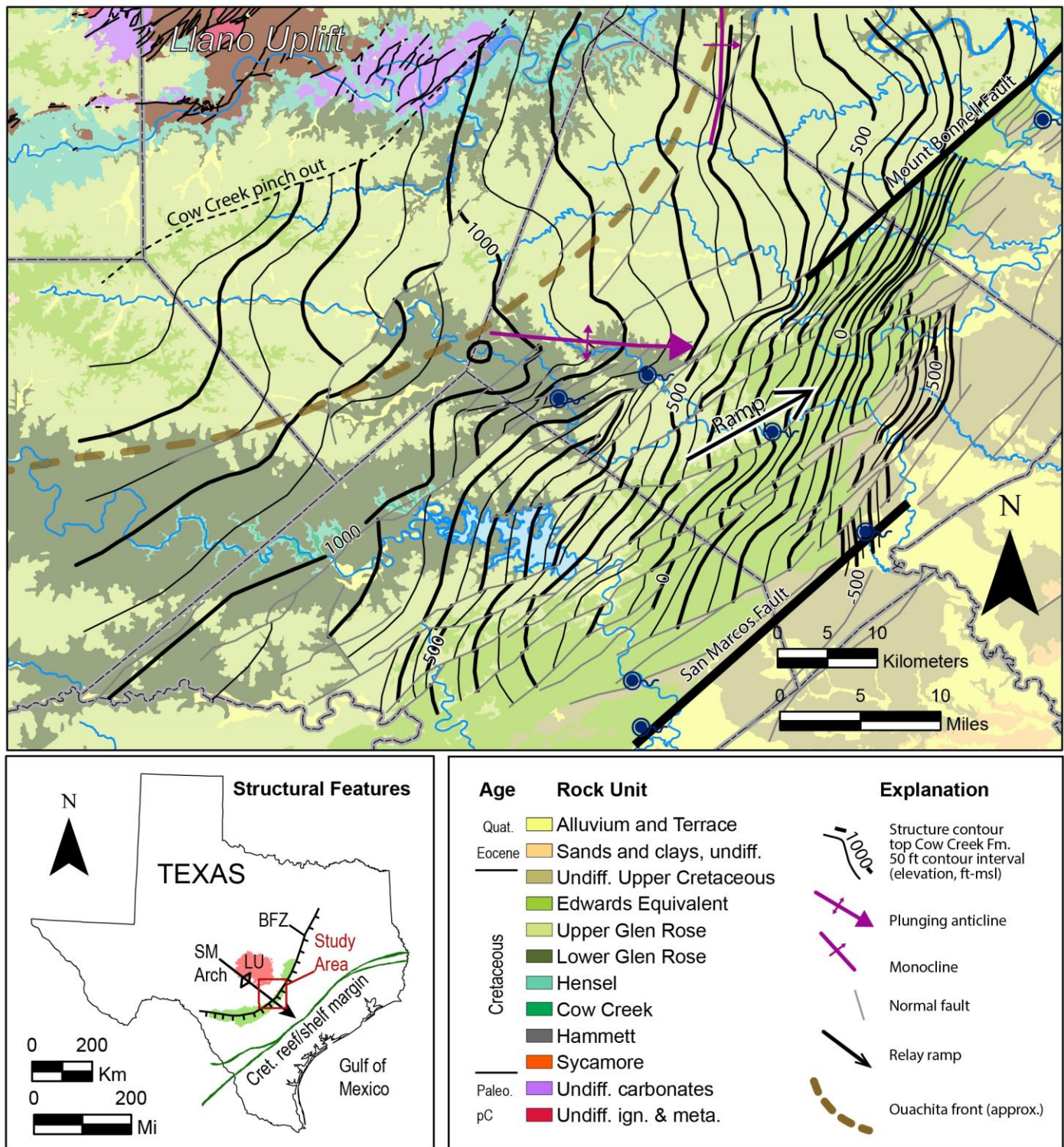


Figure 3. Geologic and structural map. From Hunt et al., 2017a. Structure data and contours are modified from Wierman et al., 2010 with additional data from Al Broun (unpublished data).

Conceptual Model of the Middle Trinity Aquifer, Hays County, Texas

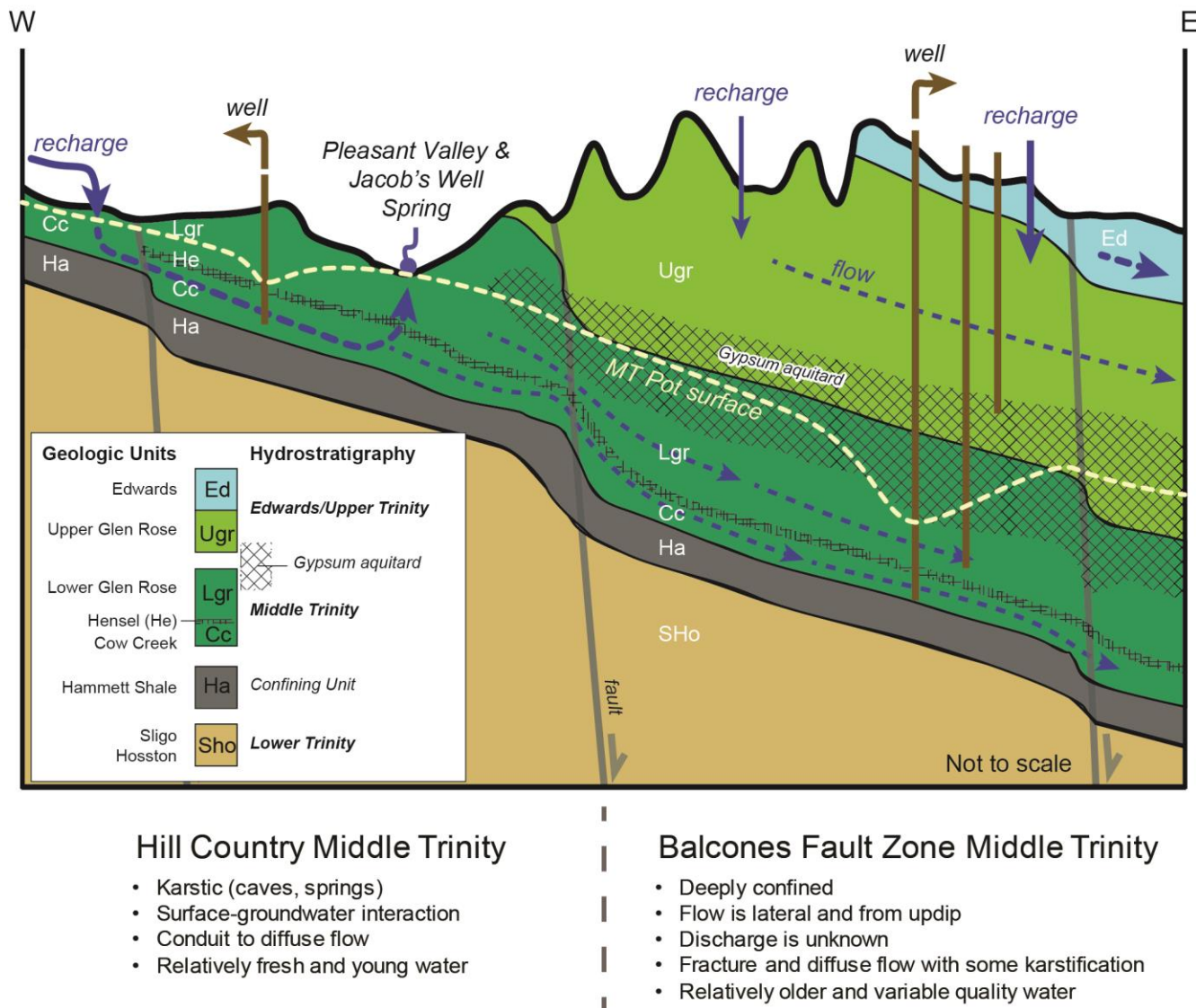


Figure 4. Schematic conceptual model of the Middle Trinity Aquifer. Modified from Hunt et al., 2017a.

US Drought Monitor
(<https://droughtmonitor.unl.edu/>)

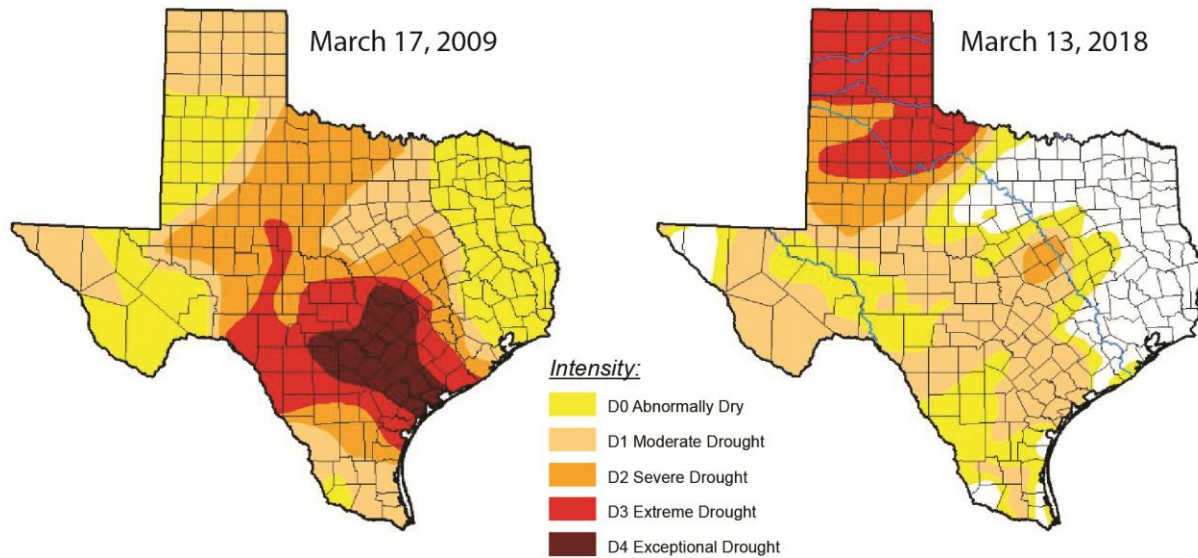


Figure 5. Drought map produced by the US Drought Monitor showing conditions during the synoptic event in 2009 vs 2018.

