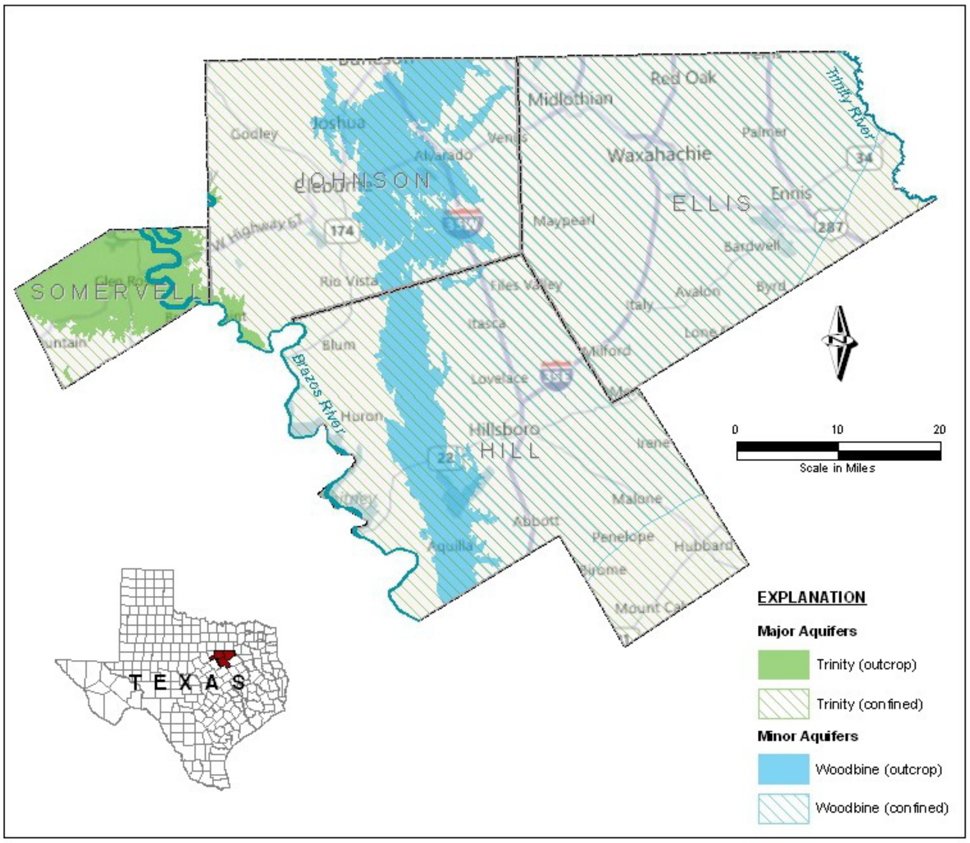
PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN



As Adopted on March 18, 2024

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I. DISTRICT MISSION

The Mission of the Prairielands Groundwater Conservation District ("District") is to implement rules to provide protection to existing and future water 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 Ellis, Hill, Johnson, and Somervell 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.

II. HISTORY AND PURPOSE OF THE MANAGEMENT PLAN

The purpose of the management plan is to identify the goals of the District and to document the management objectives and performance standards that will be used to accomplish those goals.

The 75th Texas Legislature in 1997 enacted Senate Bill 1 ("SB 1") to establish a comprehensive statewide water planning process. In particular, SB 1 contained provisions that require each groundwater conservation district ("GCD") to prepare a management plan to identify the water supply resources and water demands that will shape the decisions of the GCD. SB 1 designed the management plans to include management goals for each GCD to manage and conserve the groundwater resources within their boundaries. In 2001, the Texas Legislature enacted Senate Bill 2 ("SB 2") to build on the planning requirements of SB 1 and to further clarify the actions necessary for GCDs to manage and conserve the groundwater resources of the state of Texas.

The Texas Legislature enacted significant changes to the management of groundwater resources in Texas with the passage of House Bill 1763 ("HB 1763") in 2005. HB 1763 created a long-term planning process in which GCDs in each Groundwater Management Area ("GMA") were required to meet and engage in joint planning activities to, among other things, determine the Desired Future Conditions ("DFCs") for the groundwater resources within their boundaries by September 1, 2010. There have been numerous subsequent legislative enactments further modifying these groundwater laws and GCD management requirements in Texas.

Texas groundwater law is clear in establishing the sequence that a GCD is to follow in accomplishing statutory responsibilities related to the conservation and management of groundwater resources. The three primary steps, which must occur at least once every five years, are the following: (1) to adopt desired future conditions for the relevant aquifers in the GCD (Texas Water Code Sections 36.108(c) and (d)), (2) to develop and adopt a management plan that includes goals designed to achieve the desired future conditions (Texas Water Code Section 36.1071(a)(8)), and (3) to amend and adopt rules necessary to achieve goals included in the management plan (Texas Water Code Sections 36.101(a)(5); 36.1132(a)and (b); and 36.3011(b)). The District's management plan satisfies the statutory requirements of the Texas Water Code Section 36.1071 and the administrative requirements of the Texas Water Development Board's rules set forth in Texas Administrative Code, Title 31, Chapter 356.

III. DISTRICT INFORMATION

A. Creation

The Prairielands Groundwater Conservation District ("District") was created by the 81st Texas Legislature under the authority of Section 59, Article XVI, of the Texas Constitution, and in accordance with Chapter 36 of the Texas Water Code ("Water Code"), by the Act of May 31, 2009, 81st Leg., R.S., Ch. 1208, 2009 Tex. Gen. Laws 3859, codified at TEX. SPEC. DIST. LOC. LAWS CODE ANN. Ch. 8855 ("the District Act"). The District is a governmental agency and a body politic and corporate. The District was created to serve a public use and benefit, and is essential to accomplish the objectives set forth in Section 59, Article XVI, of the Texas Constitution.

B. Directors

The District's Board of Directors ("Board") consists of eight members who are appointed by the county commissioners courts for four-year terms. There are two members on the Board for each of the four counties in the District. One director is appointed per county every two years; therefore, each county has one director with a term that expires every two years.

C. Authority

The District has the rights and responsibilities provided for in Chapter 36 of the Texas Water Code and Chapter 356, Title 31 of the Texas Administrative Code. The District is charged with conducting hydrogeological studies, adopting a management plan, providing for the permitting of certain water wells, and implementing programs to achieve statutory mandates. The District has rulemaking authority to implement the policies and procedures needed to manage the groundwater resources of Ellis, Hill, Johnson, and Somervell counties.

D. Location and Extent

The District's boundaries are coextensive with the boundaries of Ellis, Hill, Johnson, and Somervell Counties, Texas. The District covers an area of approximately 2,861 square miles. A map is included as Figure 1.

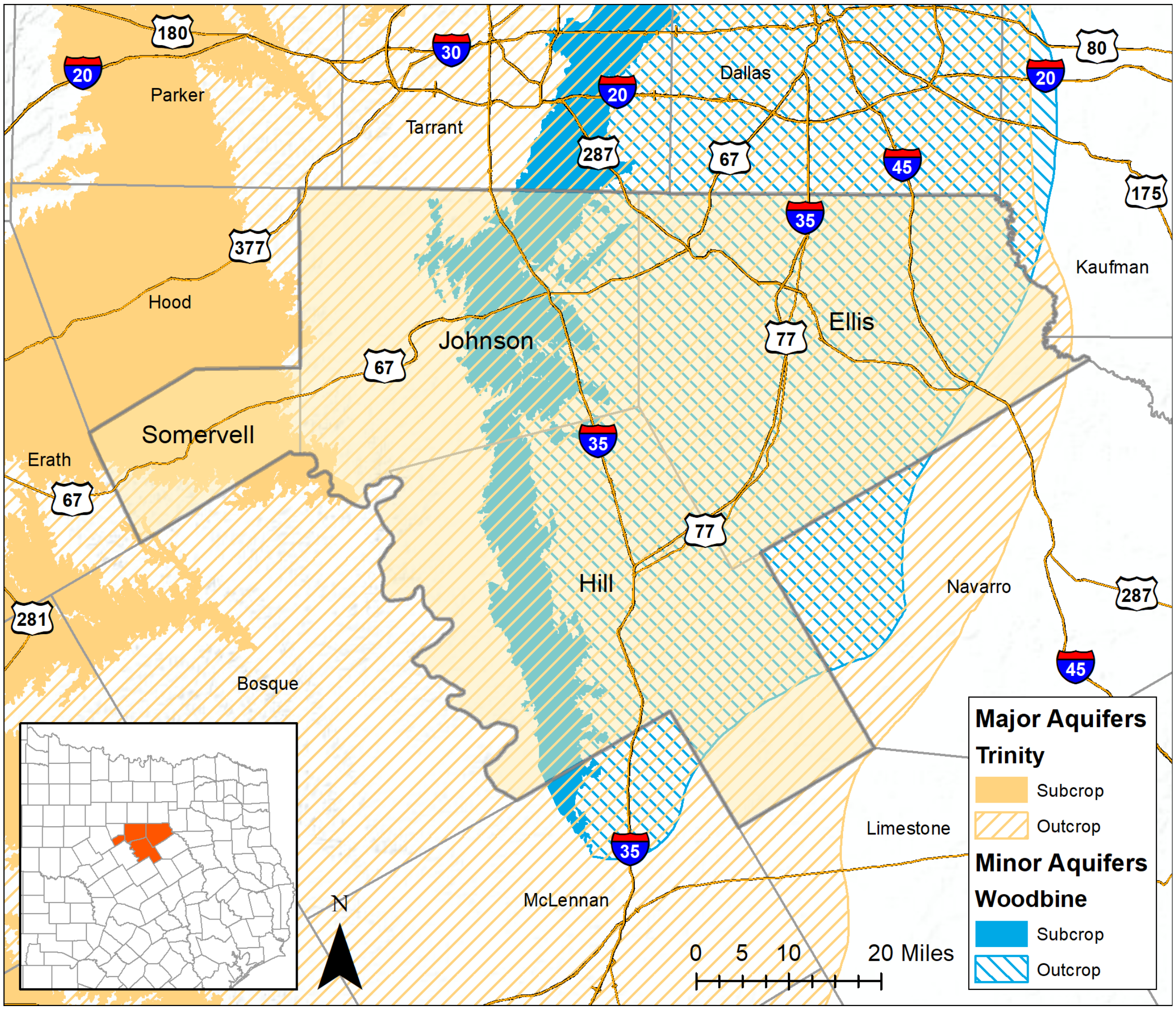

Figure 1. Prairielands Groundwater Conservation District Location Map

E. Topography and Drainage

The District is located within the Brazos and Trinity River Basins. Runoff on the west side of the District flows primarily west to the Brazos River, and runoff on the east side of the District drains primarily to the east to the Trinity River. Elevations in the District range from approximately 280 to 1,315 ft. above mean sea level (amsl) and the physiography consists primarily of gently rolling prairieland, woodlands, and wooded bottomlands in the river valleys.

F. Groundwater Resources of Ellis, Hill, Johnson, and Somervell Counties

A map showing the extent of the aquifers in the District is included as Figure 1. Cross sections through both the Woodbine and Trinity aquifers are included as Figures 2 and 3.

The Trinity aquifer consists of early Cretaceous Period formations of the Trinity Group where they occur in a band extending through the central part of the state in all or parts of 55 counties, from the Red River in North Texas to the Hill Country of South-Central Texas. Trinity Group deposits also occur in the Panhandle and Edwards Plateau regions where they are included as part of the Edwards-Trinity (High Plains and Plateau) aquifers.

Formations comprising the Trinity Group are (from youngest to oldest) the Paluxy, Glen Rose, and Twin Mountains-Travis Peak. Updip, where the Glen Rose thins or is missing, the Paluxy and Twin Mountains coalesce to form the Antlers Formation. The Antlers consists of up to 900 feet of sand and gravel, with clay beds in the middle section. Water from the Antlers is mainly used for irrigation in the outcrop area of North and Central Texas. Forming the upper unit of the Trinity Group, the Paluxy Formation consists of up to 400 feet of predominantly fine-to-coarse-grained sand interbedded with clay and shale. The formation pinches out downdip and does not occur south of the Colorado River.

Underlying the Paluxy, the Glen Rose Formation forms a gulf-ward-thickening wedge of marine carbonates consisting primarily of limestone. South of the Colorado River, the Glen Rose is the upper unit of the Trinity Group and is divisible into an upper and lower member. In the north, the downdip portion of the aquifer becomes highly mineralized and is a source of contamination to wells that are drilled into the underlying Twin Mountains.

The basal unit of the Trinity Group consists of the Twin Mountains and Travis Peak formations, which are laterally separated by a facies change. To the north, the Twin

Mountains formation consists mainly of medium-to coarse-grained sands, silty clays, and conglomerates. The Twin Mountains is the most prolific of the Trinity aquifers in North-Central Texas; however, the quality of the water is generally not as good as that from the Paluxy or Antlers Formations. To the south, the Travis Peak Formation contains calcareous sands and silts, conglomerates, and limestones. The formation is subdivided into the following members in descending order: Hensell, Pearsall, Cow Creek, Hammett, Sligo, Hosston, and Sycamore.

Extensive development of the Trinity aquifer has occurred in the Fort Worth-Dallas region where water levels have historically dropped as much as 800 feet and greater. Since the mid-1970s, many public supply entities have inactivated wells and shifted to surface water supplies, and water levels in some areas have responded with slight rises. Water-level declines are still occurring in areas. The Trinity aquifer is most extensively developed from the Hensell and Hosston members in the Waco area, where the water level has declined by as much as 400 feet.

The Woodbine aquifer extends from McLennan County in North-Central Texas northward to Cooke County and eastward to Red River County, paralleling the Red River. Groundwater produced from the aquifer furnishes municipal, industrial, domestic, livestock, and small irrigation supplies throughout its North Texas extent. The Woodbine Formation is composed of water-bearing sandstone beds interbedded with shale and clay. The aquifer dips eastward into the subsurface where it reaches a maximum depth of 2,500 feet below land surface and a maximum thickness of approximately 700 feet.

The Woodbine aquifer is divided into three water-bearing zones that differ considerably in productivity and quality. Only the lower two zones of the aquifer are developed to supply water for domestic and municipal uses. Chemical quality deteriorates rapidly in well depths below 1,500 feet. In areas between the outcrop and this depth, quality is considered good overall as long as ground water from the upper Woodbine is sealed off. The upper Woodbine contains water of extremely poor quality in downdip locales and contains excessive iron concentrations along the outcrop.

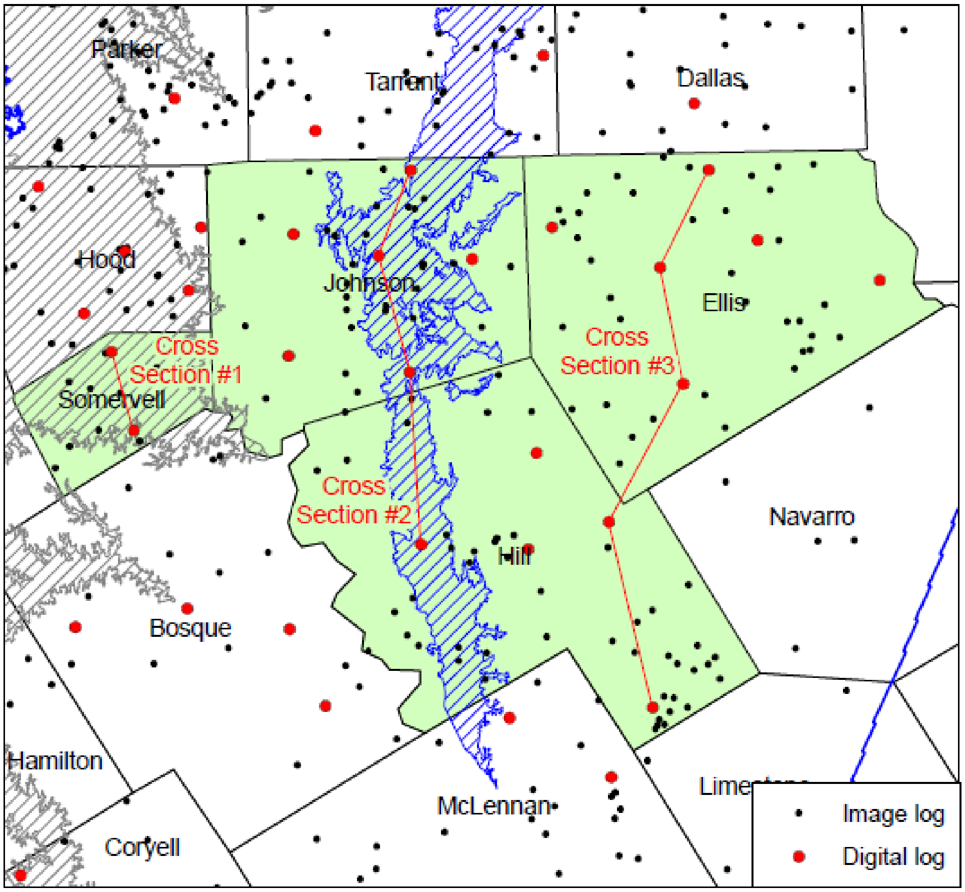

Figure 2. Aerial views of cross sections 1-3 demonstrating the stratigraphy of Prairielands GCD.

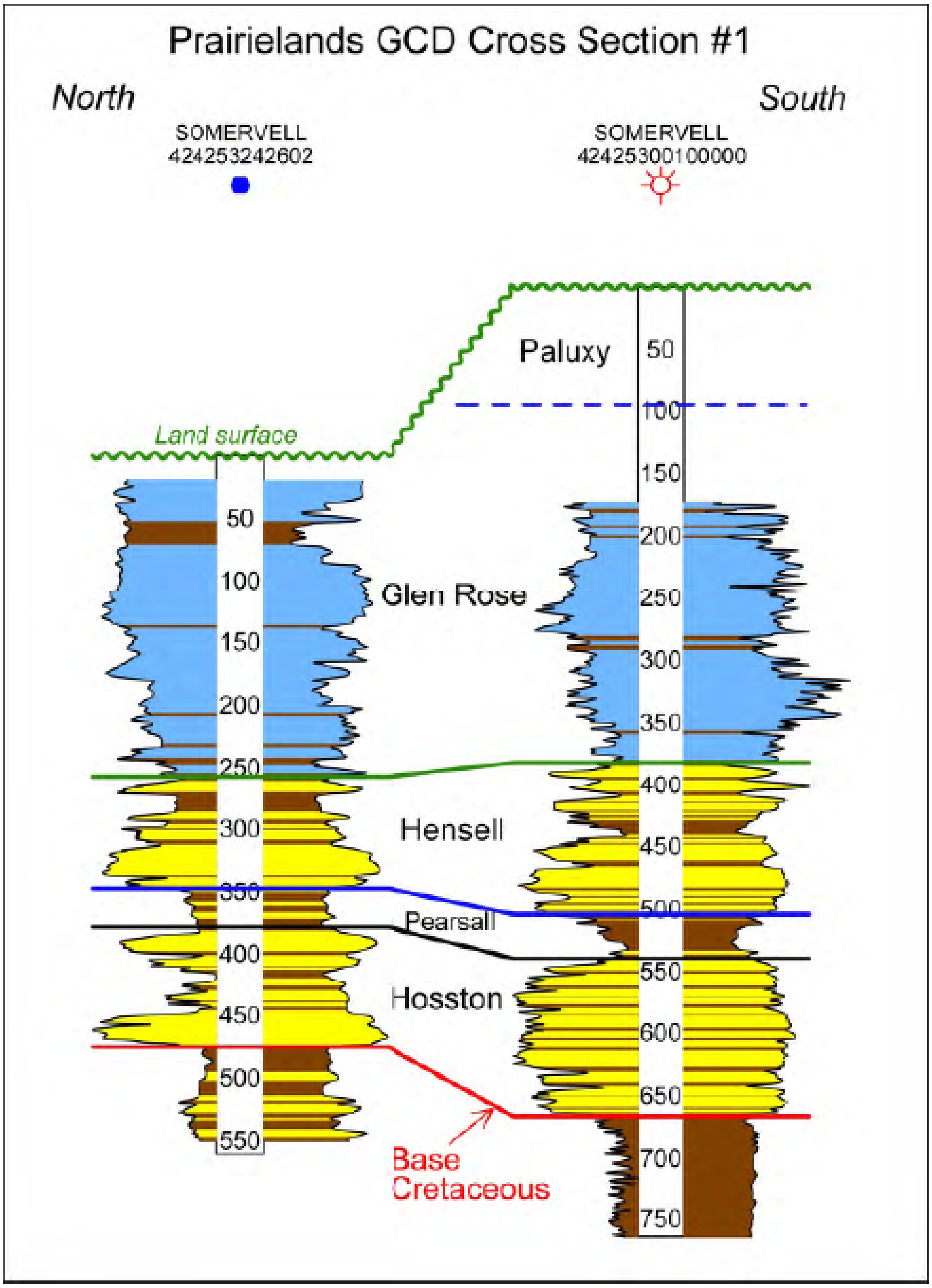

Figure 3. Cross section 1 through Somervell County.

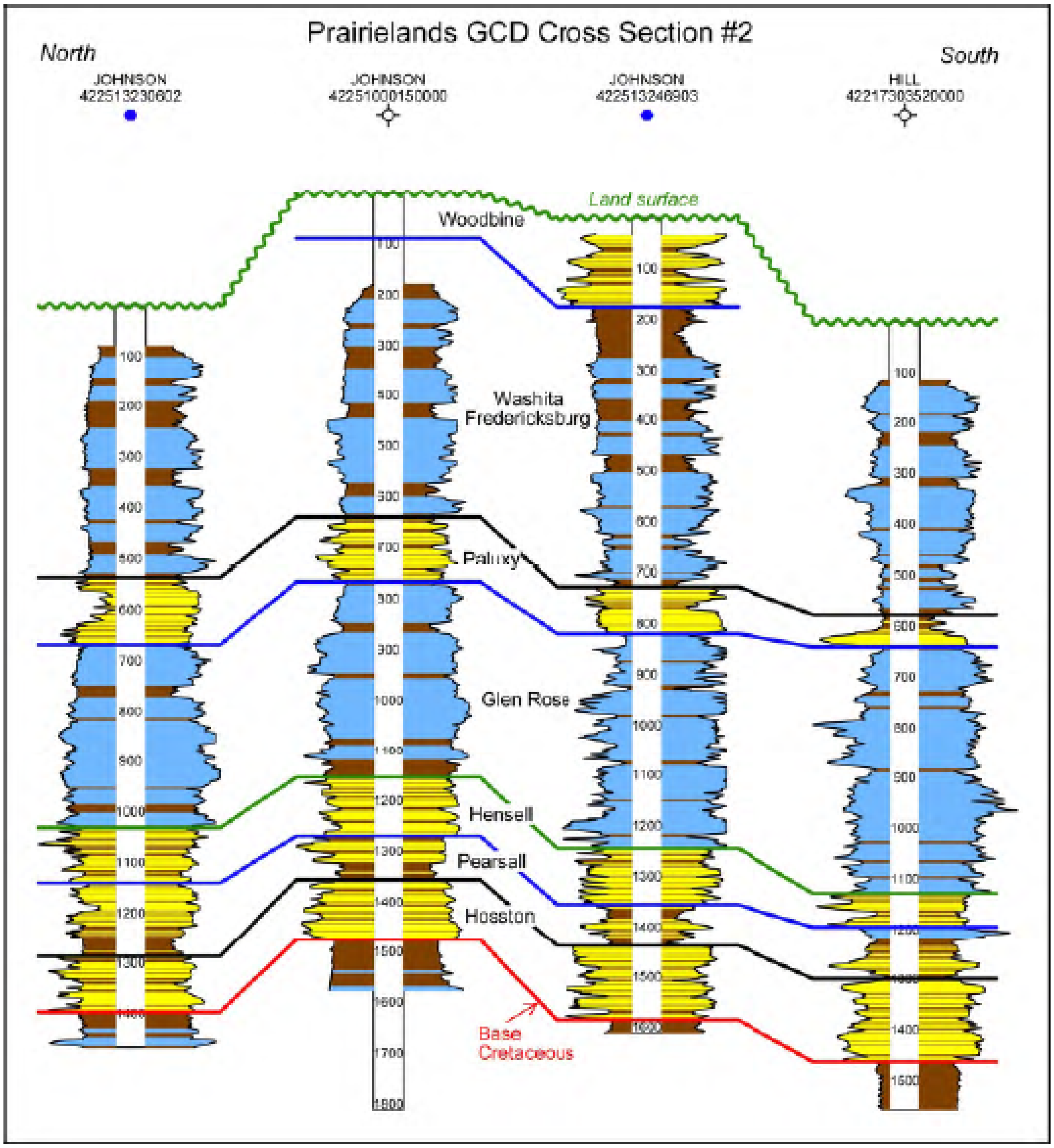

Figure 4. Cross section 2 through Johnson and Hill Counties.

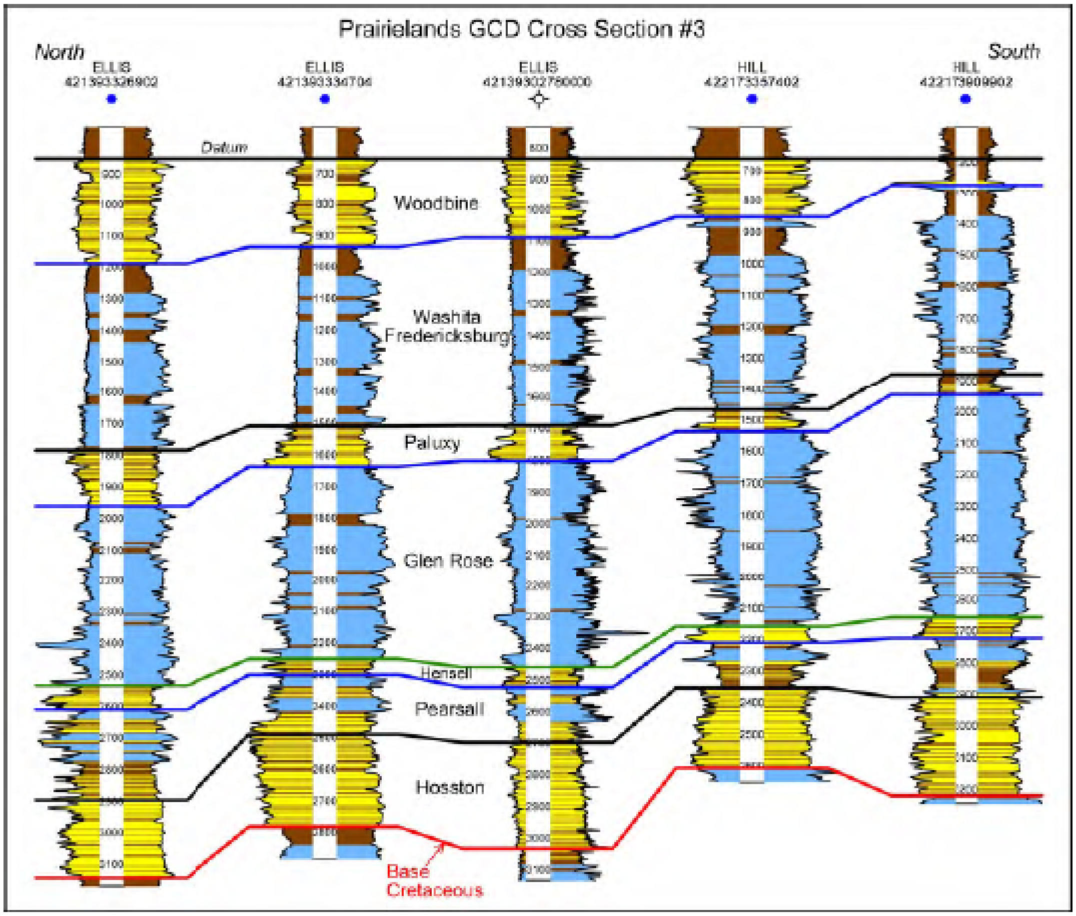

Figure 5. Cross section 5 through Ellis and Hill Counties.

IV. STATEMENT OF GUIDING PRINCIPLES

The District is committed to manage and protect the groundwater resources within its jurisdiction and to work with others to ensure a sustainable, adequate, high quality, and cost-effective supply of water, now and in the future. The District will strive to develop, promote, and implement water conservation, augmentation, and management strategies to protect water resources for the benefit of the citizens, economy, and environment of the District. The preservation of this valuable resource can be managed in a prudent and cost-effective manner through conservation, education, and appropriate rules. Any action taken by the District shall only be after full consideration and respect has been afforded to the individual property rights of all citizens of the District.

V. CRITERIA FOR PLAN CERTIFICATION

A. Planning Horizon

The time period for this management plan is five years from the date of approval by the Texas Water Development Board ("TWDB"). This plan will be reviewed and readopted with or without amendments at least once every five years, or more frequently if deemed necessary or appropriate by the District Board or as required by law. This management plan will remain in effect until it is replaced by a revised management plan approved by the TWDB.

B. Board Resolution

A certified copy of the Prairielands Groundwater Conservation District resolution adopting the plan is located in Appendix A – District Resolution.

C. Plan Adoption

Public notices documenting that the plan was adopted following appropriate public meetings and hearings are located in Appendix B – Notice of Meetings.

D. Coordination with Surface Water Management Entities

A sample letter transmitting copies of this plan to the surface water management entities in the District along with a list of the surface water management entities to which the plan was sent are located in Appendix C – Coordination with Surface Water Management Entities.

VI. ESTIMATES OF TECHNICAL INFORMATION

A. Modeled Available Groundwater Based on the Desired Future Conditions

The amount of water that may be permitted from an aquifer is not the same amount as the total amount that can be pumped from an aquifer. Total pumping includes uses of water both subject to permitting and exempt from permitting ("exempt use"). Examples of exempt use include: domestic, livestock, and some types of water use associated with oil and gas exploration.

The DFCs of the aquifers are determined through joint planning with other GCDs in the same groundwater management area ("GMA") as required by the Texas Legislature. The Prairielands Groundwater Conservation District is located in GMA 8. The GCDs of GMA 8 have completed the development and adoption of DFCs for the relevant aquifers in the GMA through the most recent five-year cycle of the joint planning process.

To determine the DFCs, a series of simulations using the TWDB's Groundwater Availability Model ("GAM") for the Northern Trinity and Woodbine aquifers were completed. Each GAM simulation was done by iteratively applying various amounts of simulated groundwater pumping from the aquifer over a predictive period that included a simulation of the drought of record. Pumping was increased until the amount of pumping that could be sustained by the aquifer without impairing the aquifer conditions selected for consideration as the indicator of the aquifer desired future condition was identified.

There are three subdivisions in the Trinity aquifer – the Upper, Middle and Lower. In the Prairielands District, the geologic units comprising the Trinity are the Paluxy Sand, the Glen Rose Limestone, the Hensell Sand and the Hosston Conglomerate of the Travis Peak Formation. The DFCs of the Woodbine and Northern Trinity aquifers in GMA 8 are documented in GAM Run 21-013 MAG, which is included as Appendix D. The DFCs are based on average drawdown in feet after 70 years from the year 2010 for each of the following Trinity aquifer units: Paluxy (Upper Trinity), Glen Rose (Upper Trinity), Hensell (Middle Trinity) and the Hosston (Lower Trinity).

The current DFCs are listed in Table 1. These values are the maximum drawdown (in feet) allowed over the 50-year planning period. The associated MAGs (in acre-feet per year) are shown in Table 2.

Table 1. Summary of Desired Future Conditions in Prairielands GCD, adopted November 2021.

	Woodbine	Paluxy	Glen Rose	Hensell	Hosston	Twin Mountains	Travis Peak
Ellis	76	128	220	290	390	413	380
Hill	20	45	149	211	413	Not Present	365
Johnson	4	-57	66	120	329	184	235
Somervell	Not present	4	4	17	120	50	64

Note: All values are in feet.

Table 2. Summary of Modeled Available Groundwater in Prairielands GCD, 2021 Round of Joint Planning.

	Woodbine	Paluxy	Glen Rose	Hensell	Hosston	Twin Mountains	Travis Peak
Ellis	2,074	442	50	0	5,545	0	5,676
Hill	587	352	115	25	3,610	Not Present	4,685
Johnson	1,981	2,442	1,633	119	4,251	278	4,472
Somervell	Not present	14	146	217	930	65	1,763

Note: All values are in acre-feet per year.

B. Amount of Groundwater Being Used Within the District

Each year the TWDB conducts an annual survey of ground and surface water use by municipal and industrial entities within the state of Texas. The information obtained is then utilized by the TWDB for water resources planning. The historical water use estimates are subject to revision as additional data and corrections are made available to the TWDB.

The amount of groundwater used in Ellis, Hill, Johnson, and Somervell Counties in the years 2004 through 2019 is presented in Appendix E. TWDB data included in Appendix E do not differentiate between exempt and non-exempt use.

C. Annual Amount of Recharge from Precipitation

Recharge from precipitation falling on the outcrop of the aquifer (where the aquifer is exposed to the surface) within the Prairielands GCD was estimated by the TWDB in the GAM Run 23-025 dated December 21, 2023. Water budget values of recharge extracted for the transient model period indicate that precipitation accounts for 7,351 acre-feet per year of recharge to the Trinity aquifer, 21,777 acre-feet per year of recharge to the Woodbine aquifer, 383 acre-feet per year of recharge to the Brazos River Alluvium Aquifer, and 1 acre-foot per year of recharge to the Nacatoch Aquifer within the boundaries of the Prairielands GCD (Appendix F). The model assumes average rainfall as measured during the calibration and verification time period (years 1980 through 2012).

D. Annual Volume of Discharge from the Aquifer to Springs and Surface Water Bodies

The total water discharged from the aquifer to surface water features such as streams, reservoirs, and springs is defined as the surface water outflow. Water budget values of surface water outflow within the Prairielands GCD were estimated by the TWDB in the GAM Run 23-025 (Appendix F). Values from the transient model period (years 1980 through 2012) are 27,166 acre-feet per year of discharge from the Trinity aquifer, 17,084 acre-feet per year of discharge from the Woodbine aquifer, and 823 acre-feet per year of discharge from the Brazos River Alluvium Aquifer to surface water bodies that are located within the Prairielands GCD.

E. Annual Volume of Flow into and out of the District within Each Aquifer and between Aquifers in the District

Flow into and out of the District is defined as the lateral flow within an aquifer between the District and adjacent counties. Flow between aquifers is defined as the vertical flow between aquifers or confining units that occurs within the boundaries of the District.

The flow is controlled by hydrologic properties as well as relative water levels in the aquifers and confining units. Water budget values of flow for the Prairielands GCD were estimated by the TWDB in the GAM Run 23- 025 (Appendix F). Values extracted from the transient model period represent the model's calibration and verification time period (years 1980 through 2012).

F. Projected Surface Water Supply in the District

The 2022 Texas State Water Plan, the most recent plan available, provides an estimate of projected surface water supplies in Ellis, Hill, Johnson, and Somervell counties. These estimates are included in Appendix E.

G. Projected Total Demand for Water in the District

Appendix E contains an estimate of projected net water demand in Ellis, Hill, Johnson, and Somervell counties based on the 2022 Texas State Water Plan.

VII. WATER SUPPLY NEEDS AND WATER MANAGEMENT STRATEGIES INCLUDED IN THE ADOPTED STATE WATER PLAN

Projected Water Supply Needs

The District has reviewed and considered the projected water needs for the counties in the District from the 2022 State Water Plan. TWDB defines "water supply needs" as the projected water demands in excess of existing water supplies for a water user group or wholesale water provider in the event of a drought of record. Projected water needs were estimated on the county-basin level for all water user group categories for every decade from 2020 through 2070. Appendix E lists the total water supply needs for Ellis, Hill, Johnson and Somervell counties as adopted in the TWDB 2022 State Water Plan.

Water supply needs for the District exist for many entities and use types. In Ellis County this includes sizable municipal needs for Ennis, Mountain Peak SUD, Rockett SUD, Sardis Lone Elm WSC, and Waxahachie as well as smaller needs for other public water suppliers. The TWDB 2022 State Water Plan also has identified needs for Irrigation and Steam-Electric Power users. In Hill County, the largest need identified is for Steam-Electric Power generation. In Johnson County, project water supply needs include municipal suppliers such as Bethesda WSC, Burleson, and Cleburne in addition to lesser amounts for Steam-Electric Power and Irrigation. In Somervell County, substantial needs have been identified for Steam-Electric Power throughout the planning period.

Water Management Strategies

The District has reviewed and considered the 2022 State Water Plan assessed and recommended water management strategies to meet the identified needs for every decade from 2020 through 2070. Potential strategies include water conservation, developing additional groundwater and surface water supplies, expanding and improving management of existing water supplies, water reuse, and alternative approaches such as desalination. The projected water management strategies for the counties in the District from the 2022 State Water Plan are shown in Appendix E by water user group ("WUG").

In Ellis County, substantial water supply strategies include the Marvin Nichols Reservoir and Indirect Reuse from the TRA Central Wastewater Treatment Plant, the Cedar Creek Wetlands, and Midlothian. In Hill County, the largest water supply strategies include conservation, surface water from the Brazos River Authority, and development of the Woodbine Aquifer. In Johnson County, strategies include conservation, the Marvin Nichols Reservoir, and Direct Reuse (Cleburne). In Somervell County strategies include conservation and surplus water from the Wheeler Branch Off-Channel Reservoir.

VIII. DISTRICT MANAGEMENT OF GROUNDWATER

The Texas Legislature has declared in Chapter 36 of the Texas Water Code that groundwater conservation districts ("GCDs") are the state's preferred method of groundwater management in order to protect property rights, balance the conservation and development of groundwater to meet the needs of this state, and use the best available science in the conservation and development of groundwater. TEX. WATER CODE ANN. § 36.0015(b) (2017). Chapter 36 gives GCDs the authority to manage groundwater resources by developing and implementing management plans and rules and also provides the necessary tools to help GCDs be successful in this endeavor.

Successful groundwater management requires a balance of long-term planning, consistent evaluation of groundwater science and the District's practices in light of that science, and responsiveness to the evolving needs of the individuals who rely on the resource. Since its creation in 2009, the District has operated toward achieving this balance through a comprehensive regulatory scheme, continuing education and interaction with experts in the groundwater arena, and building relationships in our communities with the people who rely on us to be good stewards our shared groundwater resources.

The District's efforts in its early years focused on organization, assembling a management structure and administrative staff, retaining well-qualified technical and legal consultants, and gathering data on groundwater use and the nature, location, extent, and hydraulic properties of the various layers of the aquifers that are located within the District's boundaries. The District adopted temporary rules effective November 15, 2010, through December 31, 2018, that allowed it to gather information on groundwater production throughout the District through a well registration program and metering and production reporting requirements for non-exempt wells. The District also constructed a geodatabase to serve as a repository for that information, and has commissioned studies to map, characterize, and model the groundwater resources within its boundaries. This approach is largely reflected in the "Goals, Management Objectives, and Performance Standards" section of this management plan, as well as in the meeting minutes and other records of the District.

The District adopted its first comprehensive rules with a permitting system on December 17, 2018, which became effective January 1, 2019. The rules were developed over years through analysis of the aquifers in the District's boundaries, usage and growth patterns, consultation with hydrogeologists and legal counsel, and input from stakeholders. The District works to assist and guide registrants and permittees through the water well registration and permitting processes, and periodically amends the rules to ensure that they are having their intended result. The District expects to continue learning and improving over time as we implement the amended rules and as new science becomes available. On November 4, 2021, the GCDs in GMA 8 adopted the most recent DFCs for the aquifers in GMA 8 as required by Section 36.108 of the Texas Water Code. These DFCs were based in part on the Northern Trinity and Woodbine Aquifers Groundwater Availability Model developed by Prairielands GCD and other districts in GMA 8, and used in coordination with the TWDB during the DFC development and adoption process. The updated model has been utilized for purposes of this management plan to provide important technical information, including annual amount of recharge from precipitation, annual volume of discharge from the aquifer to springs and surface water bodies, and annual volume of flow into and out of the District within each aquifer and between aquifers in the District, as set forth in Section VI of this plan.

The aquifer characterization and modeling studies the District has undertaken help provide the District with insight on how much pumping can be sustained by each layer of each aquifer on a long-term basis, maximizing the utilization of each resource without overproduction that could lead to failure to achieve DFCs. The District is also committed to manage groundwater resources to protect private property rights in the region, including the investments of both existing well owners and other property owners.

In addition to obvious threats to the long-term viability of the aquifers and property values from over-pumping, the District is also concerned about protecting the limited available groundwater resources from contamination that may render the supplies unusable. The District is particularly concerned with potential impacts from injection well waste disposal activities and activities on the surface of the land that have a strong potential to cause the introduction of contaminants into the aquifers, and the future implications of those activities to both freshwater and brackish groundwater supplies in the District. The District Board is aware that state agencies are often too understaffed to thoroughly evaluate and track all proposed and ongoing projects. Therefore, the District Board attempts to monitor the waste-injection and other potentially hazardous projects within its boundaries to ensure that the practices being used do not threaten the long-time viability of freshwater and brackish groundwater resources as water supplies.

The District is committed to the important and complex task it has been given to manage, conserve, and protect the groundwater resources of the region so that they are viable sources of supply both now and for future generations. In doing so, the District Board continues to rely upon the best information and science available and to act reasonably and prudently in carrying out the District's mission.

IX. ACTIONS, PROCEDURES, PERFORMANCE, AND AVOIDANCE FOR PLAN IMPLEMENTATION

In order to implement the management plan, the District continually works to develop, maintain, review, and update the District's rules and procedures for the various activities contained in the management plan. The District's rules, as most recently amended, can be viewed at the following link:

https://www.prairielandsgcd.org/about/rules-and-bylaws/

In order to monitor performance: (a) the General Manager routinely meets with staff to track progress on the various objectives and standards adopted in this management plan, and (b) on an annual basis, staff prepares and submits an annual report documenting progress made towards implementation of the management plan to the Board for its review and approval.

The District will work diligently to ensure that all landowners and groundwater users within the District's jurisdictional boundaries are treated as fairly as possible. The District, as needed, will work with federal, state, regional, and local water management entities in the implementation of this management plan and management of groundwater supplies. The District will continue to enforce its rules to conserve, preserve, protect, and prevent the waste of groundwater resources within its jurisdiction. Texas Water Code Chapter 36.1071(a) (1-8) requires that all management plans address the following management goals, as applicable:

- providing the most efficient use of groundwater;

- controlling and preventing waste of groundwater;
- controlling and preventing subsidence;
- addressing conjunctive surface water management issues;
- addressing natural resource issues;
- addressing drought conditions;
- addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective; and
- addressing the desired future conditions adopted by the District under Section 36.108 of the Texas Water Code.

The following management goals, management objectives, and performance standards have been developed and adopted to ensure the management and conservation of groundwater resources within the District's jurisdiction.

X. METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS

The District's General Manager and staff will prepare an annual report ("Annual Report") and will submit the Annual Report to members of the Board of the District. The Annual Report covers the activities of the District including information on the District's performance in regards to achieving the District's management goals and objectives. The Annual Report will be delivered to the Board by July 1 following the completion of the District's fiscal year. A copy of the Annual Report will be kept on file and available for public inspection at the District's offices upon approval by the Board.

XI. GOALS, MANAGEMENT OBJECTIVES, AND PERFORMANCE STANDARDS

A. Providing the most efficient use of groundwater

The Board of Directors and staff work to assist water users in protecting, preserving, and conserving groundwater resources. The Board strives to use scientific data and logical methods to make decisions that allow for reasonable groundwater use. The Board determines what programs and activities the staff will undertake to best implement water conservation and management practices in the District. District rules will be amended as necessary and implemented to protect the quantity and quality of the groundwater and to prevent the waste of groundwater.

Management Objective 1

The District will require that wells be registered and permitted in accordance with its rules.

Performance Standard

Each year the staff will report well registration and permitting statistics. A summary of registration and permitting activity by county and by aquifer will be included in the District's Annual Report.

Management Objective 2

Each year the District will monitor annual production from all non-exempt wells within the District. The District will compile records and maintain a database of non-exempt wells to help assess the aquifer units from which groundwater production occurs.

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.

Management Objective 3

The District will periodically review and update as appropriate its methodology to quantify current and projected annual groundwater production from exempt wells.

Performance Standard

The District will provide the TWDB with its methodology and estimates of current and projected annual groundwater production from exempt wells. The District will continue to utilize estimates of exempt use in their production allocation system and rules. Information related to implementation of this objective will be included in the Annual Report to the Board of Directors.

B. Controlling and preventing waste of groundwater

Management Objective 1

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

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.

Management Objective 2

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

Performance Standard

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

Management Objective 3

The District will identify well owners that are not in compliance with District well registration, permitting, reporting, maximum annual groundwater production limits, and water use fee payment requirements of the District Rules, and bring them into compliance.

Performance Standard

The District will compare existing state records and field staff observations with the well registration database to identify noncompliant well owners.

Management Objective 4

The District will investigate instances of potential waste of groundwater.

Performance Standard

Report to the Board as needed and include the number of investigations in the Annual Report.

C. Addressing conjunctive surface water management issues

Management Objective 1

The District will actively participate in the Region C and Region G regional water planning processes to stay abreast of water demand projections and supply strategies in the District and to coordinate the District's groundwater management strategies with the regional water planning groups and foster an understanding of regional management practices.

Performance Standard

The District will review the most recently approved State Water Plan to gain an understanding of water demand projections and supply strategies in the District. The District will monitor future proposed amendments to the Region C and Region G regional water plans as they pertain to the District and ensure that supply strategies impacting groundwater resources in the District are identified in the appropriate regional water plan. The District's General Manager or designated representative will attend meetings of the Region C and Region G regional water planning groups when feasible. A summary of the District's interactions with the regional water planning groups will be included in the Annual Report provided to the Board of Directors.

Management Objective 2

The District will: 1) seek to better understand groundwater and surface water interactions, including groundwater base flow discharges to surface water courses and aquifer recharge from surface water flows; 2) identify existing and planned surface water and other alternative supplies to meet anticipated demand growth; 3) explore possible groundwater to surface water conversions in the District and facilitate the process, and 4) understand current and planned surface water supplies and how they affect groundwater demands.

Performance Standard

A summary of any new information or studies on groundwater-surface water interaction, as well as a summary of the District's efforts related to promoting development of surface water supplies, groundwater to surface water conversions, and interactions with RWPGs and other water suppliers and users will be included in each Annual Report.

D. Addressing natural resource issues that impact the use and availability of groundwater and which are impacted by the use of groundwater

Management Objective 1

The District will develop a program to monitor and assess injection well activities in the District.

Performance Standard

The District will monitor and review injection well applications filed with the Railroad Commission of Texas and the Texas Commission on Environmental Quality that propose injection wells to be located within the boundaries of the District to identify contamination threats to groundwater resources in the District. The General Manager will bring to the attention of the Board any applications that the General Manager determines may threaten the groundwater resources in the District and any outcomes of actions taken by the District. A summary of the District's injection well monitoring activities and actions taken by the District will be included in each Annual Report.

Management Objective 2

The District will monitor compliance by oil and gas companies of the well registration, metering, production reporting, and fee payment requirements of the District's rules.

Performance Standard

As with other types of wells, instances of non-compliance by owners and operators of water wells for oil and gas activities will be reported to the Board of Directors as appropriate for enforcement action. A summary of such enforcement activities will be included in the Annual Report.

E. Addressing drought conditions

Management Objective 1

The District will conduct a monthly review of drought conditions within the District using the Texas Water Development Board's Monthly Drought Conditions available at:

http://www.twdb.texas.gov/surfacewater/conditions/report/index.asp

Performance Standard

An annual review of drought conditions within the District will be included in the Annual Report provided to the Board of Directors. Reports will be provided more frequently to the Board as deemed appropriate by the General Manager to timely respond to drought conditions as they occur.

Management Objective 2

The District will develop information to understand the relationships between drought conditions, increased pumping, and the impacts of both on water levels and shallow wells in the outcrops and subcrops of the aquifers in the District. The District will also determine areas where it may be suitable for the District to implement pumping restrictions during drought times in order to protect public safety and welfare. The District will also determine times when it may allow overpumping during years of extreme drought to promote conjunctive management when surface water supplies become unavailable to water user groups or when groundwater demand otherwise increases due to drought conditions, or to respond to emergency conditions.

Performance Standard

The District will monitor and assess drought impacts on aquifer outcrops and subcrops, including effects of increased pumping. The District will continue to implement the information gained from their recent drought studies to decisions regarding future pumping restrictions and overpumping allowables, and will continue to annually determine whether to implement its rules allowing for increased groundwater during periods of extreme drought or other emergency conditions. Information on any such pumping restrictions or overpumping allowables in a calendar year shall be included in the District's Annual Report.

F. Where appropriate and cost-effective address conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, and brush control

Management Objective 1

The District will annually produce at least one article regarding water conservation, rainwater harvesting, or brush control, to be shared through social media channels assessable to communities within the District.

Performance Standard

Each year, copies of the social media post(s) and each conservation article will be included in the District's Annual Report to be given to the District's Board of Directors.

Management Objective 2

Each year, the District will include at least one informative flyer on water conservation, rainwater harvesting, or brush control within at least one email distributed to groundwater non-exempt water users as part of the normal course of business for the District. The District will also consider additional flyers or initiating other public awareness campaigns and outreach efforts on water conservation during drought conditions.

Performance Standard

Each year, a copy of each flyer and a summary of all other public awareness water conservation campaigns and outreach efforts will be included in the District's Annual Report to be given to the District's Board of Directors

Management Objective 3

The District will investigate the feasibility of recharge enhancement and aquifer storage and recovery ("ASR") projects in the District.

Performance Standard

The District will use the datasets generated by their recent studies on ASR to assist potential ASR project sponsors with appropriate project information. Any activities of the District relating to ASR will be summarized in the District's Annual Report.

Management Objective 4

The District will periodically support or sponsor an educational seminar addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control.

Performance Standard

The District will support or sponsor such a seminar at least once every other year. A summary of such educational activities will be included in the District's Annual Report.

Management Objective 5

Each year, the District will seek to provide educational outreach regarding water conservation to at least one elementary school in each county of the District.

Performance Standard

Each year, a list of schools that participate in the educational outreach will be included in the District's Annual Report to be given to the District's Board of Directors.

G. Addressing the desired future conditions adopted by the District under TWC §36.108; TWC §36.1071(a)(8)

Management Objective 1

The District will follow and update its Groundwater Monitoring Program within the District to monitor water well levels (and baseline water quality) in wells in each aquifer and subdivision thereof in the District. The District will take periodic readings from the monitoring wells and input the data into the District's database. The District will utilize the information to help implement its regulatory and permitting program and monitor water level trends and actual achievement of DFCs.

Performance Standard

The District will continue to implement their recently developed Groundwater Monitoring Program. A summary of the District Groundwater Monitoring Program will be included in the District's Annual Report to be given to the District's Board of Directors. A technical memorandum detailing the monitoring plan can be found in Appendix G.

Management Objective 2

The District will monitor non-exempt pumping within the District for use in evaluating the District's compliance with aquifer desired future conditions.

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.

XII. MANAGEMENT GOALS DETERMINED NON-APPLICABLE TO THE DISTRICT

Controlling and preventing subsidence

The District considered the applicable information regarding subsidence in the District in TWDB's 2017 report *Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping* (Furnans and others, 2017), and determined that this management goal is not relevant due to the surface elevation and the compacted nature of the geologic units in the District. On Page 1-5 of Furnans and others (2017), it lists the Trinity Aquifer as having a "Medium" risk of subsidence. Figure 1-1 of the report shows a map depicting the distribution of subsidence risk based on the methodology described therein. Despite the significant water level declines that have occurred in the Trinity Aquifer and in the District historically, the District has not observed subsidence as an issue of concern. The District will investigate all reports of possible subsidence brought to its attention.

Appendix A
District Resolution

AFFIDAVIT OF KATHY TURNER JONES

STATE OF TEXAS §
§
COUNTY OF JOHNSON §

Before me, the undersigned notary, on this day personally appeared KATHY TURNER JONES, the affiant, whose identity is known to me. After I administered an oath, affiant testified as follows:

1. My name is Kathy Turner Jones. I am over 18 years of age, of sound mind, and capable of making this affidavit. The facts stated in this affidavit are within my personal knowledge and are true and correct.

2. I am the General Manager of the Prairielands Groundwater Conservation District ("District").

3. On March 18, 2024, the Board of Directors of the District adopted this District Management Plan in a public hearing for which notice was provided as required by law.

4. The adoption of the District Management Plan will be documented in the minutes of the public hearing, which are scheduled to be adopted by the Board of Directors of the District at its Regular Board Meeting on April 15, 2024.

5. Once adopted and if desired by Texas Water Development Board, the District can provide a copy of the signed minutes of the public hearing to the TWDB.

Prairielands Groundwater Conservation District

FURTHER affiant sayeth not.

Kathy Turner Jones

SWORN TO AND SUBSCRIBED BEFORE ME on this 26th day of March, 2024.

ANNETTE KINNEY
Notary ID #132541418
My Commission Expires
June 26, 2024

Notary Public in and for
the State of Texas

Appendix B
Notice of Meetings

NOTICE OF PUBLIC HEARINGS AND BOARD MEETING

OF THE BOARD OF DIRECTORS
Of the
PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT
To be held at
9:00 AM, Monday, March 18, 2024

Prairielands GCD – Board Room
208 Kimberly Drive
Cleburne, TX 76031

Public Hearing on Historic Use Permit Applications and Proposed Permits

The Public Hearing on Permit Applications will begin at 9:00 AM. Notice of the Hearing on Historic Use Permit Applications and Proposed Permits was also posted separately in accordance with the District Rules, and Chapter 36, Texas Water Code, on February 16, 2024.

The Board of Directors will hold a public hearing on the following applications for Historic Use Permits and the proposed Historic Use Permits prepared by the District's General Manager:

1. Call to order and declare public hearing open to the public
2. Roll call
3. Procedural matters for the hearing
4. Receive report from General Manager, receive any public comment(s) or requests to contest, and consider granting, denying, or amending applications for the following applications for a Historic Use Permit:

Application #	Permit Applicant	GM's Recom-mendation (gallons per year)	Maximum Historic Use Claim	# of Wells	Location of Wells	County	Purpose
HUP-095	Covia Solutions Inc. (Office) 1788 CR 308 Cleburne TX 76033	200,000	200,000	2	1788 CR 308, Cleburne, TX 76033	Somervell	Commercial/Public Water System
HUP-073	Hilco United Services Inc (Lakeshore Water System) PO Box 26 Itasca TX 76055	47,300,500	48,497,100	3	132-154 Oak Run, Whitney, TX 76692	Hill	Public Water System

5. Adjourn or continue public hearing in whole or in part.

Public Hearing(s) on Operating Permit Applications

The Hearing on Applications for Operating Permits will begin at 9:00 A.M. or upon adjournment of the above listed Public Hearing on Historic Use Permits.

The Prairielands GCD Board of Directors will hold a hearing(s) on the below-listed applications for Operating Permits and/or Permit Amendments. Notice of the Hearing on Permit Applications was also posted separately in accordance with the District Rules, and Chapter 36, Texas Water Code, no later than 10 days prior to the date of this hearing.

1. Call to order and declare public hearing open to the public
2. Roll call
3. Board will receive a report from the General Manager describing the following applications for an Operating Permit and the General Manager's recommendation to the Board:
   1) Hill Solar 1, LLC, for a proposed Operating Permit (OP-24-054) for authorization to drill a new well (PGCD-003393) to be located in Hill County at 499 HCR 4311, Itasca, TX; not to exceed 426,594 gallons annually for 2024→2028; Commercial Use (AK);
   2) Avalon WSC, for a proposed Operating Permit (OP-24-055) for authorization to produce additional groundwater from existing wells (PGCD-000654, PGCD-000655) located in Ellis County at 213 N FM 55, Italy, TX; not to exceed 9,171,420 gallons annually for 2024→2027; Public Water Supply (AK); and
   3) Ron Sturgeon Real Estate LP, for a proposed Operating Permit (OP-24-056) for authorization to produce groundwater from an existing well (PGCD-003150) located in Johnson County at 6400 FM 157, Venus, TX; not to exceed 655,150 gallons annually for 2024→2028; Commercial Use (KB)
4. Receive public comment(s) or requests to contest the above-listed application(s) for

Operating Permits and Permit Amendments

5. Discussion, consideration, and possible action on the above-listed applications for Operating Permits and Permit Amendments

6. Adjourn or continue public hearing in whole or in part.

Public Hearing on District Management Plan

The Public Hearing will begin at 9:00 A.M. or upon adjournment of the above listed Public Hearing on Operating Permit Applications.

Notice is hereby given that the Board of Directors of the Prairielands Groundwater Conservation District ("District") will hold a public hearing, accept public comment, and may discuss, consider, and take all necessary action regarding development and readoption of the District Management Plan, including proposed amendments.

1. Call to order and declare public hearing open to the public

2. Roll call

3. Consider amendments to the proposed District Management Plan

4. Receive Public Comments

5. Consider Readoption of District Management Plan with Amendments

6. Adjourn or continue public hearing on District Management Plan.

If the public hearing is continued, the proposed Management Plan may be adopted at any future special or regular meetings of the Board of Directors with or without further amendments based on comments received.

Regular Board Meeting

The Regular Board Meeting will begin at 9:00 a.m., or upon adjournment of the Public Hearing(s).

The Prairielands GCD Board of Directors may discuss, consider, and take all necessary action, including possible expenditure of funds, regarding each of the agenda items below:

1. Call to order and declare regular meeting open to the public

2. Roll call

3. Public comment (Verbal comments limited to 3 minutes per speaker)

4. Presentation of Consent Agenda. All items are considered routine and self-explanatory and may be considered and approved by one motion of the Board. There will be no separate discussion of the items unless a Board Member requests, in which event the item will be removed from the consent agenda and considered in its normal sequence.

   a) Minutes of the February 20, 2024, Hearing on Permit Applications
   b) Minutes of the February 20, 2024, Board of Directors Meeting
   c) February 2024 monthly invoices and payment of bills

5. Finance Report – Brian Watts, Comptroller

   a) Presentation of unaudited financials for the month of February 2024

6. Consider and take action to declare the following item(s) surplus and authorize the General Manager to dispose or auction.

   a) Mipro Transmitter and (3) wireless microphones
   b) Bosch Long Microphones (5) NIB
   c) Bosch Control Unit including display panel
   d) Bosch Long Microphones (10) used
   e) Uniden digital answering system and Uniden cordless phone(s)

7. Update on public outreach activities, educational, and conservation efforts – Kaylin Garcia, Public Relations/Education Director

   a) Update on District involved activities
   b) Review and possible action to approve draft 2023 Annual Report for the Prairielands Groundwater Conservation District for publication and distribution

8. Hydrogeologist Report – Wade Oliver, INTERA, Inc.

   a) Update on District involved activities.
   b) Update on activities related to Groundwater Management Area 8 joint planning and the development of desired future conditions.

9. Update on well monitoring and field operations – Michael Heath, Field Operations Coordinator

10. General Manager's Report and Update – The General Manager will brief the Board on the following administrative, operational, and regulatory matters of the District and any other items included in the General Manager's written report, which may be discussed,

considered, and acted upon by the Board, including authorizing the initiation of, managing, or resolving enforcement action or litigation where applicable – Kathy Turner Jones

a) Update on current administrative activities of the District
b) Monthly update on well registrations and groundwater production reports
c) Drought Monitoring
d) Enforcement

11. General Counsel's Report — The District's legal counsel will brief the Board on pertinent legal issues and developments impacting the District since the last Board meeting, and legal counsel's activities on behalf of the District, including without limitation waste injection well monitoring activities including any protests of injection wellapplications with the Railroad Commission of Texas or the Texas Commission on Environmental Quality, District rules enforcement activities, rules and management plan implementation issues, groundwater-related legislative activities, joint planning and DFC development activities, developments in groundwater case law and submission of legal briefs, contractual issues related to the District, open government, policy, personnel, and financial issues of the District, and other legal activities on behalf of the District – Brian Sledge, Legal Counsel, SledgeLaw Group, PLLC

12. Open Forum / Discussion of New Business for Future Meeting Agendas

13. Adjourn Regular Meeting

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. Public hearings and public meetings of the District are available to all persons regardless of disability. If you require special assistance to attend a hearing or meeting, please call (817)556-2299 at least 24 hours in advance of the hearing or meeting to coordinate any special physical access arrangements.

At any time during a hearing or meeting of the Prairielands Groundwater Conservation District Board and in compliance with the Texas Open Meetings Act, Chapter 551, Government Code, Vernon's Texas Codes, Annotated, the Board may meet in a closed executive session on any of the above agenda items or other lawful items for consultation concerning attorney-client matters (§551.071); deliberation regarding real property (§551.072); deliberation regarding prospective gifts (§551.073); personnel matters (§551.074); and deliberation regarding security devices (§551.076). Any subject discussed in executive session may be subject to action during an open hearing or meeting.

Persons may make comments for or against an application for any type of permit, permit amendment, replacement well, or exception request without the need to request a contested case hearing on the application. However, persons wanting to protest an application involving a permit or permit amendment by requesting a contested case hearing must do so in writing in accordance with District Rule 10.6 that is either received by the District or submitted at the public hearing in person before the time that the Board takes final action onthe application, as set forth more specifically in the District Rules.

Certification

I, the undersigned authority, do hereby certify that on March 14, 2024 at or before 5:00 PM, I posted and filed the above notice of meeting(s) and hearing(s) with the Texas Secretary of State, the Johnson, Ellis, Somervell, and Hill counties' clerk offices, and also posted a copy in the front window of the Prairielands GCD office in a place convenient and readily accessible to the general public all times and that it will remain so posted continuously for at least 72 hours preceding the scheduled time of said meeting in accordance with the Texas Government Code, Chapter 551.

Prairielands Groundwater Conservation District

Kathy Turner Jones, General Manager

REC NO: 994629

Ellis County, Texas
Krystal Valdez, County Clerk
P. O. Box 250
Waxahachie, Texas 75165
(972)825-5070

DATE: 03/15/2024
TIME: 08:12am
REGISTER NO: 38
RECEIVED FROM: Prairielands Groundwater Conservation District
CASHIER: DRIEPER

ITEM DESCRIPTION	CLERK/CAUSE #	QTY	FEES PAID
POSTING FEE		1	$2.00
		TOTAL FEES PAID	**$2.00**

ACCOUNT CHARGED

ACCT NO: 131
NAME: Prairielands Groundwater Conservation
TOTAL CHARGED: $2.00
NEW ACCT BALANCE: -$122.00

Thank You,
Krystal Valdez
County Clerk

NOTICE OF PUBLIC HEARINGS AND BOARD MEETING

OF THE BOARD OF DIRECTORS
Of the
PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT
To be held at
9:00 AM, Monday, March 18, 2024

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The Board of Directors will hold a public hearing on the following applications for Historic Use Permits and the proposed Historic Use Permits prepared by the District's General Manager:

1. Call to order and declare public hearing open to the public
2. Roll call
3. Procedural matters for the hearing
4. Receive report from General Manager, receive any public comment(s) or requests to contest, and consider granting, denying, or amending applications for the following applications for a Historic Use Permit:

Application #	Permit Applicant	GM's Recom-mendation (gallons per year)	Maximum Historic Use Claim	# of Wells	Location of Wells	County	Purpose
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Prairielands Groundwater Conservation District

Kathy Turner Jones, General Manager

POSTED
A.M. 415 P.M.

MAR 14 2024

April Long, County Clerk
Johnson County Texas
By LS Deputy

NOTICE OF PUBLIC HEARINGS AND BOARD MEETING

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3. Consider amendments to the proposed District Management Plan

4. Receive Public Comments

5. Consider Readoption of District Management Plan with Amendments

6. Adjourn or continue public hearing on District Management Plan.

If the public hearing is continued, the proposed Management Plan may be adopted at any future special or regular meetings of the Board of Directors with or without further amendments based on comments received.

Regular Board Meeting

The Regular Board Meeting will begin at 9:00 a.m., or upon adjournment of the Public Hearing(s).

The Prairielands GCD Board of Directors may discuss, consider, and take all necessary action, including possible expenditure of funds, regarding each of the agenda items below:

1. Call to order and declare regular meeting open to the public

2. Roll call

3. Public comment (Verbal comments limited to 3 minutes per speaker)

4. Presentation of Consent Agenda. All items are considered routine and self-explanatory and may be considered and approved by one motion of the Board. There will be no separate discussion of the items unless a Board Member requests, in which event the item will be removed from the consent agenda and considered in its normal sequence.

   a) Minutes of the February 20, 2024, Hearing on Permit Applications
   b) Minutes of the February 20, 2024, Board of Directors Meeting
   c) February 2024 monthly invoices and payment of bills

5. Finance Report – Brian Watts, Comptroller

   a) Presentation of unaudited financials for the month of February 2024

6. Consider and take action to declare the following item(s) surplus and authorize the General Manager to dispose or auction.

   a) Mipro Transmitter and (3) wireless microphones
   b) Bosch Long Microphones (5) NIB
   c) Bosch Control Unit including display panel
   d) Bosch Long Microphones (10) used
   e) Uniden digital answering system and Uniden cordless phone(s)

7. Update on public outreach activities, educational, and conservation efforts – Kaylin Garcia, Public Relations/Education Director

   a) Update on District involved activities
   b) Review and possible action to approve draft 2023 Annual Report for the Prairielands Groundwater Conservation District for publication and distribution

8. Hydrogeologist Report – Wade Oliver, INTERA, Inc.

   a) Update on District involved activities.
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9. Update on well monitoring and field operations – Michael Heath, Field Operations Coordinator

10. General Manager's Report and Update – The General Manager will brief the Board on the following administrative, operational, and regulatory matters of the District and any other items included in the General Manager's written report, which may be discussed,

considered, and acted upon by the Board, including authorizing the initiation of, managing, or resolving enforcement action or litigation where applicable – Kathy Turner Jones

a) Update on current administrative activities of the District
b) Monthly update on well registrations and groundwater production reports
c) Drought Monitoring
d) Enforcement

11. General Counsel's Report — The District's legal counsel will brief the Board on pertinent legal issues and developments impacting the District since the last Board meeting, and legal counsel's activities on behalf of the District, including without limitation waste injection well monitoring activities including any protests of injection wellapplications with the Railroad Commission of Texas or the Texas Commission on Environmental Quality, District rules enforcement activities, rules and management plan implementation issues, groundwater-related legislative activities, joint planning and DFC development activities, developments in groundwater case law and submission of legal briefs, contractual issues related to the District, open government, policy, personnel, and financial issues of the District, and other legal activities on behalf of the District – Brian Sledge, Legal Counsel, SledgeLaw Group, PLLC

12. Open Forum / Discussion of New Business for Future Meeting Agendas

13. Adjourn Regular Meeting

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At any time during a hearing or meeting of the Prairielands Groundwater Conservation District Board and in compliance with the Texas Open Meetings Act, Chapter 551, Government Code, Vernon's Texas Codes, Annotated, the Board may meet in a closed executive session on any of the above agenda items or other lawful items for consultation concerning attorney-client matters (§551.071); deliberation regarding real property (§551.072); deliberation regarding prospective gifts (§551.073); personnel matters (§551.074); and deliberation regarding security devices (§551.076). Any subject discussed in executive session may be subject to action during an open hearing or meeting.

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Certification

I, the undersigned authority, do hereby certify that on March 14, 2024 at or before 5:00 PM, I posted and filed the above notice of meeting(s) and hearing(s) with the Texas Secretary of State, the Johnson, Ellis, Somervell, and Hill counties' clerk offices, and also posted a copy in the front window of the Prairielands GCD office in a place convenient and readily accessible to the general public all times and that it will remain so posted continuously for at least 72 hours preceding the scheduled time of said meeting in accordance with the Texas Government Code, Chapter 551.

Prairielands Groundwater Conservation District

Kathy Turner Jones, General Manager

POSTED
DATE 3-14-24
______A.M. 3:30 P.M.
Miriam Ryan
CH ______ Deputy

PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT
JOHNSON · ELLIS · HILL · SOMERVELL

FILED FOR RECORD
______A.M. 3:30 P.M.

MAR 14 2024

Michelle Reynolds
COUNTY CLERK
SOMERVELL COUNTY, TEXAS
BY ______ CH ______ DEPUTY

NOTICE OF PUBLIC HEARINGS AND BOARD MEETING

OF THE BOARD OF DIRECTORS
Of the
PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT
To be held at
9:00 AM, Monday, March 18, 2024

Prairielands GCD – Board Room
208 Kimberly Drive
Cleburne, TX 76031

Public Hearing on Historic Use Permit Applications and Proposed Permits

The Public Hearing on Permit Applications will begin at 9:00 AM. Notice of the Hearing on Historic Use Permit Applications and Proposed Permits was also posted separately in accordance with the District Rules, and Chapter 36, Texas Water Code, on February 16, 2024.

The Board of Directors will hold a public hearing on the following applications for Historic Use Permits and the proposed Historic Use Permits prepared by the District's General Manager:

1. Call to order and declare public hearing open to the public
2. Roll call
3. Procedural matters for the hearing
4. Receive report from General Manager, receive any public comment(s) or requests to contest, and consider granting, denying, or amending applications for the following applications for a Historic Use Permit:

SEE FULL Document in Clerk's Office

Application #	Permit Applicant	GM's Recom-mendation (gallons per year)	Maximum Historic Use Claim	# of Wells	Location of Wells	County	Purpose
HUP-095	Covia Solutions Inc. (Office) 1788 CR 308 Cleburne TX 76033	200,000	200,000	2	1788 CR 308, Cleburne, TX 76033	Somervell	Commercial/Public Water System
HUP-073	Hilco United Services Inc (Lakeshore Water System) PO Box 26 Itasca TX 76055	47,300,500	48,497,100	3	132-154 Oak Run, Whitney, TX 76692	Hill	Public Water System

5. Adjourn or continue public hearing in whole or in part.

Public Hearing(s) on Operating Permit Applications

The Hearing on Applications for Operating Permits will begin at 9:00 A.M. or upon adjournment of the above listed Public Hearing on Historic Use Permits.

The Prairielands GCD Board of Directors will hold a hearing(s) on the below-listed applications for Operating Permits and/or Permit Amendments. Notice of the Hearing on Permit Applications was also posted separately in accordance with the District Rules, and Chapter 36, Texas Water Code, no later than 10 days prior to the date of this hearing.

1. Call to order and declare public hearing open to the public
2. Roll call
3. Board will receive a report from the General Manager describing the following applications for an Operating Permit and the General Manager's recommendation to the Board:
   1) Hill Solar 1, LLC, for a proposed Operating Permit (OP-24-054) for authorization to drill a new well (PGCD-003393) to be located in Hill County at 499 HCR 4311, Itasca, TX; not to exceed 426,594 gallons annually for 2024→2028; Commercial Use (AK);
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   3) Ron Sturgeon Real Estate LP, for a proposed Operating Permit (OP-24-056) for authorization to produce groundwater from an existing well (PGCD-003150) located in Johnson County at 6400 FM 157, Venus, TX; not to exceed 655,150 gallons annually for 2024→2028; Commercial Use (KB)
4. Receive public comment(s) or requests to contest the above-listed application(s) for

Operating Permits and Permit Amendments

5. Discussion, consideration, and possible action on the above-listed applications for Operating Permits and Permit Amendments

6. Adjourn or continue public hearing in whole or in part.

Public Hearing on District Management Plan

The Public Hearing will begin at 9:00 A.M. or upon adjournment of the above listed Public Hearing on Operating Permit Applications.

Notice is hereby given that the Board of Directors of the Prairielands Groundwater Conservation District ("District") will hold a public hearing, accept public comment, and may discuss, consider, and take all necessary action regarding development and readoption of the District Management Plan, including proposed amendments.

1. Call to order and declare public hearing open to the public

2. Roll call

3. Consider amendments to the proposed District Management Plan

4. Receive Public Comments

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Prairielands Groundwater Conservation District

Kathy Turner Jones, General Manager

From:	Annette Kinney
To:	Nicole Windham
Subject:	FW: S.O.S. Acknowledgment of Receipt
Date:	Thursday, March 14, 2024 3:27:35 PM

Acknowledgment of Receipt

Agency: Prairielands Groundwater Conservation District

Liaison: Annette Kinney

The Office of the Secretary of State has posted

notice of the following meeting:

Board: Prairielands Groundwater Conservation District

Committee: Board of Directors

Date: 03/18/2024 09:00 AM "TRD# 2024001486"

Notice posted: 03/14/24 03:26 PM

Proofread your current open meeting notice at:

http://texreg.sos.state.tx.us/public/pub_om_lookup$.startup?Z_TRD=2024001486

OFFICE of the SECRETARY of STATE

Open Meeting Information

Agency Name:	**Prairielands Groundwater Conservation District**
Date of Meeting:	03/18/2024
Time of Meeting:	09:00 AM **(Local Time)**
Board:	Prairielands Groundwater Conservation District
Committee:	Board of Directors
Status:	Accepted
Street Location:	208 Kimberly Dr.
City Location:	Cleburne
Meeting State:	TX
TRD:	2024001486
Submit Date:	03/14/2024
Emergency Mtg:	No
Additional Information Obtained From:	District Staff @ (817) 556-2299

Agenda:

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PUBLIC HEARINGS
AND BOARD MEETING

OF THE BOARD OF DIRECTORS
Of the
PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT
To be held at
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chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.prairielandsgcd.org/wp-content/uploads/2023/12/Notice-of-03.18.24-Hearing-on-HUP-Applications.pdf
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Prairielands Groundwater Conservation District

Kathy Turner Jones, General Manager

Appendix C
Coordination with Surface Water Management Entities – Sample Letter

PGCD
PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT
JOHNSON • ELLIS • HILL • SOMERVELL

208 Kimberly Dr
Cleburne, TX 76031
Phone: (817) 556-2299
Fax: (817) 556-2305
www.prairielandsgcd.org

March 25, 2024

VIA: Mail and Email Transmission to davidc@brazos.org

Brazos River Authority
Mr. David Collinsworth
PO Box 7555
Waco, Texas 76714

RE: Prairielands Groundwater Conservation District Adopted Management Plan

To Whom It May Concern:

This email is being sent to you for two primary purposes: (1) to notify you of the recent adoption of the Prairielands Groundwater Conservation District ("District") Management Plan, developed and adopted in accordance with Chapter 36 of the Texas Water Code and Title 31 Texas Administrative Code Chapter 356; and (2) to make sure you are aware that continued increases in annual groundwater pumping in the District to accommodate growth is getting very near the total annual amount that can lawfully be produced under the State's groundwater management laws, which means public water suppliers and other groundwater users need to already be working to secure or develop alternative water supplies beyond groundwater for future growth.

The District's boundaries are coextensive with the boundaries of Ellis, Hill, Johnson, and Somervell counties. The purpose of the District Management Plan is to identify the water supplies and demands within the District and to define the goals that the District will use to manage the groundwater resources in the District.

The District Management Plan is the product of a public planning process that culminated in the adoption of the plan by the District's board of directors at the conclusion of a public hearing held on March 18, 2024, following public notice. The District submits the Management Plan to you in accordance with Section 36.1071(a) of the Texas Water Code in an effort to coordinate with you on the District's management goals. Due to the large size of the Management Plan, we are not mailing a hard copy but instead are providing the following link that will allow you to access the plan electronically: https://www.prairielandsgcd.org/about/management-plan/

For the most recent five-year joint planning cycle, Groundwater Management Area 8 ("GMA 8") developed Desired Future Conditions ("DFCs") for the Trinity and Woodbine aquifers using the Texas Water Development Board's ("TWDB's") updated Northern Trinity / Woodbine Groundwater Availability Model, and adopted revised DFCs on November 4, 2021. Those GMA 8 DFCs were subsequently adopted by the various individual groundwater conservation districts in GMA 8, and represent the management goals for the future condition of the aquifers that the groundwater conservation districts are required by law to achieve through their water well permitting and other groundwater management efforts.

Please note that total annual groundwater pumping in the District is getting very near the total annual amount of pumping that the Texas Water Development Board has determined will achieve the DFCs, which is also the total amount that the District can lawfully allow to be pumped each year under its rules and permitting system. It is critical for all groundwater users in the District to be working now to secure alternative sources of water to meet future growth in water demands, because the District must comply with the law and limit overall pumping to protect the long-term viability of the aquifers and the private property rights in groundwater of all overlying landowners. In addition to promoting strong water conservation measures, the most obvious solution is for public water suppliers and other water users to work with surface water management entities to continue to build and expand capacity to bring more surface water into the four counties of the District in order to meet the increased demands for water that come with population and economic growth. The District stands ready to help facilitate discussions among wholesale water suppliers, retail water suppliers, and other water users and to find solutions to these water demand and supply issues.

Please feel free to contact me if you have any questions or comments regarding the District Management Plan or other District activities, or if we can help you find alternative solutions to meet your future growth in water demand.

Sincerely,

Kathy Turner Jones
General Manager

cc: Stephen Allen, Texas Water Development Board
Brian L. Sledge, SledgeLaw Group PLLC

Appendix D
GAM Run 21-013 MAG

GAM RUN 21-013 MAG: MODELED AVAILABLE GROUNDWATER FOR THE AQUIFERS IN GROUNDWATER MANAGEMENT AREA 8

Jerry Shi, Ph.D., P.G. and Jevon Harding, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-463-5076
November 1, 2022

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Geoscientist Seals

The following professional geoscientists contributed to this conceptual model report and associated data compilation and analyses:

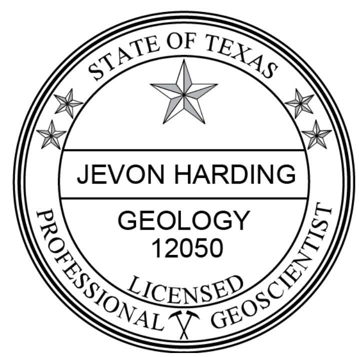
Jianyou (Jerry) Shi, Ph.D., P.G.

Dr. Shi was responsible for the calculations to verify the attainability of desired future conditions and the calculations of modeled available groundwater values. He was the primary author of the report.

Signature 11/10/2022 Date

Jevon Harding, P.G.

Ms. Harding was responsible for editing the report and adding additional documentation as necessary to meet TWDB standards after Dr. Shi had left the agency.



Signature 11/3/2022 Date

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Jerry Shi, Ph.D., P.G. and Jevon Harding, P.G.
Texas Water Development Board
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November 1, 2022

EXECUTIVE SUMMARY:

The Texas Water Development Board (TWDB) has prepared estimates of the modeled available groundwater for the Trinity, Woodbine, Edwards (Balcones Fault Zone), Marble Falls, Ellenburger-San Saba, and Hickory aquifers in Groundwater Management Area 8. The modeled available groundwater estimates are based on the revised desired future conditions for these aquifers adopted by groundwater conservation districts in Groundwater Management Area 8 on July 26, 2022. The district representatives declared the Nacatoch, Blossom, Brazos River Alluvium, and Cross Timbers aquifers to be non-relevant for purposes of joint planning. After review, the TWDB determined that the explanatory report and other materials submitted by the district representatives were administratively complete on September 23, 2022.