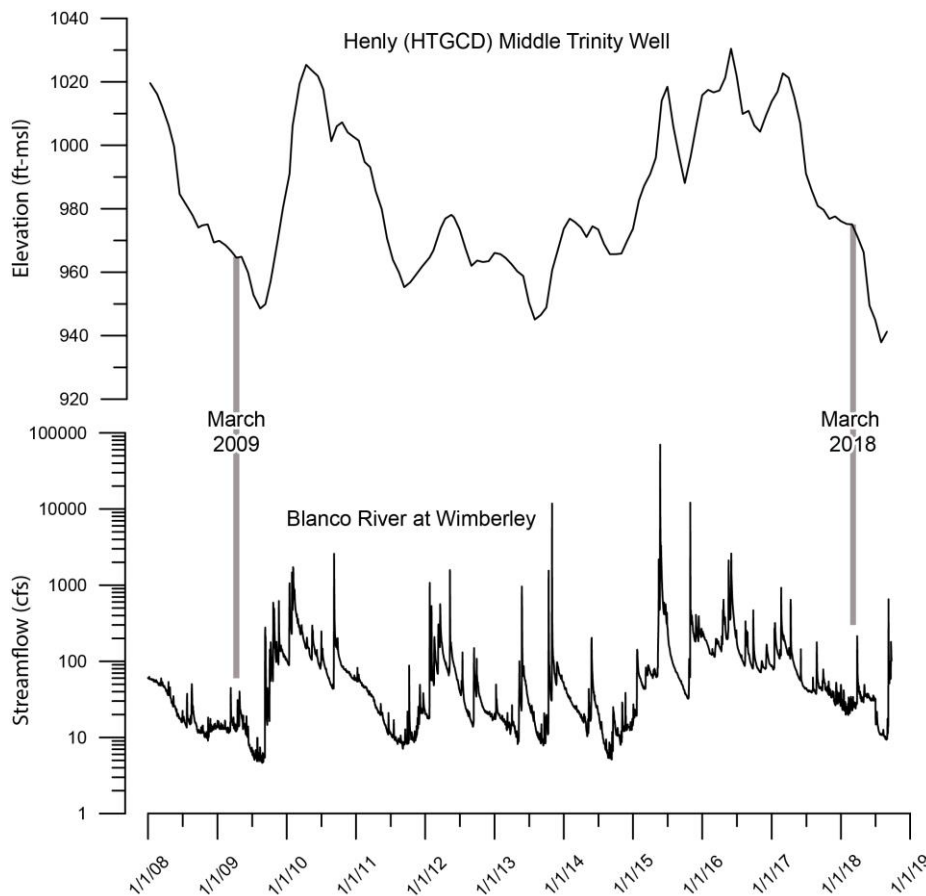


Figure 6. Hydrograph of the USGS flow data from the Blanco River at Wimberley and the Henly Middle Trinity Monitor well (Figure 1). The general time periods for the synoptic of 2009 (Hunt et al, 2010) and this study area shown.

METHODS AND DATA

Water-level measurements were collected using either manual measurements or less frequently from automated recorders. Manual measurements were most often made with a calibrated electric tape (e-line) or, less commonly with a sonic meter. Manual e-line measurements are generally accurate to within ± 0.01 feet, and sonic measurements are less accurate and precise with an error of about 2 ft.

Data sources include field measurements by the authors and contributors, the Texas Water Development Board automated recorders, elevations of known springs, and some data from previous studies (Hunt et al., 2010; Watson et al., 2014).

Data Compilation, Validation, and Quality Assurance

Data were compiled into a spreadsheet and mapped using GIS software (ESRI ArcMap). Water level elevations were contoured and compared to the historic published potentiometric maps of Hunt et al., 2010 and Watson et al., 2014. Comparison to historic maps allowed general quality assurance and control on the 2018 data. All data were carefully reviewed and were omitted from the compilation if suspected of questionable well completion, significant influence from pumping, or other anomalous or non-representative conditions.

Contouring and Mapping

All water-level data were gridded using a kriging interpolation (linear model) algorithm within Goldenware's Surfer® software. Potentiometric contours were then generated from the grid. Computer-generated contours were then manually reinterpreted and manipulated to account for qualitative data and information such as hydrogeologic boundaries, published reports, and experience of the authors.

Structure data was derived from Wierman et al., (2010) and supplemental data from Al Broun (unpublished). Figure 3 represents hand-drawn contours from Al Broun published in Wierman et al., 2010 and modified by Hunt et al., 2017a. Additional structure contours were generated from gridded data using a kriging interpolation (linear model) algorithm within Goldenware's Surfer® software.

Datums and Coordinates

Horizontal coordinates in the database are in latitude and longitude. Many of the sites had locations that were previously recorded by the TWDB or within other published sources (Hunt et al., 2010; Waston et al., 2014). New sites and verification of existing sites was done using Google Earth. Horizontal datums in GIS are in North American Datum 1983 (NAD83). Horizontal accuracy of the locations is likely within about 20 feet, or better.

Water-level measurements are made in reference to a measurement point (MP) at the well head. Commonly, the MP corresponds to the top of casing (TOC). The MP or TOC measurement is subtracted from the depth-to-water measurement to reflect a depth from the land surface datum (LSD). LSD is generally defined as the top of the concrete slab around the casing, or from ground level if no slab exists. All depth to water measurements are referenced to LSD (in feet). Elevations for LSDs are in feet above mean sea level and were generally obtained from existing databases (TWDB), published reports (Hunt et al., 2010; Waston et al., 2014), or Google Earth for new sites. Vertical datums are either National Geodetic Vertical Datum 1929 (NAVD29) or National Geodetic Vertical Datum 1988 (NAVD88). Each elevation was verified in Google Earth. The accuracy of the LSD of a well is the largest source of error for the elevation data in this report and is likely less than 10 feet.

RESULTS

Figure 7 is a potentiometric map of the Middle Trinity Aquifer. A larger version (11x17 inch) of the map is provided in **Appendix 1**. **Appendix 2** contains the well-control data used to produce the contour map. **Appendix 3** provides the supplemental data from 2009 (Hunt et al., 2010) used to qualitatively constrain the contours in areas with sparse data. **Appendix 4** contains the locations of some Middle Trinity Springs in the study area. **Figure 8** combines the March 2009 potentiometric map of the Middle Trinity Aquifer for direct comparison. **Figure 9** shows the structure contours of the top of the Cow Creek with other structures compared to the 2018 potentiometric map.

DISCUSSION

The potentiometric map can help characterize flow characteristic and hydrologic boundaries. Some observations about flow and boundaries are discussed below.

Groundwater Flow

Previous potentiometric maps (Mace et al., 2000; Hunt et al., 2009; Watson et al., 2014) are remarkably similar to the 2018 potentiometric map provided in this report (**Figure 8**). Groundwater flow within the Middle Trinity Aquifer is generally west to east from Gillespie, Blanco, and into Hays counties (**Figure 7**). Water-level elevations in central Hays County are relatively flat in the area between Onion Creek and Cypress Creek—two surface streams that have some portions that have losing reaches. North of Onion Creek in Hays and Travis Counties, the heads have a steep gradient to the northeast. Thus, groundwater flow in the Middle Trinity in Travis County is predominately to the northeast and appears derived mostly from Hays County. Groundwater contours in Travis County suggest that the Mount Bonnell Fault may play a role as barrier to eastward flow, as noted by Mace et al., (2000).

A significant trough in the potentiometric surface is located upgradient from Jacob's Well Spring (JWS) in Cypress Creek. The trough is related to the Jacob's Well conduit that is mapped in that area and is a feature common within the karstic Edward Aquifer (Hunt et al., 2007).

Groundwater flow south and east of the Cypress Creek is to the east-southeast past the major springs and into the BFZ. Gradients steepen southeast of Cypress Creek into the BFZ, then flatten out on the eastern edge of the study area in an area corresponding to the confined zone of the Edwards Aquifer.

The overall flow direction and potentiometric gradients appear to follow the structure contour gradients that reflect depositional dip and faulting or anticlinal structures (**Figure 9**). For example, the flat gradient within central Hays appears to occur coincident with a broad arch that is bound on the south by a more localized anticlinal structure. The exception is the flow in northern-most Hays and western-most Travis Counties that has flow normal to the structural dip.

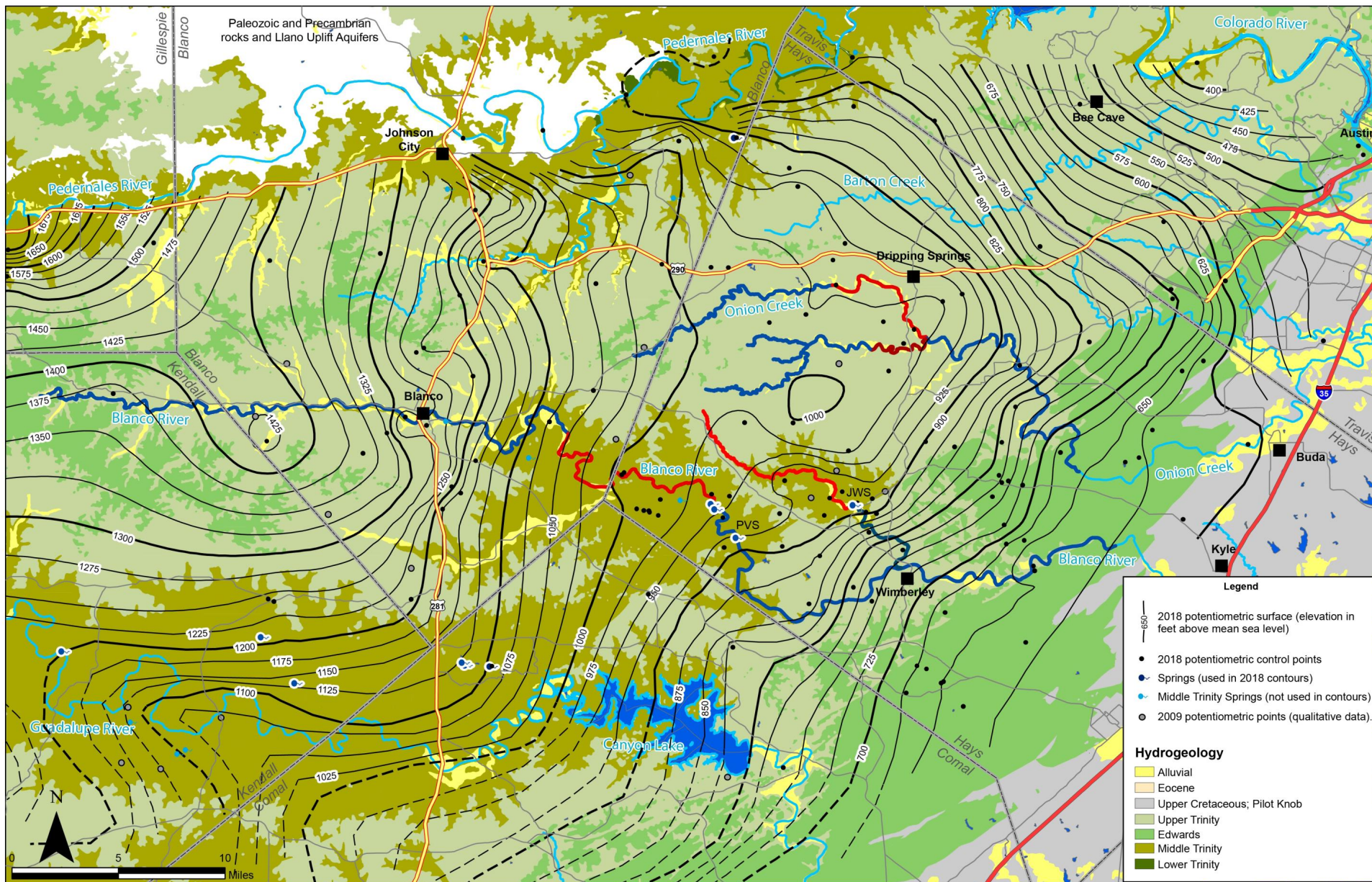


Figure 7. Potentiometric map of the Middle Trinity Aquifer.

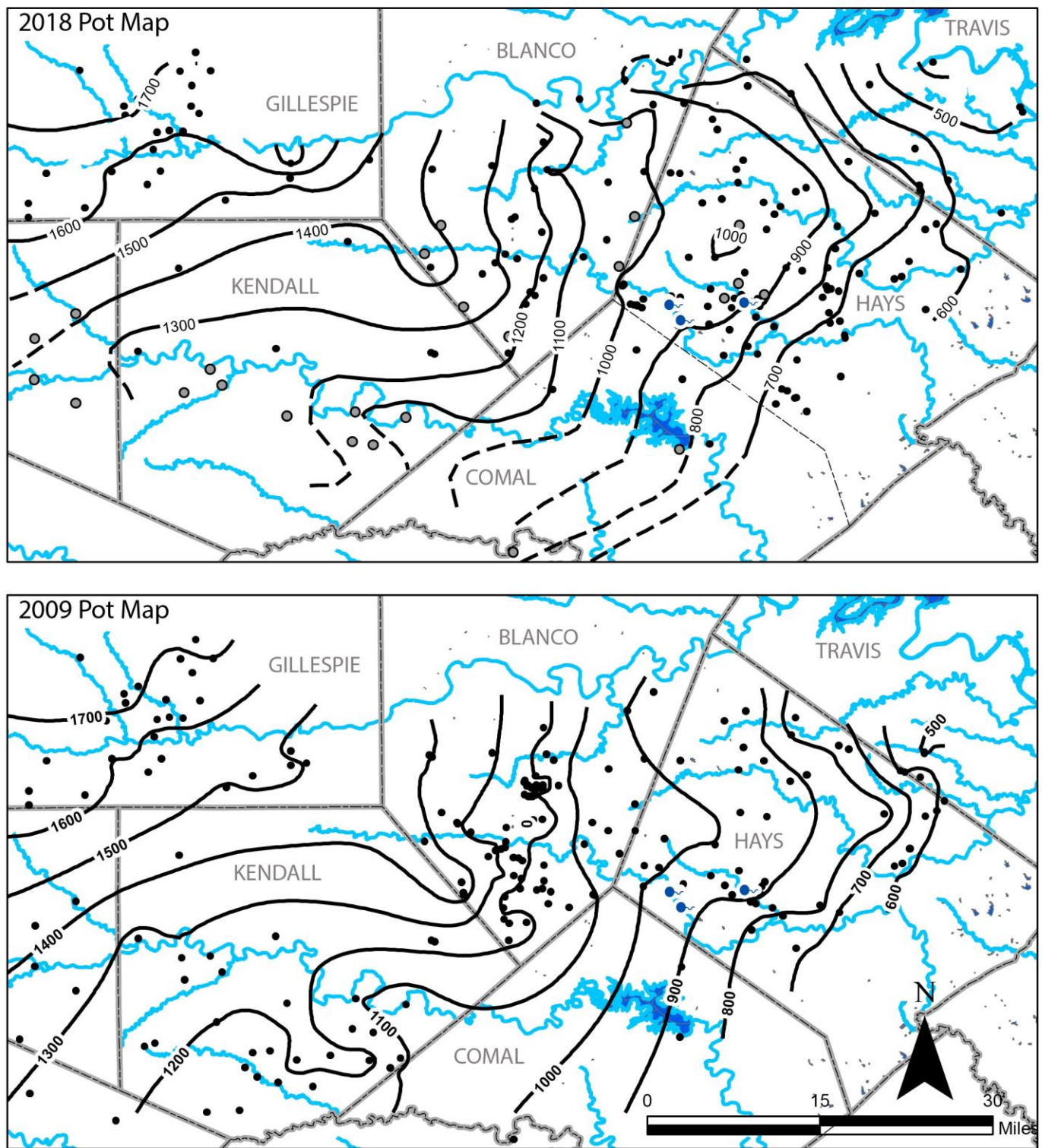


Figure 8. A comparison of potentiometric maps from 2018 (top; this study) and 2009 (bottom; after Hunt et al., 2010).

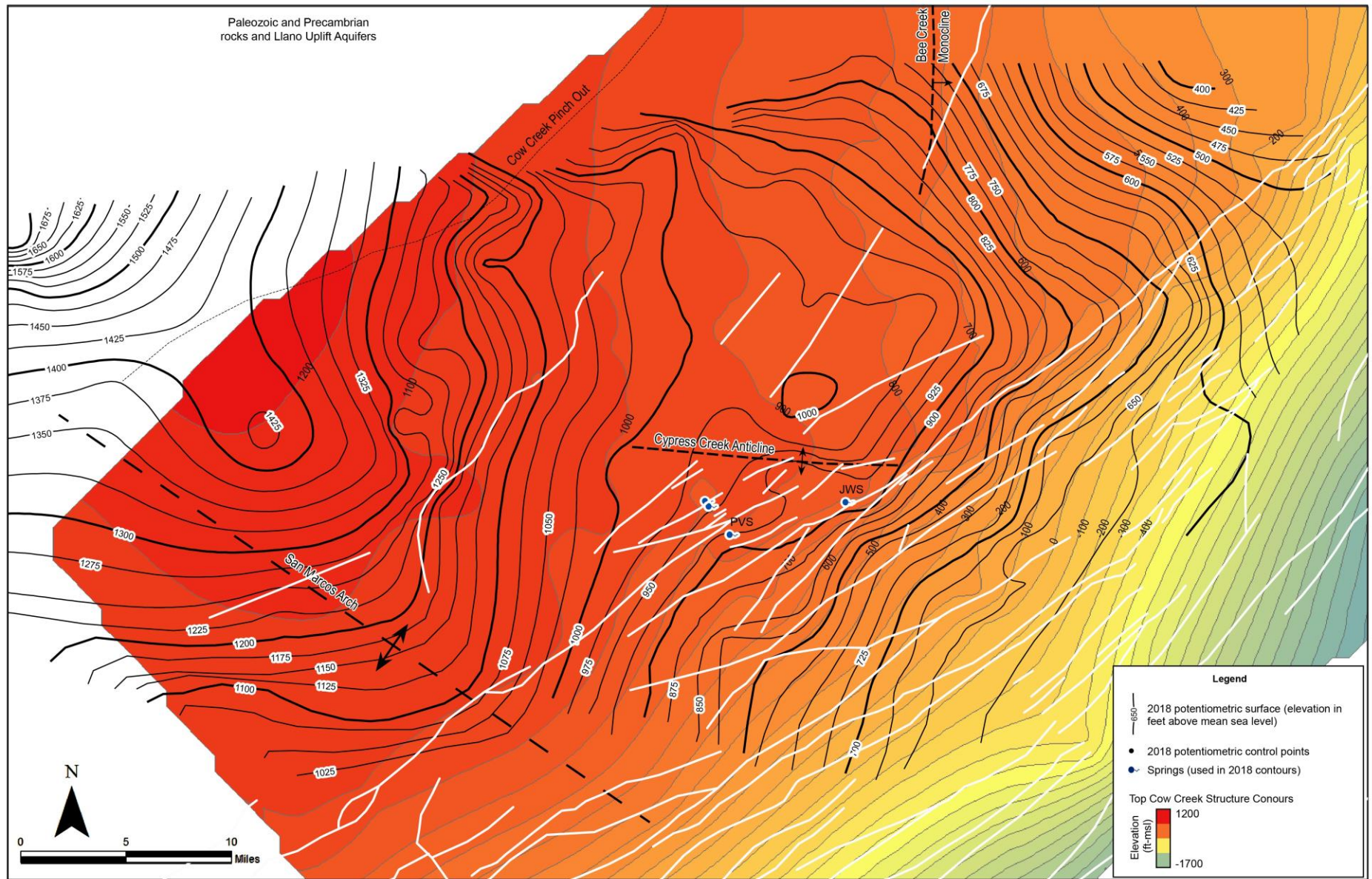


Figure 9. Colored structure contour map of the top of the Cow Creek Formation with mapped faults (white), other anticline features (dashed) compared to the potentiometric surface (black lines). Structure contours were gridded in Surfer with no manual re-interpretation. Faults are from the Geologic Atlas of Texas modified by Wierman et al., 2010. Anticline and monocline structures from Wierman et al., 2010. San Marcos Arch axis is from Rose, 1972.

Hydrologic Boundaries

A prominent potentiometric ridge exists along the Blanco-Kendall County line that may extend over Canyon Lake. This ridge appears consistent within previous published maps (Mace et al., 2000; Hunt et al., 2010). The hydrologic ridge appears to be related to the underlying structural ridge, which may also be related to the broad crest of the San Marcos Arch (**Figure 9**).

Faulting appears to influence the gradients and perhaps direction of flow. The Mount Bonnell/Tom Creek Fault may act as a barrier to eastward flow from about Bear Creek and FM 1826 in Hays County to north of the Colorado River. This may be related to the larger degree of throw along this portion of the fault zone.

Southwest of Onion Creek the faults do not appear to act as barriers to flow as the potentiometric contours continue to the east. This may be related to the relay-ramp structures discussed in Hunt et al., (2015).

The Pedernales river is inferred to be a gaining segment, in part, from the Middle Trinity Aquifer (**Figure 7**). This is primarily based on the work of Bluntzer (1992), Bush et al., (1983), and Wierman et al., (2017). The Colorado River is often assumed to be a hydrologic barrier or boundary condition for numerical models (Mace et al., 2000). However, the data in this study suggest it is not a discharge boundary. Despite the Colorado River being the regional base level (lowest surface elevation), and the fact that the Lower Glen Rose is exposed within the channel of the Colorado River west of the BFZ, the heads in this study appear to be below the elevation of the river. This is based on relatively sparse data and should be revisited in future studies.

Future Work

Very little information exists about the potential influence of the Paleozoic Aquifers on the Middle Trinity. Previous studies indicate a hydrologic connection (Bluntzer, 1992; Wierman et al., 2017), but further work is needed to characterize those connections.

It is not clear why the heads north of Onion Creek and into Travis County appear depleted compared to the rest of Hays County. This could be result of pumping, changes in the lithology, or facies of the units that could result in porosity and permeability changes, or some combination of both.