The modeled available groundwater values are summarized by decade by groundwater conservation district and county (Tables 1 through 12) and by county, regional water planning area, and river basin for use in the regional water planning process (Tables 13 through 24). The modeled available groundwater in Groundwater Management Area 8 is described below:

- Trinity Aquifer (Paluxy aquifer) – The modeled available groundwater is approximately 24,520 acre-feet per year during the period from 2020 to 2080.
- Trinity Aquifer (Glen Rose Formation) – The modeled available groundwater is approximately 12,410 acre-feet per year during the period from 2020 to 2080.

- Trinity Aquifer (Twin Mountains Formation) – The modeled available groundwater is approximately 45,510 acre-feet per year during the period from 2020 to 2080.
- Trinity Aquifer (Travis Peak Formation) – The modeled available groundwater is approximately 98,230 acre-feet per year during the period from 2020 to 2080.
- Trinity Aquifer (Hensell aquifer) – The modeled available groundwater is approximately 27,120 acre-feet per year during the period from 2020 to 2080.
- Trinity Aquifer (Hosston aquifer) – The modeled available groundwater is approximately 67,730 acre-feet per year during the period from 2020 to 2080.
- Trinity Aquifer (Antlers Formation) – The modeled available groundwater is approximately 78,440 acre-feet per year during the period from 2020 to 2080.
- Woodbine Aquifer – The modeled available groundwater is approximately 30,570 acre-feet per year during the period from 2020 to 2080.
- Edwards (Balcones Fault Zone) Aquifer – The modeled available groundwater is approximately 15,170 acre-feet per year during the period from 2020 to 2080.
- Marble Falls Aquifer – The modeled available groundwater is approximately 5,630 acre-feet per year during the period from 2020 to 2080.
- Ellenburger-San Saba Aquifer – The modeled available groundwater is approximately 14,060 acre-feet per year during the period from 2020 to 2080.
- Hickory Aquifer – The modeled available groundwater is approximately 3,580 acre-feet per year during the period from 2020 to 2080.

Modeled available groundwater estimates are also provided by outcrop and downdip areas for the counties within Upper Trinity Groundwater Conservation District to be consistent with that district's desired future conditions statements.

The modeled available groundwater values estimated for counties may be slightly different from those estimated for groundwater conservation districts because of the process for rounding the values.

REQUESTOR:

Mr. Drew Satterwhite, General Manager of North Texas Groundwater Conservation District and Groundwater Management Area 8 Coordinator at the time of request.

DESCRIPTION OF REQUEST:

In a letter dated January 4, 2022, Mr. Drew Satterwhite provided the TWDB with the desired future conditions of the Trinity Aquifer subunits (Paluxy, Glen Rose, Twin Mountains, Travis Peak, Hensell, Hosston, and Antlers formations), and the Woodbine, Edwards (Balcones Fault Zone), Marble Falls, Ellenburger-San Saba, and Hickory aquifers. After review of the submittal, the TWDB identified missing or corrupted model files and received updated versions from Groundwater Management Area 8 on March 3, 2022. Following the TWDB analysis to verify the achievability of the adopted desired future conditions, the TWDB identified desired future conditions that were unachievable. Groundwater Management Area 8 confirmed that these were typos and adopted a revised version of the desired future conditions resolution on July 26, 2022. The following sections present the final adopted desired future conditions:

Trinity and Woodbine aquifers

The desired future conditions for the Trinity and Woodbine aquifers are expressed as water level decline, or drawdown, in feet from January 1, 2010, to December 31, 2080 (Groundwater Management Area 8, 2021).

The county-based desired future conditions for the Trinity Aquifer subunits, excluding counties in the Upper Trinity Groundwater Conservation District, are listed in Table 1 (dashes indicate areas where the subunits do not exist):

TABLE 1. DESIRED FUTURE CONDITIONS IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY COUNTY FOR THE NORTHERN TRINITY AND WOODBINE AQUIFERS. VALUES REPRESENT AVERAGE DRAWDOWN IN FEET BETWEEN JANUARY 1, 2010, AND DECEMBER 31, 1980.

County	Woodbine	Paluxy	Glen Rose	Twin Mountains	Travis Peak	Hensell	Hosston	Antlers
Bell	—	17	83	—	333	145	375	—
Bosque	—	6	53	—	189	139	232	—
Bowie	—	—	—	—	—	—	—	—
Brown	—	—	1	—	2	1	1	2
Burnet	—	—	2	—	19	7	21	—
Callahan	—	—	—	—	—	—	—	1
Collin	482	729	366	560	—	—	—	596
Comanche	—	—	2	—	4	2	3	12

TABLE 2 (CONT). DESIRED FUTURE CONDITIONS IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY COUNTY FOR THE NORTHERN TRINITY AND WOODBINE AQUIFERS. VALUES REPRESENT AVERAGE DRAWDOWN IN FEET BETWEEN JANUARY 1, 2010, AND DECEMBER 31, 1980.

County	Woodbine	Paluxy	Glen Rose	Twin Mountains	Travis Peak	Hensell	Hosston	Antlers
Cooke	2	—	—	—	—	—	—	191
Coryell	—	5	15	—	107	70	141	—
Dallas	137	346	288	515	415	362	419	—
Delta	—	279	198	—	202	—	—	—
Denton	22	558	367	752	—	—	—	416
Eastland	—	—	—	—	—	—	—	4
Ellis	76	128	220	413	380	290	390	—
Erath	—	6	6	8	25	12	35	14
Falls	—	159	238	—	505	296	511	—
Fannin	259	709	305	400	291	—	—	269
Franklin	—	—	—	—	—	—	—	—
Grayson	163	943	364	445	—	—	—	364
Hamilton	—	2	4	—	26	14	38	—
Hill	20	45	149	—	365	211	413	—
Hopkins	—	—	—	—	—	—	—	—
Hunt	631	610	326	399	350	—	—	—
Johnson	4	-57	66	184	235	120	329	—
Kaufman	242	311	305	427	372	349	345	—
Lamar	42	100	107	—	125	—	—	132
Lampasas	—	—	1	—	6	1	11	—
Limestone	—	199	301	—	433	214	445	—
McLennan	6	41	148	—	504	242	582	—
Milam	—	—	241	—	412	261	412	—
Mills	—	1	1	—	9	2	13	—
Navarro	110	139	266	—	343	295	343	—
Rains	—	—	—	—	—	—	—	—
Red River	2	24	40	—	57	—	—	15
Rockwall	275	433	343	466	—	—	—	—
Somervell	—	4	4	50	64	17	120	—
Tarrant	6	105	163	348	—	—	—	177
Taylor	—	—	—	—	—	—	—	0
Travis	—	—	90	—	219	68	226	—
Williamson	—	—	78	—	220	89	225	—

The desired future conditions for the counties in the Upper Trinity Groundwater Conservation District are further divided into outcrop and downdip areas, and are listed in Table 2 (dashes indicate areas where the subunits do not exist):

TABLE 2. THE DESIRED FUTURE CONDITIONS FOR THE UPPER TRINITY GROUNDWATER CONSERVTION DISTRICT IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY AQUIFER. VALUES REPRESENT AVERAGE DRAWDOWN IN FEET BETWEEN JANUARY 1, 2010, AND DECEMBER 31, 1980.

County	Antlers	Paluxy	Glen Rose	Twin Mountains
Hood -Outcrop	—	6	9	13
Hood-Downdip	—	—	39	72
Montague-Outcrop	40	—	—	—
Montague-Downdip	—	—	—	—
Parker-Outcrop	42	6	20	7
Parker-Downdip	—	2	50	68
Wise-Outcrop	60	—	—	—
Wise-Downdip	154	—	—	—

Edwards (Balcones Fault Zone) Aquifer

The desired future conditions adopted by Groundwater Management Area 8 for the Edwards (Balcones Fault Zone) Aquifer are to maintain minimum streamflow and springflow under a repeat of the drought of record in Bell, Travis, and Williamson counties from January 1, 2010, to December 31, 2080 (Groundwater Management Area 8, 2021). The desired future conditions are listed in Table 3:

TABLE 3. THE DESIRED FUTURE CONDITIONS IN GROUNDWATER MANAGEMENT AREA (GMA) 8 BASED ON SPRING/STREAM FLOW FOR SELECTED COUNTIES. THESE CONDITIONS ARE TO BE MAINTAINED BETWEEN JANUARY 1, 2010, AND DECEMBER 31, 1980.

County	Adopted Desired Future Condition
Bell	Maintain at least 100 acre-feet per month of stream/spring flow in Salado Creek during a repeat of the drought of record
Travis	Maintain at least 42 acre-feet per month of aggregated stream/spring flow during a repeat of the drought of record
Williamson	Maintain at least 60 acre-feet per month of aggregated stream/spring flow during a repeat of the drought of record

Marble Falls, Ellenburger-San Saba, and Hickory aquifers

The desired future conditions for the Marble Falls, Ellenburger-San Saba, and Hickory aquifers in Brown, Burnet, Lampasas, and Mills counties are defined as water level decline, or drawdown, in feet from January 1, 2010, to December 31, 2080 (Groundwater Management Area 8, 2021). The desired future conditions are listed in Table 4:

TABLE 4. DESIRED FUTURE CONDITIONS IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY COUNTY FOR THE LLANO UPLIFT AQUIFERS. VALUES REPRESENT AVERAGE DRAWDOWN IN FEET BETWEEN JANUARY 1, 2010, AND DECEMBER 31, 1980.

County	Ellenburger-San Saba	Hickory	Marble Falls
Brown	3	3	3
Burnet	12	11	11
Lampasas	16	16	16
Mills	9	9	9

METHODS:

The desired future conditions for Groundwater Management Area 8 are based on multiple criteria. The methods to calculate the desired future conditions are discussed below.

Trinity and Woodbine aquifers

The desired future conditions for the Trinity and Woodbine aquifers in Groundwater Management Area 8 are based on the predictive simulation "Run 11" (Groundwater Management area 8, 2021), which was constructed as an extension of the groundwater availability model for the northern portion of the Trinity and Woodbine aquifers (Kelley and others, 2014).

The average drawdowns between January 1, 2010 (initial water levels) and December 31, 2080 (stress period 71) were calculated using a composite water levels methodology, described in Appendix A. Appendix A also presents the calculated average drawdown results for the Trinity and Woodbine aquifers that the TWDB used to verify that the pumping scenario in the submitted model files achieved the desired future conditions. The modeled available groundwater values were determined by extracting pumping rates by decade from the MODFLOW cell-by-cell budget files using custom Fortran scripts developed by the TWDB.

Edwards (Balcones Fault Zone) Aquifer

Groundwater Management Area 8 requested that the results from the previous GAM Run 08-010 MAG (Anaya, 2008) be used, unchanged, for the current round of joint planning. That model run includes a ten-year predictive period that represents a simulated repeat of the drought of record in the 1950s. The modeled available groundwater values were determined using the monthly stress period within that predictive period with the lowest monthly springflow volume, which was assumed to represent the worst-case scenario for Salado Springs during a potential repeat of the 1950s drought of record.

Marble Falls, Ellenburger-San Saba, and Hickory aquifers

The desired future conditions for the Marble Falls, Ellenburger-San Saba, and Hickory aquifers in Brown, Burnet, Lampasas, and Mills counties within Groundwater Management Area 8 are based on a predictive simulation constructed by Groundwater Management Area 8 for planning purposes (Groundwater Management Area 8, 2021). This simulation is an extension of the groundwater availability model for the minor aquifers in the Llano Uplift region by Shi and others (2016). Modeled water levels were extracted for January 1, 2010 (initial water levels) and December 31, 2080 (stress period 71) and drawdown calculated as the difference in water level between those two endpoints. Drawdown averages were calculated by aquifer for each area specified in the desired future conditions. Additional details on the predictive simulation and methods to calculate the drawdowns are described in Appendix B. Appendix B also presents the calculated average drawdown results for the Marble Falls, Ellenburger-San Saba, and Hickory aquifers that the TWDB used to verify that the pumping scenario in the submitted model files achieved the desired future conditions. The modeled available groundwater values were determined by extracting pumping rates by decade from the MODFLOW cell-by-cell budget files using custom Fortran scripts developed by the TWDB.

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code (2011), "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits.

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the groundwater availability simulations are described below:

Trinity and Woodbine Aquifers

- Version 2.01 of the updated groundwater availability model for the northern Trinity and Woodbine aquifers was the base model for this analysis. See Kelley and others (2014) for the assumptions and limitations of the historical calibrated model. Groundwater Management Area 8 constructed a predictive model simulation to extend the base model to 2080 for planning purposes. See Appendix E of Groundwater Management Area 8 (2021) for the assumptions of this predictive model simulation.

- The predictive model was run with MODFLOW-NWT (Niswonger and others, 2011).
- The model has eight layers that represent units younger than the Woodbine Aquifer and the shallow outcrop of all aquifers (Layer 1), the Woodbine Aquifer (Layer 2), the Fredericksburg and Washita units (Layer 3), and various combinations of the subunits that comprise the Trinity Aquifer (Layers 4 to 8).
- To be consistent with Groundwater Management Area 8, the TWDB model grid files dated August 26, 2015 (*trnt_n_grid_poly082615.csv* and *wdbn_grid_poly082615.csv* for the Trinity and Woodbine aquifers, respectively) were used to assign model cells to counties, groundwater management areas, groundwater conservation districts, river basins, and regional water planning areas.
- Drawdown was calculated as the difference in modeled water levels between the baseline date of January 1, 2010 (initial water levels) and the final date of December 31, 2080 (stress period 71) using a composite water level methodology described in Appendix A.
- During the predictive simulation model run, some model cells went dry, meaning the modeled water level fell below the bottom of the cell. The dry cell count at the baseline date of January 1, 2010 (initial water levels) and final date of December 31, 2080 (stress period 71) is presented in Table C1 of Appendix C. Appendix A describes how dry cells were handled in the drawdown calculations using the composite water level methodology. Pumping in dry cells was excluded from the modeled available groundwater calculations.
- The drawdown averages and modeled available groundwater values were calculated using the official TWDB boundaries for the Trinity and Woodbine aquifers.
- Estimates of modeled drawdown and available groundwater from the model simulation were rounded to whole numbers.

Edwards (Balcones Fault Zone) Aquifer

- Version 1.01 of the groundwater availability model for the northern segment of the Edwards (Balcones Fault Zone) Aquifer was the base model for this analysis. See Jones (2003) for the assumptions and limitations of the historical calibrated model. During the previous planning cycle, a predictive model simulation was constructed to extend the base model and include a simulated repeat of the 1950s drought of record for planning purposes. See the previous GAM Run 08-010 MAG (Anaya, 2008) for the assumptions of this predictive model simulation.

- The model has one layer that represents the Edwards (Balcones Fault Zone) Aquifer.
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).
- The modeled available groundwater values were determined using the monthly stress period within the predictive drought period with the lowest monthly springflow volume, which was assumed to represent the worst-case scenario for Salado Springs during a potential repeat of the 1950s drought of record.
- The modeled available groundwater values were calculated using the official TWDB Edwards (Balcones Fault Zone) Aquifer boundary.
- To be consistent with Groundwater Management Area 8, the TWDB model grid file dated August 26, 2015 (*ebfz_n_grid_poly082615.csv*) was used to assign model cells to counties, groundwater management areas, groundwater conservation districts, river basins, and regional water planning areas.
- Estimates of modeled streamflow and springflow from the model simulation were rounded to whole numbers.

Marble Falls, Ellenburger-San Saba, and Hickory Aquifers

- Version 1.01 of the groundwater availability model for the minor aquifers in the Llano Uplift region was the base model for this analysis. See Shi and others (2016) for the assumptions and limitations of the historical calibrated model. Groundwater Management Area 8 constructed a predictive model simulation to extend the base model to 2080 for planning purposes. See Groundwater Management Area 8 (2021) for the assumptions of this predictive model simulation.
- The model has eight layers: Layer 1 (the Trinity Aquifer, Edwards-Trinity (Plateau) Aquifer, and younger alluvium deposits), Layer 2 (confining units), Layer 3 (the Marble Falls Aquifer and equivalent unit), Layer 4 (confining units), Layer 5 (Ellenburger-San Saba Aquifer and equivalent unit), Layer 6 (confining units), Layer 7 (the Hickory Aquifer and equivalent unit), and Layer 8 (Precambrian units).
- The model was run with MODFLOW-USG beta (development) version (Panday and others, 2013).
- To be consistent with Groundwater Management Area 8, the TWDB model grid file dated January 7, 2016 (*lnup_grid_poly010716.csv*) was used to assign model cells to

counties, groundwater management areas, groundwater conservation districts, river basins, and regional water planning areas.

- Drawdown was calculated as the difference in modeled water level between the baseline date of January 1, 2010 (initial water levels) and the final date of December 31, 2080 (stress period 71), using the methodology described in Appendix B.
- During the predictive model run, some active model cells went dry, meaning the modeled water level fell below the bottom of the cell. The dry cell count at the baseline date of January 1, 2010 (initial water levels) and final date of December 31, 2080 (stress period 71) is presented in Table C2 of Appendix C). Appendix B describes how dry cells were handled in the drawdown calculations. Pumping in dry cells was excluded from the modeled available groundwater.
- To be consistent with the desired future conditions defined by Groundwater Management Area 8, the drawdown averages and modeled available groundwater values were calculated using the active model extent of Layers 3, 5, and 7 (Figures 10 through 12) for the Marble Falls, Ellenburger-San Saba, and Hickory aquifers, respectively, rather than the official TWDB boundaries for these aquifers.
- Estimates of modeled drawdown and available groundwater from the model simulation were rounded to whole numbers.

RESULTS:

The modeled available groundwater for the Trinity, Woodbine, Edwards (Balcones Fault Zone), Marble Falls, Ellenburger-San Saba, and Hickory aquifers are listed below:

- Trinity Aquifer (Paluxy aquifer) – The modeled available groundwater is approximately 24,520 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 5) and by county, regional water planning group, and river basin (Table 17).
- Trinity Aquifer (Glen Rose Formation) – The modeled available groundwater is approximately 12,410 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 6) and by county, regional water planning group, and river basin (Table 18).
- Trinity Aquifer (Twin Mountains Formation) – The modeled available groundwater is approximately 45,510 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 7) and by county, regional water planning group, and river basin (Table 19).

- Trinity Aquifer (Travis Peak Formation) – The modeled available groundwater is approximately 98,230 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 8) and by county, regional water planning group, and river basin (Table 20).
- Trinity Aquifer (Hensell aquifer) – The modeled available groundwater is approximately 27,120 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 9) and by county, regional water planning group, and river basin (Table 21).
- Trinity Aquifer (Hosston aquifer) – The modeled available groundwater is approximately 67,730 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 10) and by county, regional water planning group, and river basin (Table 22).
- Trinity Aquifer (Antlers Formation) – The modeled available groundwater is approximately 78,440 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 11) and by county, regional water planning group, and river basin (Table 23).
- Woodbine Aquifer – The modeled available groundwater is approximately 30,570 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 12) and by county, regional water planning group, and river basin (Table 24).
- Edwards (Balcones Fault Zone) Aquifer – The modeled available groundwater is approximately 15,170 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 13) and by county, regional water planning group, and river basin (Table 25).
- Marble Falls Aquifer – The modeled available groundwater is approximately 5,630 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 14) and by county, regional water planning group, and river basin (Table 26).
- Ellenburger-San Saba Aquifer – The modeled available groundwater is approximately 14,060 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 15) and by county, regional water planning group, and river basin (Table 27).
- Hickory Aquifer – The modeled available groundwater is approximately 3,580 acre-feet per year during the period from 2020 to 2080. Values are summarized by groundwater conservation district and county (Table 16) and by county, regional water planning group, and river basin (Table 28).

Figures 1 through 7 show the extent of the Trinity Aquifer subunits (Paluxy, Glen Rose, Twin Mountains, Travis Peak, Hensell, Hosston, and Antlers formations, respectively). Figures 8 through 12 show the extent of the Woodbine, Edwards (Balcones Fault Zone), Marble Falls, Ellenburger-San Saba, and Hickory aquifers, respectively. Figure 13 shows the county, groundwater conservation district, regional water planning area, and river basin boundaries represented by the divisions in Tables 5 to 28.

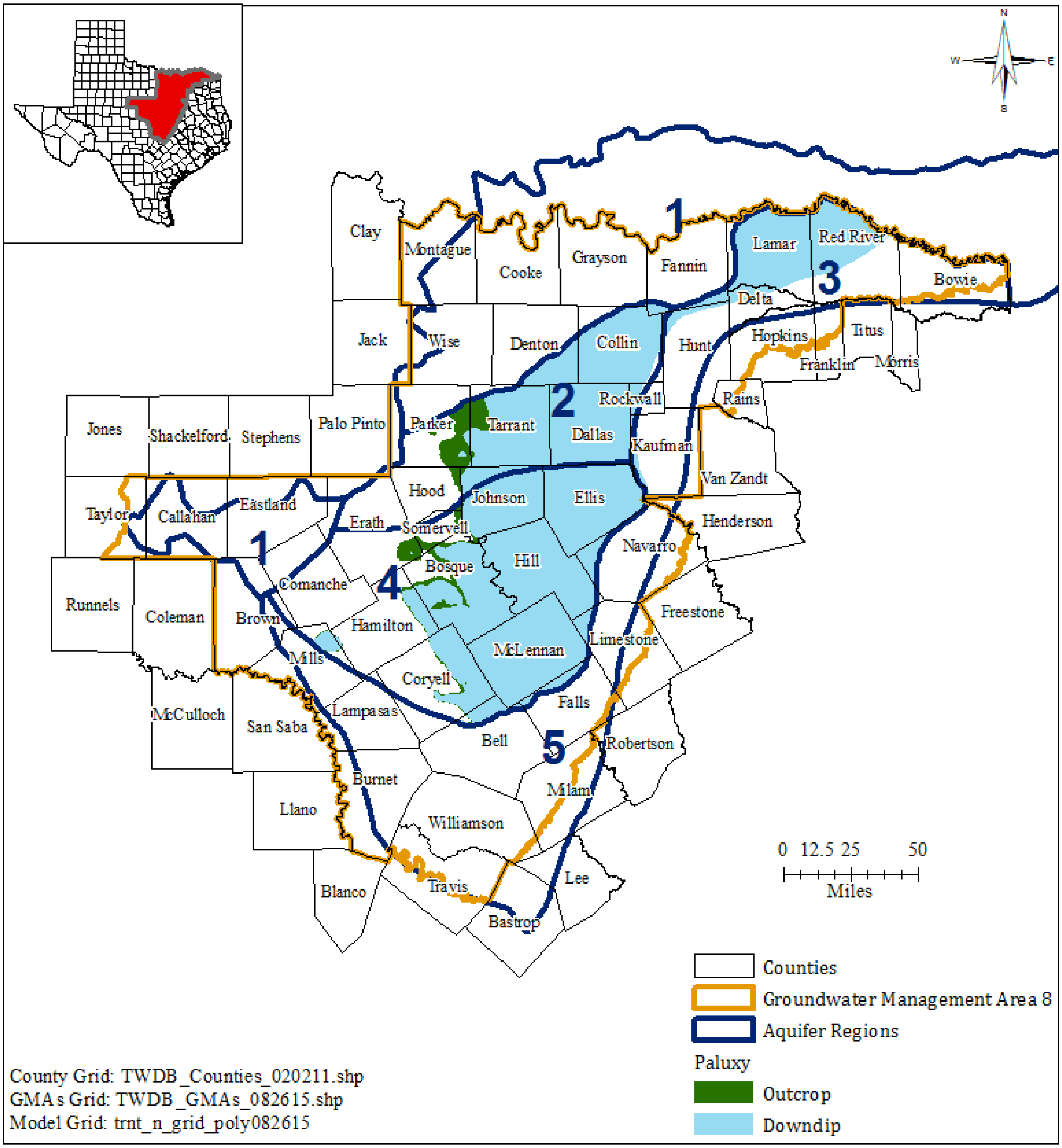


FIGURE 1. MAP SHOWING THE TRINITY AQUIFER (PALUXY) WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR NORTHERN PORTION OF TRINITY AND WOODBINE AQUIFERS. SEE APPENDIX A FOR AQUIFER REGION DETAILS.

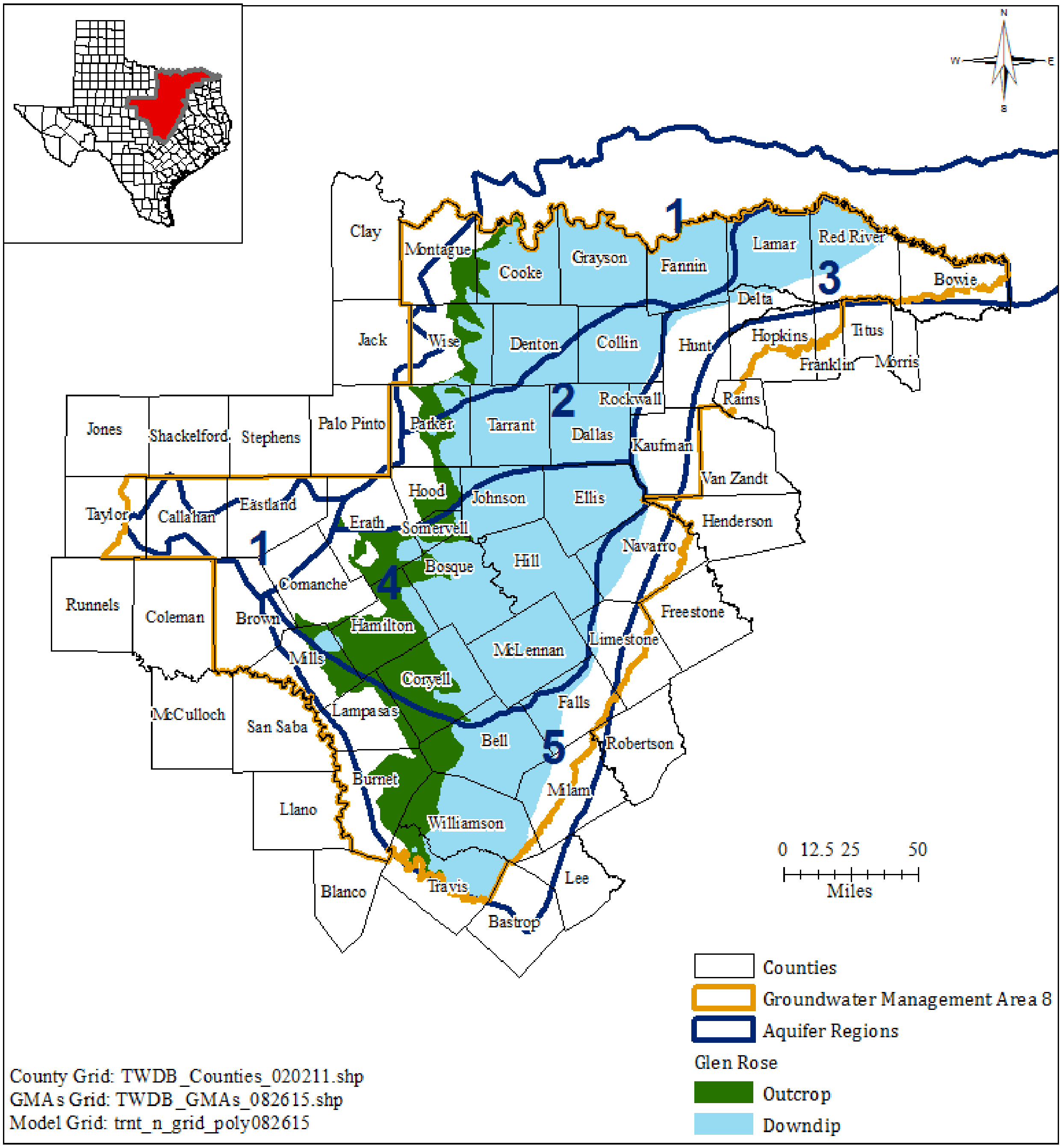


FIGURE 2. MAP SHOWING THE TRINITY AQUIFER (GLEN ROSE) WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF TRINITY AND WOODBINE AQUIFERS. SEE APPENDIX A FOR AQUIFER REGION DETAILS.

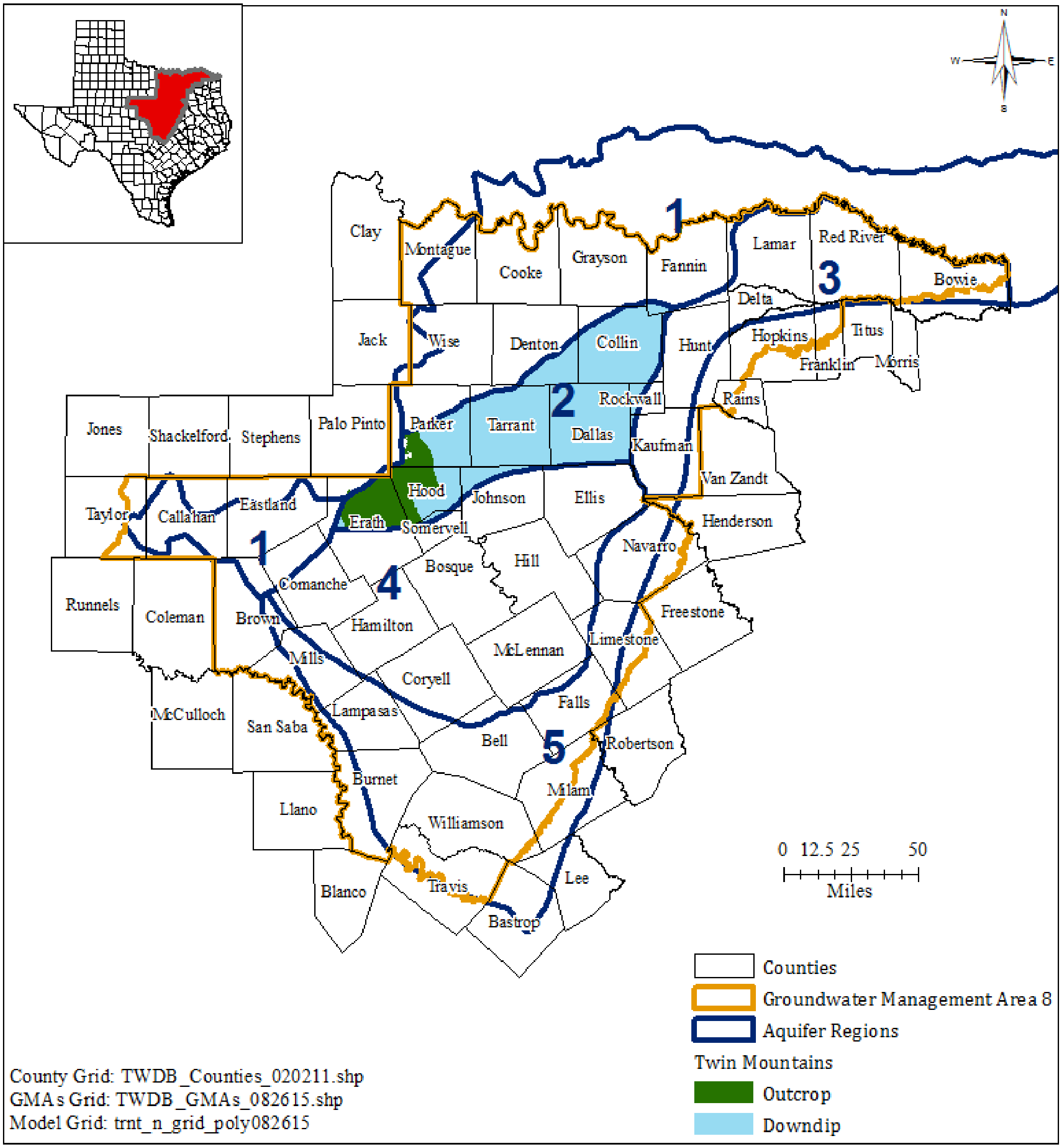


FIGURE 3. **MAP SHOWING THE TRINITY AQUIFER (TWIN MOUNTAINS) WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF TRINITY AND WOODBINE AQUIFERS. SEE APPENDIX A FOR AQUIFER REGION DETAILS.**

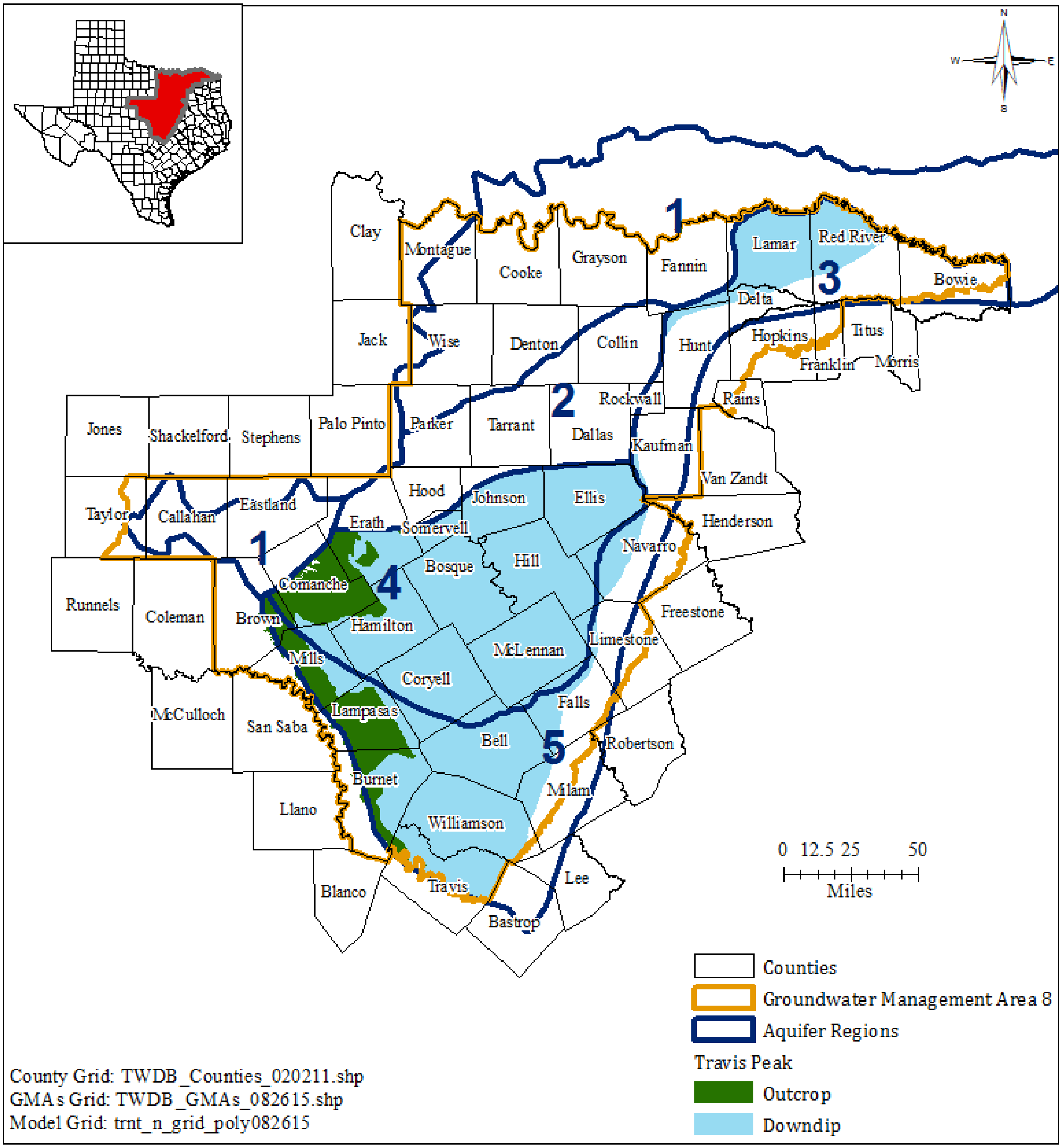


FIGURE 4. MAP SHOWING THE TRINITY AQUIFER (TRAVIS PEAK) WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF TRINITY AND WOODBINE AQUIFERS. SEE APPENDIX A FOR AQUIFER REGION DETAILS.

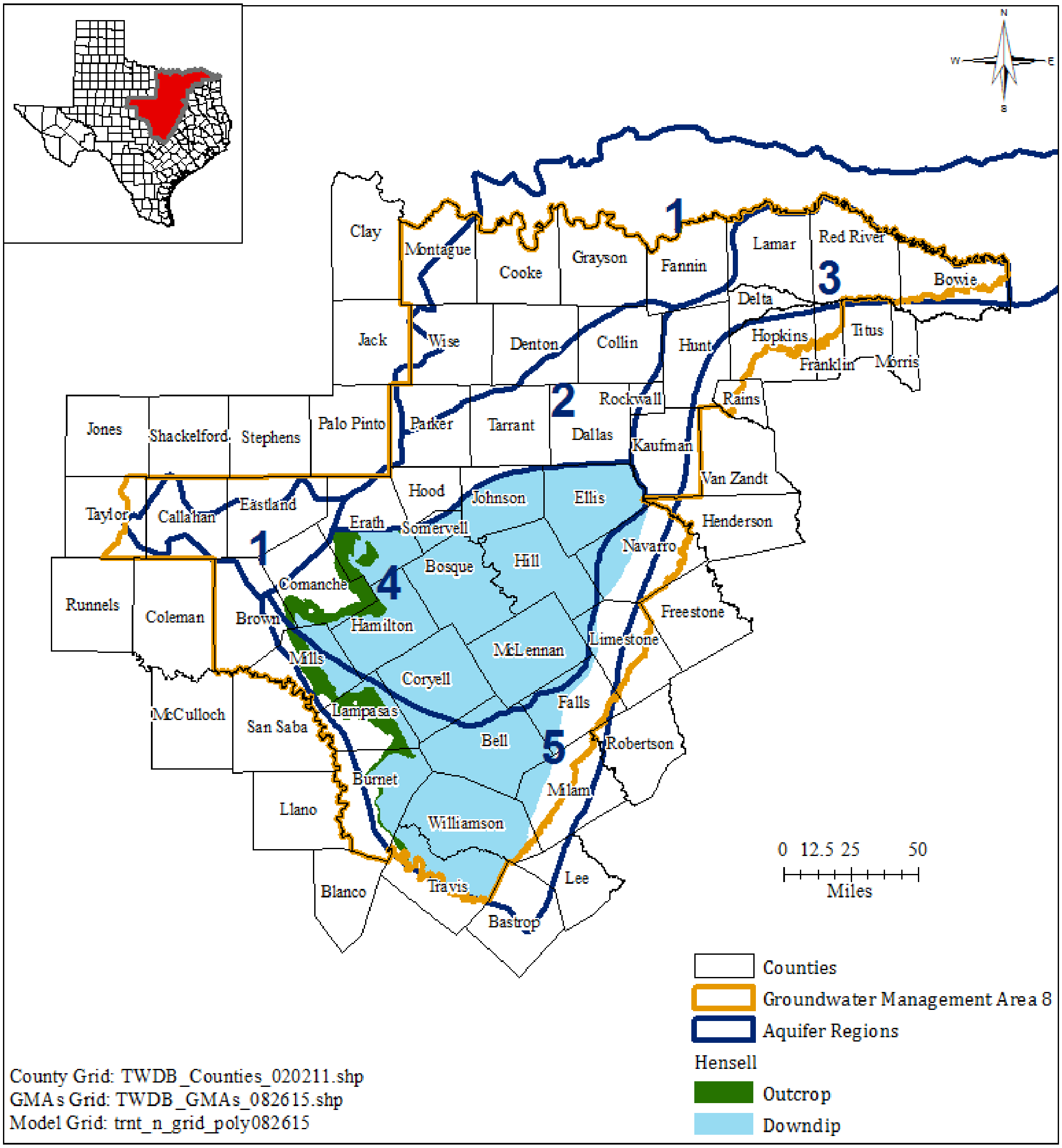


FIGURE 5. MAP SHOWING THE TRINITY AQUIFER (HENSELL) WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF TRINITY AND WOODBINE AQUIFERS. SEE APPENDIX A FOR AQUIFER REGION DETAILS.