The natural discharge of the eastward flow of groundwater in the BFZ Middle Trinity is unknown. It is possible that the natural discharge is into overlying units east of the BFZ. The natural discharge of the northward flow of groundwater in the HC Middle Trinity units north of the Colorado River is also unknown. One possibility is that the lower heads is part of the southern margin of a regional drawdown cone of depression from historic pumping of the Trinity Aquifer centered around McLennan County (Waco) (George et al., 2011). Further work is needed to characterize Middle Trinity heads north of the Colorado River.

Locally heads at individual well locations may not accurately reflect the average head within the Middle Trinity Aquifer at that location. There is head differential documented within the geologic units that compose the Middle Trinity Aquifer, which includes the Cow Creek, Hensel, and Lower Glen Rose. Some of the head variability depends of the well completion, geologic setting, recharge conditions, and the permeability of the Hensel separating the Cow Creek from the overlying Lower Glen Rose. For example, head data from multiport monitor wells indicates a head differential between the Lower Glen Rose and the Cow Creek of up to 40 ft (Hunt and Smith et al., 2017). To complicate the issue, despite the head separation in the area surrounding this particular multiport well, aquifer testing indicates communication between the Lower Glen Rose and Cow Creek (Hunt and Smith, 2017). In other multiport wells, head data throughout the Middle Trinity are relatively similar (Hunt et al., 2016). More work is needed to fully characterize the heads within the Middle Trinity Aquifer.

CONCLUSIONS

The March 2018 potentiometric map provides critical information to the overall flow patterns and potential boundaries for the Middle Trinity Aquifer. The data and interpretations are consistent with previous published maps. This data set should be used to help refine the conceptual model of the aquifer, numerical modeling, and highlights areas for future study.

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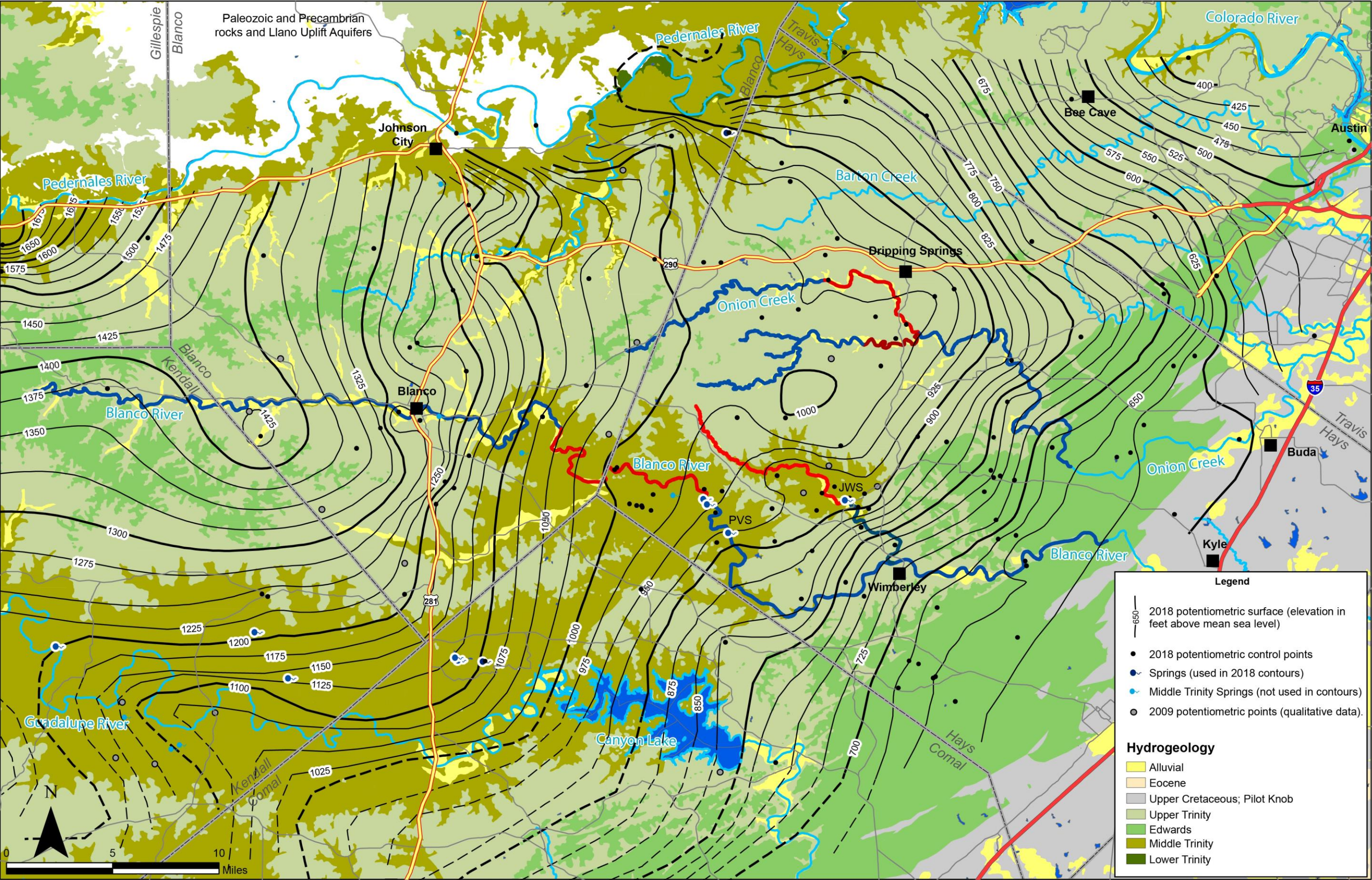
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APPENDICES