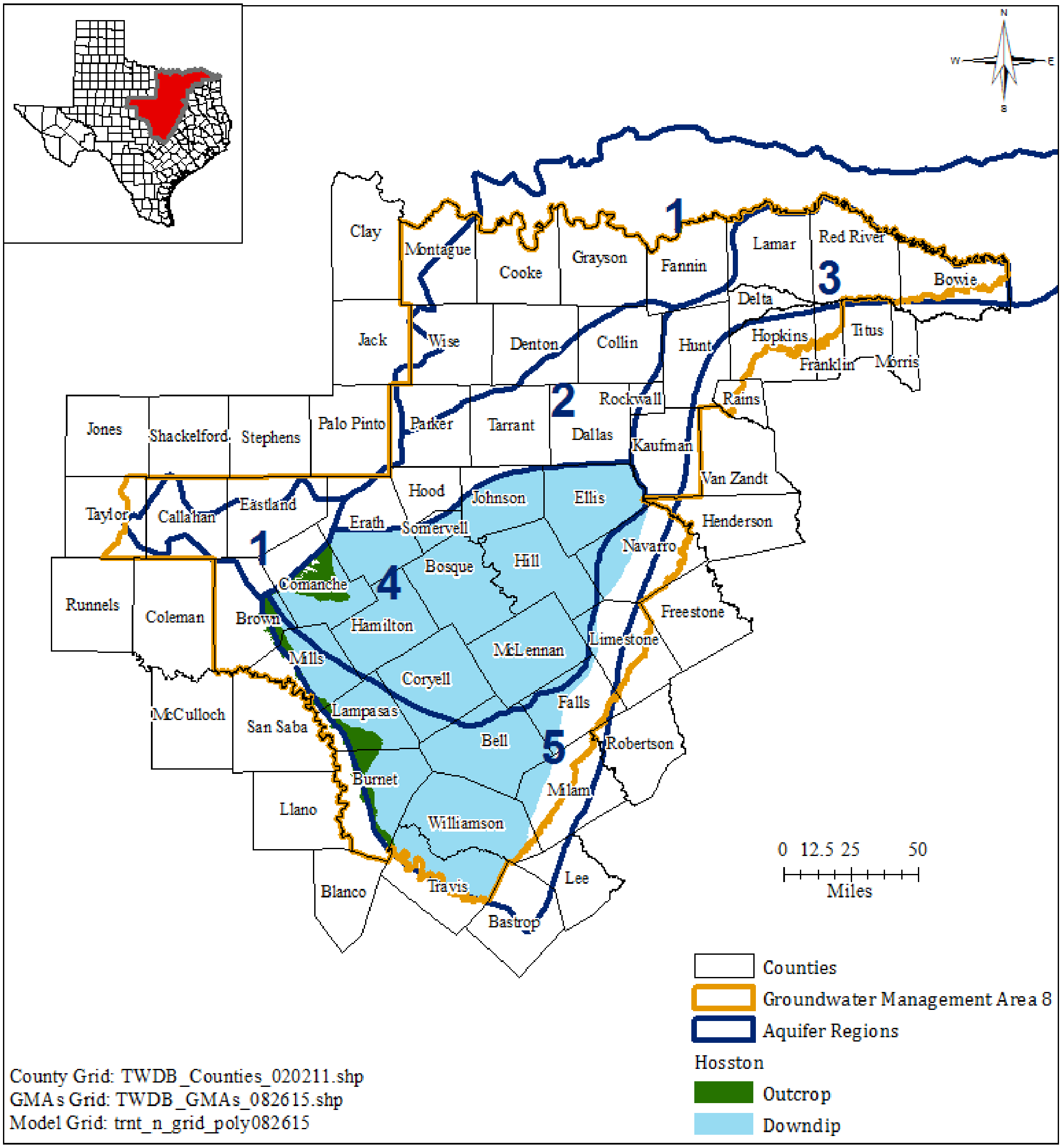


FIGURE 6. MAP SHOWING THE TRINITY AQUIFER (HOSSTON) WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR NORTHERN PORTION OF THE TRINITY AND WOODBINE AQUIFERS. SEE APPENDIX A FOR AQUIFER REGION DETAILS.

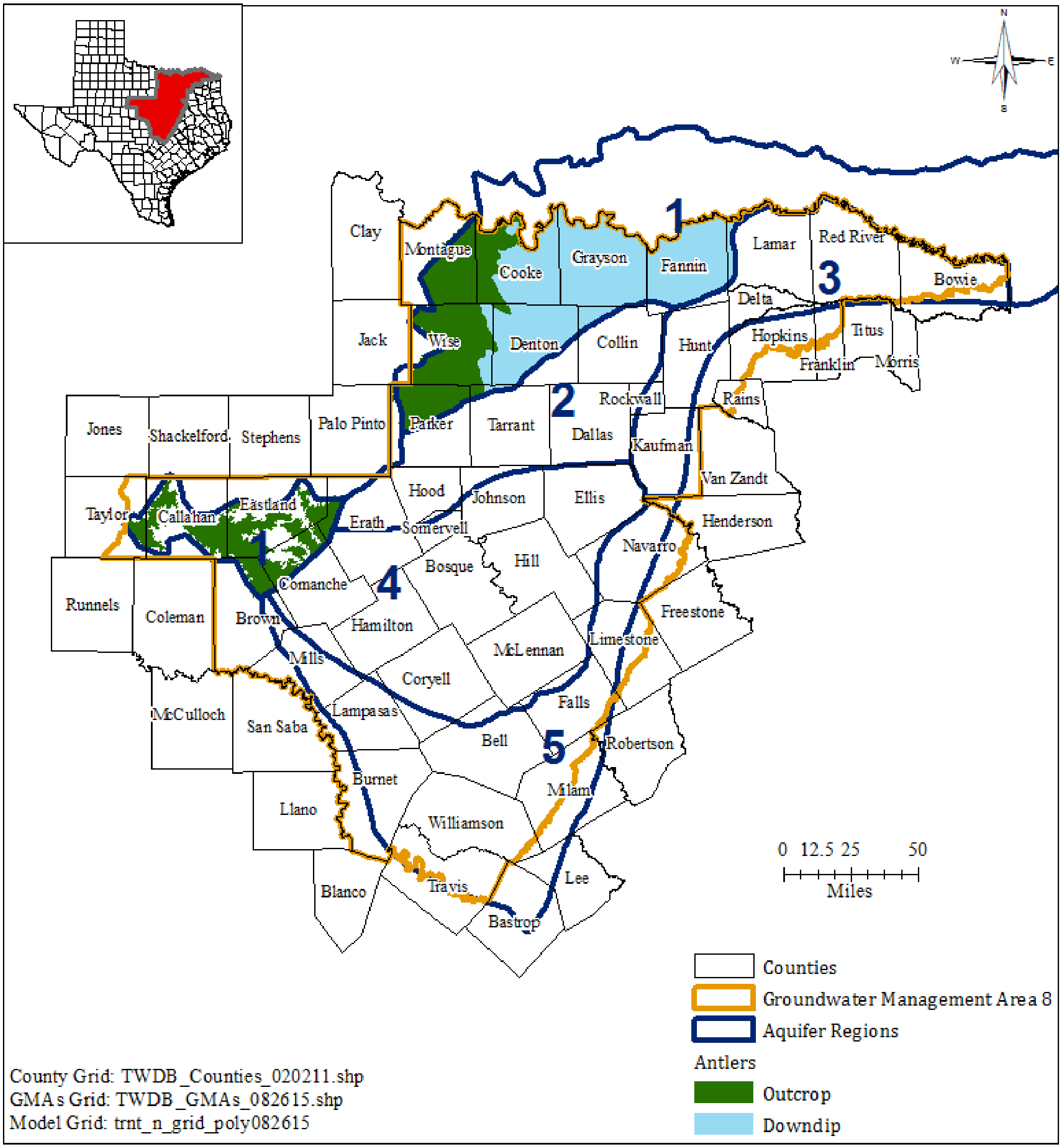


FIGURE 7. MAP SHOWING THE TRINITY AQUIFER (ANTLERS) WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF TRINITY AND WOODBINE AQUIFERS. SEE APPENDIX A FOR AQUIFER REGION DETAILS.

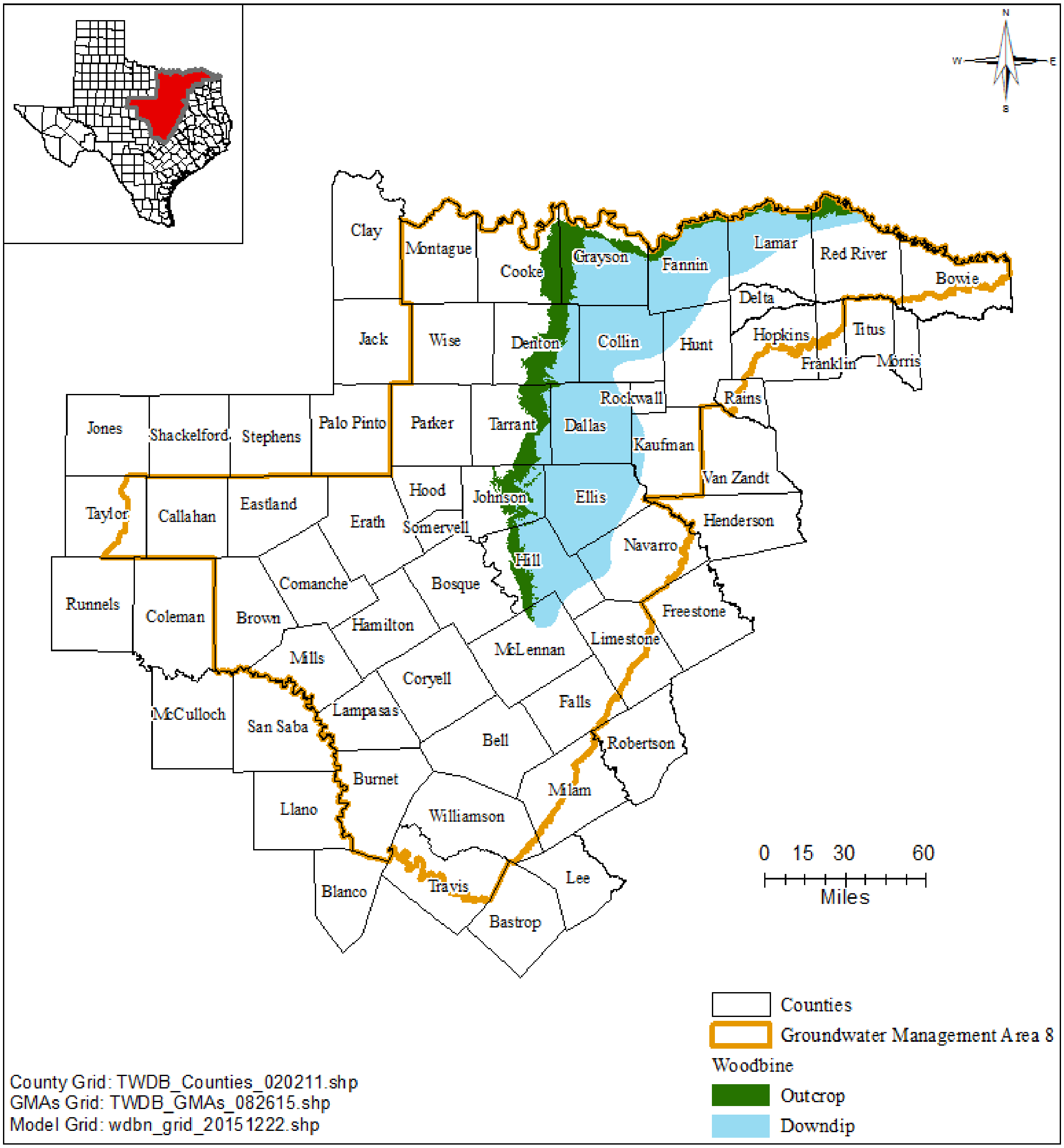


FIGURE 8. MAP SHOWING THE WOODBINE AQUIFER WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF TRINITY AND WOODBINE AQUIFERS.

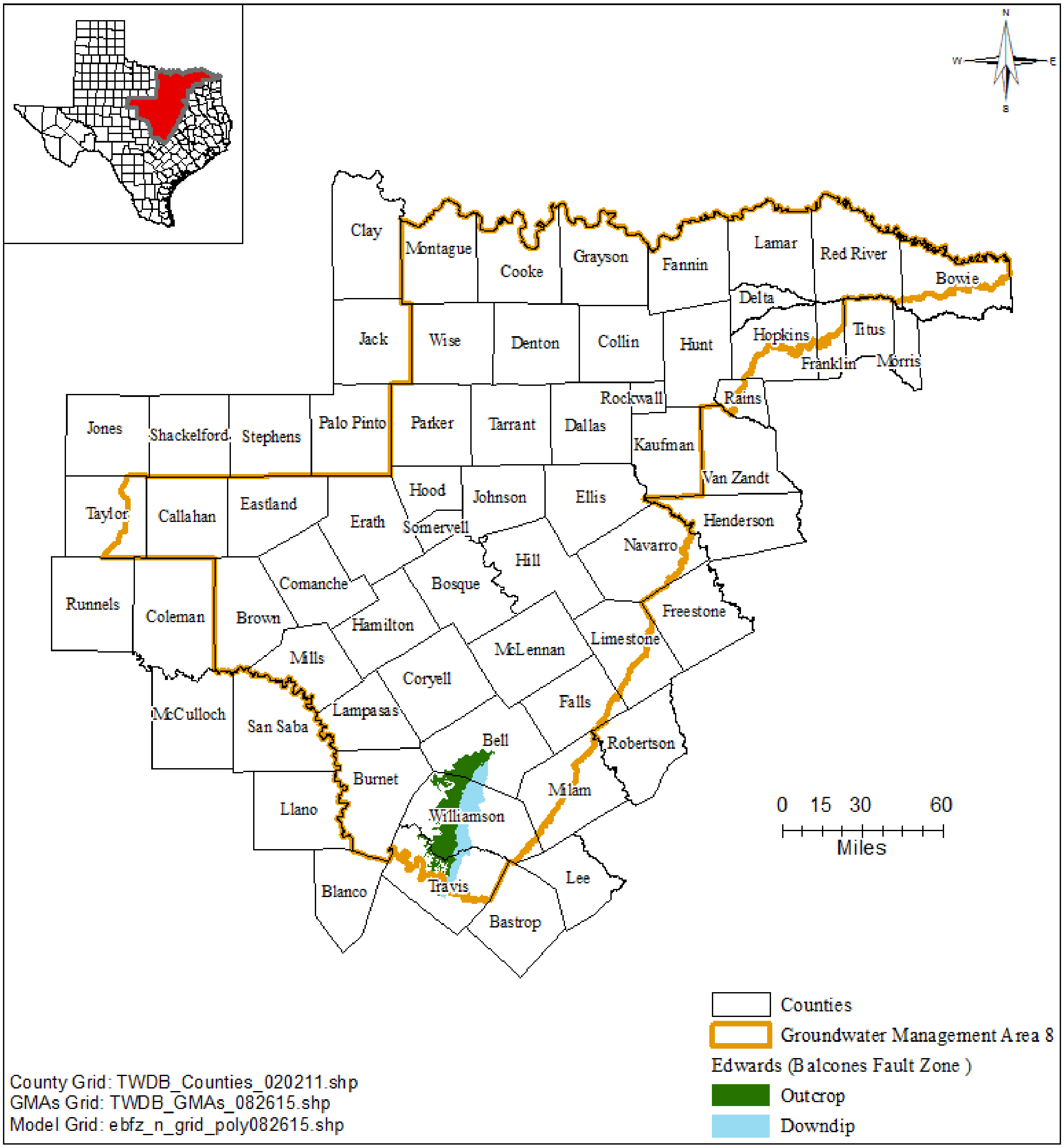


FIGURE 9. MAP SHOWING THE EDWARDS (BALCONES FAULT ZONE) AQUIFER WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN SEGMENT OF EDWARDS (BALCONES FAULT ZONE) AQUIFER.

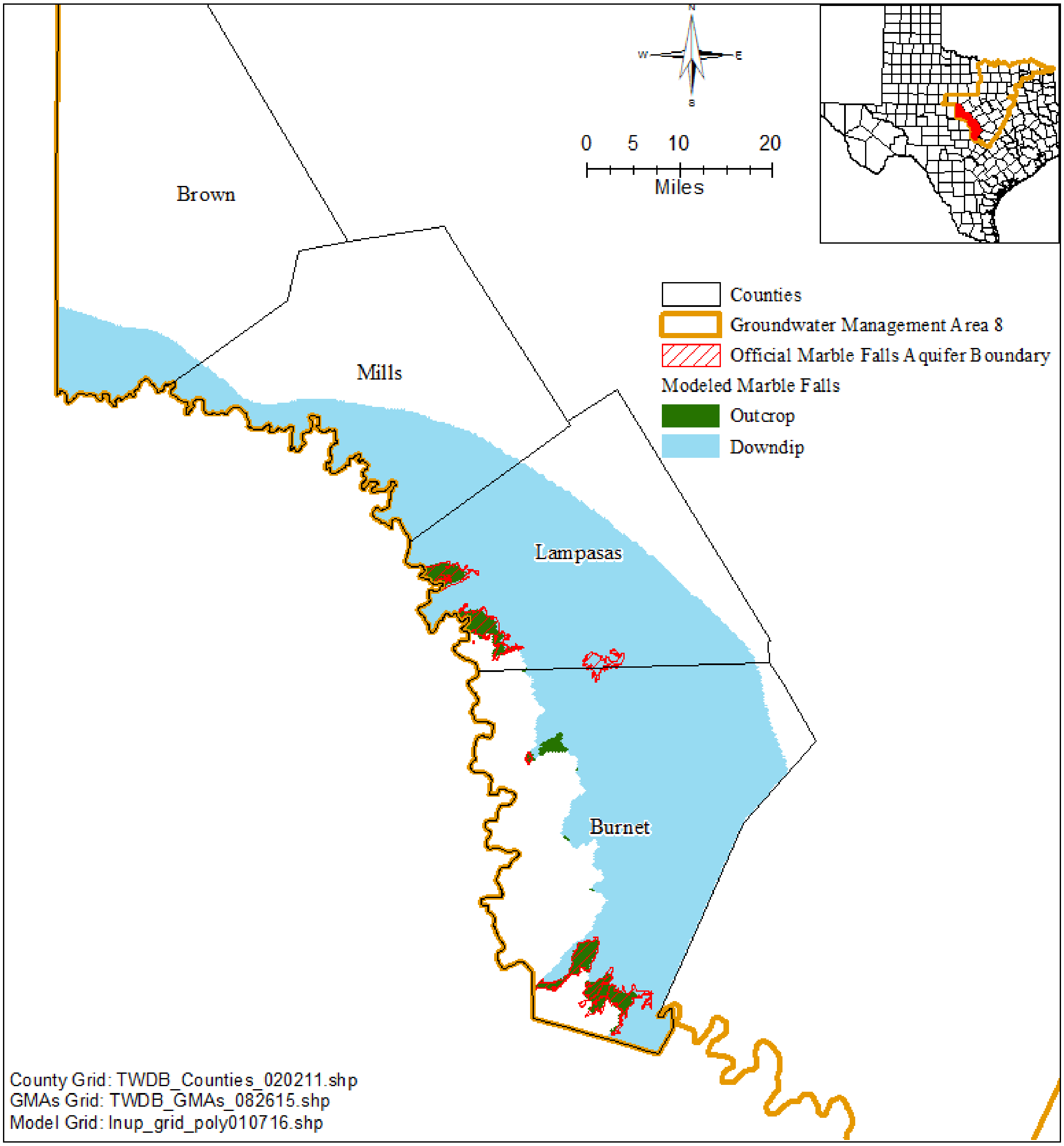


FIGURE 10. MAP SHOWING THE MARBLE FALLS AQUIFER WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS IN THE LLANO UPLIFT REGION.

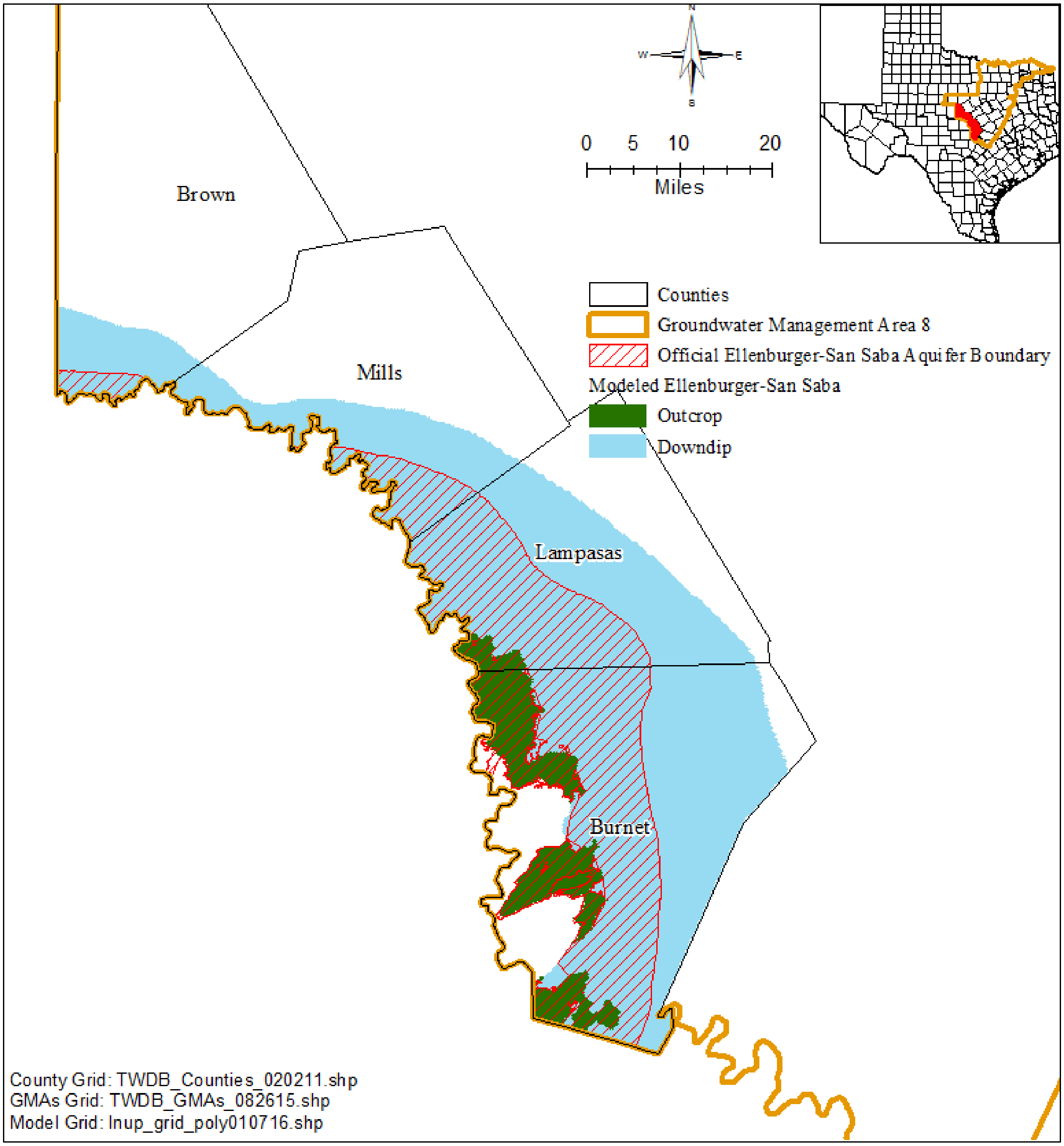


FIGURE 11. MAP SHOWING THE ELLENBURGER-SAN SABA AQUIFER WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS IN THE LLANO UPLIFT REGION.

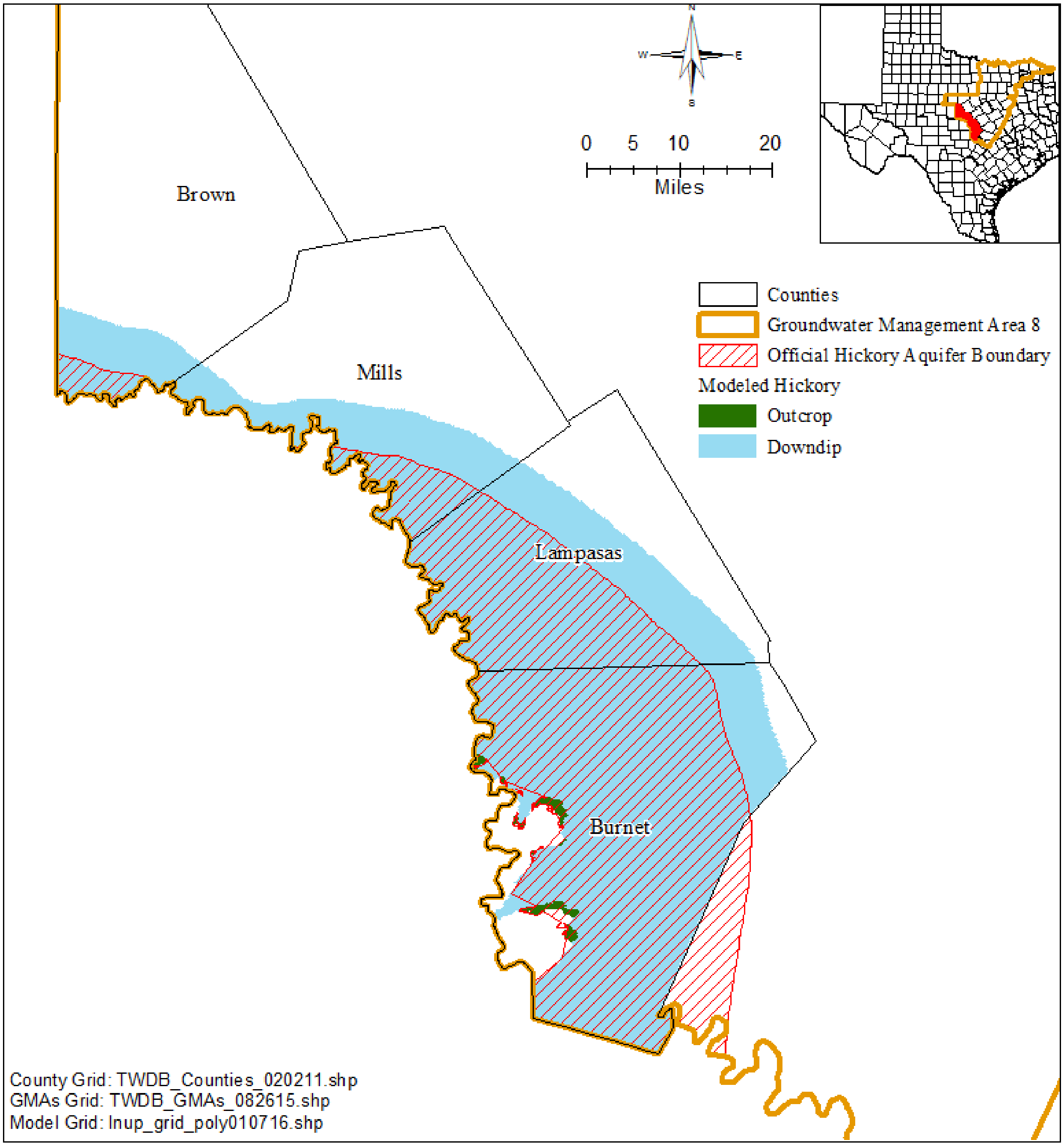


FIGURE 12. MAP SHOWING THE HICKORY AQUIFER WITHIN GROUNDWATER MANAGEMENT AREA 8 FROM THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS IN THE LLANO UPLIFT REGION.

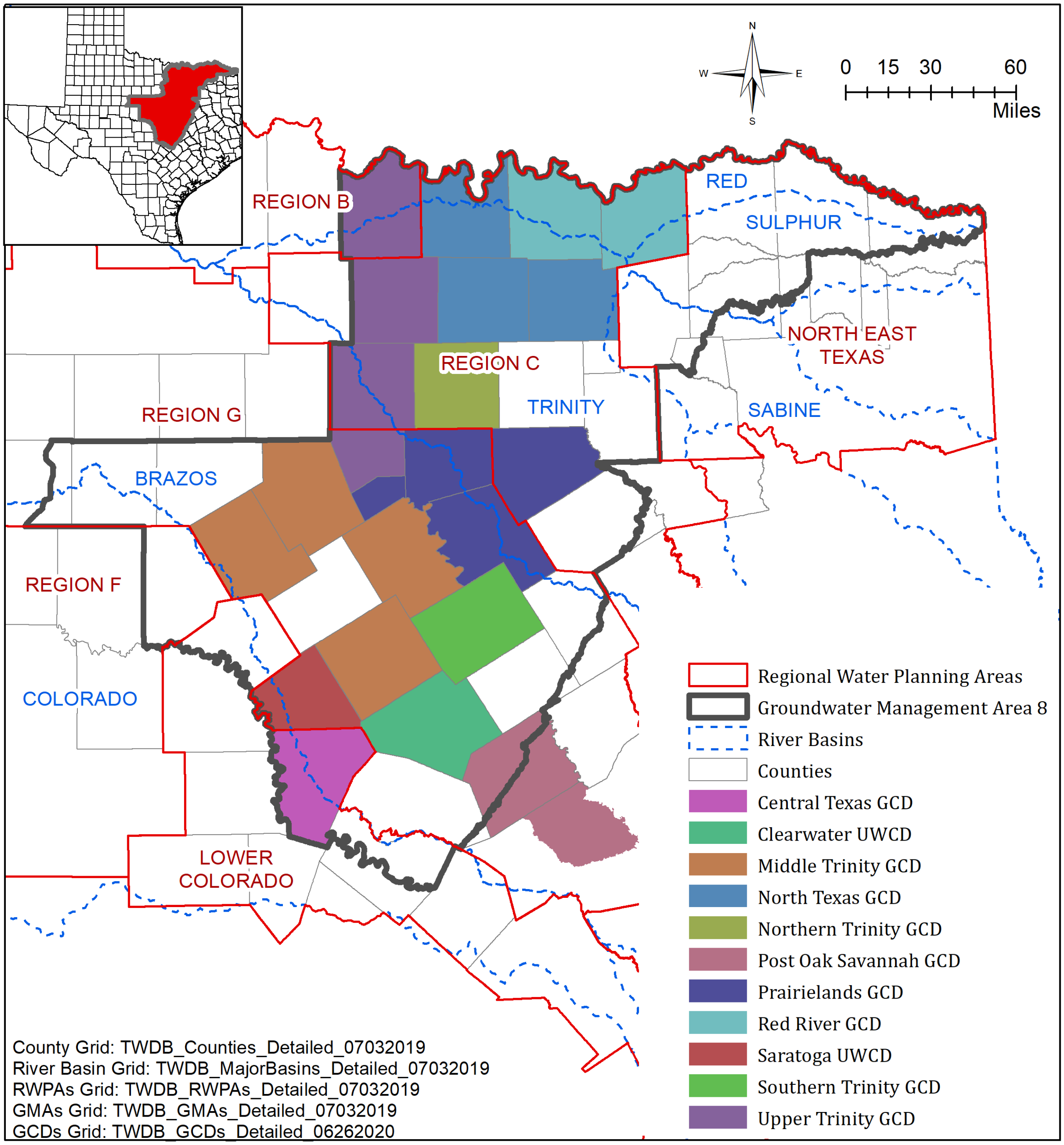


FIGURE 13. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAs), GROUNDWATER CONSERVATION DISTRICTS (GCDs), AND RIVER BASINS ASSOCIATED WITH GROUNDWATER MANAGEMENT AREA 8.

TABLE 5. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (PALUXY) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Clearwater UWCD*	Bell	Paluxy	0	0	0	0	0	0	0
Clearwater UWCD Total		**Paluxy**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Middle Trinity GCD	Bosque	Paluxy	357	357	357	357	357	357	357
Middle Trinity GCD	Coryell	Paluxy	0	0	0	0	0	0	0
Middle Trinity GCD	Erath	Paluxy	61	61	61	61	61	61	61
Middle Trinity GCD Total		**Paluxy**	**418**	**418**	**418**	**418**	**418**	**418**	**418**
North Texas GCD	Collin	Paluxy	1,548	1,548	1,548	1,548	1,548	1,548	1,548
North Texas GCD	Denton	Paluxy	4,823	4,823	4,823	4,823	4,823	4,823	4,823
North Texas GCD Total		**Paluxy**	**6,371**	**6,371**	**6,371**	**6,371**	**6,371**	**6,371**	**6,371**
Northern Trinity GCD	Tarrant	Paluxy	8,963	8,963	8,963	8,963	8,963	8,963	8,963
Northern Trinity GCD Total		**Paluxy**	**8,963**	**8,963**	**8,963**	**8,963**	**8,963**	**8,963**	**8,963**
Prairielands GCD	Ellis	Paluxy	442	442	442	442	442	442	442
Prairielands GCD	Hill	Paluxy	352	352	352	352	352	352	352
Prairielands GCD	Johnson	Paluxy	2,442	2,442	2,442	2,442	2,442	2,442	2,442
Prairielands GCD	Somervell	Paluxy	14	14	14	14	14	14	14
Prairielands GCD Total		**Paluxy**	**3,250**	**3,250**	**3,250**	**3,250**	**3,250**	**3,250**	**3,250**
Red River GCD	Fannin	Paluxy	2,088	2,088	2,088	2,088	2,088	2,088	2,088
Red River GCD	Grayson	Paluxy	0	0	0	0	0	0	0
Red River GCD Total		**Paluxy**	**2,088**	**2,088**	**2,088**	**2,088**	**2,088**	**2,088**	**2,088**
Southern Trinity GCD	McLennan	Paluxy	0	0	0	0	0	0	0
Southern Trinity GCD Total		**Paluxy**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

TABLE 5 (CONT). MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (PALUXY) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Upper Trinity GCD	Hood	Paluxy (outcrop)	159	159	159	159	159	159	159
Upper Trinity GCD	Parker	Paluxy (outcrop)	2,609	2,609	2,609	2,609	2,609	2,609	2,609
Upper Trinity GCD	Parker	Paluxy (downdip)	50	50	50	50	50	50	50
Upper Trinity GCD Total		**Paluxy**	**2,818**	**2,818**	**2,818**	**2,818**	**2,818**	**2,818**	**2,818**
No District	Dallas	Paluxy	359	359	359	359	359	359	359
No District	Delta	Paluxy	56	56	56	56	56	56	56
No District	Falls	Paluxy	0	0	0	0	0	0	0
No District	Hamilton	Paluxy	0	0	0	0	0	0	0
No District	Hunt	Paluxy	3	3	3	3	3	3	3
No District	Kaufman	Paluxy	0	0	0	0	0	0	0
No District	Lamar	Paluxy	8	8	8	8	8	8	8
No District	Limestone	Paluxy	0	0	0	0	0	0	0
No District	Mills	Paluxy	6	6	6	6	6	6	6
No District	Navarro	Paluxy	0	0	0	0	0	0	0
No District	Red River	Paluxy	177	177	177	177	177	177	177
No District	Rockwall	Paluxy	0	0	0	0	0	0	0
No District Total		**Paluxy**	**609**	**609**	**609**	**609**	**609**	**609**	**609**
GMA 8 Total		**Paluxy**	**24,517**	**24,517**	**24,517**	**24,517**	**24,517**	**24,517**	**24,517**

*UWCD: Underground Water Conservation District.

TABLE 6. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (GLEN ROSE) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Central Texas GCD	Burnet	Glen Rose	148	148	148	148	148	148	148
Central Texas GCD Total		**Glen Rose**	**148**	**148**	**148**	**148**	**148**	**148**	**148**
Clearwater UWCD	Bell	Glen Rose	275	275	275	275	275	275	275
Clearwater UWCD Total		**Glen Rose**	**275**	**275**	**275**	**275**	**275**	**275**	**275**
Middle Trinity GCD	Bosque	Glen Rose	729	729	729	729	729	729	729
Middle Trinity GCD	Comanche	Glen Rose	41	41	41	41	41	41	41
Middle Trinity GCD	Coryell	Glen Rose	120	120	120	120	120	120	120
Middle Trinity GCD	Erath	Glen Rose	1,078	1,078	1,078	1,078	1,078	1,078	1,078
Middle Trinity GCD Total		**Glen Rose**	**1,968**	**1,968**	**1,968**	**1,968**	**1,968**	**1,968**	**1,968**
North Texas GCD	Collin	Glen Rose	83	83	83	83	83	83	83
North Texas GCD	Denton	Glen Rose	339	339	339	339	339	339	339
North Texas GCD Total		**Glen Rose**	**422**	**422**	**422**	**422**	**422**	**422**	**422**
Northern Trinity GCD	Tarrant	Glen Rose	793	793	793	793	793	793	793
Northern Trinity GCD Total		**Glen Rose**	**793**	**793**	**793**	**793**	**793**	**793**	**793**
Post Oak Savannah GCD	Milam	Glen Rose	0	0	0	0	0	0	0
Post Oak Savannah GCD Total		**Glen Rose**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Prairielands GCD	Ellis	Glen Rose	50	50	50	50	50	50	50
Prairielands GCD	Hill	Glen Rose	115	115	115	115	115	115	115
Prairielands GCD	Johnson	Glen Rose	1,633	1,633	1,633	1,633	1,633	1,633	1,633
Prairielands GCD	Somervell	Glen Rose	146	146	146	146	146	146	146
Prairielands GCD Total		**Glen Rose**	**1,944**	**1,944**	**1,944**	**1,944**	**1,944**	**1,944**	**1,944**
Red River GCD	Fannin	Glen Rose	0	0	0	0	0	0	0
Red River GCD	Grayson	Glen Rose	0	0	0	0	0	0	0
Red River GCD Total		**Glen Rose**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

TABLE 6 (CONT). MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (GLEN ROSE) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Saratoga UWCD	Lampasas	Glen Rose	68	68	68	68	68	68	68
Saratoga UWCD Total		**Glen Rose**	**68**	**68**	**68**	**68**	**68**	**68**	**68**
Southern Trinity GCD	McLennan	Glen Rose	0	0	0	0	0	0	0
Southern Trinity GCD Total		**Glen Rose**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Upper Trinity GCD	Hood	Glen Rose (outcrop)	790	790	790	790	790	790	790
Upper Trinity GCD	Hood	Glen Rose (downdip)	124	124	124	124	124	124	124
Upper Trinity GCD	Parker	Glen Rose (outcrop)	3,685	3,685	3,685	3,685	3,685	3,685	3,685
Upper Trinity GCD	Parker	Glen Rose (downdip)	1,406	1,406	1,406	1,406	1,406	1,406	1,406
Upper Trinity GCD Total			**6,005**	**6,005**	**6,005**	**6,005**	**6,005**	**6,005**	**6,005**
No District	Brown	Glen Rose	0	0	0	0	0	0	0
No District	Dallas	Glen Rose	131	131	131	131	131	131	131
No District	Delta	Glen Rose	0	0	0	0	0	0	0
No District	Falls	Glen Rose	0	0	0	0	0	0	0
No District	Hamilton	Glen Rose	218	218	218	218	218	218	218
No District	Hunt	Glen Rose	0	0	0	0	0	0	0
No District	Kaufman	Glen Rose	0	0	0	0	0	0	0
No District	Lamar	Glen Rose	0	0	0	0	0	0	0
No District	Limestone	Glen Rose	0	0	0	0	0	0	0
No District	Mills	Glen Rose	189	189	189	189	189	189	189
No District	Navarro	Glen Rose	0	0	0	0	0	0	0
No District	Red River	Glen Rose	0	0	0	0	0	0	0
No District	Rockwall	Glen Rose	0	0	0	0	0	0	0
No District	Travis	Glen Rose	100	100	100	100	100	100	100
No District	Williamson	Glen Rose	149	149	149	149	149	149	149
No District Total		**Glen Rose**	**787**	**787**	**787**	**787**	**787**	**787**	**787**
GMA 8 Total		**Glen Rose**	**12,410**	**12,410**	**12,410**	**12,410**	**12,410**	**12,410**	**12,410**

*UWCD: Underground Water Conservation District.

TABLE 7. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (TWIN MOUNTAINS) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Middle Trinity GCD	Erath	Twin Mountains	5,017	5,017	5,017	5,017	5,017	5,017	5,017
Middle Trinity GCD Total		**Twin Mountains**	**5,017**	**5,017**	**5,017**	**5,017**	**5,017**	**5,017**	**5,017**
North Texas GCD	Collin	Twin Mountains	2,202	2,202	2,202	2,202	2,202	2,202	2,202
North Texas GCD	Denton	Twin Mountains	8,372	8,372	8,372	8,372	8,372	8,372	8,372
North Texas GCD Total		**Twin Mountains**	**10,574**	**10,574**	**10,574**	**10,574**	**10,574**	**10,574**	**10,574**
Northern Trinity GCD	Tarrant	Twin Mountains	6,922	6,922	6,922	6,922	6,922	6,922	6,922
Northern Trinity GCD Total		**Twin Mountains**	**6,922**	**6,922**	**6,922**	**6,922**	**6,922**	**6,922**	**6,922**
Prairielands GCD	Ellis	Twin Mountains	0	0	0	0	0	0	0
Prairielands GCD	Johnson	Twin Mountains	278	278	278	278	278	278	278
Prairielands GCD	Somervell	Twin Mountains	65	65	65	65	65	65	65
Prairielands GCD Total		**Twin Mountains**	**343**	**343**	**343**	**343**	**343**	**343**	**343**
Red River GCD	Fannin	Twin Mountains	0	0	0	0	0	0	0
Red River GCD	Grayson	Twin Mountains	0	0	0	0	0	0	0
Red River GCD Total		**Twin Mountains**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Upper Trinity GCD	Hood (outcrop)	Twin Mountains (outcrop)	5,024	5,024	5,024	5,024	5,024	5,024	5,024
Upper Trinity GCD	Hood	Twin Mountains (downdip)	10,619	10,619	10,619	10,619	10,619	10,619	10,619
Upper Trinity GCD	Parker	Twin Mountains (outcrop)	1,282	1,282	1,282	1,282	1,282	1,282	1,282
Upper Trinity GCD	Parker	Twin Mountains (downdip)	2,528	2,528	2,528	2,528	2,528	2,528	2,528
Upper Trinity GCD Total		**Twin Mountains**	**19,453**	**19,453**	**19,453**	**19,453**	**19,453**	**19,453**	**19,453**

TABLE 7 (CONT). MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (TWIN MOUNTAINS) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
No District	Dallas	Twin Mountains	3,201	3,201	3,201	3,201	3,201	3,201	3,201
No District	Hunt	Twin Mountains	0	0	0	0	0	0	0
No District	Kaufman	Twin Mountains	0	0	0	0	0	0	0
No District	Rockwall	Twin Mountains	0	0	0	0	0	0	0
No District Total		**Twin Mountains**	**3,201**	**3,201**	**3,201**	**3,201**	**3,201**	**3,201**	**3,201**
GMA 8 Total		**Twin Mountains**	**45,510**	**45,510**	**45,510**	**45,510**	**45,510**	**45,510**	**45,510**

TABLE 8. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (TRAVIS PEAK) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Central Texas GCD	Burnet	Travis Peak	3,742	3,742	3,742	3,742	3,742	3,742	3,742
Central Texas GCD Total		**Travis Peak**	**3,742**	**3,742**	**3,742**	**3,742**	**3,742**	**3,742**	**3,742**
Clearwater UWCD[1]	Bell	Travis Peak	9,000	9,000	9,000	9,000	9,000	9,000	9,000
Clearwater UWCD Total		**Travis Peak**	**9,000**	**9,000**	**9,000**	**9,000**	**9,000**	**9,000**	**9,000**
Middle Trinity GCD	Bosque	Travis Peak	7,683	7,683	7,683	7,683	7,683	7,683	7,683
Middle Trinity GCD	Comanche	Travis Peak	6,164	6,164	6,164	6,164	6,164	6,164	6,164
Middle Trinity GCD	Coryell	Travis Peak	4,374	4,374	4,374	4,374	4,374	4,374	4,374
Middle Trinity GCD	Erath	Travis Peak	11,824	11,824	11,824	11,824	11,824	11,824	11,824
Middle Trinity GCD Total		**Travis Peak**	**30,045**	**30,045**	**30,045**	**30,045**	**30,045**	**30,045**	**30,045**
Post Oak Savannah GCD	Milam	Travis Peak	0	0	0	0	0	0	0
Post Oak Savannah GCD Total		**Travis Peak**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Prairielands GCD	Ellis	Travis Peak	5,676	5,676	5,676	5,676	5,676	5,676	5,676
Prairielands GCD	Hill	Travis Peak	4,685	4,685	4,685	4,685	4,685	4,685	4,685
Prairielands GCD	Johnson	Travis Peak	4,472	4,472	4,472	4,472	4,472	4,472	4,472
Prairielands GCD	Somervell	Travis Peak	1,763	1,763	1,763	1,763	1,763	1,763	1,763
Prairielands GCD Total		**Travis Peak**	**16,596**	**16,596**	**16,596**	**16,596**	**16,596**	**16,596**	**16,596**
Red River GCD	Fannin	Travis Peak	0	0	0	0	0	0	0
Red River GCD Total		**Travis Peak**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Saratoga UWCD	Lampasas	Travis Peak	1,593	1,593	1,593	1,593	1,593	1,593	1,593
Saratoga UWCD Total		**Travis Peak**	**1,593**	**1,593**	**1,593**	**1,593**	**1,593**	**1,593**	**1,593**
Southern Trinity GCD	McLennan	Travis Peak	20,649	20,649	20,649	20,649	20,649	20,649	20,649
Southern Trinity GCD Total		**Travis Peak**	**20,649**	**20,649**	**20,649**	**20,649**	**20,649**	**20,649**	**20,649**
Upper Trinity GCD[2]	Hood	Travis Peak	122	122	122	122	122	122	122
Upper Trinity GCD Total[2]		**Travis Peak**	**122**	**122**	**122**	**122**	**122**	**122**	**122**

TABLE 8 (CONT). MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (TRAVIS PEAK) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
No District	Brown	Travis Peak	384	384	384	384	384	384	384
No District	Dallas	Travis Peak	0	0	0	0	0	0	0
No District	Delta	Travis Peak	0	0	0	0	0	0	0
No District	Falls	Travis Peak	1,435	1,435	1,435	1,435	1,435	1,435	1,435
No District	Hamilton	Travis Peak	2,209	2,209	2,209	2,209	2,209	2,209	2,209
No District	Hunt	Travis Peak	0	0	0	0	0	0	0
No District	Kaufman	Travis Peak	0	0	0	0	0	0	0
No District	Lamar	Travis Peak	0	0	0	0	0	0	0
No District	Limestone	Travis Peak	0	0	0	0	0	0	0
No District	Mills	Travis Peak	2,264	2,264	2,264	2,264	2,264	2,264	2,264
No District	Navarro	Travis Peak	0	0	0	0	0	0	0
No District	Red River	Travis Peak	0	0	0	0	0	0	0
No District	Travis	Travis Peak	6,644	6,644	6,644	6,644	6,644	6,644	6,644
No District	Williamson	Travis Peak	3,548	3,548	3,548	3,548	3,548	3,548	3,548
No District Total		**Travis Peak**	**16,484**	**16,484**	**16,484**	**16,484**	**16,484**	**16,484**	**16,484**
GMA 8 Total		**Travis Peak**	**98,231**	**98,231**	**98,231**	**98,231**	**98,231**	**98,231**	**98,231**

[1]UWCD: Underground Water Conservation District.
[2]Splits for Upper Trinity GCD are presented since they are included in the GMA 8-wide desired future conditions.

TABLE 9. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (HENSELL) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Central Texas GCD	Burnet	Hensell	2,662	2,662	2,662	2,662	2,662	2,662	2,662
Central Texas GCD Total		**Hensell**	**2,662**	**2,662**	**2,662**	**2,662**	**2,662**	**2,662**	**2,662**
Clearwater UWCD[1]	Bell	Hensell	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Clearwater UWCD Total		**Hensell**	**1,100**	**1,100**	**1,100**	**1,100**	**1,100**	**1,100**	**1,100**
Middle Trinity GCD	Bosque	Hensell	3,837	3,837	3,837	3,837	3,837	3,837	3,837
Middle Trinity GCD	Comanche	Hensell	204	204	204	204	204	204	204
Middle Trinity GCD	Coryell	Hensell	2,197	2,197	2,197	2,197	2,197	2,197	2,197
Middle Trinity GCD	Erath	Hensell	5,141	5,141	5,141	5,141	5,141	5,141	5,141
Middle Trinity GCD Total		**Hensell**	**11,379**	**11,379**	**11,379**	**11,379**	**11,379**	**11,379**	**11,379**
Post Oak Savannah GCD	Milam	Hensell	0	0	0	0	0	0	0
Post Oak Savannah GCD Total		**Hensell**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Prairielands GCD	Ellis	Hensell	0	0	0	0	0	0	0
Prairielands GCD	Hill	Hensell	25	25	25	25	25	25	25
Prairielands GCD	Johnson	Hensell	119	119	119	119	119	119	119
Prairielands GCD	Somervell	Hensell	217	217	217	217	217	217	217
Prairielands GCD Total		**Hensell**	**361**	**361**	**361**	**361**	**361**	**361**	**361**
Saratoga UWCD	Lampasas	Hensell	713	713	713	713	713	713	713
Saratoga UWCD Total		**Hensell**	**713**	**713**	**713**	**713**	**713**	**713**	**713**
Southern Trinity GCD	McLennan	Hensell	4,701	4,701	4,701	4,701	4,701	4,701	4,701
Southern Trinity GCD Total		**Hensell**	**4,701**	**4,701**	**4,701**	**4,701**	**4,701**	**4,701**	**4,701**
Upper Trinity GCD[2]	Hood	Hensell	50	50	50	50	50	50	50
Upper Trinity GCD Total[2]		**Hensell**	**50**	**50**	**50**	**50**	**50**	**50**	**50**

TABLE 9 (CONT). MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (HENSELL) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
No District	Brown	Hensell	4	4	4	4	4	4	4
No District	Dallas	Hensell	0	0	0	0	0	0	0
No District	Falls	Hensell	0	0	0	0	0	0	0
No District	Hamilton	Hensell	1,672	1,672	1,672	1,672	1,672	1,672	1,672
No District	Kaufman	Hensell	0	0	0	0	0	0	0
No District	Limestone	Hensell	0	0	0	0	0	0	0
No District	Mills	Hensell	607	607	607	607	607	607	607
No District	Navarro	Hensell	0	0	0	0	0	0	0
No District	Travis	Hensell	2,269	2,269	2,269	2,269	2,269	2,269	2,269
No District	Williamson	Hensell	1,599	1,599	1,599	1,599	1,599	1,599	1,599
No District Total		**Hensell**	**6,151**	**6,151**	**6,151**	**6,151**	**6,151**	**6,151**	**6,151**
GMA 8 Total		**Hensell**	**27,117**	**27,117**	**27,117**	**27,117**	**27,117**	**27,117**	**27,117**

[1]UWCD: Underground Water Conservation District.
[2]Splits for Upper Trinity GCD are presented since they are included in the GMA 8-wide desired future conditions.
*Note that the Hensell values in this table represent a portion of the total Travis Peak values already provided in Table 8 and do not represent an additional source of water.

TABLE 10. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (HOSSTON) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Central Texas GCD	Burnet	Hosston	883	883	883	883	883	883	883
Central Texas GCD Total		**Hosston**	**883**	**883**	**883**	**883**	**883**	**883**	**883**
Clearwater UWCD[1]	Bell	Hosston	7,900	7,900	7,900	7,900	7,900	7,900	7,900
Clearwater UWCD Total		**Hosston**	**7,900**	**7,900**	**7,900**	**7,900**	**7,900**	**7,900**	**7,900**
Middle Trinity GCD	Bosque	Hosston	3,765	3,765	3,765	3,765	3,765	3,765	3,765
Middle Trinity GCD	Comanche	Hosston	5,869	5,869	5,869	5,869	5,869	5,869	5,869
Middle Trinity GCD	Coryell	Hosston	2,163	2,163	2,163	2,163	2,163	2,163	2,163
Middle Trinity GCD	Erath	Hosston	6,387	6,387	6,387	6,387	6,387	6,387	6,387
Middle Trinity GCD Total		**Hosston**	**18,184**	**18,184**	**18,184**	**18,184**	**18,184**	**18,184**	**18,184**
Post Oak Savannah GCD	Milam	Hosston	0	0	0	0	0	0	0
Post Oak Savannah GCD Total		**Hosston**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Prairielands GCD	Ellis	Hosston	5,545	5,545	5,545	5,545	5,545	5,545	5,545
Prairielands GCD	Hill	Hosston	3,610	3,610	3,610	3,610	3,610	3,610	3,610
Prairielands GCD	Johnson	Hosston	4,251	4,251	4,251	4,251	4,251	4,251	4,251
Prairielands GCD	Somervell	Hosston	930	930	930	930	930	930	930
Prairielands GCD Total		**Hosston**	**14,336**	**14,336**	**14,336**	**14,336**	**14,336**	**14,336**	**14,336**
Saratoga UWCD	Lampasas	Hosston	849	849	849	849	849	849	849
Saratoga UWCD Total		**Hosston**	**849**	**849**	**849**	**849**	**849**	**849**	**849**
Southern Trinity GCD	McLennan	Hosston	15,948	15,948	15,948	15,948	15,948	15,948	15,948
Southern Trinity GCD Total		**Hosston**	**15,948**	**15,948**	**15,948**	**15,948**	**15,948**	**15,948**	**15,948**
Upper Trinity GCD[2]	Hood	Hosston	72	72	72	72	72	72	72
Upper Trinity GCD Total[2]		**Hosston**	**72**	**72**	**72**	**72**	**72**	**72**	**72**

TABLE 10 (CONT). MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (HOSSTON) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
No District	Brown	Hosston	346	346	346	346	346	346	346
No District	Dallas	Hosston	0	0	0	0	0	0	0
No District	Falls	Hosston	1,435	1,435	1,435	1,435	1,435	1,435	1,435
No District	Hamilton	Hosston	385	385	385	385	385	385	385
No District	Kaufman	Hosston	0	0	0	0	0	0	0
No District	Limestone	Hosston	0	0	0	0	0	0	0
No District	Mills	Hosston	1,455	1,455	1,455	1,455	1,455	1,455	1,455
No District	Navarro	Hosston	0	0	0	0	0	0	0
No District	Travis	Hosston	4,185	4,185	4,185	4,185	4,185	4,185	4,185
No District	Williamson	Hosston	1,750	1,750	1,750	1,750	1,750	1,750	1,750
No District Total		**Hosston**	**9,556**	**9,556**	**9,556**	**9,556**	**9,556**	**9,556**	**9,556**
GMA 8 Total		**Hosston**	**67,728**	**67,728**	**67,728**	**67,728**	**67,728**	**67,728**	**67,728**

[1]UWCD: Underground Water Conservation District.
[2]Splits for Upper Trinity GCD are presented since they are included in the GMA 8-wide desired future conditions.
*Note that the Hosston values in this table represent a portion of the total Travis Peak values already provided in Table 8 and do not represent an additional source of water.

TABLE 11. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER (ANTLERS) IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Middle Trinity GCD	Comanche	Antlers	5,843	5,843	5,843	5,843	5,843	5,843	5,843
Middle Trinity GCD	Erath	Antlers	2,627	2,627	2,627	2,627	2,627	2,627	2,627
Middle Trinity GCD Total		**Antlers**	**8,470**	**8,470**	**8,470**	**8,470**	**8,470**	**8,470**	**8,470**
North Texas GCD	Collin	Antlers	1,962	1,962	1,962	1,962	1,962	1,962	1,962
North Texas GCD	Cooke	Antlers	10,522	10,522	10,522	10,522	10,522	10,522	10,522
North Texas GCD	Denton	Antlers	16,557	16,557	16,557	16,557	16,557	16,557	16,557
North Texas GCD Total		**Antlers**	**29,041**	**29,041**	**29,041**	**29,041**	**29,041**	**29,041**	**29,041**
Northern Trinity GCD	Tarrant	Antlers	1,248	1,248	1,248	1,248	1,248	1,248	1,248
Northern Trinity GCD Total		**Antlers**	**1,248**	**1,248**	**1,248**	**1,248**	**1,248**	**1,248**	**1,248**
Red River GCD	Fannin	Antlers	0	0	0	0	0	0	0
Red River GCD	Grayson	Antlers	10,716	10,716	10,716	10,716	10,716	10,716	10,716
Red River GCD Total		**Antlers**	**10,716**	**10,716**	**10,716**	**10,716**	**10,716**	**10,716**	**10,716**
Upper Trinity GCD	Montague	Antlers (outcrop)	6,103	6,103	6,103	6,103	6,103	6,103	6,103
Upper Trinity GCD	Parker	Antlers (outcrop)	2,889	2,889	2,889	2,889	2,889	2,889	2,889
Upper Trinity GCD	Wise	Antlers (outcrop)	9,013	9,013	9,013	9,013	9,013	9,013	9,013
Upper Trinity GCD	Wise	Antlers (downdip)	2,439	2,439	2,439	2,439	2,439	2,439	2,439
Upper Trinity GCD Total		**Antlers**	**20,444**	**20,444**	**20,444**	**20,444**	**20,444**	**20,444**	**20,444**
No District	Brown	Antlers	1,043	1,043	1,043	1,043	1,043	1,043	1,043
No District	Callahan	Antlers	1,726	1,726	1,726	1,726	1,726	1,726	1,726
No District	Eastland	Antlers	5,736	5,736	5,736	5,736	5,736	5,736	5,736
No District	Lamar	Antlers	0	0	0	0	0	0	0
No District	Red River	Antlers	0	0	0	0	0	0	0
No District	Taylor	Antlers	13	13	13	13	13	13	13
No District Total		**Antlers**	**8,518**	**8,518**	**8,518**	**8,518**	**8,518**	**8,518**	**8,518**
GMA 8 Total		**Antlers**	**78,437**	**78,437**	**78,437**	**78,437**	**78,437**	**78,437**	**78,437**

TABLE 12. MODELED AVAILABLE GROUNDWATER FOR THE WOODBINE AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
North Texas GCD	Collin	Woodbine	4,254	4,254	4,254	4,254	4,254	4,254	4,254
North Texas GCD	Cooke	Woodbine	800	800	800	800	800	800	800
North Texas GCD	Denton	Woodbine	3,609	3,609	3,609	3,609	3,609	3,609	3,609
North Texas GCD Total		**Woodbine**	**8,663**	**8,663**	**8,663**	**8,663**	**8,663**	**8,663**	**8,663**
Northern Trinity GCD	Tarrant	Woodbine	1,139	1,139	1,139	1,139	1,139	1,139	1,139
Northern Trinity GCD Total		**Woodbine**	**1,139**	**1,139**	**1,139**	**1,139**	**1,139**	**1,139**	**1,139**
Prairielands GCD	Ellis	Woodbine	2,074	2,074	2,074	2,074	2,074	2,074	2,074
Prairielands GCD	Hill	Woodbine	587	587	587	587	587	587	587
Prairielands GCD	Johnson	Woodbine	1,981	1,981	1,981	1,981	1,981	1,981	1,981
Prairielands GCD Total		**Woodbine**	**4,642**	**4,642**	**4,642**	**4,642**	**4,642**	**4,642**	**4,642**
Red River GCD	Fannin	Woodbine	4,924	4,924	4,924	4,924	4,924	4,924	4,924
Red River GCD	Grayson	Woodbine	7,526	7,526	7,526	7,526	7,526	7,526	7,526
Red River GCD Total		**Woodbine**	**12,450**	**12,450**	**12,450**	**12,450**	**12,450**	**12,450**	**12,450**
Southern Trinity GCD	McLennan	Woodbine	0	0	0	0	0	0	0
Southern Trinity GCD Total		**Woodbine**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
No District	Dallas	Woodbine	2,798	2,798	2,798	2,798	2,798	2,798	2,798
No District	Hunt	Woodbine	763	763	763	763	763	763	763
No District	Kaufman	Woodbine	0	0	0	0	0	0	0
No District	Lamar	Woodbine	49	49	49	49	49	49	49
No District	Navarro	Woodbine	68	68	68	68	68	68	68
No District	Red River	Woodbine	2	2	2	2	2	2	2
No District	Rockwall	Woodbine	0	0	0	0	0	0	0
No District Total		**Woodbine**	**3,680**	**3,680**	**3,680**	**3,680**	**3,680**	**3,680**	**3,680**
GMA 8 Total		**Woodbine**	**30,574**	**30,574**	**30,574**	**30,574**	**30,574**	**30,574**	**30,574**

TABLE 13. MODELED AVAILABLE GROUNDWATER FOR THE EDWARDS (BALCONES FAULT ZONE) AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Clearwater UWCD*	Bell	Edwards (Balcones Fault Zone)	6,469	6,469	6,469	6,469	6,469	6,469	6,469
Clearwater UWCD Total		**Edwards (Balcones Fault Zone)**	**6,469**	**6,469**	**6,469**	**6,469**	**6,469**	**6,469**	**6,469**
No District	Travis	Edwards (Balcones Fault Zone)	5,237	5,237	5,237	5,237	5,237	5,237	5,237
No District	Williamson	Edwards (Balcones Fault Zone)	3,462	3,462	3,462	3,462	3,462	3,462	3,462
No District Total		**Edwards (Balcones Fault Zone)**	**8,699**	**8,699**	**8,699**	**8,699**	**8,699**	**8,699**	**8,699**
GMA 8 Total		**Edwards (Balcones Fault Zone)**	**15,168**	**15,168**	**15,168**	**15,168**	**15,168**	**15,168**	**15,168**

*UWCD: Underground Water Conservation District.

TABLE 14. MODELED AVAILABLE GROUNDWATER FOR THE MARBLE FALLS AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Central Texas GCD	Burnet	Marble Falls	2,738	2,738	2,738	2,738	2,738	2,738	2,738
Central Texas GCD Total		**Marble Falls**	**2,738**	**2,738**	**2,738**	**2,738**	**2,738**	**2,738**	**2,738**
Saratoga UWCD*	Lampasas	Marble Falls	2,839	2,839	2,839	2,839	2,839	2,839	2,839
Saratoga UWCD Total		**Marble Falls**	**2,839**	**2,839**	**2,839**	**2,839**	**2,839**	**2,839**	**2,839**
No District	Brown	Marble Falls	25	25	25	25	25	25	25
No District	Mills	Marble Falls	25	25	25	25	25	25	25
No District Total		**Marble Falls**	**50**	**50**	**50**	**50**	**50**	**50**	**50**
GMA 8 Total		**Marble Falls**	**5,627**	**5,627**	**5,627**	**5,627**	**5,627**	**5,627**	**5,627**

*UWCD: Underground Water Conservation District.

TABLE 15. MODELED AVAILABLE GROUNDWATER FOR ELLENBURGER-SAN SABA AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Central Texas GCD	Burnet	Ellenburger-San Saba	10,835	10,835	10,835	10,835	10,835	10,835	10,835
Central Texas GCD Total		**Ellenburger-San Saba**	**10,835**	**10,835**	**10,835**	**10,835**	**10,835**	**10,835**	**10,835**
Saratoga UWCD*	Lampasas	Ellenburger-San Saba	2,595	2,595	2,595	2,595	2,595	2,595	2,595
Saratoga UWCD Total		**Ellenburger-San Saba**	**2,595**	**2,595**	**2,595**	**2,595**	**2,595**	**2,595**	**2,595**
No District	Brown	Ellenburger-San Saba	131	131	131	131	131	131	131
No District	Mills	Ellenburger-San Saba	499	499	499	499	499	499	499
No District Total		**Ellenburger-San Saba**	**630**	**630**	**630**	**630**	**630**	**630**	**630**
GMA 8 Total		**Ellenburger-San Saba**	**14,060**	**14,060**	**14,060**	**14,060**	**14,060**	**14,060**	**14,060**

*UWCD: Underground Water Conservation District.

TABLE 16. MODELED AVAILABLE GROUNDWATER FOR THE HICKORY AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Central Texas GCD	Burnet	Hickory	3,415	3,415	3,415	3,415	3,415	3,415	3,415
Central Texas GCD Total		**Hickory**	**3,415**	**3,415**	**3,415**	**3,415**	**3,415**	**3,415**	**3,415**
Saratoga UWCD*	Lampasas	Hickory	113	113	113	113	113	113	113
Saratoga UWCD Total		**Hickory**	**113**	**113**	**113**	**113**	**113**	**113**	**113**
No District	Brown	Hickory	12	12	12	12	12	12	12
No District	Mills	Hickory	36	36	36	36	36	36	36
No District Total		**Hickory**	**48**	**48**	**48**	**48**	**48**	**48**	**48**
GMA 8 Total		**Hickory**	**3,576**	**3,576**	**3,576**	**3,576**	**3,576**	**3,576**	**3,576**

*UWCD: Underground Water Conservation District.

TABLE 17. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (PALUXY) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties Not in Upper Trinity GCD									
Bell	G	Brazos	Paluxy	0	0	0	0	0	0
Bosque	G	Brazos	Paluxy	357	357	357	357	357	357
Collin	C	Sabine	Paluxy	0	0	0	0	0	0
Collin	C	Trinity	Paluxy	1,548	1,548	1,548	1,548	1,548	1,548
Coryell	G	Brazos	Paluxy	0	0	0	0	0	0
Dallas	C	Trinity	Paluxy	359	359	359	359	359	359
Delta	D	Sulphur	Paluxy	56	56	56	56	56	56
Denton	C	Trinity	Paluxy	4,823	4,823	4,823	4,823	4,823	4,823
Ellis	C	Trinity	Paluxy	442	442	442	442	442	442
Erath	G	Brazos	Paluxy	61	61	61	61	61	61
Falls	G	Brazos	Paluxy	0	0	0	0	0	0
Fannin	C	Sulphur	Paluxy	2,088	2,088	2,088	2,088	2,088	2,088
Fannin	C	Trinity	Paluxy	0	0	0	0	0	0
Grayson	C	Trinity	Paluxy	0	0	0	0	0	0
Hamilton	G	Brazos	Paluxy	0	0	0	0	0	0
Hill	G	Brazos	Paluxy	347	347	347	347	347	347
Hill	G	Trinity	Paluxy	5	5	5	5	5	5
Hunt	D	Sabine	Paluxy	0	0	0	0	0	0
Hunt	D	Sulphur	Paluxy	3	3	3	3	3	3
Hunt	D	Trinity	Paluxy	0	0	0	0	0	0
Johnson	G	Brazos	Paluxy	878	878	878	878	878	878
Johnson	G	Trinity	Paluxy	1,563	1,563	1,563	1,563	1,563	1,563
Kaufman	C	Trinity	Paluxy	0	0	0	0	0	0
Lamar	D	Red	Paluxy	0	0	0	0	0	0
Lamar	D	Sulphur	Paluxy	8	8	8	8	8	8
Limestone	G	Brazos	Paluxy	0	0	0	0	0	0
Limestone	G	Trinity	Paluxy	0	0	0	0	0	0
McLennan	G	Brazos	Paluxy	0	0	0	0	0	0
Mills	K	Brazos	Paluxy	6	6	6	6	6	6
Mills	K	Colorado	Paluxy	0	0	0	0	0	0
Navarro	C	Trinity	Paluxy	0	0	0	0	0	0
Red River	D	Red	Paluxy	52	52	52	52	52	52
Red River	D	Sulphur	Paluxy	125	125	125	125	125	125
Rockwall	C	Trinity	Paluxy	0	0	0	0	0	0
Somervell	G	Brazos	Paluxy	14	14	14	14	14	14
Tarrant	C	Trinity	Paluxy	8,963	8,963	8,963	8,963	8,963	8,963
Subtotal			**Paluxy**	**21,698**	**21,698**	**21,698**	**21,698**	**21,698**	**21,698**

TABLE 17 (CONT). MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (PALUXY) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties in Upper Trinity GCD									
Hood	G	Brazos	Paluxy (outcrop)	159	159	159	159	159	159
Hood	G	Trinity	Paluxy (outcrop)	0	0	0	0	0	0
Parker	C	Brazos	Paluxy (outcrop)	34	34	34	34	34	34
Parker	C	Trinity	Paluxy (outcrop)	2,575	2,575	2,575	2,575	2,575	2,575
Parker	C	Trinity	Paluxy (downdip)	50	50	50	50	50	50
Subtotal			**Paluxy**	**2,818**	**2,818**	**2,818**	**2,818**	**2,818**	**2,818**
GMA 8 Total			**Paluxy**	**24,516**	**24,516**	**24,516**	**24,516**	**24,516**	**24,516**

TABLE 18. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (GLEN ROSE) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties Not in Upper Trinity GCD									
Bell	G	Brazos	Glen Rose	275	275	275	275	275	275
Bosque	G	Brazos	Glen Rose	729	729	729	729	729	729
Brown	F	Colorado	Glen Rose	0	0	0	0	0	0
Burnet	K	Brazos	Glen Rose	66	66	66	66	66	66
Burnet	K	Colorado	Glen Rose	82	82	82	82	82	82
Collin	C	Sabine	Glen Rose	0	0	0	0	0	0
Collin	C	Trinity	Glen Rose	83	83	83	83	83	83
Comanche	G	Brazos	Glen Rose	22	22	22	22	22	22
Comanche	G	Colorado	Glen Rose	18	18	18	18	18	18
Coryell	G	Brazos	Glen Rose	120	120	120	120	120	120
Dallas	C	Trinity	Glen Rose	131	131	131	131	131	131
Delta	D	Sulphur	Glen Rose	0	0	0	0	0	0
Denton	C	Trinity	Glen Rose	339	339	339	339	339	339
Ellis	C	Trinity	Glen Rose	50	50	50	50	50	50
Erath	G	Brazos	Glen Rose	1,078	1,078	1,078	1,078	1,078	1,078
Falls	G	Brazos	Glen Rose	0	0	0	0	0	0
Fannin	C	Sulphur	Glen Rose	0	0	0	0	0	0
Fannin	C	Trinity	Glen Rose	0	0	0	0	0	0
Grayson	C	Trinity	Glen Rose	0	0	0	0	0	0
Hamilton	G	Brazos	Glen Rose	218	218	218	218	218	218
Hill	G	Brazos	Glen Rose	114	114	114	114	114	114
Hill	G	Trinity	Glen Rose	1	1	1	1	1	1
Hunt	D	Sabine	Glen Rose	0	0	0	0	0	0
Hunt	D	Sulphur	Glen Rose	0	0	0	0	0	0
Hunt	D	Trinity	Glen Rose	0	0	0	0	0	0
Johnson	G	Brazos	Glen Rose	951	951	951	951	951	951
Johnson	G	Trinity	Glen Rose	682	682	682	682	682	682
Kaufman	C	Trinity	Glen Rose	0	0	0	0	0	0
Lamar	D	Red	Glen Rose	0	0	0	0	0	0
Lamar	D	Sulphur	Glen Rose	0	0	0	0	0	0
Lampasas	G	Brazos	Glen Rose	68	68	68	68	68	68
Limestone	G	Brazos	Glen Rose	0	0	0	0	0	0
Limestone	G	Trinity	Glen Rose	0	0	0	0	0	0
McLennan	G	Brazos	Glen Rose	0	0	0	0	0	0
Milam	G	Brazos	Glen Rose	0	0	0	0	0	0
Mills	K	Brazos	Glen Rose	96	96	96	96	96	96
Mills	K	Colorado	Glen Rose	93	93	93	93	93	93
Navarro	C	Trinity	Glen Rose	0	0	0	0	0	0
Red River	D	Red	Glen Rose	0	0	0	0	0	0

TABLE 18 (CONT). MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (GLEN ROSE) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Red River	D	Sulphur	Glen Rose	0	0	0	0	0	0
Rockwall	C	Trinity	Glen Rose	0	0	0	0	0	0
Somervell	G	Brazos	Glen Rose	146	146	146	146	146	146
Tarrant	C	Trinity	Glen Rose	793	793	793	793	793	793
Travis	K	Brazos	Glen Rose	0	0	0	0	0	0
Travis	K	Colorado	Glen Rose	100	100	100	100	100	100
Williamson	G	Brazos	Glen Rose	135	135	135	135	135	135
Williamson	G	Colorado	Glen Rose	0	0	0	0	0	0
Williamson	K	Brazos	Glen Rose	0	0	0	0	0	0
Williamson	K	Colorado	Glen Rose	15	15	15	15	15	15
Subtotal			**Glen Rose**	**6,405**	**6,405**	**6,405**	**6,405**	**6,405**	**6,405**
Counties in Upper Trinity GCD									
Hood	G	Brazos	Glen Rose (outcrop)	790	790	790	790	790	790
Hood	G	Brazos	Glen Rose (downdip)	100	100	100	100	100	100
Hood	G	Trinity	Glen Rose (downdip)	24	24	24	24	24	24
Parker	C	Brazos	Glen Rose (outcrop)	140	140	140	140	140	140
Parker	C	Brazos	Glen Rose (downdip)	11	11	11	11	11	11
Parker	C	Trinity	Glen Rose (outcrop)	3,545	3,545	3,545	3,545	3,545	3,545
Parker	C	Trinity	Glen Rose (downdip)	1,395	1,395	1,395	1,395	1,395	1,395
Subtotal			**Glen Rose**	**6,005**	**6,005**	**6,005**	**6,005**	**6,005**	**6,005**
GMA 8 Total			**Glen Rose**	**12,410**	**12,410**	**12,410**	**12,410**	**12,410**	**12,410**

TABLE 19. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (TWIN MOUNTAINS) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Counties Not in Upper Trinity GCD									
Collin	C	Sabine	Twin Mountains	0	0	0	0	0	0
Collin	C	Trinity	Twin Mountains	2,202	2,202	2,202	2,202	2,202	2,202
Dallas	C	Trinity	Twin Mountains	3,201	3,201	3,201	3,201	3,201	3,201
Denton	C	Trinity	Twin Mountains	8,372	8,372	8,372	8,372	8,372	8,372
Ellis	C	Trinity	Twin Mountains	0	0	0	0	0	0
Erath	G	Brazos	Twin Mountains	5,017	5,017	5,017	5,017	5,017	5,017
Fannin	C	Sulphur	Twin Mountains	0	0	0	0	0	0
Fannin	C	Trinity	Twin Mountains	0	0	0	0	0	0
Grayson	C	Trinity	Twin Mountains	0	0	0	0	0	0
Hunt	D	Sabine	Twin Mountains	0	0	0	0	0	0
Hunt	D	Trinity	Twin Mountains	0	0	0	0	0	0
Johnson	G	Brazos	Twin Mountains	127	127	127	127	127	127
Johnson	G	Trinity	Twin Mountains	152	152	152	152	152	152
Kaufman	C	Trinity	Twin Mountains	0	0	0	0	0	0
Rockwall	C	Trinity	Twin Mountains	0	0	0	0	0	0
Somervell	G	Brazos	Twin Mountains	65	65	65	65	65	65
Tarrant	C	Trinity	Twin Mountains	6,922	6,922	6,922	6,922	6,922	6,922
Subtotal			**Twin Mountains**	**26,058**	**26,058**	**26,058**	**26,058**	**26,058**	**26,058**

TABLE 19 (CONT). MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (TWIN MOUNTAINS) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Counties in Upper Trinity GCD									
Hood	G	Brazos	Twin Mountains (outcrop)	5,024	5,024	5,024	5,024	5,024	5,024
Hood	G	Brazos	Twin Mountains (downdip)	10,594	10,594	10,594	10,594	10,594	10,594
Hood	G	Trinity	Twin Mountains (downdip)	26	26	26	26	26	26
Parker	C	Brazos	Twin Mountains (outcrop)	1,282	1,282	1,282	1,282	1,282	1,282
Parker	C	Brazos	Twin Mountains (downdip)	942	942	942	942	942	942
Parker	C	Trinity	Twin Mountains (downdip)	1,586	1,586	1,586	1,586	1,586	1,586
Subtotal			**Twin Mountains**	**19,454**	**19,454**	**19,454**	**19,454**	**19,454**	**19,454**
GMA 8 Total			**Twin Mountains**	**45,512**	**45,512**	**45,512**	**45,512**	**45,512**	**45,512**

TABLE 20. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (TRAVIS PEAK) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties Not in Upper Trinity GCD									
Bell	G	Brazos	Travis Peak	9,000	9,000	9,000	9,000	9,000	9,000
Bosque	G	Brazos	Travis Peak	7,683	7,683	7,683	7,683	7,683	7,683
Brown	F	Brazos	Travis Peak	3	3	3	3	3	3
Brown	F	Colorado	Travis Peak	381	381	381	381	381	381
Burnet	K	Brazos	Travis Peak	3,297	3,297	3,297	3,297	3,297	3,297
Burnet	K	Colorado	Travis Peak	445	445	445	445	445	445
Comanche	G	Brazos	Travis Peak	6,115	6,115	6,115	6,115	6,115	6,115
Comanche	G	Colorado	Travis Peak	49	49	49	49	49	49
Coryell	G	Brazos	Travis Peak	4,374	4,374	4,374	4,374	4,374	4,374
Dallas	C	Trinity	Travis Peak	0	0	0	0	0	0
Delta	D	Sulphur	Travis Peak	0	0	0	0	0	0
Ellis	C	Trinity	Travis Peak	5,676	5,676	5,676	5,676	5,676	5,676
Erath	G	Brazos	Travis Peak	11,824	11,824	11,824	11,824	11,824	11,824
Falls	G	Brazos	Travis Peak	1,435	1,435	1,435	1,435	1,435	1,435
Fannin	C	Sulphur	Travis Peak	0	0	0	0	0	0
Fannin	C	Trinity	Travis Peak	0	0	0	0	0	0
Hamilton	G	Brazos	Travis Peak	2,209	2,209	2,209	2,209	2,209	2,209
Hill	G	Brazos	Travis Peak	4,404	4,404	4,404	4,404	4,404	4,404
Hill	G	Trinity	Travis Peak	281	281	281	281	281	281
Hunt	D	Sabine	Travis Peak	0	0	0	0	0	0
Hunt	D	Sulphur	Travis Peak	0	0	0	0	0	0
Hunt	D	Trinity	Travis Peak	0	0	0	0	0	0

TABLE 20 (CONT). MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (TRAVIS PEAK) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Johnson	G	Brazos	Travis Peak	1,581	1,581	1,581	1,581	1,581	1,581
Johnson	G	Trinity	Travis Peak	2,891	2,891	2,891	2,891	2,891	2,891
Kaufman	C	Trinity	Travis Peak	0	0	0	0	0	0
Lamar	D	Red	Travis Peak	0	0	0	0	0	0
Lamar	D	Sulphur	Travis Peak	0	0	0	0	0	0
Lampasas	G	Brazos	Travis Peak	1,525	1,525	1,525	1,525	1,525	1,525
Lampasas	G	Colorado	Travis Peak	68	68	68	68	68	68
Limestone	G	Brazos	Travis Peak	0	0	0	0	0	0
Limestone	G	Trinity	Travis Peak	0	0	0	0	0	0
McLennan	G	Brazos	Travis Peak	20,649	20,649	20,649	20,649	20,649	20,649
Milam	G	Brazos	Travis Peak	0	0	0	0	0	0
Mills	K	Brazos	Travis Peak	704	704	704	704	704	704
Mills	K	Colorado	Travis Peak	1,560	1,560	1,560	1,560	1,560	1,560
Navarro	C	Trinity	Travis Peak	0	0	0	0	0	0
Red River	D	Red	Travis Peak	0	0	0	0	0	0
Red River	D	Sulphur	Travis Peak	0	0	0	0	0	0
Somervell	G	Brazos	Travis Peak	1,763	1,763	1,763	1,763	1,763	1,763
Travis	K	Brazos	Travis Peak	1	1	1	1	1	1
Travis	K	Colorado	Travis Peak	6,642	6,642	6,642	6,642	6,642	6,642
Williamson	G	Brazos	Travis Peak	3,543	3,543	3,543	3,543	3,543	3,543
Williamson	G	Colorado	Travis Peak	5	5	5	5	5	5
Williamson	K	Brazos	Travis Peak	0	0	0	0	0	0

TABLE 20 (CONT). MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (TRAVIS PEAK) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Williamson	K	Colorado	Travis Peak	0	0	0	0	0	0
Subtotal			**Travis Peak**	**98,108**	**98,108**	**98,108**	**98,108**	**98,108**	**98,108**
Counties in Upper Trinity GCD[1]									
Hood	G	Brazos	Travis Peak	122	122	122	122	122	122
Subtotal			**Travis Peak**	**122**	**122**	**122**	**122**	**122**	**122**
GMA 8 Total			**Travis Peak**	**98,230**	**98,230**	**98,230**	**98,230**	**98,230**	**98,230**

[1]Splits for Upper Trinity GCD are presented since they are included in the GMA 8-wide desired future conditions.