Appendix 1: Middle Trinity Potentiometric Map



Appendix 2: Middle Trinity 2018 Potentiometric Data

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|--------------------------------|---------|----------|------------------|-----------|------------|-------------------|------------------|---------------------------------|-------------------------|------------|--------------|--------|-----------|----------|------|--------------|--|---|
| Seiders | 5842937 | | BSEACD | 30.273200 | -97.780640 | 574 | | Middle Trinity (Cow Creek) | Roy Seiders | 1060 | e-line | KBE | 16-Apr-18 | 52.78 | 1.35 | 522.57 | | |
| Cornerstone | 5842936 | | BSEACD | 30.279380 | -97.784100 | 573 | | Middle Trinity (Cow Creek) | Hunter and Teresa Jones | 1020 | e-line | KBE | 16-Apr-18 | 125.85 | 2 | 449.15 | Well was on, couldn't get static level | |
| Onion Creek CC | 5850864 | | BSEACD | 30.146492 | -97.807914 | 654 | | Middle Trinity | | | | ES | 07-May-18 | 141.9 | 1.5 | 513.6 | 140.3 sonic | |
| Antioch Westbay | 5858431 | | BSEACD | 30.075833 | -97.859167 | 702 | | Middle Trinity (Cow Creek) | BSEACD monitor well | 1375 | Westbay tool | JC/BH | 01-May-18 | 93.61 | 2 | 610.39 | Zone 1 99.19 ft (lower Kcc) | |
| Wildflower Center | 5850424 | | BSEACD | 30.187333 | -97.874528 | 818 | | Middle Trinity (Cow Creek) | UT Austin | | e-line | KBE | 16-Apr-18 | 234.95 | 2.85 | 585.9 | BSEACD transducer in well | zone 2-Cow Creek |
| Aqua Tx-Cardinal Plant | 5849910 | | BSEACD | 30.132778 | -97.889442 | 827 | | Middle Trinity | | 850 | eline | VE | 24-Apr-18 | 221.65 | 2.45 | 607.8 | | |
| Commons Ford PWS | 5841311 | | BSEACD | 30.336028 | -97.893833 | 588 | | Middle Trinity | CoA Parks and Rec | | eline | BH | 30-Apr-18 | 225.7 | 2 | 364.3 | sonic 226.0 | |
| Anthem/Clark Wilson | 5857918 | 453228 | BSEACD | 30.024528 | -97.903225 | 842 | | Middle Trinity (Cow Creek) | | 1460 | eline | JC | 04-May-18 | 230.66 | 3.3 | 614.64 | | |
| Borheim Trinity | | | BSEACD | 30.125940 | -97.903820 | 789.86 | | Middle Trinity | | 1000 | | JC | 19-Apr-18 | 157.4 | 3.63 | 636.09 | | |
| Spillar Test Well | | | BSEACD | 30.175000 | -97.910277 | 884 | | Middle Trinity | | 840 | | JC | 19-Apr-18 | 178.46 | 1.66 | 705.54 | | |
| Grey Rock #5 | 5849616 | | BSEACD | 30.181389 | -97.911389 | 940 | | Middle Trinity | City of Austin | 809 | eline | BH | 02-May-18 | 245.6 | 3 | 697.4 | static level | |
| Hunt | 58501HU | | BSEACD | 30.227706 | -97.916417 | 1012 | | Middle Trinity (Lower Glenrose) | Brian Hunt | 480 | eline | | 13-Apr-18 | 353.1 | 0.85 | 659.75 | | |
| KBDJ - Trinity Production Well | 5857211 | | BSEACD | 30.085583 | -97.924028 | 820 | | Middle Trinity | | 1100 | eline | VE | 18-Apr-18 | 212.1 | 2.05 | 609.95 | | |
| Ruby Westbay Well | 5857513 | | BSEACD | 30.066729 | -97.933189 | 815 | | Middle trinity | | | | JC | 19-Apr-18 | 187.88 | 1.5 | 628.62 | Zone 2; Zone 3 = 187.7 | |
| Sky Cow Creek | 5857507 | | BSEACD_mon | 30.063583 | -97.942531 | 884 | | Middle Trinity (Cow Creek) | | | eline | JC | 18-Apr-18 | 239.35 | 0.8 | 645.45 | 241 sonic; Dual completion well with piezometer into Cow Creek | No well house yet, house just finished in Oct 2014, Straight Wall |
| Wizard Academy | 5849715 | | HTGCD_mon_wells | 30.145694 | -97.967056 | 1059 | 1065.137 | Middle Trinity? | | | sonic | JW | 19-Apr-18 | 266.7 | 0.7 | 793 | | |
| Travis Co. Pct 3 Multiport | 5841408 | | BSEACD | 30.307914 | -97.973383 | 989 | | Middle Trinity (Cow Creek) | BSEACD | 717 | Westbay tool | JC/BH | 30-Apr-18 | 456.76 | 2 | 534.24 | Zone 6 Cow Creek | Formerly owned by Don Cole |
| Nelson | | 375459 | EP Synoptic 2015 | 30.070266 | -97.986634 | 939 | | Middle Trinity (Cow Creek) | Todd Nelson | 850 | eline | JC | 18-Apr-18 | 279.4 | 1.75 | 661.35 | 281.7 sonic | |
| Grolnic | 5756305 | | HTGCD_mon_wells | 30.210845 | -98.000509 | 1178 | 1176.151 | Middle Trinity(Lower Glenrose) | | 450 | eline | JW | 19-Apr-18 | 439.77 | 1.5 | 739.73 | | |
| Pieter Luan | 6808304 | | BSEACD_RC | 29.989500 | -98.004130 | 888 | | Middle Trinity (Cow Creek) | | 970 | E-Line | ES | 18-Apr-18 | 235.07 | 2.7 | 655.63 | 237.0' sonic | |
| Boltauzer | | 111337 | BSEACD-RG | 29.992778 | -98.005001 | 905 | | Middle Trinity | Don Boltauzer | 660 | eline | JC, RG | 23-May-18 | 285.13 | 1.95 | 621.82 | sonic within 2 ft | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|-------------------------|---------|----------|------------------|-----------|------------|-------------------|------------------|---------------------------------|--------------------------|------------|--------------|--------|-----------|----------|------|--------------|---|-------|
| Freeman Ranch PWS | 6808603 | | BSEACD | 29.940556 | -98.010278 | 884 | | Middle Trinity | | | eline | JC | 25-Apr-18 | 238.8 | 1.6 | 646.8 | | |
| Jimmy Schroeder | 5764916 | | BSEACD_RC | 30.010350 | -98.011230 | 1039 | | Middle Trinity(Cow Creek) | | 780 | E-Line | ES | 18-Apr-18 | 382.89 | 1.4 | 657.51 | 385.6' sonic | |
| Bowman | 5764604 | 353577 | EP Synoptic 2015 | 30.048064 | -98.012283 | 1028 | | Middle Trinity (Cow Creek) | Brenda and Thomas Bowman | 850 | sonic | JC | 19-Apr-18 | 309 | 1.3 | 720.3 | 309 sonic | |
| Camp Ben McCulloch | 5756907 | | HTGCD_mon_wells | 30.129624 | -98.014272 | 953 | 961.737 | Middle Trinity | | 360 | eline | JW | 19-Apr-18 | 83.53 | 2.42 | 871.89 | | |
| Mandola | | | HTGCD_mon_wells | 30.101248 | -98.017040 | 981 | | Middle Trinity (Cow Creek) | | 620 | eline | JW | 20-Apr-18 | 210.14 | 2.33 | 773.19 | | |
| Driftwood Multiport | 5764613 | | BSEACD | 30.050842 | -98.022083 | 1037 | | Middle Trinity (Cow Creek) | BSEACD | 857 | Westbay tool | JC/BH | 26-Apr-18 | 284.26 | 2 | 754.74 | Kcc Zone 2 and 3 | |
| Ed Louk | 5764911 | | BSEACD_RC | 30.007930 | -98.023460 | 1039 | | Middle Trinity (Cow Creek) | | 960 | E-Line | ES | 18-Apr-18 | 369.35 | 1.45 | 671.1 | 376.2' sonic | |
| Miller | 5764908 | | BSEACD | 30.020833 | -98.025000 | 1066 | | Middle Trinity | | | eline | JC | 18-Apr-18 | 324.92 | 1.4 | 742.48 | 328 sonic | |
| Ochoa | 5764605 | | EP Synoptic 2015 | 30.049785 | -98.026376 | 1074 | | Middle Trinity (Cow Creek) | Bob Ochoa | 810 | eline | JC | 18-Apr-18 | 299.85 | 1.7 | 775.85 | 221.1 sonic | |
| Stirling | | | EP Synoptic 2015 | 30.077140 | -98.026450 | 1122 | | Middle Trinity (Cow Creek) | Jeri Ann Stirling | 700 | | JC | 19-Apr-18 | 331 | 1.7 | 792.7 | | |
| Lowe | 5764607 | | BSEACD | 30.054722 | -98.028333 | 1085 | | Middle Trinity (Cow Creek) | | 860 | eline | JC | 18-Apr-18 | 295.6 | 1.3 | 790.7 | 298.6 sonic | |
| Wood01 | | 233129 | EP Synoptic 2015 | 30.039986 | -98.033022 | 1065 | | Middle Trinity (Cow Creek) | Don and Jill Wood | 790 | eline | JC | 18-Apr-18 | 313.8 | 1.84 | 753.04 | 253.6 sonic | |
| Pam and RandolphHiriart | 6808805 | | BSEACD_RC | 29.896980 | -98.052700 | 967 | | Middle Trinity (Lower Glenrose) | | 840 | E-Line | ES | 18-Apr-18 | 320.5 | 1.8 | 648.3 | 328.0' sonic | |
| Broun | 5756519 | | HTGCD_mon_wells | 30.178298 | -98.053499 | 1118 | | Middle Trinity (Lower Glenrose) | | 280 | eline | JW | 20-Apr-18 | 164.15 | 1 | 954.85 | | |
| Bachardy | | | HTGCD_mon_wells | 30.074167 | -98.058611 | 1207 | | Middle Trinity(Cow Creek) | | -690 | eline | JW | 18-Apr-18 | 351.69 | 1.58 | 856.89 | transducer | |
| Amos | | | HTGCD_mon_wells | 29.961070 | -98.065135 | 1130 | | Middle Trinity (Cow Creek) | | 868 | eline | JW | 18-Apr-18 | 470.75 | 2 | 661.25 | transducer | |
| Graham | | | BSEACD-RG | 29.913903 | -98.066119 | 1006 | | Middle Trinity | Renee Graham | 930 | eline | JC, RG | 16-May-18 | 362.5 | 2.2 | 645.7 | sonic within 2 ft | |
| Stars Hollow | 5756521 | | HTGCD_mon_wells | 30.173333 | -98.066667 | 1184 | | Middle Trinity | | 505 | eline | JW | 20-Apr-18 | 204.32 | 1.5 | 981.18 | | |
| Pittman | | 123370 | BSEACD-RG | 29.913061 | -98.067786 | 1001 | | Middle Trinity | Jason Pittman | 980 | eline | JC, RG | 15-May-18 | 356.98 | 1.5 | 645.52 | sonic within 2 ft | |
| TWDB_Murphy | 5748505 | | TWDB | 30.296472 | -98.072075 | 1150 | | Middle Trinity (Lower Glenrose) | | | transducer | TWDB | 17-Apr-18 | 349.91 | | 800.09 | https://waterdatafortexas.org/groundwater/well/5748505 | |
| Gandy | | | BSEACD-RG | 29.922501 | -98.077689 | 1002 | | Middle Trinity | Dale Gandy | 950 | eline | JC, RG | 15-May-18 | 335.13 | 0.8 | 667.67 | sonic within 2 ft | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|---------------------|---------|----------|------------------|-----------|------------|-------------------|------------------|--------------------------------|----------------|------------|------------|---------|-----------|----------|------|--------------|---|---------------------------|
| Downing | 5764502 | | EP Synoptic 2015 | 30.077499 | -98.078332 | 1218 | | Middle Trinity (Cow Creek) | Ken Downing | 600 | transducer | TWDB | 17-Apr-18 | 324.3 | 1.9 | 895.6 | https://waterdatafortexas.org/groundwater/well/5764502 | submersible |
| Tanner Craigen | 6808402 | | BSEACD_RC | 29.924730 | -98.084110 | 1032 | | Middle Trinity (Cow Creek) | | 910 | E-Line | ES | 18-Apr-18 | 357.85 | 1.5 | 675.65 | 359.7' sonic | |
| DSWS Well #1 | 5756702 | | HTGCD_mon_wells | 30.154250 | -98.086000 | 1051 | | Middle Trinity(Cow Creek) | | 345 | transducer | TWDB | 17-Apr-18 | 68.3 | 0 | 982.7 | https://waterdatafortexas.org/groundwater/well/5756702 | |
| Hastings | | | BSEACD-RG | 29.906112 | -98.091667 | 1040 | | Middle Trinity | Jeff Hastings | 935 | eline | JC, RG | 15-May-18 | 371.66 | 0.9 | 669.24 | sonic does not work | |
| DSISD 2 (Kgrl) | 5756718 | | HTGCD_mon_wells | 30.144585 | -98.093280 | 1089 | 1090.8 | Middle Trinity(Lower Glenrose) | | | | | 16-Apr-18 | 105.35 | 0 | 983.65 | | Marcus access only |
| DSISD 1 (Kcc) | 5756716 | | HTGCD_mon_wells | 30.144528 | -98.093332 | 1089 | 1088.39 | Middle Trinity(Cow Creek) | | | | | 16-Apr-18 | 107.27 | 2.6 | 984.33 | | |
| Sabino Ranch | | | HTGCD_mon_wells | 30.003610 | -98.093890 | 871 | | Middle Trinity | | 760 | eline | JW | 18-Apr-18 | 116.75 | 1.7 | 755.95 | transducer | |
| O'Neil Ranch Road | 5756710 | | HTGCD_mon_wells | 30.125872 | -98.103433 | 1195 | 1200.603 | Middle Trinity | | 420 | | JW, MOG | 16-Apr-18 | 199.7 | 1.1 | 996.4 | | soon to be TWDB telemetry |
| Hog Hollow (Dupuy) | 5756714 | | HTGCD_mon_wells | 30.159444 | -98.106944 | 1167 | | Middle Trinity | | 480 | eline | JW | 18-Apr-18 | 192.94 | 1.7 | 975.76 | | |
| WC Maintenance 2 | | | HTGCD_mon_wells | 30.028610 | -98.111667 | 964 | | Middle Trinity | | 446 | eline | JW | 18-Apr-18 | 48.17 | 2 | 917.83 | transducer | middle trinity spring |
| HTGCD HCP3 | | | Watson_2013 | 30.038700 | -98.114680 | 1037.262277 | | Middle Trinity | | | eline | JW | 18-Apr-18 | 121.42 | 2.3 | 918.142277 | | |
| Glenn | | | HTGCD_mon_wells | 29.968890 | -98.114720 | 1080 | | Middle Trinity | | 680 | eline | JW | 18-Apr-18 | 325.25 | 1.2 | 755.95 | transducer | |
| Wimberley WSC | 5764705 | | TWDB | 30.015833 | -98.116944 | 938 | | Middle Trinity | | 400 | transducer | TWDB | 17-Apr-18 | 120.35 | 0 | 817.65 | https://waterdatafortexas.org/groundwater/well/5764705 | |
| Camp Young Judaea | 5764714 | | HTGCD_mon_wells | 30.029533 | -98.118811 | 958 | 956.09 | Middle Trinity | | 250 | | | 16-Apr-18 | 40.55 | 2.3 | 919.75 | | |
| HTGCD Graham | | | Watson_2013 | 30.033320 | -98.123800 | 954.261569 | | Middle Trinity | | | eline | JW | 18-Apr-18 | 36.27 | 0.4 | 918.391569 | | |
| Baker | | | 2018 Dye trace | 30.035780 | -98.124640 | 985.093 | | Middle Trinity (Cow Creek) | | | | UT | 07-Apr-18 | 63.58 | 2.05 | 923.563 | | |
| Jacob's Well Spring | 8170990 | | Spring | 30.034444 | -98.126111 | 922.84 | | Middle Trinity (Cow Creek) | | | | UT | 07-Apr-18 | 0 | 0 | 922.84 | | |
| Tom Hegemier | | | HTGCD_mon_wells | 30.306454 | -98.127110 | 1066 | 1074.988 | Middle Trinity (Cow Creek) | | 320 | sonic | JW | 19-Apr-18 | 236 | 1.2 | 831.2 | | |
| Schoen | | | Watson_2013 | 29.978270 | -98.127338 | 920.626653 | | Middle Trinity | | | | JQ | 17-Apr-18 | 138.64 | 1.7 | 783.686653 | | |
| TWDB_Hamilton Pool | 5747312 | | TWDB | 30.339650 | -98.128150 | 833 | | Middle Trinity (Cow Creek) | Travis County | 244 | transducer | TWDB | 17-Apr-18 | 56.91 | | 776.09 | https://waterdatafortexas.org/groundwater/well/5747312 | |
| Brazil | | | Watson_2013 | 30.071370 | -98.130800 | 1272.834718 | | Middle Trinity | Patrick Brazil | | eline | BH | 23-Apr-18 | 293.3 | 1.6 | 981.134718 | sonic same depth | |
| Jack Brown | 5755301 | | HTGCD | 30.212821 | -98.133139 | 1309.38 | 1314.09 | Middle Trinity | | 510 | | JW | 19-Apr-18 | 360.4 | 2.04 | 951.02 | | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|------------------------------------|---------|----------|------------------|-----------|------------|-------------------|------------------|---------------------------------|------------------------|------------|------------|---------|-----------|----------|------|--------------|---|---|
| Flocke | | | 2018 Dye trace | 30.043472 | -98.134955 | 1021 | | Middle Trinity (Cow Creek) | | | | UT | 07-Apr-18 | 100.16 | 0.71 | 920.13 | | |
| Whit Hanks | 5755607 | | HTGCD | 30.184465 | -98.139256 | 1127.923 | | Middle Trinity | | 381 | telemetry | TWDB | 17-Apr-18 | 155.88 | 1.6 | 973.643 | https://waterdatafortexas.org/groundwater/well/5755607 | |
| Wierman | | | HTGCD | 30.201511 | -98.141352 | 1260 | | Middle Trinity (Lower Glenrose) | Doug Wierman | 420 | eline | | 16-Apr-18 | 292.8 | | 967.2 | | plumbed with submersible, but not in service |
| Wood Creek 23 | 5763908 | | EP Synoptic 2015 | 30.039166 | -98.143610 | 1050 | | Middle Trinity (Cow Creek) | Woodcreek Development | 284 | eline | JW | 18-Apr-18 | 131.75 | 1.5 | 919.75 | | New well, should be able to find SWR; conductivity seems high, owner says WQ is exceptional; might be KCC |
| Section 25 | | | HTGCD_mon_wells | 30.027222 | -98.147222 | 1040 | | Middle Trinity(Cow Creek) | | 300 | eline | JW | 18-Apr-18 | 120.75 | 1.3 | 920.55 | transducer | Eline sticks at 300 ft, use sonic only, 710 packer |
| Steffien | | | Watson_2013 | 29.999670 | -98.150130 | 1116.332208 | | Middle Trinity (Cow Creek) | | | | JQ | 19-Apr-18 | 240.47 | 2.3 | 878.162208 | | |
| Wade | | | Watson_2013 | 29.967000 | -98.157690 | 973.770863 | | Middle Trinity (Cow Creek) | | | | JQ | 17-Apr-18 | 111.9 | 2.3 | 864.170863 | | |
| Prochnow | 5755907 | | HTGCD_mon_wells | 30.164417 | -98.159694 | 1347 | 1346.315 | Middle Trinity | | | sonic | JW | 19-Apr-18 | 376.4 | 1.91 | 972.51 | | |
| Jones | | 177132 | BSEACD | 30.251667 | -98.165278 | 1204 | | Middle Trinity (Cow Creek) | Nathan and Sarah Jones | | sonic | BH | 26-Apr-18 | 239.5 | 2 | 966.5 | obstruction at 40 ft; eline won't work | |
| Storm Ranch (Highgate) Toenail | 57632 | | HTGCD | 30.090497 | -98.168541 | 1296.527 | 1293.327 | Middle Trinity | | | sonic | | 16-Apr-18 | 294.4 | 1.05 | 1003.177 | | |
| Roman | | | HTGCD_mon_wells | 30.264380 | -98.170990 | 1211 | | Middle Trinity (Cow Creek) | | 360 | eline | JW | 19-Apr-18 | 299.98 | 2 | 913.02 | eline-influenced by well pumping | |
| Hargrave | | | Watson_2013 | 30.051034 | -98.174142 | 1159.211407 | | Middle Trinity (Cow Creek) | Mike and Lynn Hargrage | | | | 16-Apr-18 | 239.05 | 1.3 | 921.461407 | | |