TABLE 21. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (HENSELL) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties Not in Upper Trinity GCD[1]									
Bell	G	Brazos	Hensell	1,100	1,100	1,100	1,100	1,100	1,100
Bosque	G	Brazos	Hensell	3,837	3,837	3,837	3,837	3,837	3,837
Brown	F	Colorado	Hensell	4	4	4	4	4	4
Burnet	K	Brazos	Hensell	2,477	2,477	2,477	2,477	2,477	2,477
Burnet	K	Colorado	Hensell	186	186	186	186	186	186
Comanche	G	Brazos	Hensell	180	180	180	180	180	180
Comanche	G	Colorado	Hensell	24	24	24	24	24	24
Coryell	G	Brazos	Hensell	2,197	2,197	2,197	2,197	2,197	2,197
Dallas	C	Trinity	Hensell	0	0	0	0	0	0
Ellis	C	Trinity	Hensell	0	0	0	0	0	0
Erath	G	Brazos	Hensell	5,141	5,141	5,141	5,141	5,141	5,141
Falls	G	Brazos	Hensell	0	0	0	0	0	0
Hamilton	G	Brazos	Hensell	1,672	1,672	1,672	1,672	1,672	1,672
Hill	G	Brazos	Hensell	25	25	25	25	25	25
Hill	G	Trinity	Hensell	0	0	0	0	0	0
Johnson	G	Brazos	Hensell	68	68	68	68	68	68
Johnson	G	Trinity	Hensell	51	51	51	51	51	51
Kaufman	C	Trinity	Hensell	0	0	0	0	0	0
Lampasas	G	Brazos	Hensell	712	712	712	712	712	712
Lampasas	G	Colorado	Hensell	1	1	1	1	1	1
Limestone	G	Brazos	Hensell	0	0	0	0	0	0
Limestone	G	Trinity	Hensell	0	0	0	0	0	0
McLennan	G	Brazos	Hensell	4,701	4,701	4,701	4,701	4,701	4,701
Milam	G	Brazos	Hensell	0	0	0	0	0	0
Mills	K	Brazos	Hensell	172	172	172	172	172	172
Mills	K	Colorado	Hensell	435	435	435	435	435	435
Navarro	C	Trinity	Hensell	0	0	0	0	0	0
Somervell	G	Brazos	Hensell	217	217	217	217	217	217
Travis	K	Brazos	Hensell	1	1	1	1	1	1
Travis	K	Colorado	Hensell	2,268	2,268	2,268	2,268	2,268	2,268
Williamson	G	Brazos	Hensell	1,599	1,599	1,599	1,599	1,599	1,599
Williamson	G	Colorado	Hensell	0	0	0	0	0	0
Williamson	K	Brazos	Hensell	0	0	0	0	0	0
Williamson	K	Colorado	Hensell	0	0	0	0	0	0
Subtotal			**Hensell**	**27,068**	**27,068**	**27,068**	**27,068**	**27,068**	**27,068**

TABLE 21 (CONT). **MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (HENSELL) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.**

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties in Upper Trinity GCD[1]									
Hood	G	Brazos	Hensell	50	50	50	50	50	50
Subtotal			**Hensell**	**50**	**50**	**50**	**50**	**50**	**50**
GMA 8 Total			**Hensell**	**27,118**	**27,118**	**27,118**	**27,118**	**27,118**	**27,118**

[1]Splits for Upper Trinity GCD are presented since they are included in the GMA 8-wide desired future conditions.
*Note that the Hensell values in this table represent a portion of the total Travis Peak values already provided in Table 20 and do not represent an additional source of water.

TABLE 22. **MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (HOSSTON) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.**

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties Not in Upper Trinity GCD[1]									
Bell	G	Brazos	Hosston	7,900	7,900	7,900	7,900	7,900	7,900
Bosque	G	Brazos	Hosston	3,765	3,765	3,765	3,765	3,765	3,765
Brown	F	Brazos	Hosston	3	3	3	3	3	3
Brown	F	Colorado	Hosston	343	343	343	343	343	343
Burnet	K	Brazos	Hosston	659	659	659	659	659	659
Burnet	K	Colorado	Hosston	224	224	224	224	224	224
Comanche	G	Brazos	Hosston	5,863	5,863	5,863	5,863	5,863	5,863
Comanche	G	Colorado	Hosston	6	6	6	6	6	6
Coryell	G	Brazos	Hosston	2,163	2,163	2,163	2,163	2,163	2,163
Dallas	C	Trinity	Hosston	0	0	0	0	0	0
Ellis	C	Trinity	Hosston	5,545	5,545	5,545	5,545	5,545	5,545
Erath	G	Brazos	Hosston	6,387	6,387	6,387	6,387	6,387	6,387
Falls	G	Brazos	Hosston	1,435	1,435	1,435	1,435	1,435	1,435
Hamilton	G	Brazos	Hosston	385	385	385	385	385	385
Hill	G	Brazos	Hosston	3,330	3,330	3,330	3,330	3,330	3,330
Hill	G	Trinity	Hosston	280	280	280	280	280	280
Johnson	G	Brazos	Hosston	1,442	1,442	1,442	1,442	1,442	1,442
Johnson	G	Trinity	Hosston	2,809	2,809	2,809	2,809	2,809	2,809
Kaufman	C	Trinity	Hosston	0	0	0	0	0	0
Lampasas	G	Brazos	Hosston	785	785	785	785	785	785
Lampasas	G	Colorado	Hosston	65	65	65	65	65	65
Limestone	G	Brazos	Hosston	0	0	0	0	0	0
Limestone	G	Trinity	Hosston	0	0	0	0	0	0
McLennan	G	Brazos	Hosston	15,948	15,948	15,948	15,948	15,948	15,948
Milam	G	Brazos	Hosston	0	0	0	0	0	0
Mills	K	Brazos	Hosston	375	375	375	375	375	375
Mills	K	Colorado	Hosston	1,081	1,081	1,081	1,081	1,081	1,081

TABLE 22 (CONT). MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (HOSSTON) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Navarro	C	Trinity	Hosston	0	0	0	0	0	0
Somervell	G	Brazos	Hosston	930	930	930	930	930	930
Travis	K	Brazos	Hosston	0	0	0	0	0	0
Travis	K	Colorado	Hosston	4,185	4,185	4,185	4,185	4,185	4,185
Williamson	G	Brazos	Hosston	1,746	1,746	1,746	1,746	1,746	1,746
Williamson	G	Colorado	Hosston	5	5	5	5	5	5
Williamson	K	Brazos	Hosston	0	0	0	0	0	0
Williamson	K	Colorado	Hosston	0	0	0	0	0	0
Subtotal			**Hosston**	**67,659**	**67,659**	**67,659**	**67,659**	**67,659**	**67,659**
Counties in Upper Trinity GCD[1]									
Hood	G	Brazos	Hosston	72	72	72	72	72	72
Subtotal			**Hosston**	**72**	**72**	**72**	**72**	**72**	**72**
GMA 8 Total			**Hosston**	**67,731**	**67,731**	**67,731**	**67,731**	**67,731**	**67,731**

[1]Splits for Upper Trinity GCD are presented since they are included in the GMA 8-wide desired future conditions.
*Note that the Hosston values in this table represent a portion of the total Travis Peak values already provided in Table 20 and do not represent an additional source of water.

TABLE 23. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE TRINITY AQUIFER (ANTLERS) IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Counties Not in Upper Trinity GCD									
Brown	F	Brazos	Antlers	48	48	48	48	48	48
Brown	F	Colorado	Antlers	995	995	995	995	995	995
Callahan	G	Brazos	Antlers	443	443	443	443	443	443
Callahan	G	Colorado	Antlers	1,283	1,283	1,283	1,283	1,283	1,283
Collin	C	Trinity	Antlers	1,962	1,962	1,962	1,962	1,962	1,962
Comanche	G	Brazos	Antlers	5,843	5,843	5,843	5,843	5,843	5,843
Cooke	C	Red	Antlers	2,186	2,186	2,186	2,186	2,186	2,186
Cooke	C	Trinity	Antlers	8,335	8,335	8,335	8,335	8,335	8,335
Denton	C	Trinity	Antlers	16,557	16,557	16,557	16,557	16,557	16,557
Eastland	G	Brazos	Antlers	5,184	5,184	5,184	5,184	5,184	5,184
Eastland	G	Colorado	Antlers	552	552	552	552	552	552
Erath	G	Brazos	Antlers	2,627	2,627	2,627	2,627	2,627	2,627
Fannin	C	Red	Antlers	0	0	0	0	0	0
Fannin	C	Sulphur	Antlers	0	0	0	0	0	0
Fannin	C	Trinity	Antlers	0	0	0	0	0	0
Grayson	C	Red	Antlers	6,665	6,665	6,665	6,665	6,665	6,665
Grayson	C	Trinity	Antlers	4,051	4,051	4,051	4,051	4,051	4,051
Lamar	D	Red	Antlers	0	0	0	0	0	0
Lamar	D	Sulphur	Antlers	0	0	0	0	0	0
Red River	D	Red	Antlers	0	0	0	0	0	0
Tarrant	C	Trinity	Antlers	1,248	1,248	1,248	1,248	1,248	1,248
Taylor	G	Brazos	Antlers	5	5	5	5	5	5
Taylor	G	Colorado	Antlers	9	9	9	9	9	9
Subtotal			**Antlers**	**57,993**	**57,993**	**57,993**	**57,993**	**57,993**	**57,993**
Counties in Upper Trinity GCD									
Montague	B	Red	Antlers (outcrop)	238	238	238	238	238	238
Montague	B	Trinity	Antlers (outcrop)	5,866	5,866	5,866	5,866	5,866	5,866
Parker	C	Brazos	Antlers (outcrop)	247	247	247	247	247	247
Parker	C	Trinity	Antlers (outcrop)	2,642	2,642	2,642	2,642	2,642	2,642
Wise	C	Trinity	Antlers (outcrop)	9,013	9,013	9,013	9,013	9,013	9,013
Wise	C	Trinity	Antlers (downdip)	2,439	2,439	2,439	2,439	2,439	2,439
Subtotal			**Antlers**	**20,445**	**20,445**	**20,445**	**20,445**	**20,445**	**20,445**
GMA 8 Total			**Antlers**	**78,438**	**78,438**	**78,438**	**78,438**	**78,438**	**78,438**

TABLE 24. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE WOODBINE AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Collin	C	Sabine	Woodbine	0	0	0	0	0	0
Collin	C	Trinity	Woodbine	4,254	4,254	4,254	4,254	4,254	4,254
Cooke	C	Red	Woodbine	262	262	262	262	262	262
Cooke	C	Trinity	Woodbine	539	539	539	539	539	539
Dallas	C	Trinity	Woodbine	2,798	2,798	2,798	2,798	2,798	2,798
Denton	C	Trinity	Woodbine	3,609	3,609	3,609	3,609	3,609	3,609
Ellis	C	Trinity	Woodbine	2,074	2,074	2,074	2,074	2,074	2,074
Fannin	C	Red	Woodbine	3,547	3,547	3,547	3,547	3,547	3,547
Fannin	C	Sulphur	Woodbine	550	550	550	550	550	550
Fannin	C	Trinity	Woodbine	827	827	827	827	827	827
Grayson	C	Red	Woodbine	5,603	5,603	5,603	5,603	5,603	5,603
Grayson	C	Trinity	Woodbine	1,923	1,923	1,923	1,923	1,923	1,923
Hill	G	Brazos	Woodbine	284	284	284	284	284	284
Hill	G	Trinity	Woodbine	302	302	302	302	302	302
Hunt	D	Sabine	Woodbine	268	268	268	268	268	268
Hunt	D	Sulphur	Woodbine	165	165	165	165	165	165
Hunt	D	Trinity	Woodbine	330	330	330	330	330	330
Johnson	G	Brazos	Woodbine	24	24	24	24	24	24
Johnson	G	Trinity	Woodbine	1,957	1,957	1,957	1,957	1,957	1,957
Kaufman	C	Trinity	Woodbine	0	0	0	0	0	0
Lamar	D	Red	Woodbine	0	0	0	0	0	0
Lamar	D	Sulphur	Woodbine	49	49	49	49	49	49
McLennan	G	Brazos	Woodbine	0	0	0	0	0	0
Navarro	C	Trinity	Woodbine	68	68	68	68	68	68
Red River	D	Red	Woodbine	2	2	2	2	2	2
Rockwall	C	Trinity	Woodbine	0	0	0	0	0	0
Tarrant	C	Trinity	Woodbine	1,139	1,139	1,139	1,139	1,139	1,139
GMA 8 Total			**Woodbine**	**30,574**	**30,574**	**30,574**	**30,574**	**30,574**	**30,574**

TABLE 25. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE EDWARDS (BALCONES FAULT ZONE) AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN. MODELED AVAILABLE GROUNDWATER VALUES ARE FROM GAM RUN 08-010MAG BY ANAYA (2008).

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Bell	G	Brazos	Edwards (Balcones Fault Zone)	6,469	6,469	6,469	6,469	6,469	6,469
Travis	K	Brazos	Edwards (Balcones Fault Zone)	275	275	275	275	275	275
Travis	K	Colorado	Edwards (Balcones Fault Zone)	4,962	4,962	4,962	4,962	4,962	4,962
Williamson	G	Brazos	Edwards (Balcones Fault Zone)	3,351	3,351	3,351	3,351	3,351	3,351
Williamson	G	Colorado	Edwards (Balcones Fault Zone)	101	101	101	101	101	101
Williamson	K	Brazos	Edwards (Balcones Fault Zone)	6	6	6	6	6	6
Williamson	K	Colorado	Edwards (Balcones Fault Zone)	4	4	4	4	4	4
GMA 8 Total			Edwards (Balcones Fault Zone)	**15,168**	**15,168**	**15,168**	**15,168**	**15,168**	**15,168**

TABLE 26. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE MARBLE FALLS AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Brown	F	Colorado	Marble Falls	25	25	25	25	25	25
Burnet	K	Brazos	Marble Falls	1,384	1,384	1,384	1,384	1,384	1,384
Burnet	K	Colorado	Marble Falls	1,354	1,354	1,354	1,354	1,354	1,354
Lampasas	G	Brazos	Marble Falls	1,954	1,954	1,954	1,954	1,954	1,954
Lampasas	G	Colorado	Marble Falls	885	885	885	885	885	885
Mills	K	Brazos	Marble Falls	1	1	1	1	1	1
Mills	K	Colorado	Marble Falls	24	24	24	24	24	24
GMA 8 Total			**Marble Falls**	**5,627**	**5,627**	**5,627**	**5,627**	**5,627**	**5,627**

TABLE 27. MODELED AVAILABLE GROUNDWATER BY DECADE FOR ELLENBURGER-SAN SABA AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Brown	F	Colorado	Ellenburger-San Saba	131	131	131	131	131	131
Burnet	K	Brazos	Ellenburger-San Saba	3,825	3,825	3,825	3,825	3,825	3,825
Burnet	K	Colorado	Ellenburger-San Saba	7,010	7,010	7,010	7,010	7,010	7,010
Lampasas	G	Brazos	Ellenburger-San Saba	1,681	1,681	1,681	1,681	1,681	1,681
Lampasas	G	Colorado	Ellenburger-San Saba	914	914	914	914	914	914
Mills	K	Brazos	Ellenburger-San Saba	93	93	93	93	93	93
Mills	K	Colorado	Ellenburger-San Saba	406	406	406	406	406	406
GMA 8 Total			Ellenburger-San Saba	**14,060**	**14,060**	**14,060**	**14,060**	**14,060**	**14,060**

TABLE 28. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE HICKORY AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 8. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Brown	F	Colorado	Hickory	12	12	12	12	12	12
Burnet	K	Brazos	Hickory	1,237	1,237	1,237	1,237	1,237	1,237
Burnet	K	Colorado	Hickory	2,178	2,178	2,178	2,178	2,178	2,178
Lampasas	G	Brazos	Hickory	79	79	79	79	79	79
Lampasas	G	Colorado	Hickory	34	34	34	34	34	34
Mills	K	Brazos	Hickory	7	7	7	7	7	7
Mills	K	Colorado	Hickory	29	29	29	29	29	29
GMA 8 Total			**Hickory**	**3,576**	**3,576**	**3,576**	**3,576**	**3,576**	**3,576**

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> *"Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."*

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and groundwater levels in the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Anaya, R., 2008, Gam Run 08-010mag: Managed available groundwater for the Edwards (Balcones Fault Zone) Aquifer in Bell, Travis, and Williamson counties, 7 p., http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR08-10mag_final.pdf?d=16598.495

Groundwater Management Area 8, 2021, Groundwater Management Area 8 Desired Future Conditions Explanatory Report (with technical Assistance from: WSP USA, Advanced Groundwater Solutions, LLC, and Blanton & Associates, Inc.) (August 2021), 85 p.

Harbaugh, A. W., and McDonald, M. G., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p.

Jones, I., 2003, Groundwater Availability Modeling: Northern Segment of the Edwards Aquifer, Texas (December 2003), 75 p., http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R358/Report%20358%20Northern%20Edwards.pdf?d=1503601352574.

Kelley, V.A., Ewing, J., Jones, T.L., Young, S.C., Deeds, N., and Hamlin, S., 2014, Updated Groundwater Availability Model of the Northern Trinity and Woodbine Aquifers – Draft Final Model Report (August 2014), 990 p., http://www.twdb.texas.gov/groundwater/models/gam/trnt_n/Final_NTGAM_Vol%20I%20Aug%202014_Report.pdf?d=1503601407956.

National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.

Niswonger, R.G., Panday, S., and Ibaraki, M., 2011, MODFLOW-NWT, a Newton formulation for MODFLOW-2005: United States Geological Survey, Techniques and Methods 6-A37, 44 p.

Panday, S., Langevin, C.D., Niswonger, R.G., Ibaraki, M., and Hughes, J.D., 2013, MODFLOW–USG version 1: An unstructured grid version of MODFLOW for simulating groundwater flow and tightly coupled processes using a control volume finite-difference formulation: U.S. Geological Survey Techniques and Methods, book 6, chap. A45, 66 p.

Shi, J., Boghici, R., Kohlrenken, W., and Hutchison, W.R., 2016, Numerical Model Report: Minor Aquifers of the Llano Uplift Region of Texas (Marble Falls, Ellenburger-San Saba, and Hickory). Texas Water Development Board, November 2016, 435p. http://www.twdb.texas.gov/groundwater/models/gam/llano/Llano_Uplift_Numerical_Model_Report_Final.pdf?d=1503601525245.

Texas Water Code, 2011, http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf.

Appendix A

Comparison between Desired Future Conditions and Simulated Drawdowns for the Trinity and Woodbine Aquifers

Drawdown values for the Trinity and Woodbine aquifers between 2009 and 2080 were based on the simulated water level values at individual model cells extracted from predictive simulation water level file submitted by Groundwater Management Area 8.

The Paluxy, Glen Rose, Twin Mountains, Travis Peak, Hensell, Hosston, and Antlers are subunits of the Trinity Aquifer. These subunits and Woodbine Aquifer exist in both outcrop and downdip areas (Figures 1 through 8). Kelley and others (2014) further divided these aquifers into five (5) regions, each with unique aquifer combinations and properties (table below and Figures 1 through 8).

<table>
<tr><th>Model Layer</th><th>Region 1</th><th>Region 2</th><th>Region 3</th><th colspan="2">Region 4</th><th colspan="2">Region 5</th></tr>
<tr><td>2</td><td colspan="4">Woodbine</td><td colspan="3">Woodbine (no sand)</td></tr>
<tr><td>3</td><td colspan="7">Washita/Fredericksburg</td></tr>
<tr><td>4</td><td rowspan="5">Antlers</td><td colspan="4">Paluxy</td><td colspan="2">Paluxy (no sand)</td></tr>
<tr><td>5</td><td colspan="6">Glen Rose</td></tr>
<tr><td>6</td><td rowspan="3">Twin Mountains</td><td colspan="2" rowspan="3">Travis Peak</td><td>Hensell</td><td rowspan="3">Travis Peak</td><td>Hensell</td></tr>
<tr><td>7</td><td>Pearsall/Sligo</td><td>Pearsall/Sligo</td></tr>
<tr><td>8</td><td>Hosston</td><td>Hosston</td></tr>
</table>

Vertically, the Trinity and Woodbine aquifers could contain multiple model layers and some of the model cells are pass-through cells with a thickness of one foot. To account for variable model cells from multiple model layers for the same aquifer, Groundwater Management Area 8 (2021) adopted a method presented by Van Kelley of INTERA, Inc., which calculated a single composite water level from multiple model cells with each adjusted by transmissivity. This composite water level took both the water level and hydraulic transmissivity at each cell into calculation, as shown in the following equation:

$$Hc = \frac{\sum_{i=UL}^{LL} T_i H_i}{\sum_{i=UL}^{LL} T_i}$$

Where:

H_C = Composite Water Level (feet above mean sea level)

T_i = Transmissivity of model layer i (square feet per day)

H_i = Water Level of model layer i (feet above mean sea level)

LL = Lowest model layer representing the regional aquifer

UL = Uppermost model layer representing the regional aquifer.

Note that multiple model layers can represent a single aquifer or subunit, so the aquifer or subunit designation should be determined by the IBOUND value of a model cell rather than the model layer. When a model cell goes dry, the water level was set to the cell bottom. However, if an aquifer completely goes dry, TWDB assigns the bottom elevation from the lowest model cell of the aquifer to the composite water level.

The average water level for the same aquifer in a county (*Hc_County*) was then calculated using the following equation:

$$Hc\_County = \frac{\sum_{i=1}^{n} Hc_i}{n}$$

Where:

Hc_County = Average composite water level for a county (feet above mean sea level)

Hc_i = Composite Water Level at a lateral location as defined in last step (feet above mean sea level)

n = Total lateral (row, column) locations of an aquifer in a county.

Drawdown of the aquifer in a county (*DD_County*) was calculated using the following equation:

$$DD\_County = Hc\_County_{2009} - Hc\_County_{2080}$$

Where:

Hc_County_{2009} = Average water level of an aquifer in a county in 2009 as defined above (feet above mean sea level)

Hc_County_{2080} = Average water level of an aquifer in a county in 2080 as defined above (feet above mean sea level).

If an aquifer went dry in 2009, that lateral location was excluded from the calculation.

In comparison with a simple average calculation based on total model cell count, use of composite water level gives less weight to cells with lower transmissivity values (such as pass-through cells, cells with low saturation in outcrop area, or cells with lower hydraulic conductivity) in water level and drawdown calculation.

Per Groundwater Management Area 8, a desired future condition was met if the simulated drawdown was within five percent or five feet of the desired future condition. Using the water level output file submitted by Groundwater Management Area 8 and the method described above, the TWDB calculated the drawdowns and then compared with the correlated desired future conditions. The comparisons are presented in Tables A1, A2, A3, and A4. The comparison indicates that the predictive simulation meets the desired future conditions of the Trinity and Woodbine aquifers in Groundwater Management Area 8.

TABLE A1. COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY GROUNDWATER CONSERVATION DISTRICT (GCD), EXCLUDING UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

GCD	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Central Texas GCD	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	2	2	No
	Twin Mountains	—	—	—
	Travis Peak	19	11	No
	Hensell	7	9	No
	Hosston	21	21	No
	Antlers	—	—	—
Clearwater UWCD	Woodbine	—	—	—
	Paluxy	17	18	No
	Glen Rose	83	83	No
	Twin Mountains	—	—	—
	Travis Peak	333	333	No
	Hensell	145	145	No
	Hosston	375	375	No
	Antlers	—	—	—
Middle Trinity GCD	Woodbine	—	—	—
	Paluxy	5	7	No
	Glen Rose	29	29	No
	Twin Mountains	8	6	No
	Travis Peak	98	98	No
	Hensell	77	77	No
	Hosston	124	124	No
	Antlers	12	12	No
North Texas GCD	Woodbine	263	263	No
	Paluxy	690	690	No
	Glen Rose	366	366	No
	Twin Mountains	601	601	No
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	305	296	No

TABLE A1 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY GROUNDWATER CONSERVATION DISTRICT (GCD), EXCLUDING UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

GCD	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Northern Trinity GCD	Woodbine	6	6	No
	Paluxy	105	105	No
	Glen Rose	163	163	No
	Twin Mountains	348	232	No
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	177	83	No
Post Oak Savannah GCD	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	241	241	No
	Twin Mountains	—	—	—
	Travis Peak	412	412	No
	Hensell	261	261	No
	Hosston	412	412	No
	Antlers	—	—	—
Prairielands GCD	Woodbine	44	44	No
	Paluxy	44	46	No
	Glen Rose	142	142	No
	Twin Mountains	170	46	No
	Travis Peak	323	311	No
	Hensell	201	207	No
	Hosston	364	369	No
	Antlers	—	—	—
Red River GCD	Woodbine	209	211	No
	Paluxy	830	720	No
	Glen Rose	335	308	No
	Twin Mountains	405	405	No
	Travis Peak	291	291	No
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	321	321	No
Saratoga UWCD	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	1	1	No
	Twin Mountains	—	—	—
	Travis Peak	6	6	No
	Hensell	1	2	No
	Hosston	11	12	No
	Antlers	—	—	—

TABLE A1 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY GROUNDWATER CONSERVATION DISTRICT (GCD), EXCLUDING UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

GCD	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Southern Trinity GCD	Woodbine	6	6	No
	Paluxy	41	41	No
	Glen Rose	148	148	No
	Twin Mountains	—	—	—
	Travis Peak	504	499	No
	Hensell	242	242	No
	Hosston	582	582	No
	Antlers	—	—	—

TABLE A2. COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS FOR UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

GCD	Portion	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Upper Trinity GCD	outcrop	Woodbine	—	—	—
		Paluxy	6	6	No
		Glen Rose	15	14	No
		Twin Mountains	10	6	No
		Travis Peak	—	—	—
		Hensell	—	—	—
		Hosston	—	—	—
		Antlers	47	16	No
Upper Trinity GCD	subcrop	Woodbine	—	—	—
		Paluxy	2	2	No
		Glen Rose	45	49	No
		Twin Mountains	70	46	No
		Travis Peak	—	—	—
		Hensell	—	—	—
		Hosston	—	—	—
		Antlers	154	92	No

TABLE A3. COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Bell	Woodbine	—	—	—
	Paluxy	17	18.46	No
	Glen Rose	83	82.74	No
	Twin Mountains	—	—	—
	Travis Peak	333	332.79	No
	Hensell	145	144.73	No
	Hosston	375	374.76	No
	Antlers	—	—	—
Bosque	Woodbine	—	—	—
	Paluxy	6	6.78	No
	Glen Rose	53	53.38	No
	Twin Mountains	—	—	—
	Travis Peak	189	188.88	No
	Hensell	139	139.01	No
	Hosston	232	232.23	No
	Antlers	—	—	—
Brown	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	1	1.9	No
	Twin Mountains	—	—	—
	Travis Peak	2	1.23	No
	Hensell	1	1.14	No
	Hosston	1	1.3	No
	Antlers	2	2.56	No
Burnet	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	2	2.39	No
	Twin Mountains	—	—	—
	Travis Peak	19	10.76	No
	Hensell	7	8.89	No
	Hosston	21	21.2	No
	Antlers	—	—	—
Callahan	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	—	—	—
	Twin Mountains	—	—	—
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	1	1.38	No

TABLE A3 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Collin	Woodbine	482	481.88	No
	Paluxy	729	728.64	No
	Glen Rose	366	365.79	No
	Twin Mountains	560	559.87	No
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	596	583.45	No
Comanche	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	2	1.44	No
	Twin Mountains	—	—	—
	Travis Peak	4	2.4	No
	Hensell	2	1.76	No
	Hosston	3	2.86	No
	Antlers	12	12.08	No
Cooke	Woodbine	2	2.41	No
	Paluxy	—	—	—
	Glen Rose	—	—	—
	Twin Mountains	—	—	—
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	191	178.36	No
Coryell	Woodbine	—	—	—
	Paluxy	5	7.5	No
	Glen Rose	15	15.37	No
	Twin Mountains	—	—	—
	Travis Peak	107	107.32	No
	Hensell	70	70.02	No
	Hosston	141	140.6	No
	Antlers	—	—	—
Dallas	Woodbine	137	137.41	No
	Paluxy	346	345.58	No
	Glen Rose	288	288.24	No
	Twin Mountains	515	515.09	No
	Travis Peak	415	414.61	No
	Hensell	362	361.55	No
	Hosston	419	418.84	No
	Antlers	—	—	—

TABLE A3 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Delta	Woodbine	—	—	—
	Paluxy	279	278.97	No
	Glen Rose	198	197.8	No
	Twin Mountains	—	—	—
	Travis Peak	202	202.1	No
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	—	—	—
Denton	Woodbine	22	20.37	No
	Paluxy	558	557.89	No
	Glen Rose	367	367.03	No
	Twin Mountains	752	742.97	No
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	416	404.5	No
Eastland	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	—	—	—
	Twin Mountains	—	—	—
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	4	4.11	No
Ellis	Woodbine	76	76.07	No
	Paluxy	128	127.51	No
	Glen Rose	220	220.03	No
	Twin Mountains	413	413.29	No
	Travis Peak	380	380.25	No
	Hensell	290	290.49	No
	Hosston	390	390.34	No
	Antlers	—	—	—
Erath	Woodbine	—	—	—
	Paluxy	6	1.01	No
	Glen Rose	6	5.07	No
	Twin Mountains	8	6.4	No
	Travis Peak	25	20.18	No
	Hensell	12	11.45	No
	Hosston	35	35	No
	Antlers	14	13.56	No

TABLE A3 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Falls	Woodbine	—	—	—
	Paluxy	159	159.35	No
	Glen Rose	238	238.09	No
	Twin Mountains	—	—	—
	Travis Peak	505	504.77	No
	Hensell	296	296.31	No
	Hosston	511	511.14	No
	Antlers	—	—	—
Fannin	Woodbine	259	259.23	No
	Paluxy	709	708.85	No
	Glen Rose	305	305.1	No
	Twin Mountains	400	400.17	No
	Travis Peak	291	291.45	No
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	269	268.98	No
Grayson	Woodbine	163	162.86	No
	Paluxy	943	942.74	No
	Glen Rose	364	363.85	No
	Twin Mountains	445	445.2	No
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	364	363	No
Hamilton	Woodbine	—	—	—
	Paluxy	2	2.77	No
	Glen Rose	4	4.25	No
	Twin Mountains	—	—	—
	Travis Peak	26	25.93	No
	Hensell	14	13.99	No
	Hosston	38	38.2	No
	Antlers	—	—	—
Hill	Woodbine	20	19.71	No
	Paluxy	45	44.9	No
	Glen Rose	149	148.93	No
	Twin Mountains	—	—	—
	Travis Peak	365	364.39	No
	Hensell	211	211.07	No
	Hosston	413	412.6	No
	Antlers	—	—	—

TABLE A3 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Hunt	Woodbine	631	630.96	No
	Paluxy	610	610.15	No
	Glen Rose	326	326.15	No
	Twin Mountains	399	398.85	No
	Travis Peak	350	349.84	No
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	—	—	—
Johnson	Woodbine	4	3.55	No
	Paluxy	-57	-57.56	No
	Glen Rose	66	65.87	No
	Twin Mountains	184	33.24	No
	Travis Peak	235	178.04	No
	Hensell	120	120.41	No
	Hosston	329	329.41	No
	Antlers	—	—	—
Kaufman	Woodbine	242	241.7	No
	Paluxy	311	311.43	No
	Glen Rose	305	304.98	No
	Twin Mountains	427	427	No
	Travis Peak	372	371.84	No
	Hensell	349	348.53	No
	Hosston	345	344.74	No
	Antlers	—	—	—
Lamar	Woodbine	42	42.07	No
	Paluxy	100	100.09	No
	Glen Rose	107	106.9	No
	Twin Mountains	—	—	—
	Travis Peak	125	124.5	No
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	132	132.31	No
Lampasas	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	1	1.22	No
	Twin Mountains	—	—	—
	Travis Peak	6	6.31	No
	Hensell	1	1.56	No
	Hosston	11	11.64	No
	Antlers	—	—	—

TABLE A3 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Limestone	Woodbine	—	—	—
	Paluxy	199	198.7	No
	Glen Rose	301	300.8	No
	Twin Mountains	—	—	—
	Travis Peak	433	433.11	No
	Hensell	214	214.2	No
	Hosston	445	444.63	No
	Antlers	—	—	—
McLennan	Woodbine	6	6.49	No
	Paluxy	41	41.02	No
	Glen Rose	148	147.65	No
	Twin Mountains	—	—	—
	Travis Peak	504	498.88	No
	Hensell	242	242.36	No
	Hosston	582	581.81	No
	Antlers	—	—	—
Milam	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	241	240.72	No
	Twin Mountains	—	—	—
	Travis Peak	412	411.52	No
	Hensell	261	260.7	No
	Hosston	412	412.3	No
	Antlers	—	—	—
Mills	Woodbine	—	—	—
	Paluxy	1	0.64	No
	Glen Rose	1	1.2	No
	Twin Mountains	—	—	—
	Travis Peak	9	7.36	No
	Hensell	2	2.16	No
	Hosston	13	13.67	No
	Antlers	—	—	—
Navarro	Woodbine	110	110.34	No
	Paluxy	139	139.22	No
	Glen Rose	266	265.96	No
	Twin Mountains	—	—	—
	Travis Peak	343	343.14	No
	Hensell	295	295.18	No
	Hosston	343	343.41	No
	Antlers	—	—	—

TABLE A3 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Red River	Woodbine	2	2.28	No
	Paluxy	24	23.74	No
	Glen Rose	40	39.58	No
	Twin Mountains	—	—	—
	Travis Peak	57	56.88	No
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	15	14.51	No
Rockwall	Woodbine	275	274.86	No
	Paluxy	433	432.69	No
	Glen Rose	343	342.57	No
	Twin Mountains	466	466.49	No
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	—	—	—
Somervell	Woodbine	—	—	—
	Paluxy	4	1.62	No
	Glen Rose	4	4.45	No
	Twin Mountains	50	50.27	No
	Travis Peak	64	64.26	No
	Hensell	17	16.57	No
	Hosston	120	120.22	No
	Antlers	—	—	—
Tarrant	Woodbine	6	6.41	No
	Paluxy	105	105.14	No
	Glen Rose	163	163.16	No
	Twin Mountains	348	231.93	No
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	177	83.43	No
Taylor	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	—	—	—
	Twin Mountains	—	—	—
	Travis Peak	—	—	—
	Hensell	—	—	—
	Hosston	—	—	—
	Antlers	0	0.26	No

TABLE A3 (CONT). COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY, EXCLUDING COUNTIES IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Travis	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	90	89.73	No
	Twin Mountains	—	—	—
	Travis Peak	219	215.69	No
	Hensell	68	69.19	No
	Hosston	226	224.15	No
	Antlers	—	—	—
Williamson	Woodbine	—	—	—
	Paluxy	—	—	—
	Glen Rose	78	79.23	No
	Twin Mountains	—	—	—
	Travis Peak	220	220.43	No
	Hensell	89	90.6	No
	Hosston	225	225.78	No
	Antlers	—	—	—

TABLE A4. COMPARISON BETWEEN DRAWDOWN AND DESIRED FUTURE CONDITIONS BY COUNTY IN UPPER TRINITY GROUNDWATER CONSERVATION DISTRICT.

County	Portion	Aquifer	Desired Future Condition (feet of drawdown between January 1, 2010 and December 31, 2080)	Simulated Drawdown between Initial Water Levels and Stress Period 71 (feet)	Is Desired Future Condition Violated (Exceeded by 5 feet and 5%)?
Hood	outcrop	Antlers	—	—	—
		Paluxy	6	5.68	No
		Glen Rose	9	9.41	No
		Twin Mountains	13	8.14	No
	subcrop	Antlers	—	—	—
		Paluxy	—	—	—
		Glen Rose	39	39.41	No
		Twin Mountains	72	20.57	No
Montague	outcrop	Antlers	40	20.37	No
		Paluxy	—	—	—
		Glen Rose	—	—	—
		Twin Mountains	—	—	—
	subcrop	Antlers	—	—	—
		Paluxy	—	—	—
		Glen Rose	—	—	—
		Twin Mountains	—	—	—
Parker	outcrop	Antlers	42	8.76	No
		Paluxy	6	5.69	No
		Glen Rose	20	20.06	No
		Twin Mountains	7	2.42	No
	subcrop	Antlers	—	—	—
		Paluxy	2	1.81	No
		Glen Rose	50	50.41	No
		Twin Mountains	68	61.87	No
Wise	outcrop	Antlers	60	16.44	No
		Paluxy	—	—	—
		Glen Rose	—	—	—
		Twin Mountains	—	—	—
	subcrop	Antlers	154	92.38	No
		Paluxy	—	—	—
		Glen Rose	—	—	—
		Twin Mountains	—	—	—

Appendix B

Comparison between Desired Future Conditions and Drawdowns for the Marble Falls, Ellenburger-San Saba, and Hickory Aquifers in Brown, Burnet, Lampasas, and Mills Counties

The water level file from the predictive model output was used to calculate the drawdown (D) within the modeled extent for each aquifer between 2009 and 2080 using the following equation:

$$D = \frac{\sum_{i=1}^{n}(h2009_i - h2080_i)}{n}$$

Where:

n = Total model cells in a county

$h2009_i$ = Water level of 2009 at model cell i (feet)

$h2080_i$ = Water level of 2080 at model cell i (feet)

Model cells with water level values below the cell bottom in 2009 were excluded from the calculation. Also, water level was set at the cell bottom if it fell below the cell bottom in 2080.

The comparison between the simulated drawdowns and the desired future conditions is presented in Table B1. The comparison indicates that the predictive simulation meets the desired future conditions of the Marble Falls, Ellenburger-San Saba, and Hickory aquifers in Brown, Burnet, Lampasas, and Mills counties.

TABLE B1. COMPARISON BETWEEN SIMULATED REMAINING AQUIFER SATURATED THICKESS AND DESIRED FUTURE CONDITIONS OF MARBLE FALLS, ELLENBURGER-SAN SABA, AND HICKORY AQUIFERS IN BROWN, BURNET, LAMPASAS, AND MILLS COUNTIES.

County	Aquifer	Desired Future Condition (feet of drawdown between 2009 and 2080)	Simulated Drawdown between 2009 and 2080 (feet)	Is Desired Future Condition Violated?
Brown	Marble Falls	3	3	no
	Ellenburger-San Saba	3	3	no
	Hickory	3	3	no
Burnet	Marble Falls	11	11	no
	Ellenburger-San Saba	12	9	no
	Hickory	11	11	no
Lampasas	Marble Falls	16	16	no
	Ellenburger-San Saba	16	16	no
	Hickory	16	16	no
Mills	Marble Falls	9	9	no
	Ellenburger-San Saba	9	9	no
	Hickory	9	9	no

Appendix C

Summary of Dry Model Cell Count for the Trinity, Woodbine, Marble Falls, Ellenburger-San Saba, and Hickory Aquifers

TABLE C1. SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Bell	Paluxy	2009	1,767	0
		2080	1,767	0
	Glen Rose	2009	23,737	0
		2080	23,737	8
	Hensell	2009	17,390	0
		2080	17,390	0
	Hosston	2009	17,390	0
		2080	17,390	0
	Travis Peak	2009	52,170	0
		2080	52,170	0
Bosque	Paluxy	2009	13,818	0
		2080	13,818	0
	Glen Rose	2009	22,360	0
		2080	22,360	0
	Hensell	2009	16,034	0
		2080	16,034	0
	Hosston	2009	16,034	0
		2080	16,034	0
	Travis Peak	2009	48,102	0
		2080	48,102	0
Brown	Glen Rose	2009	36	0
		2080	36	0
	Hensell	2009	1,608	0
		2080	1,608	0
	Hosston	2009	10,258	0
		2080	10,258	0
	Travis Peak	2009	15,847	0
		2080	15,847	0
	Antlers	2009	12,354	0
		2080	12,354	0

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Burnet	Glen Rose	2009	22,534	0
		2080	22,534	0
	Hensell	2009	12,332	0
		2080	12,332	0
	Hosston	2009	22,320	217
		2080	22,320	765
	Travis Peak	2009	44,433	217
		2080	44,433	828
Callahan	Antlers	2009	34,576	0
		2080	34,576	0
Collin	Woodbine	2009	11,762	0
		2080	11,762	2
	Paluxy	2009	12,062	0
		2080	12,062	319
	Glen Rose	2009	12,062	0
		2080	12,062	0
	Twin Mountains	2009	36,186	0
		2080	36,186	0
	Antlers	2009	7,055	0
		2080	7,055	172
Comanche	Glen Rose	2009	1,440	0
		2080	1,440	0
	Hensell	2009	22,362	0
		2080	22,362	0
	Hosston	2009	41,062	0
		2080	41,062	353
	Travis Peak	2009	78,137	0
		2080	78,137	353
	Antlers	2009	23,711	123
		2080	23,711	3,149
Cooke	Woodbine	2009	5,700	0
		2080	5,700	26
	Antlers	2009	77,047	0
		2080	77,047	839

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Coryell	Paluxy	2009	6,512	0
		2080	6,512	0
	Glen Rose	2009	41,647	11
		2080	41,647	25
	Hensell	2009	16,914	0
		2080	16,914	0
	Hosston	2009	16,914	0
		2080	16,914	0
	Travis Peak	2009	50,742	0
		2080	50,742	0
Dallas	Woodbine	2009	14,152	0
		2080	14,152	0
	Paluxy	2009	14,532	0
		2080	14,532	10
	Glen Rose	2009	14,532	0
		2080	14,532	0
	Hensell	2009	80	0
		2080	80	0
	Hosston	2009	80	0
		2080	80	0
	Twin Mountains	2009	43,353	0
		2080	43,353	0
	Travis Peak	2009	243	0
		2080	243	0
Delta	Paluxy	2009	1,217	0
		2080	1,217	0
	Glen Rose	2009	1,217	0
		2080	1,217	0
	Travis Peak	2009	3,651	0
		2080	3,651	0

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Denton	Woodbine	2009	11,991	3
		2080	11,991	10
	Paluxy	2009	3,520	0
		2080	3,520	2,115
	Glen Rose	2009	3,520	0
		2080	3,520	0
	Twin Mountains	2009	10,560	0
		2080	10,560	84
	Antlers	2009	59,107	0
		2080	59,107	5,738
Eastland	Antlers	2009	44,009	74
		2080	44,009	1,116
Ellis	Woodbine	2009	14,207	0
		2080	14,207	0
	Paluxy	2009	15,173	0
		2080	15,173	0
	Glen Rose	2009	15,209	0
		2080	15,209	0
	Hensell	2009	15,120	0
		2080	15,120	0
	Hosston	2009	15,120	0
		2080	15,120	0
	Twin Mountains	2009	225	0
		2080	225	0
	Travis Peak	2009	45,402	0
		2080	45,402	0

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Erath	Paluxy	2009	1,443	0
		2080	1,443	0
	Glen Rose	2009	20,905	0
		2080	20,905	32
	Hensell	2009	21,880	0
		2080	21,880	83
	Hosston	2009	8,464	0
		2080	8,464	372
	Twin Mountains	2009	46,114	20
		2080	46,114	286
	Travis Peak	2009	39,220	0
		2080	39,220	1,006
	Antlers	2009	8,983	0
		2080	8,983	962
Falls	Paluxy	2009	1,439	0
		2080	1,439	0
	Glen Rose	2009	5,840	0
		2080	5,840	0
	Hensell	2009	5,840	0
		2080	5,840	0
	Hosston	2009	5,840	0
		2080	5,840	0
	Travis Peak	2009	17,520	0
		2080	17,520	0
Fannin	Woodbine	2009	15,443	3
		2080	15,443	60
	Paluxy	2009	1,582	0
		2080	1,582	0
	Glen Rose	2009	1,582	0
		2080	1,582	0
	Twin Mountains	2009	1,758	0
		2080	1,758	0
	Travis Peak	2009	2,988	0
		2080	2,988	0
	Antlers	2009	63,730	0
		2080	63,730	0

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Grayson	Woodbine	2009	17,911	2
		2080	17,911	58
	Paluxy	2009	77	0
		2080	77	0
	Glen Rose	2009	77	0
		2080	77	0
	Twin Mountains	2009	231	0
		2080	231	0
	Antlers	2009	77,954	0
		2080	77,954	327
Hamilton	Paluxy	2009	1,897	0
		2080	1,897	0
	Glen Rose	2009	36,944	0
		2080	36,944	13
	Hensell	2009	16,890	0
		2080	16,890	0
	Hosston	2009	13,373	0
		2080	13,373	0
	Travis Peak	2009	43,636	0
		2080	43,636	0
Hill	Woodbine	2009	12,602	0
		2080	12,602	0
	Paluxy	2009	15,648	0
		2080	15,648	0
	Glen Rose	2009	15,766	0
		2080	15,766	0
	Hensell	2009	15,766	0
		2080	15,766	0
	Hosston	2009	15,766	0
		2080	15,766	0
	Travis Peak	2009	47,298	0
		2080	47,298	157

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Hood	Paluxy	2009	434	0
		2080	434	0
	Glen Rose	2009	14,461	0
		2080	14,461	74
	Hensell	2009	117	0
		2080	117	0
	Hosston	2009	117	0
		2080	117	5
	Twin Mountains	2009	37,444	0
		2080	37,444	1,710
	Travis Peak	2009	351	0
		2080	351	5
Hunt	Woodbine	2009	2,193	0
		2080	2,193	0
	Paluxy	2009	1,362	0
		2080	1,362	0
	Glen Rose	2009	1,362	0
		2080	1,362	0
	Twin Mountains	2009	492	0
		2080	492	0
	Travis Peak	2009	3,594	0
		2080	3,594	0
Johnson	Woodbine	2009	8,407	14
		2080	8,407	68
	Paluxy	2009	11,627	17
		2080	11,627	0
	Glen Rose	2009	12,342	15
		2080	12,342	37
	Hensell	2009	9,462	0
		2080	9,462	0
	Hosston	2009	9,462	0
		2080	9,462	1,278
	Twin Mountains	2009	6,816	0
		2080	6,816	1,836
	Travis Peak	2009	28,386	0
		2080	28,386	1,278

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Kaufman	Woodbine	2009	1,616	0
		2080	1,616	0
	Paluxy	2009	1,321	0
		2080	1,321	0
	Glen Rose	2009	1,331	0
		2080	1,331	0
	Hensell	2009	82	0
		2080	82	0
	Hosston	2009	82	0
		2080	82	0
	Twin Mountains	2009	960	0
		2080	960	0
	Travis Peak	2009	3,033	0
		2080	3,033	0
Lamar	Woodbine	2009	9,839	0
		2080	9,839	0
	Paluxy	2009	12,260	0
		2080	12,260	0
	Glen Rose	2009	12,260	0
		2080	12,260	0
	Travis Peak	2009	36,780	0
		2080	36,780	0
	Antlers	2009	7,995	0
		2080	7,995	0
Lampasas	Glen Rose	2009	8,692	0
		2080	8,692	0
	Hensell	2009	25,364	1
		2080	25,364	1
	Hosston	2009	23,100	0
		2080	23,100	0
	Travis Peak	2009	62,529	1
		2080	62,529	1

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Limestone	Paluxy	2009	962	0
		2080	962	0
	Glen Rose	2009	1,760	0
		2080	1,760	0
	Hensell	2009	1,760	0
		2080	1,760	0
	Hosston	2009	1,760	0
		2080	1,760	0
	Travis Peak	2009	5,280	0
		2080	5,280	0
McLennan	Woodbine	2009	1,909	0
		2080	1,909	0
	Paluxy	2009	16,952	0
		2080	16,952	0
	Glen Rose	2009	16,991	0
		2080	16,991	0
	Hensell	2009	16,991	0
		2080	16,991	0
	Hosston	2009	16,991	0
		2080	16,991	16
	Travis Peak	2009	50,973	0
		2080	50,973	16
Milam	Glen Rose	2009	2,579	0
		2080	2,579	0
	Hensell	2009	2,579	0
		2080	2,579	0
	Hosston	2009	2,579	0
		2080	2,579	0
	Travis Peak	2009	7,737	0
		2080	7,737	0

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Mills	Paluxy	2009	936	0
		2080	936	0
	Glen Rose	2009	10,615	0
		2080	10,615	2
	Hensell	2009	18,539	0
		2080	18,539	0
	Hosston	2009	14,226	0
		2080	14,226	0
	Travis Peak	2009	42,934	0
		2080	42,934	0
Montague	Antlers	2009	52,693	0
		2080	52,693	417
Navarro	Woodbine	2009	1,578	0
		2080	1,578	0
	Paluxy	2009	1,755	0
		2080	1,755	0
	Glen Rose	2009	6,326	0
		2080	6,326	0
	Hensell	2009	6,326	0
		2080	6,326	0
	Hosston	2009	6,326	0
		2080	6,326	0
	Travis Peak	2009	18,978	0
		2080	18,978	0
Parker	Paluxy	2009	5,637	0
		2080	5,637	0
	Glen Rose	2009	11,389	8
		2080	11,389	753
	Twin Mountains	2009	30,326	0
		2080	30,326	223
	Antlers	2009	40,600	0
		2080	40,600	435

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Red River	Woodbine	2009	4,222	0
		2080	4,222	0
	Paluxy	2009	8,494	0
		2080	8,494	0
	Glen Rose	2009	8,494	0
		2080	8,494	0
	Travis Peak	2009	25,482	0
		2080	25,482	0
	Antlers	2009	1,065	0
		2080	1,065	0
Rockwall	Woodbine	2009	33	0
		2080	33	0
	Paluxy	2009	711	0
		2080	711	0
	Glen Rose	2009	711	0
		2080	711	0
	Twin Mountains	2009	2,133	0
		2080	2,133	0
Somervell	Paluxy	2009	851	0
		2080	851	0
	Glen Rose	2009	11,274	0
		2080	11,274	0
	Hensell	2009	3,045	0
		2080	3,045	0
	Hosston	2009	2,640	0
		2080	2,640	0
	Twin Mountains	2009	1,660	0
		2080	1,660	0
	Travis Peak	2009	8,325	0
		2080	8,325	0

TABLE C1 (CONT). SUMMARY OF DRY MODEL CELLS FOR TRINITY AND WOODBINE AQUIFERS FROM PREDICTIVE SIMULATION.

County	Aquifer	Year	Total Aquifer Cells	Dry Cells
Tarrant	Woodbine	2009	8,901	2
		2080	8,901	3
	Paluxy	2009	15,389	3
		2080	15,389	1,926
	Glen Rose	2009	13,571	0
		2080	13,571	0
	Twin Mountains	2009	40,713	0
		2080	40,713	6,065
	Antlers	2009	5,009	0
		2080	5,009	1,033
Taylor	Antlers	2009	6,176	0
		2080	6,176	0
Travis	Glen Rose	2009	14,314	25
		2080	14,314	0
	Hensell	2009	11,310	0
		2080	11,310	0
	Hosston	2009	9,400	57
		2080	9,400	123
	Travis Peak	2009	30,124	57
		2080	30,124	124
Williamson	Glen Rose	2009	24,271	0
		2080	24,271	0
	Hensell	2009	17,454	0
		2080	17,454	0
	Hosston	2009	17,454	0
		2080	17,454	0
	Travis Peak	2009	52,362	0
		2080	52,362	0
Wise	Antlers	2009	90,469	0
		2080	90,469	3,563

TABLE C2. SUMMARY OF DRY MODEL CELLS FOR MARBLE FALLS, ELLENBURGER-SAN SABA, AND HICKORY AQUIFERS IN BROWN, BURNET, LAMPASAS, AND MILLS COUNTIES FROM PREDICTIVE SIMULATION.

County	Aquifer	Active Cells	Dry Cells (2009)	Dry Cells (2080)
Brown	Marble Falls	1,635	0	0
	Ellenburger-San Saba	1,635	0	0
	Hickory	1,635	0	0
Burnet	Marble Falls	10,810	2,298	2,450
	Ellenburger-San Saba	13,618	709	851
	Hickory	14,334	111	131
Lampasas	Marble Falls	7,614	611	683
	Ellenburger-San Saba	7,895	0	0
	Hickory	7,895	0	0
Mills	Marble Falls	3,540	0	0
	Ellenburger-San Saba	3,540	0	0
	Hickory	3,540	0	0

Appendix E
Estimated Historical Water Use and 2022 State Water Plan Datasets

Estimated Historical Groundwater Use And 2022 State Water Plan Datasets:

Prairielands Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
February 14, 2024

GROUNDWATER MANAGEMENT PLAN DATA:

This package of water data reports (part 1 of a 2-part package of information) is being provided to groundwater conservation districts to help them meet the requirements for approval of their five-year groundwater management plan. Each report in the package addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan checklist. The checklist can be viewed and downloaded from this web address:

http://www.twdb.texas.gov/groundwater/docs/GCD/GMPChecklist0113.pdf

The five reports included in this part are:

1. Estimated Historical Groundwater Use (checklist item 2)

   from the TWDB Historical Water Use Survey (WUS)

2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)

   from the 2022 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Grayson Dowlearn@twdb.texas.gov, (512) 475-1552.

DISCLAIMER:

The data presented in this report represents the most up to date WUS and 2022 SWP data available as of 2/14/2024. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2022 SWP. District personnel must review these datasets and correct any discrepancies to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/

The 2022 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

The values presented in the data tables of this report are county based. In cases where groundwater conservation districts cover only a portion of one or more counties the data values are modified with an apportioning multiplier to create new values that more accurately represent conditions within district boundaries. The multiplier used in the following formula is a land area ratio: (data value * (land area of district in county / land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide water user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these entity locations).

The remaining SWP tables (Projected Water Supply Needs and Projected Water Management Strategies) are not modified because district-specific values are not statutorily required. Each district needs only "consider" the county values in these tables.

In the WUS table every category of water use (including municipal) is apportioned. Staff determined that breaking down the annual municipal values into individual WUGs was too complex.

TWDB recognizes that the apportioning formula used is not ideal but it is the best available process with respect to time and staffing constraints. If a district believes it has data that is more accurate it can add those data to the plan with an explanation of how the data were derived. Apportioning percentages that the TWDB used are listed above each applicable table.

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317).

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2020. TWDB staff anticipates the calculation and posting of these estimates at a later date.

ELLIS COUNTY *100% (multiplier)* All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	6,179	2,234	0	0	3,404	19	11,836
	SW	21,217	2,276	0	1,854	0	931	26,278
2018	GW	6,419	2,124	0	0	2,965	19	11,527
	SW	20,154	2,834	0	810	0	931	24,729
2017	GW	5,897	2,142	0	0	3,490	18	11,547
	SW	19,388	2,271	0	549	0	906	23,114
2016	GW	6,052	2,122	0	0	2,934	18	11,126
	SW	17,395	2,619	0	734	0	890	21,638
2015	GW	6,310	1,967	0	0	830	18	9,125
	SW	17,763	2,591	0	729	1	867	21,951
2014	GW	6,236	2,229	0	0	1,249	17	9,731
	SW	17,475	2,965	0	901	51	855	22,247
2013	GW	6,323	2,705	0	0	1,229	18	10,275
	SW	19,957	2,415	0	0	0	891	23,263
2012	GW	7,077	1,949	5	0	1,933	15	10,979
	SW	20,302	2,067	21	0	44	724	23,158
2011	GW	8,047	2,069	0	0	1,499	32	11,647
	SW	19,810	2,923	0	83	0	1,564	24,380
2010	GW	6,407	1,316	136	0	270	32	8,161
	SW	17,045	2,830	239	77	0	1,554	21,745
2009	GW	7,936	1,116	87	0	1,019	19	10,177
	SW	15,752	1,358	159	805	0	930	19,004
2008	GW	7,697	1,844	1,209	0	1,155	18	11,923
	SW	16,706	2,251	1,847	0	0	864	21,668
2007	GW	7,012	2,117	0	0	166	19	9,314
	SW	16,305	2,992	33	0	0	929	20,259
2006	GW	8,060	2,326	0	0	261	22	10,669
	SW	19,827	2,998	23	611	51	1,093	24,603
2005	GW	7,340	2,652	0	0	208	21	10,221
	SW	18,004	1,488	23	0	0	1,041	20,556
2004	GW	6,224	2,543	0	0	208	97	9,072
	SW	14,646	1,182	23	0	0	872	16,723

HILL COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	3,841	0	2	0	372	63	4,278
	SW	2,476	0	0	0	332	1,201	4,009
2018	GW	4,015	0	2	0	357	63	4,437
	SW	2,589	0	0	0	468	1,197	4,254
2017	GW	3,605	0	2	0	333	61	4,001
	SW	2,220	0	0	0	720	1,159	4,099
2016	GW	3,685	0	2	0	226	55	3,968
	SW	2,271	0	0	0	720	1,033	4,024
2015	GW	3,829	0	2	0	85	53	3,969
	SW	2,303	0	0	0	1,379	1,009	4,691
2014	GW	4,296	0	2	0	407	55	4,760
	SW	2,361	0	0	0	1,717	1,041	5,119
2013	GW	4,051	0	2	0	64	51	4,168
	SW	2,391	0	0	0	1,587	981	4,959
2012	GW	4,392	0	2	0	823	46	5,263
	SW	2,437	0	0	0	1,568	871	4,876
2011	GW	4,641	1	0	0	18	92	4,752
	SW	2,764	0	0	0	1,817	1,750	6,331
2010	GW	3,422	1	593	0	181	90	4,287
	SW	2,757	0	772	0	569	1,710	5,808
2009	GW	3,152	0	608	0	99	68	3,927
	SW	2,662	0	792	0	232	1,296	4,982
2008	GW	2,481	0	623	0	324	61	3,489
	SW	2,679	0	812	0	27	1,161	4,679
2007	GW	2,851	0	0	0	0	46	2,897
	SW	2,392	0	0	0	881	882	4,155
2006	GW	3,105	0	0	0	0	59	3,164
	SW	2,565	8	0	0	1,073	1,118	4,764
2005	GW	2,995	1	0	0	108	61	3,165
	SW	2,503	8	0	0	238	1,166	3,915
2004	GW	3,250	0	0	0	150	74	3,474
	SW	2,365	10	0	0	15	1,216	3,606

JOHNSON COUNTY *100% (multiplier)* All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	6,057	1,100	16	0	103	414	7,690
	SW	14,012	700	12	470	202	967	16,363
2018	GW	6,160	1,139	12	0	15	411	7,737
	SW	14,461	832	0	291	578	959	17,121
2017	GW	5,788	1,038	32	0	86	399	7,343
	SW	14,406	878	106	186	526	932	17,034
2016	GW	5,863	959	9	0	84	471	7,386
	SW	13,437	789	0	264	468	1,101	16,059
2015	GW	6,154	845	35	0	89	463	7,586
	SW	13,629	657	68	322	436	1,079	16,191
2014	GW	6,317	796	36	0	107	494	7,750
	SW	14,426	687	69	327	427	1,153	17,089
2013	GW	6,770	776	137	0	210	431	8,324
	SW	14,474	621	460	312	453	1,006	17,326
2012	GW	7,102	725	268	0	289	387	8,771
	SW	14,700	619	928	448	625	905	18,225
2011	GW	6,925	786	549	0	192	437	8,889
	SW	17,004	791	2,117	487	126	1,019	21,544
2010	GW	6,139	698	1,762	0	130	429	9,158
	SW	14,140	829	2,468	644	269	999	19,349
2009	GW	6,208	731	2,818	0	304	533	10,594
	SW	14,020	921	3,990	469	96	1,245	20,741
2008	GW	6,376	987	3,963	0	95	468	11,889
	SW	12,793	811	5,361	480	69	1,095	20,609
2007	GW	6,483	998	0	0	29	440	7,950
	SW	12,411	802	0	465	9	1,026	14,713
2006	GW	7,802	1,017	0	0	17	493	9,329
	SW	15,682	892	17	207	33	1,151	17,982
2005	GW	8,045	79	2	0	0	483	8,609
	SW	12,947	1,467	195	261	51	1,128	16,049
2004	GW	6,361	136	0	0	0	395	6,892
	SW	10,501	1,264	221	855	21	1,184	14,046

SOMERVELL COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	531	4	181	0	140	42	898
	SW	821	0	100	68,663	0	98	69,682
2018	GW	487	4	137	1	170	42	841
	SW	851	0	97	65,400	0	98	66,446
2017	GW	510	3	232	1	117	41	904
	SW	859	0	51	66,253	333	96	67,592
2016	GW	467	3	233	0	145	40	888
	SW	828	0	23	65,543	275	94	66,763
2015	GW	697	4	190	1	111	40	1,043
	SW	540	0	45	60,578	4	92	61,259
2014	GW	677	3	38	0	0	54	772
	SW	612	0	84	52,490	234	125	53,545
2013	GW	702	2	164	1	128	43	1,040
	SW	594	0	81	65,315	260	100	66,350
2012	GW	773	1	120	2	526	40	1,462
	SW	590	0	99	70,360	0	94	71,143
2011	GW	1,288	2	157	23	582	56	2,108
	SW	67	0	60	19,959	97	130	20,313
2010	GW	1,202	2	691	21	130	54	2,100
	SW	0	0	935	21,283	95	127	22,440
2009	GW	1,195	4	634	23	0	46	1,902
	SW	0	0	699	20,142	34	108	20,983
2008	GW	1,138	8	628	22	0	46	1,842
	SW	0	0	507	19,235	39	107	19,888
2007	GW	989	8	386	25	20	55	1,483
	SW	0	0	55	38,184	88	129	38,456
2006	GW	1,217	9	430	28	83	46	1,813
	SW	0	0	167	46,746	84	108	47,105
2005	GW	1,113	6	433	29	0	43	1,624
	SW	0	0	137	39,137	70	101	39,445
2004	GW	1,058	4	253	24	2	64	1,405
	SW	0	0	58	44,989	81	64	45,192

Projected Surface Water Supplies
TWDB 2022 State Water Plan Data

ELLIS COUNTY *100% (multiplier)* All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
C	Brandon Irene WSC	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	8	11	13	15	18	19
C	Buena Vista-Bethel SUD	Trinity	Bardwell Lake/Reservoir	489	510	462	460	498	511
C	Buena Vista-Bethel SUD	Trinity	TRWD Lake/Reservoir System	32	178	242	413	795	838
C	Buena Vista-Bethel SUD	Trinity	Waxahachie Lake/Reservoir	317	329	300	301	330	341
C	Cedar Hill	Trinity	Fork Lake/Reservoir	15	20	25	32	32	33
C	Cedar Hill	Trinity	Ray Hubbard Lake/Reservoir	16	19	21	24	23	21
C	Cedar Hill	Trinity	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System	35	38	40	45	40	35
C	Cedar Hill	Trinity	Tawakoni Lake/Reservoir	53	62	68	78	71	66
C	County-Other, Ellis	Trinity	Bardwell Lake/Reservoir	16	24	49	162	469	634
C	County-Other, Ellis	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	84	84	84	84	84	84
C	County-Other, Ellis	Trinity	Joe Pool Lake/Reservoir	39	24	30	61	176	387
C	County-Other, Ellis	Trinity	TRWD Lake/Reservoir System	461	453	348	465	1,171	1,944
C	County-Other, Ellis	Trinity	Waxahachie Lake/Reservoir	5	6	9	41	185	276
C	East Garrett WSC	Trinity	Bardwell Lake/Reservoir	246	273	284	251	186	250
C	East Garrett WSC	Trinity	TRWD Lake/Reservoir System	0	29	72	119	103	160
C	Ennis	Trinity	Bardwell Lake/Reservoir	4,026	4,119	3,950	3,851	3,735	3,504
C	Ennis	Trinity	TRWD Lake/Reservoir System	0	445	1,004	1,820	2,062	2,245
C	Ferris	Trinity	Joe Pool Lake/Reservoir	157	216	265	233	195	152
C	Ferris	Trinity	TRWD Lake/Reservoir System	303	503	629	584	487	378
C	Files Valley WSC	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	262	338	385	445	498	522
C	Glenn Heights	Trinity	Fork Lake/Reservoir	44	59	73	94	117	184
C	Glenn Heights	Trinity	Ray Hubbard	46	55	61	72	82	119

			Lake/Reservoir						
C	Glenn Heights	Trinity	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System	101	110	118	134	145	198
C	Glenn Heights	Trinity	Tawakoni Lake/Reservoir	154	181	199	230	258	367
C	Grand Prairie	Trinity	Fork Lake/Reservoir	1	1	1	2	2	3
C	Grand Prairie	Trinity	Ray Hubbard Lake/Reservoir	1	1	1	1	2	2
C	Grand Prairie	Trinity	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System	2	2	2	2	3	3
C	Grand Prairie	Trinity	Tawakoni Lake/Reservoir	3	3	4	4	5	5
C	Grand Prairie	Trinity	TRWD Lake/Reservoir System	0	1	0	2	2	2
C	Hilco United Services	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	4	4	4	4	4	4
C	Irrigation, Ellis	Trinity	Trinity Run-of-River	3	3	3	3	3	3
C	Livestock, Ellis	Trinity	Trinity Livestock Local Supply	1,112	1,112	1,112	1,112	1,112	1,112
C	Mansfield	Trinity	TRWD Lake/Reservoir System	28	25	27	34	37	42
C	Manufacturing, Ellis	Trinity	Bardwell Lake/Reservoir	1,430	1,350	1,104	809	555	383
C	Manufacturing, Ellis	Trinity	TRWD Lake/Reservoir System	1,854	1,655	1,570	1,742	1,776	1,543
C	Manufacturing, Ellis	Trinity	Waxahachie Lake/Reservoir	576	494	396	307	231	178
C	Midlothian	Trinity	Joe Pool Lake/Reservoir	2,470	2,349	2,228	3,228	3,107	2,987
C	Midlothian	Trinity	TRWD Lake/Reservoir System	1,938	2,397	2,226	2,041	2,215	2,461
C	Mountain Peak SUD	Trinity	Joe Pool Lake/Reservoir	1,121	1,121	1,121	0	0	0
C	Ovilla	Trinity	Fork Lake/Reservoir	106	141	172	221	275	519
C	Ovilla	Trinity	Ray Hubbard Lake/Reservoir	109	130	145	169	192	334
C	Ovilla	Trinity	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System	242	261	281	316	341	555
C	Ovilla	Trinity	Tawakoni Lake/Reservoir	367	431	471	541	605	1,033
C	Palmer	Trinity	Joe Pool Lake/Reservoir	93	92	101	100	96	124
C	Palmer	Trinity	TRWD Lake/Reservoir System	181	213	239	251	239	309
C	Red Oak	Trinity	Fork Lake/Reservoir	70	149	197	279	348	557
C	Red Oak	Trinity	Ray Hubbard Lake/Reservoir	72	138	166	214	244	359
C	Red Oak	Trinity	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System	159	277	321	400	432	598

C	Red Oak	Trinity	Tawakoni Lake/Reservoir	242	458	540	684	766	1,110
C	Rice Water Supply and Sewer Service	Trinity	Bardwell Lake/Reservoir	31	28	23	16	10	6
C	Rice Water Supply and Sewer Service	Trinity	Navarro Mills Lake/Reservoir	558	668	798	893	972	1,016
C	Rice Water Supply and Sewer Service	Trinity	Richland Chambers Lake/Reservoir Non-System Portion	112	134	160	179	194	203
C	Rice Water Supply and Sewer Service	Trinity	TRWD Lake/Reservoir System	0	3	6	7	6	4
C	Rockett SUD	Trinity	Joe Pool Lake/Reservoir	1,533	1,541	1,489	1,547	1,536	1,400
C	Rockett SUD	Trinity	TRWD Lake/Reservoir System	2,972	3,581	3,546	3,869	3,842	3,504
C	Sardis Lone Elm WSC	Trinity	Joe Pool Lake/Reservoir	381	308	277	217	162	114
C	Sardis Lone Elm WSC	Trinity	TRWD Lake/Reservoir System	1,668	1,849	2,037	1,962	1,757	1,547
C	Steam-Electric Power, Ellis	Trinity	TRWD Lake/Reservoir System	232	141	120	124	118	110
C	Venus	Trinity	TRWD Lake/Reservoir System	9	8	8	9	10	10
C	Waxahachie	Trinity	Bardwell Lake/Reservoir	2,726	2,636	2,510	2,363	2,143	1,988
C	Waxahachie	Trinity	TRWD Lake/Reservoir System	184	922	1,315	2,120	3,414	3,259
C	Waxahachie	Trinity	Waxahachie Lake/Reservoir	1,767	1,698	1,629	1,549	1,416	1,328
	Sum of Projected Surface Water Supplies (acre-feet)			**31,266**	**34,411**	**35,081**	**37,335**	**39,932**	**41,983**

HILL COUNTY

100% (multiplier) All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
G	Birome WSC	Brazos	Navarro Mills Lake/Reservoir	68	68	68	68	68	68
G	Birome WSC	Brazos	Richland Chambers Lake/Reservoir Non-System Portion	14	14	14	14	14	14
G	Birome WSC	Trinity	Navarro Mills Lake/Reservoir	1	1	1	1	1	1
G	Bold Springs WSC	Brazos	Waco Lake/Reservoir	45	45	45	45	44	45
G	Brandon Irene WSC	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	44	47	46	46	44	42
G	Brandon Irene WSC	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	159	173	170	166	163	151
G	Chatt WSC	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	70	75	76	76	75	72
G	Chatt WSC	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	9	11	10	10	11	10

G	County-Other, Hill	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	26	28	28	29	30	31
G	County-Other, Hill	Brazos	Navarro Mills Lake/Reservoir	76	81	80	70	58	49
G	County-Other, Hill	Brazos	Richland Chambers Lake/Reservoir Non-System Portion	15	16	16	14	11	10
G	County-Other, Hill	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	3	3	4	4	4	4
G	County-Other, Hill	Trinity	Navarro Mills Lake/Reservoir	16	18	17	15	13	11
G	County-Other, Hill	Trinity	Richland Chambers Lake/Reservoir Non-System Portion	3	4	3	3	3	2
G	Files Valley WSC	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	274	296	280	261	246	215
G	Files Valley WSC	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	606	655	624	583	545	477
G	Hilco United Services	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	108	108	108	108	107	102
G	Hill County WSC	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	211	230	230	230	230	220
G	Hillsboro	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	3,833	3,634	3,632	3,631	3,629	3,468
G	Hubbard	Trinity	Navarro Mills Lake/Reservoir	122	124	135	127	117	100
G	Hubbard	Trinity	Richland Chambers Lake/Reservoir Non-System Portion	25	25	27	25	23	20
G	Irrigation, Hill	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	1,000	1,000	1,000	1,000	1,000	1,000
G	Irrigation, Hill	Brazos	Brazos Run-of-River	1	1	1	1	1	1
G	Johnson County SUD	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	8	9	9	9	9	9
G	Johnson County SUD	Brazos	TRWD Lake/Reservoir System	2	8	10	8	7	7
G	Livestock, Hill	Brazos	Brazos Livestock Local Supply	1,066	1,066	1,066	1,066	1,066	1,066
G	Livestock, Hill	Trinity	Brazos Livestock Local Supply	271	271	271	271	271	271
G	Mining, Hill	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	800	800	800	799	800	801

G	Mining, Hill	Trinity	Brazos River Authority Main Stem Lake/Reservoir System	200	200	200	201	200	199
G	Parker WSC	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	24	21	18	16	14	13
G	Parker WSC	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	5	5	4	3	3	3
G	Post Oak SUD	Brazos	Navarro Mills Lake/Reservoir	8	8	11	7	5	2
G	Post Oak SUD	Brazos	Richland Chambers Lake/Reservoir Non-System Portion	2	2	2	1	1	0
G	Post Oak SUD	Trinity	Navarro Mills Lake/Reservoir	46	47	59	42	26	9
G	Post Oak SUD	Trinity	Richland Chambers Lake/Reservoir Non-System Portion	10	10	13	9	6	3
	Sum of Projected Surface Water Supplies (acre-feet)			**9,171**	**9,104**	**9,078**	**8,959**	**8,845**	**8,496**

JOHNSON COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
G	Acton MUD	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	37	37	36	36	28	20
G	Alvarado	Trinity	Brazos River Authority Main Stem Lake/Reservoir System	2,241	2,241	2,241	2,241	2,241	2,241
G	Bethany WSC	Trinity	Brazos River Authority Main Stem Lake/Reservoir System	1,120	1,120	1,120	1,120	1,120	1,120
G	Bethesda WSC	Brazos	TRWD Lake/Reservoir System	109	115	121	128	138	142
G	Bethesda WSC	Trinity	TRWD Lake/Reservoir System	2,227	2,344	2,454	2,594	2,785	2,881
G	Burleson	Brazos	TRWD Lake/Reservoir System	5	6	7	8	6	7
G	Burleson	Trinity	TRWD Lake/Reservoir System	5,186	5,360	5,470	5,354	5,385	5,557
G	Cleburne	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	2,971	2,586	2,195	1,845	1,498	885
G	Cleburne	Brazos	Pat Cleburne Lake/Reservoir	5,040	4,968	4,896	4,824	4,752	4,680
G	County-Other, Johnson	Brazos	TRWD Lake/Reservoir System	959	737	629	620	565	485
G	County-Other, Johnson	Trinity	TRWD Lake/Reservoir System	2,022	1,553	1,328	1,309	1,208	1,022
G	Crowley	Trinity	TRWD Lake/Reservoir System	8	11	13	14	14	14

G	Fort Worth	Trinity	TRWD Lake/Reservoir System	0	0	0	418	596	657
G	Johnson County SUD	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	964	963	964	964	964	964
G	Johnson County SUD	Brazos	TRWD Lake/Reservoir System	228	867	1,056	827	732	696
G	Johnson County SUD	Trinity	Brazos River Authority Main Stem Lake/Reservoir System	1,910	2,000	2,000	2,000	2,000	2,000
G	Johnson County SUD	Trinity	TRWD Lake/Reservoir System	473	1,801	2,192	1,716	1,519	1,444
G	Keene	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	155	156	156	155	155	156
G	Keene	Trinity	Brazos River Authority Main Stem Lake/Reservoir System	965	964	964	965	965	964
G	Livestock, Johnson	Brazos	Brazos Livestock Local Supply	1,161	1,161	1,161	1,161	1,161	1,161
G	Livestock, Johnson	Trinity	Trinity Livestock Local Supply	291	291	291	291	291	291
G	Mansfield	Trinity	TRWD Lake/Reservoir System	658	714	803	864	950	1,030
G	Manufacturing, Johnson	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	2,328	2,712	3,104	3,454	3,800	4,181
G	Manufacturing, Johnson	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	7	9	10	11	12	13
G	Manufacturing, Johnson	Trinity	TRWD Lake/Reservoir System	2	2	2	2	2	2
G	Mining, Johnson	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	10	10	10	10	10	10
G	Mining, Johnson	Trinity	Brazos River Authority Main Stem Lake/Reservoir System	10	10	10	10	10	10
G	Parker WSC	Brazos	Brazos River Authority Aquilla Lake/Reservoir System	236	239	242	244	246	247
G	Parker WSC	Trinity	Brazos River Authority Aquilla Lake/Reservoir System	71	71	72	73	73	73
G	Venus	Trinity	TRWD Lake/Reservoir System	434	308	302	359	390	415
	Sum of Projected Surface Water Supplies (acre-feet)			**31,828**	**33,356**	**33,849**	**33,617**	**33,616**	**33,368**

SOMERVELL COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
G	Livestock, Somervell	Brazos	Brazos Livestock Local Supply	165	165	165	165	165	165
G	Somervell County Water District	Brazos	Wheeler Branch Off-Channel Lake/Reservoir	1,400	1,400	1,400	1,400	1,400	1,400
G	Steam-Electric Power, Somervell	Brazos	BRA System Operations Permit Supply	8,647	10,803	12,959	15,114	17,270	19,425
G	Steam-Electric Power, Somervell	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	18,253	16,069	13,885	11,702	9,518	7,335
G	Steam-Electric Power, Somervell	Brazos	Squaw Creek Lake/Reservoir	8,050	7,982	7,914	7,846	7,778	7,710
	Sum of Projected Surface Water Supplies (acre-feet)			**36,515**	**36,419**	**36,323**	**36,227**	**36,131**	**36,035**

Projected Water Demands
TWDB 2022 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

ELLIS COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
C	Avalon Water Supply & Sewer Service	Trinity	149	175	211	286	384	538
C	Brandon Irene WSC	Trinity	9	11	14	18	22	26
C	Buena Vista-Bethel SUD	Trinity	1,282	1,541	1,800	2,299	3,300	4,395
C	Cedar Hill	Trinity	139	174	215	275	275	275
C	County-Other, Ellis	Trinity	414	330	467	1,473	4,649	9,576
C	East Garrett WSC	Trinity	246	306	377	483	592	1,411
C	Ennis	Trinity	4,026	4,625	5,234	7,401	11,887	19,761
C	Ferris	Trinity	460	787	1,069	1,206	1,348	1,492
C	Files Valley WSC	Trinity	116	143	175	223	273	332
C	Glenn Heights	Trinity	424	524	646	827	1,013	1,544
C	Grand Prairie	Trinity	9	11	14	18	22	26
C	Hilco United Services	Trinity	21	22	22	24	25	26
C	Irrigation, Ellis	Trinity	1,367	1,367	1,367	1,367	1,367	1,367
C	Italy	Trinity	311	380	464	592	749	997
C	Livestock, Ellis	Trinity	1,140	1,140	1,140	1,140	1,140	1,140
C	Mansfield	Trinity	30	35	44	64	79	97
C	Manufacturing, Ellis	Trinity	5,414	6,549	6,549	6,549	6,549	6,549
C	Midlothian	Trinity	4,811	7,094	7,408	7,839	8,359	9,231
C	Mining, Ellis	Trinity	931	547	164	123	82	55
C	Mountain Peak SUD	Trinity	2,971	3,733	3,938	5,636	6,517	7,308
C	Ovilla	Trinity	954	1,192	1,473	1,891	2,317	4,264
C	Palmer	Trinity	274	334	407	519	662	1,219
C	Red Oak	Trinity	1,144	1,265	1,687	2,390	2,936	4,582
C	Rice Water Supply and Sewer Service	Trinity	701	833	992	1,215	1,456	1,735
C	Rockett SUD	Trinity	4,505	5,606	6,028	8,000	10,638	13,816
C	Sardis Lone Elm WSC	Trinity	5,304	7,037	8,079	8,324	8,583	8,581
C	South Ellis County WSC	Trinity	401	476	579	784	1,053	1,469
C	Steam-Electric Power, Ellis	Trinity	901	901	901	901	901	901
C	Venus	Trinity	15	19	23	30	37	45
C	Waxahachie	Trinity	6,872	7,702	9,226	11,299	13,749	16,715
	Sum of Projected Water Demands (acre-feet)		**45,341**	**54,859**	**60,713**	**73,196**	**90,964**	**119,473**