| TWDB Canyon Lake Water Service Co. | 6815211 | | TWDB | 29.855417 | -98.175222 | 870 | | Middle Trinity | | 249 | transducer | TWDB | 17-Apr-18 | 107.95 | | 762.05 | https://waterdatafortexas.org/groundwater/well/6815211 | |
| Lovellass | | | Watson_2013 | 30.006175 | -98.175713 | 1123.842191 | | Middle Trinity | | | | JQ | 17-Apr-18 | 221.88 | 2.25 | 904.212191 | | |
| Sklar | | | Watson_2013 | 30.028601 | -98.177550 | 1167.663816 | | Middle Trinity | | | eline | BH | 26-Apr-18 | 233.86 | 2 | 935.803816 | sonic 235.0 | |
| Dreyer | 5755803 | | HTGCD_mon_wells | 30.158889 | -98.184444 | 1325 | 1323.088 | Middle Trinity | | | | JW | 19-Apr-18 | 327.59 | 1.87 | 999.28 | | |
| Roberts | 5763205 | | HTGCD_mon_wells | 30.090630 | -98.201450 | 1347 | 1347.362 | Middle Trinity | | | sonic | JW, MOG | 16-Apr-18 | 383.3 | 1 | 964.7 | | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|-----------------------------|---------|----------|-----------------|-----------|------------|-------------------|------------------|---------------------------------|------------------|------------|------------|--------|-----------|----------|------|--------------|---|-----------------------------|
| Pleasant Valley Spring | 5763809 | | Spring | 30.012223 | -98.205834 | 925 | | Middle Trinity (Cow Creek) | | | | UT | 07-Apr-18 | 0 | 0 | 925 | | |
| Child Inc. Spring | 5747802 | | BSEACD | 30.285000 | -98.206945 | 921 | | Middle Trinity (Cow Creek) | | | n/a | BH | 27-Apr-18 | 0 | 0 | 921 | Spring within Kcc | |
| TWDB Fischer | 6807407 | | TWDB | 29.937499 | -98.209444 | 1133 | | Middle Trinity (Lower Glenrose) | | 575 | transducer | TWDB | 17-Apr-18 | 322.03 | | 810.97 | https://waterdatafortexas.org/groundwater/well/6807407 | |
| Braumbach | | | Watson_2013 | 30.040385 | -98.211631 | 1185.226176 | | Middle Trinity | Colleen and Doug | | eline | BH/RG | 23-Apr-18 | 231.65 | 0.42 | 953.996176 | sonic 232.8 | |
| Henly Church | 5755401 | | HTGCD | 30.196291 | -98.212441 | 1336.7 | 1336.073 | Middle Trinity | | 460 | transducer | JW | 17-Apr-18 | 356.22 | 0.95 | 981.43 | https://waterdatafortexas.org/groundwater/well/5755405 | |
| Houston | 57638HO | | BSEACD | 30.005464 | -98.215346 | 1053 | | Middle Trinity | Houston | | eline | | 16-Apr-18 | 140.38 | 0.3 | 912.92 | | |
| DiLeo (house) | | | Watson_2013 | 30.025833 | -98.216005 | 1008.513576 | | Middle Trinity (Cow Creek) | | | | | 16-Apr-18 | 65.76 | 0.87 | 943.623576 | | zone 3-Cow Creek |
| Park Spring | 5763707 | | Spring | 30.031667 | -98.220278 | 958 | 967.203 | Middle Trinity (Cow Creek) | | | | UT | 14-Apr-18 | 0 | 0 | 958 | | |
| Middle Trinity | | | Meadows | 30.340202 | -98.222211 | | | | | | | | | | | 912 | Wierman et al., 2017 | |
| Little Park Spring | 5763709 | | Spring | 30.035278 | -98.222778 | 959 | 962.488 | Middle Trinity (Cow Creek) | | | | UT | 11-Apr-18 | 3.1 | 0 | 955.9 | | |
| Pope | 5763402 | | Watson_2013 | 30.041809 | -98.223838 | 1013.003005 | | Middle Trinity (Cow Creek) | | | | UT | 07-Apr-18 | 54.9 | 0.79 | 958.893005 | | |
| Skipton | 5755405 | | HTGCD_mon_wells | 30.196444 | -98.224306 | 1362 | 1355.871 | Middle Trinity (Cow Creek) | | 506 | | TWDB | 19-Apr-18 | 381.22 | 1.21 | 981.99 | | |
| Pedernales Falls State Park | 5747705 | | BPGCD | 30.282778 | -98.246111 | 1177 | | Middle Trinity | | | | RF | 19-Apr-18 | 188.12 | 1.8 | 990.68 | | |
| Randy Barton | 57546B3 | | BPGCD--2009 | 30.198667 | -98.257500 | 1342 | | Middle Trinity | | 440 | | RF | 10-Mar-09 | 341.3 | 1.4 | 1002.1 | Frank & Karen Dick-Armadillo Bar | |
| Still Well # 1 (Whitehouse) | 57629 | | HTGCD | 30.038169 | -98.258734 | 1079.217 | | Middle Trinity? | | | eline | JW | 11-Apr-18 | 80.89 | 0.2 | 998.527 | | |
| Stude #3--Hill Top Solar | | | Watson_2013 | 30.027263 | -98.260026 | 1121.028691 | | Middle Trinity (Cow Creek) | Mike Stude | | eline | BH/MOG | 25-Apr-18 | 130.68 | 1.9 | 992.248691 | sonic 131.7 | |
| Stude #4--River Well | 5762902 | 285281 | Watson_2013 | 30.029480 | -98.266050 | 1071.248593 | | Middle Trinity(Cow Creek) | Mike Stude | 210 | eline | BH/MOG | 25-Apr-18 | 78.7 | 1.7 | 994.248593 | | |
| Stude #2--Guest House | | | Watson_2013 | 30.030439 | -98.266486 | 1077.432507 | | Middle Trinity (Cow Creek) | Mike Stude | | eline | BH/MOG | 25-Apr-18 | 86.1 | 1.5 | 992.832507 | sonic 88.1 | |
| Zlatkovich | | | Watson_2013 | 29.973660 | -98.266880 | 1191.268119 | | Middle Trinity | | | | JQ | 19-Apr-18 | 239.07 | 1.8 | 953.998119 | | |
| Stude Windmill #1 | | | BSEACD | 30.030711 | -98.269969 | 1083 | | Middle Trinity | Mike Stude | | eline | BH/MOG | 25-Apr-18 | 90.23 | 0 | 992.77 | drilled 1962 | |
| Stude Windmill #2 | | | Watson_2013 | 30.031831 | -98.274776 | 1091.065896 | | Middle Trinity | Mike Stude | | eline | BH/MOG | 25-Apr-18 | 94.33 | 0 | 996.735896 | | new well added by EAA staff |
| Pedernales | | | Meadows | 30.314107 | -98.282046 | | | | | | | | | | | 900 | Wierman et al., 2017 | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|--------------------------------------|---------|-----------------|-----------------|-----------|------------|-------------------|------------------|----------------------------|-------------------------------|------------|-----------|--------|-----------|----------|-----|--------------|------------------------------------|---|
| Narrows #2 | | 343751 | BSEACD | 30.056667 | -98.283334 | 1104 | | Middle Trinity (Cow Creek) | Estate of Catherine Ann Craft | 220 | eline | BH/RG | 23-Apr-18 | 117.55 | 1.4 | 987.85 | Sonic 118.8 ft | domestic |
| Narrows | | | Watson_2013 | 30.054983 | -98.284984 | 1094.860466 | | Middle Trinity (Cow Creek) | Dorothy and Eddie Gumbert | | eline | BH/RG | 23-Apr-18 | 106.5 | 0 | 988.360466 | | stock use |
| Franklin Ranch | 57545EP | | BPGCD--2009 | 30.185472 | -98.302500 | 1359 | | Middle Trinity | | | | RF | 04-Mar-09 | 317.53 | 1.6 | 1043.07 | East Pasture well | hardly used |
| Arnosky Farms--Blue Barn | | 34776 | BPGCD | 30.112643 | -98.304267 | 1333 | | Middle Trinity | Arknosky Farms | 360 | eline | BH | 26-Apr-18 | 277.69 | 1.4 | 1056.71 | sonic 278.3; water-bearing 292-318 | unused; main road |
| Karen Wagenfehr Well | | 57621KW | BPGCD | 30.091300 | -98.334110 | 1210 | | Middle Trinity | | | | RF | 24-Apr-18 | 140.1 | 1.5 | 1071.4 | | unused; main road |
| Pedernales | | | Meadows | 30.290013 | -98.338415 | | | | | | | | | | | 1000 | Wierman et al., 2017 | |
| Rebecca Springs | | | Spring | 29.924444 | -98.373055 | 1094 | | Middle Trinity (Cow Creek) | | | | BSEACD | 17-Apr-18 | 0 | 0 | 1094 | | |
| Miller Creek Replacement Well | | 57536PR | BPGCD | 30.200450 | -98.378940 | 1264 | | Middle Trinity | | | | RF | 24-Apr-18 | 172 | 2 | 1094 | | |
| David Seymour Well | | 57616DS | BPGCD | 30.064500 | -98.384280 | 1312 | | Middle Trinity | | | | RF | 24-Apr-18 | 164.65 | 2 | 1149.35 | | |
| Stanton Well | 5753305 | | BPGCD | 30.235556 | -98.384444 | 1445 | | Middle Trinity | | | | RF | 19-Apr-18 | 219.6 | 0.5 | 1225.9 | | |
| Anne Wynn Well | | 57613S1 | BPGCD | 30.122280 | -98.386140 | 1348 | | Middle Trinity | | | | RF | 19-Apr-18 | 115.6 | 1.8 | 1234.2 | | |
| Walter's Spring | 6805617 | 295531098232401 | USGS Springs DB | 29.925278 | -98.390000 | 1120 | | 218GLRSL | | | | | | | | 1120 | | |
| Putter Creek Springs | 6805618 | 295538098233101 | USGS Springs DB | 29.927222 | -98.391944 | 1120 | | 218GLRSL | | | | | | | | 1120 | | |
| Pedernales | | | Meadows | 30.284652 | -98.392740 | | | | | | | | | | | 1100 | Wierman et al., 2017 | |
| Rockin J Ranch Monitor Well 2 | | 57616JA | BPGCD | 30.042550 | -98.394390 | 1438 | | Middle Trinity | | | | RF | 18-Apr-18 | 262.7 | 2 | 1177.3 | | |
| Amil Baker Well | 5753614 | | BPGCD | 30.177500 | -98.395000 | 1510 | | Middle Trinity | | | | RF | 19-Apr-18 | 301.2 | 1.5 | 1210.3 | | |
| Rockin J Ranch Monitor Well 4 | | 57616J2 | BPGCD | 30.046920 | -98.400610 | 1385 | | Middle Trinity | | | | RF | 18-Apr-18 | 211 | 3.2 | 1177.2 | | |
| Quaid Haack Well | | 57619QH | BPGCD | 30.031720 | -98.406590 | 1395 | | Middle Trinity | | | | RF | 30-Apr-18 | 227.4 | 2.2 | 1169.8 | | Well is likely completed at the base of the Kgrl. Water level track within a few feet of the Whit Hanks well on Creek Road, with a differential of +135 |
| Blanco County Yard Monitor Well | | 57612MW | BPGCD | 30.088830 | -98.417610 | 1335 | | Middle Trinity | | | | RF | 18-Apr-18 | 73.2 | 2.4 | 1264.2 | | |
| Dale A. Crenwelge / Tom Blevins Well | | 57538DC | BPGCD | 30.141470 | -98.419470 | 1730 | | Middle Trinity | | | | RF | 28-Apr-18 | 511.7 | 1.7 | 1220 | | |
| Jason Wheeler New Well 2018 | | 57538JW | BPGCD | 30.138420 | -98.424500 | 1530 | | Middle Trinity | | | | RF | 30-Apr-18 | 313.4 | 2 | 1218.6 | | |
| Melissa Weisbrich | 68052MW | | BPGCD--2009 | 29.970083 | -98.428111 | 1455 | | Middle Trinity | | 345 | | RF | 18-Feb-09 | 245.22 | 1.5 | 1211.28 | | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|-------------------------------|---------|-----------------|-----------------|-----------|------------|-------------------|------------------|----------------------------|----------------------|------------|------------|--------|-----------|----------|-----|--------------|---|---|
| City of Blanco River Well | 5761217 | | BPGCD | 30.094440 | -98.432220 | 1321 | | Middle Trinity | | | | RF | 18-Apr-18 | 71.8 | 4 | 1253.2 | | slotted 710 to 790. John Wilson renting red house, 717-419-6271 |
| Rosa Winn Well | 5761507 | | BPGCD | 30.083528 | -98.444611 | 1423 | | Middle Trinity | | | | RF | 18-Apr-17 | 91.28 | 1 | 1332.72 | | |
| Bamberger Ranch | 57535BA | | BPGCD--2009 | 30.206083 | -98.449083 | 1605 | | Middle Trinity | | 340 | | RF | 10-Apr-09 | 294.82 | 0.2 | 1310.38 | Main Ranch House Well, unused | |
| Trey Haack North Pasture Well | | 57619TC | BPGCD | 30.069639 | -98.461000 | 1490 | | Middle Trinity | | | | RF | 30-Apr-18 | 125.7 | 2.2 | 1366.5 | | |
| Edge Falls Spring 4 | 6804904 | 295447098302101 | USGS Springs DB | 29.913056 | -98.505833 | 1093 | | 218GLRSL | | | | | | | | 1093 | | |
| Kendalia VFD | 6804313 | 767 | CCGCD | 29.968611 | -98.521389 | 1386.42 | | Middle Trinity | | 350 | | | 28-Mar-18 | 153 | | 1233.42 | | |
| BJ Sultemeier | 57526BJ | | BPGCD--2009 | 30.201139 | -98.524222 | 1545 | | Middle Trinity | | 325 | | RF | 24-Feb-09 | 161.78 | 2 | 1385.22 | | |
| TWDB_Kendalia | 6804312 | | TWDB | 29.970277 | -98.525277 | 1367 | | Middle Trinity (Cow Creek) | | 310 | transducer | TWDB | 17-Apr-18 | 128.78 | | 1238.22 | https://waterdatafortexas.org/groundwater/well/6804312 | |
| BKS Estate Trust | 6804312 | 2754 | CCGCD | 29.970278 | -98.525278 | 1373.17 | | Middle Trinity | | 310 | | | 23-Apr-18 | 129.37 | | 1243.8 | https://waterdatafortexas.org/groundwater/well/6804312 | |
| Rhoden | 5760609 | | BSEACD | 30.077953 | -98.526208 | 1482 | | Middle Trinity(Cow Creek) | Eric and Jill Rhoden | 300 | eline | BH/MOG | 25-Apr-18 | 45.4 | 0.8 | 1437.4 | | |
| RB-68-04-607 | 6804607 | 295640098314301 | USGS Springs DB | 29.944444 | -98.528611 | 1205 | | 218GLRSL | | | | | | | | 1205 | | |
| | | R -00343 | HCUWCD | 30.213333 | -98.603139 | | | Middle Trinity--Hensel | | | | PT | 17-Apr-18 | | | 1490.1 | | |
| | | R -00343 | HCUWCD | 30.213333 | -98.603139 | | | Middle Trinity--Hensel | | | | PT | 17-Apr-18 | | | 1388.1 | | |
| Hale Barn | | | BSEACD | 30.110512 | -98.630806 | 1680 | | Middle Trinity? | Chris Hale | | eline | BH/MOG | 25-Apr-18 | 316.7 | 0.7 | 1364 | sonic 319 | |
| RB-68-03-606 | 6803606 | 295605098395101 | USGS Springs DB | 29.934722 | -98.664167 | 1200 | | 218GLRSL | | | | | | | | 1200 | Reported ceased flowing in 1956. | |
| | | R -01006 | HCUWCD | 30.208500 | -98.702111 | | | Middle Trinity--Hensel | | | | PT | 17-Apr-18 | | | 1744.4 | | |
| | 5751508 | R -01153 | HCUWCD | 30.190361 | -98.703139 | | | Middle Trinity--Hensel | | | | PT | 17-Apr-18 | | | 1512.6 | | |
| Sisterdale VFD | 6803109 | 315 | CCGCD | 29.975556 | -98.721111 | 1294.58 | | Middle Trinity | | 200 | | | 28-Mar-18 | 43.75 | | 1250.83 | | |
| | 5750901 | ER-02608 | HCUWCD | 30.162556 | -98.784000 | | | Middle Trinity--Hensel | | | | PT | 17-Apr-18 | | | 1477.8 | | |
| | | R -01017 | HCUWCD | 30.325222 | -98.802944 | | | Middle Trinity--Hensel | | | | PT | 12-Apr-18 | | | 1644.7 | | |
| | | R -00511 | HCUWCD | 30.271778 | -98.817139 | | | Middle Trinity--Hensel | | | | PT | 12-Apr-18 | | | 1624.6 | | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|----------------|---------|----------|--------|-----------|------------|-------------------|------------------|------------------------|-------|------------|-----------|-------|-----------|----------|----|--------------|----------|-------|
| | | ER-01851 | HCUWCD | 30.348833 | -98.821778 | | | Middle Trinity--Hensel | | | | PT | 12-Apr-18 | | | 1766.2 | | |
| | | R -00876 | HCUWCD | 30.306806 | -98.826667 | | | Middle Trinity--Hensel | | | | PT | 12-Apr-18 | | | 1634.6 | | |
| | | GL-00159 | HCUWCD | 30.280639 | -98.827778 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1632.2 | | |
| | | GL-00001 | HCUWCD | 30.249500 | -98.838167 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1604.1 | | |
| | | R -00888 | HCUWCD | 30.324444 | -98.841389 | | | Middle Trinity--Hensel | | | | PT | 12-Apr-18 | | | 1649.2 | | |
| David Langford | 5758402 | 6233 | CCGCD | 30.076896 | -98.843075 | 1585.58 | | Middle Trinity | | 315 | | | 28-Mar-18 | 172.85 | | 1412.73 | | |
| | | ER-01740 | HCUWCD | 30.250639 | -98.855278 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1607.6 | | |
| | | R -01168 | HCUWCD | 30.198861 | -98.866000 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1584.7 | | |
| | | R -00940 | HCUWCD | 30.248139 | -98.870694 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1640.6 | | |
| | | PL-00064 | HCUWCD | 30.226417 | -98.874972 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1564.8 | | |
| | | R -00968 | HCUWCD | 30.182361 | -98.882417 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1597.8 | | |
| Comfort TWDB | 6801314 | 7480 | CCGCD | 29.971944 | -98.894778 | 1405 | | Middle Trinity | | 280 | | | 23-Apr-18 | 156.91 | | 1248.09 | | |
| | | R -00163 | HCUWCD | 30.289694 | -98.894806 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1712.5 | | |
| | | R -01915 | HCUWCD | 30.255167 | -98.906500 | | | Middle Trinity--Hensel | | | | PT | 10-Apr-18 | | | 1664.1 | | |
| | | ER-00099 | HCUWCD | 30.269083 | -98.910528 | | | Middle Trinity--Hensel | | | | PT | 10-Apr-18 | | | 1715.6 | | |
| | | ER-01467 | HCUWCD | 30.255028 | -98.911167 | | | Middle Trinity--Hensel | | | | PT | 10-Apr-18 | | | 1659.7 | | |
| | | R -01205 | HCUWCD | 30.280556 | -98.912222 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1726.1 | | |
| | | R -00238 | HCUWCD | 30.198694 | -98.927583 | | | Middle Trinity--Hensel | | | | PT | 10-Apr-18 | | | 1588.9 | | |
| | | R -00053 | HCUWCD | 30.246056 | -98.935389 | | | Middle Trinity--Hensel | | | | PT | 10-Apr-18 | | | 1669 | | |
| | | ER-01777 | HCUWCD | 30.152806 | -98.961639 | | | Middle Trinity--Hensel | | | | PT | 10-Apr-18 | | | 1620.95 | | |
| | | ER-02077 | HCUWCD | 30.325833 | -98.967667 | | | Middle Trinity--Hensel | | | | PT | 16-Apr-18 | | | 1787.2 | | |

| Name | SWN | Other_ID | Source | Ddlat | Ddlong | Surface_Elevation | Surface_Elev_new | Aquifer | Owner | Well_depth | Equipment | Staff | 2018_Date | 2018_DTW | MP | 2018_WL_Elev | Comment_ | Notes |
|------|-----|----------|--------|-----------|------------|-------------------|------------------|-------------------------------|-------|------------|-----------|-------|-----------|----------|----|--------------|----------|-------|
| | | R -01147 | HCUWCD | 30.196111 | -99.010000 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1657.5 | | |
| | | R -00035 | HCUWCD | 30.140611 | -99.032444 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1643.8 | | |
| | | R -00895 | HCUWCD | 30.158306 | -99.032472 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1643.4 | | |
| | | ER-00643 | HCUWCD | 30.297694 | -99.070639 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1707.6 | | |
| | | R -00566 | HCUWCD | 30.205694 | -99.105056 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1683.5 | | |
| | | R -00209 | HCUWCD | 30.251944 | -99.126667 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1705 | | |
| | | PM-00005 | HCUWCD | 30.216333 | -99.139722 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1703.4 | | |
| | | R -00785 | HCUWCD | 30.281111 | -99.149167 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1713.9 | | |
| | | R -00173 | HCUWCD | 30.169139 | -99.150833 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1689.9 | | |
| | | R -01171 | HCUWCD | 30.140278 | -99.153889 | | | Middle Trinity-- Hensel | | | | PT | 10-Apr-18 | | | 1604.7 | | |

Appendix 3: 2009 Middle Trinity Potentiometric Data (from Hunt et al., 2010).

| SWN | DDL _{Long} | DDL _{Lat} | Date | LSD_Elev | Meas_WL | MPH | WL_Elev |
|--------------------|---------------------|--------------------|-----------|----------|---------|-------|---------|
| 6805209 | -98.427944 | 29.991278 | 2/18/2009 | 1390 | 128.90 | 2.00 | 1263.10 |
| 57469SH | -98.279361 | 30.259417 | 3/9/2009 | 1078 | 82.14 | 1.50 | 997.36 |
| 57529D1 | -98.512694 | 30.130861 | 2/26/2009 | 1518 | 145.31 | 2.00 | 1374.69 |
| 57549GG | -98.269722 | 30.141806 | 3/7/2009 | 1548 | 499.45 | 1.90 | 1050.45 |
| 57603HH | -98.534111 | 30.094806 | 2/26/2009 | 1512 | 93.79 | 1.00 | 1419.21 |
| 57617RH | -98.484570 | 30.027960 | 2/22/2009 | 1502 | 72.30 | 1.00 | 1430.70 |
| 57626ER | -98.288778 | 30.079250 | 3/6/2009 | 1253 | 225.00 | 1.50 | 1029.50 |
| 6802508 | -98.803889 | 29.950000 | 3/17/2009 | 1340 | 91.70 | -1.67 | 1249.97 |
| 6802609 | -98.788611 | 29.930000 | 3/17/2009 | 1355 | 121.25 | -1.25 | 1235.00 |
| 6803804 | -98.706944 | 29.890833 | 3/17/2009 | 1431 | 200.10 | -1.50 | 1232.40 |
| 6804705 | -98.620556 | 29.896389 | 3/17/2009 | 1280 | 179.00 | -1.58 | 1102.58 |
| 6804809 | -98.557222 | 29.889167 | 3/17/2009 | 1121 | 73.40 | -1.50 | 1049.10 |
| 6811302 | -98.625000 | 29.858611 | 3/17/2009 | 1308 | 167.40 | -1.33 | 1141.93 |
| 6812106 | -98.598333 | 29.854444 | 3/17/2009 | 1234 | 102.20 | -0.83 | 1132.63 |
| #79167 | -98.836389 | 29.920278 | 3/17/2009 | 1606 | 346.30 | -2.67 | 1262.37 |
| 5663305 | -99.148222 | 30.099139 | 3/30/2009 | 1785 | 250.05 | 0.00 | 1534.95 |
| 5664711 | -99.112667 | 30.009333 | 3/26/2009 | 1576 | 198.60 | 0.00 | 1377.40 |
| 5757703 | -98.972778 | 30.019444 | 3/30/2009 | 1565 | 124.90 | 0.00 | 1440.10 |
| 6801703 | -98.972917 | 29.906944 | 3/27/2009 | 1525 | 209.30 | 0.00 | 1315.70 |
| 6908305 | -99.024028 | 29.988389 | 3/26/2009 | 1662 | 279.00 | 0.00 | 1383.00 |
| 6908624 | -99.024583 | 29.936778 | 3/27/2009 | 1525 | 182.80 | 0.00 | 1342.20 |
| 57559 | -98.137199 | 30.130867 | 2/13/2009 | 1240 | 255.25 | 1.08 | 985.34 |
| 5763903, G1050039B | -98.156196 | 30.039252 | 2/18/2009 | 1033 | 121.00 | 2.57 | 914.53 |
| Holbrook | -98.105892 | 30.043739 | 2/19/2009 | 1058 | 149.90 | 1.88 | 909.75 |
| Warner | -98.138816 | 30.057818 | 2/18/2009 | 1136 | 219.58 | 0.79 | 917.19 |
| 6815116 | -98.213056 | 29.848611 | 2/14/2009 | 1010 | 138.26 | 0.00 | 871.74 |
| 6821213 | -98.422221 | 29.719443 | 2/15/2009 | 1100 | 301.00 | 0.00 | 799.00 |
| 6821902 | -98.385277 | 29.662777 | 3/15/2009 | 968 | 296.86 | 0.00 | 671.14 |

Appendix 4: Middle Trinity Springs (from TWDB groundwater database).

| Name | site_no | state_well | dec_lat_va | dec_long_v | alt_va | aquifer_cd | remarks |
|--------------------------|-----------------|------------|------------|------------|--------|------------|---|
| Swede Creek Springs | 295153098350901 | 6812101 | 29.864722 | -98.585833 | 1140 | 218GLRSL | |
| Sultenfuss Spring | 295203098344801 | 6812201 | 29.867500 | -98.580000 | 1185 | 218GLRSL | |
| Cave Without a Name | 295311098370301 | 6804701 | 29.886389 | -98.617500 | 1130 | 218GLRSL | |
| RB-68-02-605 | 295552098465601 | 6802605 | 29.931111 | -98.782222 | 1315 | 218GLRSL | |
| Buchanan Ranch Spring | 300216098143701 | 5763704 | 30.037778 | -98.243611 | 1132 | 218GLRSL | |
| Cove Branch Creek Spring | 300400098204801 | 5762403 | 30.066667 | -98.346667 | 1260 | 218GLRSL | |
| Cold Spring | 300530098241101 | 5761304 | 30.091667 | -98.403056 | 1280 | 218GLRSL | |
| AZ-57-54-401 | 301137098200901 | 5754401 | 30.193611 | -98.335833 | 1150 | 218GLRSL | |
| Mill Seat Spring | 301220098210901 | 5754402 | 30.205556 | -98.352500 | 1160 | 218GLRSL | |
| AZ-57-55-107 | 301438098145401 | 5755107 | 30.243889 | -98.248333 | 1060 | 218GLRSL | |
| Oak Spring | 301500098240701 | 5753317 | 30.250000 | -98.401944 | 1300 | 218GLRSL | |
| Hammett's Spring | 302029098083801 | 5747304 | 30.341389 | -98.143889 | 805 | 218GLRSL | Well B-38 in 1957 Travis County report. |
| Santa Monica Springs | 302036097532001 | 5841306 | 30.343333 | -97.888889 | 480 | 218GLRSL | It is now beneath Lake Austin. |
| Hamilton Springs | 302036098072801 | 5748105 | 30.343333 | -98.124444 | 805 | 218GLRSL | |
| AZ-57-45-303 | 302111098232201 | 5745303 | 30.353056 | -98.389444 | 1270 | 218GLRSL | |