HILL COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	Birome WSC	Brazos	102	105	108	111	114	117
G	Birome WSC	Trinity	2	2	2	2	2	2
G	Bold Springs WSC	Brazos	22	23	24	25	26	28
G	Brandon Irene WSC	Brazos	50	51	51	53	54	56
G	Brandon Irene WSC	Trinity	181	186	188	193	199	203
G	Chatt WSC	Brazos	84	86	88	91	93	95
G	Chatt WSC	Trinity	11	12	12	12	13	13
G	County-Other, Hill	Brazos	181	195	190	186	170	165
G	County-Other, Hill	Trinity	39	42	41	40	37	36
G	Double Diamond Utilities	Brazos	429	439	451	462	472	491
G	Files Valley WSC	Brazos	121	125	127	131	135	137
G	Files Valley WSC	Trinity	268	277	283	292	299	304
G	Gholson WSC	Brazos	89	96	102	109	117	125
G	Hilco United Services	Brazos	565	589	607	633	661	681
G	Hill County WSC	Brazos	466	487	501	518	532	544
G	Hillsboro	Brazos	1,987	2,070	2,122	2,189	2,251	2,283
G	Hubbard	Trinity	156	157	157	162	167	169
G	Irrigation, Hill	Brazos	1,171	1,171	1,171	1,171	1,171	1,171
G	Irrigation, Hill	Trinity	579	579	579	579	579	579
G	Itasca	Brazos	142	143	143	146	149	152
G	Itasca	Trinity	10	10	10	10	11	11
G	Johnson County SUD	Brazos	17	18	20	22	24	26
G	Livestock, Hill	Brazos	1,066	1,066	1,066	1,066	1,066	1,066
G	Livestock, Hill	Trinity	271	271	271	271	271	271
G	Manufacturing, Hill	Brazos	1	1	1	1	1	1
G	Mining, Hill	Brazos	1,307	952	620	322	349	378
G	Mining, Hill	Trinity	327	238	155	81	87	94
G	Parker WSC	Brazos	25	26	27	27	27	28
G	Parker WSC	Trinity	5	5	5	6	6	6
G	Post Oak SUD	Brazos	10	10	13	14	16	18
G	Post Oak SUD	Trinity	56	57	73	80	89	98
G	Steam-Electric Power, Hill	Trinity	4,120	4,120	4,120	4,120	4,120	4,120
G	Whitney	Brazos	492	492	504	520	534	547
G	Woodrow Osceola WSC	Brazos	311	311	314	325	333	341
		Sum of Projected Water Demands (acre-feet)	**14,663**	**14,412**	**14,146**	**13,970**	**14,175**	**14,356**

JOHNSON COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	Acton MUD	Brazos	37	57	71	78	86	95
G	Alvarado	Trinity	446	483	525	577	639	708
G	Bethany WSC	Trinity	363	392	426	468	520	576
G	Bethesda WSC	Brazos	179	202	227	255	287	321

G	Bethesda WSC	Trinity	3,632	4,102	4,599	5,173	5,817	6,512
G	Burleson	Brazos	5	6	7	8	8	10
G	Burleson	Trinity	5,186	6,179	7,121	7,728	8,570	9,616
G	Cleburne	Brazos	6,969	7,580	8,977	10,446	12,234	13,678
G	County-Other, Johnson	Brazos	304	357	260	141	44	48
G	County-Other, Johnson	Trinity	641	753	549	298	94	101
G	Crowley	Trinity	9	14	19	24	30	36
G	Double Diamond Utilities	Brazos	28	29	29	30	31	55
G	Fort Worth	Trinity	0	0	0	957	1,530	1,912
G	Godley	Brazos	102	111	121	134	148	164
G	Grandview	Trinity	182	197	213	234	259	287
G	Irrigation, Johnson	Brazos	284	284	284	284	284	284
G	Irrigation, Johnson	Trinity	282	282	282	282	282	282
G	Johnson County SUD	Brazos	1,760	1,866	2,042	2,232	2,435	2,643
G	Johnson County SUD	Trinity	3,653	3,874	4,238	4,633	5,055	5,484
G	Keene	Brazos	69	80	92	105	119	135
G	Keene	Trinity	428	495	570	652	740	834
G	Livestock, Johnson	Brazos	1,161	1,161	1,161	1,161	1,161	1,161
G	Livestock, Johnson	Trinity	291	291	291	291	291	291
G	Mansfield	Trinity	706	1,003	1,310	1,647	2,013	2,405
G	Manufacturing, Johnson	Brazos	1,572	1,866	1,866	1,866	1,866	1,866
G	Manufacturing, Johnson	Trinity	5	6	6	6	6	6
G	Mining, Johnson	Brazos	2,075	1,402	762	509	584	672
G	Mining, Johnson	Trinity	2,051	1,386	753	504	577	664
G	Mountain Peak SUD	Trinity	1,123	1,351	1,591	1,857	2,149	2,461
G	Parker WSC	Brazos	246	297	351	413	482	556
G	Parker WSC	Trinity	73	88	104	122	143	165
G	Rio Vista	Brazos	154	183	214	249	288	330
G	Steam-Electric Power, Johnson	Brazos	1,915	1,915	1,915	1,915	1,915	1,915
G	Venus	Trinity	623	709	801	903	1,015	1,137
	Sum of Projected Water Demands (acre-feet)		**36,554**	**39,001**	**41,777**	**46,182**	**51,702**	**57,410**

SOMERVELL COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	County-Other, Somervell	Brazos	644	698	736	769	800	827
G	Glen Rose	Brazos	605	663	703	736	767	792
G	Irrigation, Somervell	Brazos	410	410	410	410	410	410
G	Livestock, Somervell	Brazos	165	165	165	165	165	165
G	Manufacturing, Somervell	Brazos	3	4	4	4	4	4
G	Mining, Somervell	Brazos	1,112	1,279	1,146	1,060	998	971
G	Somervell County Water District	Brazos	168	181	190	198	206	213
G	Steam-Electric Power, Somervell	Brazos	70,362	70,362	70,362	70,362	70,362	70,362
	Sum of Projected Water Demands (acre-feet)		**73,469**	**73,762**	**73,716**	**73,704**	**73,712**	**73,744**

Projected Water Supply Needs
TWDB 2022 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

ELLIS COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
C	Avalon Water Supply & Sewer Service	Trinity	0	-26	-62	-137	-235	-389
C	Brandon Irene WSC	Trinity	7	10	10	11	13	11
C	Buena Vista-Bethel SUD	Trinity	0	0	-161	-403	-867	-1,836
C	Cedar Hill	Trinity	-5	-15	-36	-65	-74	-83
C	County-Other, Ellis	Trinity	287	358	158	-486	-1,357	-4,818
C	East Garrett WSC	Trinity	0	-4	-21	-113	-303	-1,001
C	Ennis	Trinity	0	-61	-280	-1,730	-6,090	-14,012
C	Ferris	Trinity	0	-68	-175	-389	-666	-962
C	Files Valley WSC	Trinity	146	195	210	222	225	190
C	Glenn Heights	Trinity	-16	-43	-108	-190	-270	-457
C	Grand Prairie	Trinity	-1	-2	-5	-5	-6	-8
C	Hilco United Services	Trinity	26	30	35	29	32	27
C	Irrigation, Ellis	Trinity	-748	-748	-748	-748	-748	-748
C	Italy	Trinity	0	-171	-255	-383	-540	-788
C	Livestock, Ellis	Trinity	0	0	0	0	0	0
C	Mansfield	Trinity	-2	-10	-17	-30	-42	-55
C	Manufacturing, Ellis	Trinity	-22	-1,305	-1,741	-2,024	-2,456	-3,010
C	Midlothian	Trinity	-403	-2,348	-2,954	-2,570	-3,037	-3,783
C	Mining, Ellis	Trinity	0	0	0	0	0	0
C	Mountain Peak SUD	Trinity	-650	-1,412	-1,617	-4,436	-5,317	-6,108
C	Ovilla	Trinity	-38	-103	-253	-448	-632	-1,285
C	Palmer	Trinity	0	-29	-67	-168	-327	-786
C	Red Oak	Trinity	-25	-110	-290	-566	-802	-1,380
C	Rice Water Supply and Sewer Service	Trinity	0	0	-5	-120	-274	-506
C	Rockett SUD	Trinity	0	-484	-993	-2,584	-5,260	-8,912
C	Sardis Lone Elm WSC	Trinity	-1,401	-3,532	-4,417	-4,797	-5,316	-5,572
C	South Ellis County WSC	Trinity	0	0	0	-204	-473	-889
C	Steam-Electric Power, Ellis	Trinity	-48	-139	-160	-156	-162	-170
C	Venus	Trinity	-6	-11	-15	-21	-27	-35
C	Waxahachie	Trinity	0	0	-869	-2,072	-3,724	-7,146
	Sum of Projected Water Supply Needs (acre-feet)		**-3,365**	**-10,621**	**-15,249**	**-24,845**	**-39,005**	**-64,739**

HILL COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	Birome WSC	Brazos	115	112	109	107	105	100
G	Birome WSC	Trinity	2	2	2	1	1	1
G	Bold Springs WSC	Brazos	72	71	71	69	67	67
G	Brandon Irene WSC	Brazos	38	39	38	35	31	27
G	Brandon Irene WSC	Trinity	139	145	139	126	115	96
G	Chatt WSC	Brazos	20	19	14	6	-1	-11
G	Chatt WSC	Trinity	3	3	1	1	0	-1
G	County-Other, Hill	Brazos	-45	-51	-47	-54	-52	-56
G	County-Other, Hill	Trinity	-12	-12	-12	-13	-12	-14
G	Double Diamond Utilities	Brazos	0	-14	-23	-37	-45	-84
G	Files Valley WSC	Brazos	153	171	153	130	111	78
G	Files Valley WSC	Trinity	338	378	341	291	246	173
G	Gholson WSC	Brazos	123	117	111	103	96	88
G	Hilco United Services	Brazos	138	115	98	71	43	14
G	Hill County WSC	Brazos	333	329	317	298	286	262
G	Hillsboro	Brazos	1,846	1,564	1,510	1,442	1,378	1,185
G	Hubbard	Trinity	249	249	263	247	231	208
G	Irrigation, Hill	Brazos	-34	-24	-11	-12	-11	-12
G	Irrigation, Hill	Trinity	-176	-187	-199	-199	-199	-199
G	Itasca	Brazos	61	60	60	57	53	50
G	Itasca	Trinity	4	4	4	4	4	4
G	Johnson County SUD	Brazos	-2	4	4	0	-3	-5
G	Livestock, Hill	Brazos	0	0	0	0	0	0
G	Livestock, Hill	Trinity	0	0	0	0	0	0
G	Manufacturing, Hill	Brazos	44	49	54	59	64	69
G	Mining, Hill	Brazos	-188	167	499	796	770	742
G	Mining, Hill	Trinity	-48	41	124	199	192	184
G	Parker WSC	Brazos	19	12	6	2	-2	-5
G	Parker WSC	Trinity	4	4	2	0	0	0
G	Post Oak SUD	Brazos	0	0	0	-6	-10	-16
G	Post Oak SUD	Trinity	0	0	-1	-29	-57	-86
G	Steam-Electric Power, Hill	Trinity	-4,120	-4,120	-4,120	-4,120	-4,120	-4,120
G	Whitney	Brazos	0	-38	-49	-67	-74	-77
G	Woodrow Osceola WSC	Brazos	309	343	343	330	320	297
		Sum of Projected Water Supply Needs (acre-feet)	**-4,625**	**-4,446**	**-4,462**	**-4,537**	**-4,586**	**-4,686**

JOHNSON COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	Acton MUD	Brazos	20	0	-15	-22	-38	-55
G	Alvarado	Trinity	1,991	1,953	1,912	1,859	1,798	1,728
G	Bethany WSC	Trinity	1,066	1,036	1,003	960	909	852
G	Bethesda WSC	Brazos	0	-18	-35	-55	-77	-106
G	Bethesda WSC	Trinity	0	-341	-716	-1,133	-1,568	-2,149

G	Burleson	Brazos	0	0	0	0	-2	-3
G	Burleson	Trinity	0	-819	-1,651	-2,374	-3,185	-4,059
G	Cleburne	Brazos	1,831	763	-1,097	-2,988	-5,195	-7,324
G	County-Other, Johnson	Brazos	657	382	371	481	523	439
G	County-Other, Johnson	Trinity	1,386	805	784	1,016	1,119	926
G	Crowley	Trinity	0	-2	-5	-9	-15	-21
G	Double Diamond Utilities	Brazos	0	-1	-2	-2	-3	-9
G	Fort Worth	Trinity	0	0	0	-391	-695	-949
G	Godley	Brazos	-3	-12	-22	-35	-49	-65
G	Grandview	Trinity	187	172	156	135	110	82
G	Irrigation, Johnson	Brazos	-132	-132	-132	-132	-132	-132
G	Irrigation, Johnson	Trinity	-137	-137	-137	-137	-137	-137
G	Johnson County SUD	Brazos	-67	464	479	59	-238	-483
G	Johnson County SUD	Trinity	-230	964	994	120	-496	-1,003
G	Keene	Brazos	131	121	109	95	81	66
G	Keene	Trinity	819	750	676	594	507	411
G	Livestock, Johnson	Brazos	0	0	0	0	0	0
G	Livestock, Johnson	Trinity	0	0	0	0	0	0
G	Mansfield	Trinity	-48	-289	-507	-783	-1,063	-1,375
G	Manufacturing, Johnson	Brazos	949	1,039	1,431	1,781	2,127	2,508
G	Manufacturing, Johnson	Trinity	5	6	7	8	9	10
G	Mining, Johnson	Brazos	-1,347	-676	-34	216	144	54
G	Mining, Johnson	Trinity	-1,332	-669	-34	214	142	53
G	Mountain Peak SUD	Trinity	-55	-287	-523	-793	-1,081	-1,397
G	Parker WSC	Brazos	182	137	88	30	-34	-108
G	Parker WSC	Trinity	56	41	27	10	-12	-32
G	Rio Vista	Brazos	180	151	120	85	46	4
G	Steam-Electric Power, Johnson	Brazos	-571	-571	-571	-571	-571	-571
G	Venus	Trinity	-86	-298	-396	-441	-522	-619
	Sum of Projected Water Supply Needs (acre-feet)		**-4,008**	**-4,252**	**-5,877**	**-9,866**	**-15,113**	**-20,597**

SOMERVELL COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	County-Other, Somervell	Brazos	0	-54	-92	-125	-156	-183
G	Glen Rose	Brazos	8	-50	-90	-123	-154	-179
G	Irrigation, Somervell	Brazos	172	172	172	172	172	172
G	Livestock, Somervell	Brazos	0	0	0	0	0	0
G	Manufacturing, Somervell	Brazos	5	4	4	4	4	4
G	Mining, Somervell	Brazos	-421	-588	-455	-369	-307	-280
G	Somervell County Water District	Brazos	1,424	1,411	1,402	1,394	1,386	1,379
G	Steam-Electric Power, Somervell	Brazos	-35,387	-35,483	-35,579	-35,675	-35,771	-35,867
	Sum of Projected Water Supply Needs (acre-feet)		**-35,808**	**-36,175**	**-36,216**	**-36,292**	**-36,388**	**-36,509**

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

ELLIS COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Avalon Water Supply & Sewer Service, Trinity (C)							
Conservation - Avalon Water Supply and Sewer Service	DEMAND REDUCTION [Ellis]	0	1	2	4	6	11
Conservation, Water Loss Control - Avalon Water Supply and Sewer Service	DEMAND REDUCTION [Ellis]	1	1	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	12	61	114
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	4	17	27
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	2	3
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	1	8	13
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	1	2
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	1	3	7
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	5	31	60
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	3	18	41
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	1	8	14
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	2	6
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	40	35	27
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	22	30	20	12
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	23	22	14	8
Waxahachie - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	24	0	0	0	0
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	15	14	9	5
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	39
		1	**26**	**62**	**137**	**235**	**389**
Brandon Irene WSC, Trinity (C)							
Conservation - Brandon-Irene WSC	DEMAND REDUCTION [Ellis]	0	0	0	0	0	0
		0	**0**	**0**	**0**	**0**	**0**

Buena Vista-Bethel SUD, Trinity (C)

Conservation - Buena Vista - Bethel SUD	DEMAND REDUCTION [Ellis]	4	10	45	77	125	187
Conservation, Irrigation Restrictions – Buena Vista-Bethel SUD	DEMAND REDUCTION [Ellis]	0	0	49	69	99	132
Conservation, Water Loss Control - Buena Vista - Bethel SUD	DEMAND REDUCTION [Ellis]	6	8	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	22	172	457
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	7	48	111
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	1	5	14
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	2	19	51
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	3	7
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	2	11	29
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	9	86	240
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	5	51	164
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	3	22	58
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	1	4	24
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	78	98	109
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	24	57	57	46
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	26	42	40	31
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	17	28	27	21
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	155
		10	**18**	**161**	**403**	**867**	**1,836**

Cedar Hill, Trinity (C)

ANRA-COL - Lake Columbia	Columbia Lake/Reservoir [Reservoir]	0	0	0	0	0	9
Conservation - Cedar Hill	DEMAND REDUCTION [Ellis]	3	5	7	10	10	12
Conservation – Waste Prohibition, Cedar Hill	DEMAND REDUCTION [Ellis]	0	1	1	1	1	1
Conservation, Irrigation Restrictions – Cedar Hill	DEMAND REDUCTION [Ellis]	4	5	6	8	8	8
Conservation, Water Loss Control - Cedar Hill	DEMAND REDUCTION [Ellis]	3	3	3	4	4	4
DWU - Conservation Surplus Reallocation	Tawakoni Lake/Reservoir [Reservoir]	0	0	0	1	0	0
DWU - Indirect Reuse Implementation	Indirect Reuse [Collin]	0	0	4	7	8	8
DWU - Indirect Reuse Implementation	Indirect Reuse [Denton]	0	0	1	2	3	3
DWU - Indirect Reuse Implementation	Indirect Reuse [Ellis]	0	0	0	14	15	15

	DWU - Lake Palestine	Palestine Lake/Reservoir [Reservoir]	0	1	14	18	17	16
	UNM-ROR-Neches Run of River	Neches Run-of-River [Anderson]	0	0	0	0	8	7
			10	**15**	**36**	**65**	**74**	**83**
County-Other, Ellis, Trinity (C)								
	Conservation - Ellis County	DEMAND REDUCTION [Ellis]	1	2	5	20	77	192
	Conservation, Water Loss Control - Ellis County	DEMAND REDUCTION [Ellis]	2	2	0	0	0	0
	DWU - Indirect Reuse Implementation	Indirect Reuse [Collin]	0	0	0	0	0	0
	DWU - Indirect Reuse Implementation	Indirect Reuse [Denton]	0	0	0	0	0	0
	DWU - Indirect Reuse Implementation	Indirect Reuse [Ellis]	0	0	0	0	0	0
	DWU - Lake Palestine	Palestine Lake/Reservoir [Reservoir]	0	0	0	0	0	0
	Ennis - Indirect Reuse	Indirect Reuse [Ellis]	0	0	3	34	202	232
	Ennis - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	7	73	86
	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	271	512	1,323
	Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	53	118	151	129	111	102
	Rockett SUD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	27	237	975
	TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	189	139	83	144	319
	TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	8	11	8	15	41
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	44	29	56	147
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	6	4	8	21
	TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	25	16	31	81
	TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	119	139	115	256	694
	TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	62	74	64	153	475
	TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	53	35	65	167
	TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	8	10	8	7	15	70
	Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	15	70	102
	Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	1	11	41	43
	Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	2	8	28	29
	Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	1	5	19	19
	Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	447
			64	**510**	**662**	**888**	**2,113**	**5,565**

East Garrett WSC, Trinity (C)

Conservation - East Garrett WSC	DEMAND REDUCTION [Ellis]	1	7	12	16	22	56
Conservation – Waste Prohibition, East Garrett WSC	DEMAND REDUCTION [Ellis]	0	0	0	0	1	1
Conservation, Irrigation Restrictions – East Garrett WSC	DEMAND REDUCTION [Ellis]	0	8	11	14	18	42
Conservation, Water Loss Control - East Garrett WSC	DEMAND REDUCTION [Ellis]	1	2	0	0	0	0
Ennis - Indirect Reuse	Indirect Reuse [Ellis]	0	0	0	65	177	244
Ennis - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	14	64	90
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	2	8	198
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	1	2	48
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	6
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	1	23
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	3
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	1	12
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	1	5	105
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	0	3	71
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	0	1	25
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	10
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	67
		2	**17**	**23**	**113**	**303**	**1,001**

Ennis, Trinity (C)

Conservation - Ennis	DEMAND REDUCTION [Ellis]	18	104	170	266	466	839
Conservation – Waste Prohibition, Ennis	DEMAND REDUCTION [Ellis]	0	9	13	22	41	74
Conservation, Irrigation Restrictions – Ennis	DEMAND REDUCTION [Ellis]	0	125	157	222	357	593
Conservation, Water Loss Control - Ennis	DEMAND REDUCTION [Ellis]	20	110	296	418	672	1,117
Ennis - Indirect Reuse	Indirect Reuse [Ellis]	0	0	1,985	2,881	3,074	3,085
Ennis - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	606	1,120	1,137
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	85	147	2,503
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	25	41	607
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	3	5	75
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	10	16	282
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	1	2	40

TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	6	10	157
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	35	71	1,317
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	21	44	895
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	12	19	314
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	2	5	131
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	846
		38	**348**	**2,621**	**4,615**	**6,090**	**14,012**

Ferris, Trinity (C)

Conservation - Ferris	DEMAND REDUCTION [Ellis]	2	5	10	16	23	32
Conservation, Water Loss Control - Ferris	DEMAND REDUCTION [Ellis]	2	4	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	116	156	191
Rockett SUD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	102	261	380
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	30	46	35	42	47
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	1	4	3	5	6
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	15	13	17	22
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	2	2	2	3
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	9	7	11	12
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	18	45	49	78	101
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	9	24	28	46	69
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	17	15	20	24
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	1	3	3	5	10
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	65
		4	**68**	**175**	**389**	**666**	**962**

Files Valley WSC, Trinity (C)

Conservation - Files Valley WSC	DEMAND REDUCTION [Ellis]	0	1	2	3	5	7
Conservation, Water Loss Control - Files Valley WSC	DEMAND REDUCTION [Ellis]	1	1	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	2	7	9
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	1	2	2
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	1	1	1

TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	1	1
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	1	3	5
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	1	2	4
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	1	1	1
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	7	4	2
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	6	5	2	1
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	7	3	2	0
Waxahachie - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	14	0	0	0	0
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	4	2	1	0
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	3
		1	**16**	**19**	**27**	**31**	**36**

Glenn Heights, Trinity (C)

ANRA-COL - Lake Columbia	Columbia Lake/Reservoir [Reservoir]	0	0	0	0	0	64
Conservation - Glenn Heights	DEMAND REDUCTION [Ellis]	2	4	9	13	21	35
Conservation, Water Loss Control - Glenn Heights	DEMAND REDUCTION [Ellis]	2	3	0	0	0	0
DWU - Conservation Surplus Reallocation	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System [Reservoir]	0	0	0	0	0	3
DWU - Conservation Surplus Reallocation	Tawakoni Lake/Reservoir [Reservoir]	4	1	2	2	2	0
DWU - Indirect Reuse Implementation	Indirect Reuse [Collin]	8	8	24	30	35	53
DWU - Indirect Reuse Implementation	Indirect Reuse [Denton]	0	1	4	8	13	20
DWU - Indirect Reuse Implementation	Indirect Reuse [Ellis]	0	0	0	59	75	111
DWU - Lake Palestine	Palestine Lake/Reservoir [Reservoir]	0	26	69	78	85	117
UNM-ROR-Neches Run of River	Neches Run-of-River [Anderson]	0	0	0	0	39	54
		16	**43**	**108**	**190**	**270**	**457**

Grand Prairie, Trinity (C)

ANRA-COL - Lake Columbia	Columbia Lake/Reservoir [Reservoir]	0	0	0	0	0	1
Conservation - Grand Prairie	DEMAND REDUCTION [Ellis]	1	1	4	0	1	1
Conservation, Irrigation Restrictions – Grand Prairie	DEMAND REDUCTION [Ellis]	0	0	0	1	1	1
Conservation, Water Loss Control - Grand Prairie	DEMAND REDUCTION [Ellis]	0	0	0	0	0	0

DWU - Conservation Surplus Reallocation	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
DWU - Conservation Surplus Reallocation	Tawakoni Lake/Reservoir [Reservoir]	0	0	0	0	0	0
DWU - Indirect Reuse Implementation	Indirect Reuse [Collin]	0	0	0	0	0	0
DWU - Indirect Reuse Implementation	Indirect Reuse [Denton]	0	0	0	0	0	0
DWU - Indirect Reuse Implementation	Indirect Reuse [Ellis]	0	0	0	1	1	2
DWU - Lake Palestine	Palestine Lake/Reservoir [Reservoir]	0	1	1	2	2	2
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	1	1	1
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	0	0	0
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	0
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	0	0	0
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	0	0	0
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	0	0	0
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
UNM-ROR-Neches Run of River	Neches Run-of-River [Anderson]	0	0	0	0	1	1
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	0
		1	**2**	**5**	**5**	**7**	**9**

Irrigation, Ellis, Trinity (C)

Non-Municipal Conservation, Irrigation, Ellis	DEMAND REDUCTION [Ellis]	1	19	37	47	56	64
		1	**19**	**37**	**47**	**56**	**64**

Italy, Trinity (C)

Conservation - Italy	DEMAND REDUCTION [Ellis]	1	3	5	8	12	20
Conservation, Water Loss Control - Italy	DEMAND REDUCTION [Ellis]	2	2	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	32	141	232
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	10	39	57
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	1	4	7
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	3	16	26

TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	2	4
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	3	9	14
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	14	70	122
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	8	42	83
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	4	18	29
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	1	4	12
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	114	81	55
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	90	83	47	23
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	97	62	33	16
Waxahachie - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	166	0	0	0	0
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	63	40	22	10
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	78
		3	**171**	**255**	**383**	**540**	**788**

Mansfield, Trinity (C)

Conservation - Mansfield	DEMAND REDUCTION [Ellis]	0	5	6	6	9	7
Conservation, Irrigation Restrictions – Mansfield	DEMAND REDUCTION [Ellis]	1	1	1	2	2	3
Conservation, Water Loss Control - Mansfield	DEMAND REDUCTION [Ellis]	0	0	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	12	15	18
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	4	4	4	4	4
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	1	1	1	2
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	1	1	1	1
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	3	4	5	8	9
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	1	2	3	5	6
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	2	1	2	2
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	1	0	0	0	0	1
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	6
		2	**14**	**21**	**35**	**47**	**59**

Manufacturing, Ellis, Trinity (C)

Conservation - Ennis	Bardwell Lake/Reservoir [Reservoir]	0	4	0	0	0	0
Conservation - Ennis	TRWD Lake/Reservoir System [Reservoir]	0	4	0	0	0	0
Ennis - Indirect Reuse	Indirect Reuse [Ellis]	0	0	35	120	226	126
Ennis - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	25	82	46
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	345	526	740
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	373	1,045	871	745	648	590
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	123	172	106	146	180
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	5	15	10	16	22
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	57	39	58	83
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	8	5	8	12
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	33	22	34	46
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	77	171	145	264	388
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	40	92	82	156	266
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	65	43	65	93
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	7	10	9	17	37
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	125	93	69
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	76	91	54	29
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	82	68	38	19
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	54	44	25	13
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	251
		373	**1,305**	**1,741**	**2,024**	**2,456**	**3,010**

Midlothian, Trinity (C)

Conservation - Midlothian	DEMAND REDUCTION [Ellis]	137	262	312	368	425	503
Conservation – Waste Prohibition, Midlothian	DEMAND REDUCTION [Ellis]	21	37	39	41	45	50
Conservation, Irrigation Restrictions – Midlothian	DEMAND REDUCTION [Ellis]	136	223	233	247	263	291
Conservation, Water Loss Control - Midlothian	DEMAND REDUCTION [Ellis]	24	35	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	401	538	645
Midlothian - Indirect Reuse	Indirect Reuse [Ellis]	2,107	9,203	10,100	10,224	10,324	10,470
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	403	1,444	1,381	977	985	1,092
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	170	273	122	149	155

TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	7	25	12	15	20
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	92	45	61	72
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	13	6	9	10
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	51	27	33	41
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	107	273	169	269	339
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	56	146	96	161	231
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	102	50	68	80
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	7	14	9	16	36
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	218
		2,828	**11,551**	**13,054**	**12,794**	**13,361**	**14,253**

Mountain Peak SUD, Trinity (C)

Conservation - Mountain Peak SUD	DEMAND REDUCTION [Ellis]	92	151	183	270	338	408
Conservation, Irrigation Restrictions – Mountain Peak SUD	DEMAND REDUCTION [Ellis]	58	82	84	127	147	164
Conservation, Water Loss Control - Mountain Peak SUD	DEMAND REDUCTION [Ellis]	88	308	301	454	525	585
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	1,647	1,859	1,855
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	489	318	549	585	516
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	15	25	40	47	48
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	93	151	179	179
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	13	21	25	25
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	53	85	99	99
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	229	277	569	792	837
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	120	149	322	472	570
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	105	169	199	200
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	412	18	16	32	50	83
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	539
		650	**1,412**	**1,617**	**4,436**	**5,317**	**6,108**

Ovilla, Trinity (C)

ANRA-COL - Lake Columbia	Columbia Lake/Reservoir [Reservoir]	0	0	0	0	0	92
Conservation - Ovilla	DEMAND REDUCTION [Ellis]	8	14	21	35	55	118
Conservation – Waste Prohibition, Ovilla	DEMAND REDUCTION [Ellis]	4	7	10	14	18	37

Conservation, Irrigation Restrictions – Ovilla	DEMAND REDUCTION [Ellis]	27	37	47	60	75	138
Conservation, Water Loss Control - Ovilla	DEMAND REDUCTION [Ellis]	34	115	135	173	211	390
DWU - Conservation Surplus Reallocation	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System [Reservoir]	0	0	0	0	0	4
DWU - Conservation Surplus Reallocation	Tawakoni Lake/Reservoir [Reservoir]	0	0	1	2	3	0
DWU - Indirect Reuse Implementation	Indirect Reuse [Collin]	0	0	9	28	38	75
DWU - Indirect Reuse Implementation	Indirect Reuse [Denton]	0	0	2	8	14	28
DWU - Indirect Reuse Implementation	Indirect Reuse [Ellis]	0	0	0	55	81	158
DWU - Lake Palestine	Palestine Lake/Reservoir [Reservoir]	0	0	28	73	94	167
UNM-ROR-Neches Run of River	Neches Run-of-River [Anderson]	0	0	0	0	43	78
		73	**173**	**253**	**448**	**632**	**1,285**

Palmer, Trinity (C)

Conservation - Palmer	DEMAND REDUCTION [Ellis]	1	2	4	7	11	26
Conservation, Water Loss Control - Palmer	DEMAND REDUCTION [Ellis]	1	2	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	50	76	157
Rockett SUD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	44	129	311
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	12	17	16	21	38
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	2	1	2	5
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	5	5	9	17
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	1	1	1	2
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	4	4	5	11
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	8	17	21	38	82
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	4	9	12	23	56
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	7	6	10	20
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	1	1	1	2	8
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	53
		2	**29**	**67**	**168**	**327**	**786**

Red Oak, Trinity (C)

ANRA-COL - Lake Columbia	Columbia Lake/Reservoir [Reservoir]	0	0	0	0	0	195
Conservation - Red Oak	DEMAND REDUCTION [Ellis]	4	8	19	38	56	103
Conservation, Water Loss Control - Red Oak	DEMAND REDUCTION [Ellis]	6	6	0	0	0	0

DWU - Conservation Surplus Reallocation	Ray Roberts-Lewisville-Grapevine Lake/Reservoir System [Reservoir]	0	0	0	0	0	11
DWU - Conservation Surplus Reallocation	Tawakoni Lake/Reservoir [Reservoir]	5	3	6	6	7	0
DWU - Indirect Reuse Implementation	Indirect Reuse [Collin]	10	21	64	88	106	159
DWU - Indirect Reuse Implementation	Indirect Reuse [Denton]	0	3	12	26	40	59
DWU - Indirect Reuse Implementation	Indirect Reuse [Ellis]	0	0	0	176	222	334
DWU - Lake Palestine	Palestine Lake/Reservoir [Reservoir]	0	69	189	232	254	354
UNM-ROR-Neches Run of River	Neches Run-of-River [Anderson]	0	0	0	0	117	165
		25	**110**	**290**	**566**	**802**	**1,380**

Rice Water Supply and Sewer Service, Trinity (C)

Conservation - Rice WSC	DEMAND REDUCTION [Ellis]	2	7	12	19	27	38
Conservation, Water Loss Control - Rice Water Supply	DEMAND REDUCTION [Ellis]	4	4	0	0	0	0
Corsicana - Halbert/Richland Chambers WTP	Richland Chambers Lake/Reservoir Non-System Portion [Reservoir]	0	0	0	93	230	445
Ennis - Indirect Reuse	Indirect Reuse [Ellis]	0	0	1	6	11	6
Ennis - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	1	4	2
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	0	1	5
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	0	0	1
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	0	1
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	0
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	1	1	3
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	0	0	2
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	0	0	1
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	2
		6	**11**	**13**	**120**	**274**	**506**

Rockett SUD, Trinity (C)

Conservation - Rockett SUD	DEMAND REDUCTION [Ellis]	20	52	75	126	205	311
Conservation, Water Loss Control - Rockett SUD	DEMAND REDUCTION [Ellis]	22	28	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	761	1,220	1,773

Rockett SUD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	1	1	678	2,059	3,525
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	196	253	234	342	430
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	9	22	24	36	53
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	86	86	137	199
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	12	12	19	28
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	47	47	76	111
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	123	252	322	611	932
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	64	136	181	364	635
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	95	96	152	223
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	11	14	17	39	92
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	600
		42	**484**	**993**	**2,584**	**5,260**	**8,912**

Sardis Lone Elm WSC, Trinity (C)

Conservation - Sardis-Lone Elm WSC	DEMAND REDUCTION [Ellis]	271	409	509	565	618	647
Conservation, Irrigation Restrictions – Sardis Lone Elm WSC	DEMAND REDUCTION [Ellis]	143	211	242	250	257	257
Conservation, Water Loss Control - Sardis Lone Elm WSC	DEMAND REDUCTION [Ellis]	27	35	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	1,270	1,394	1,274
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	193	894	1,066	912	793	722
Rockett SUD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	100	226	296
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	968	718	391	387	311
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	39	65	37	42	38
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	241	143	157	143
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	34	20	22	20
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	134	79	87	80
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	609	714	537	698	670
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	318	384	303	416	456
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	269	160	175	161
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	767	49	41	30	44	66
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	431

South Ellis County WSC, Trinity (C)		**1,401**	**3,532**	**4,417**	**4,797**	**5,316**	**5,572**
Conservation - South Ellis County WSC	DEMAND REDUCTION [Ellis]	1	3	6	21	39	58
Conservation, Irrigation Restrictions – South Ellis County WSC	DEMAND REDUCTION [Ellis]	0	0	0	21	32	44
Conservation, Water Loss Control - South Ellis County WSC	DEMAND REDUCTION [Ellis]	2	2	0	103	414	578
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	6	0	63
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	2	0	16
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	2
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	1	0	8
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	1
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	4
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	2	0	33
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	1	0	21
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	1	0	8
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	3
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	17	0	15
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	0	13	0	7
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	0	10	0	4
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	6	0	3
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	21
		3	**5**	**6**	**204**	**485**	**889**
Steam-Electric Power, Ellis, Trinity (C)							
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	32	38	37
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	48	112	93	80	69	63
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	13	18	10	11	9
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	1	2	1	1	1
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	6	3	4	4
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	1	0	1	1
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	4	3	2	2
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	8	18	14	19	20

	TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	4	10	8	11	13
	TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	7	4	5	5
	TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	1	1	1	1	2
	Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	13
			48	**139**	**160**	**156**	**162**	**170**
Venus, Trinity (C)								
	Conservation - Venus	DEMAND REDUCTION [Ellis]	0	0	0	1	2	2
	Conservation, Irrigation Restrictions – Venus	DEMAND REDUCTION [Ellis]	0	1	1	1	1	1
	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	3	4	5
	Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	6	7	5	8	8	9
	Municipal Water Conservation - Venus	DEMAND REDUCTION [Ellis]	0	2	3	4	5	6
	TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	1	1	1	1	1
	TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	0	1
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	2	1	2	2
	TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	0
	TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	1	1	2	3
	TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	1	1	1	2
	TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	1	0	1	1
	TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
	Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	2
			6	**11**	**15**	**21**	**27**	**35**
Waxahachie, Trinity (C)								
	Conservation - Waxahachie	DEMAND REDUCTION [Ellis]	32	70	253	405	538	710
	Conservation, Irrigation Restrictions – Waxahachie	DEMAND REDUCTION [Ellis]	0	0	256	350	426	519
	Conservation, Water Loss Control - Waxahachie	DEMAND REDUCTION [Ellis]	34	39	0	0	0	0
	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	115	760	1,802
	TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	84	0	35	210	437
	TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	3	0	3	22	53
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	13	85	203

TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	2	12	29
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	7	48	113
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	53	0	49	380	948
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	27	0	28	228	645
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	14	96	226
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	4	0	1	26	94
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	810	401	423	427
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	242	221	294	246	180
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	261	141	217	174	119
Waxahachie - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	588	0	0	0	0
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	168	92	143	113	80
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	610
		66	**1,539**	**1,773**	**2,077**	**3,787**	**7,195**
Sum of Projected Water Management Strategies (acre-feet)		**5,676**	**21,568**	**28,584**	**37,692**	**49,505**	**75,362**

HILL COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Chatt WSC, Brazos (G)							
Purchase Water from Files Valley WSC	Brazos River Authority Aquilla Lake/Reservoir System [Reservoir]	0	0	0	0	1	11
		0	**0**	**0**	**0**	**1**	**11**
Chatt WSC, Trinity (G)							
Purchase Water from Files Valley WSC	Brazos River Authority Aquilla Lake/Reservoir System [Reservoir]	0	0	0	0	0	1
		0	**0**	**0**	**0**	**0**	**1**
County-Other, Hill, Brazos (G)							
Corsicana - Halbert/Richland Chambers WTP	Richland Chambers Lake/Reservoir Non-System Portion [Reservoir]	0	0	0	9	16	24
Purchase Additional Supply from Brandon-Irene WSC	Brazos River Authority Aquilla Lake/Reservoir System [Reservoir]	45	51	47	54	52	57
		45	**51**	**47**	**63**	**68**	**81**
County-Other, Hill, Trinity (G)							
Corsicana - Halbert/Richland Chambers WTP	Richland Chambers Lake/Reservoir Non-System Portion [Reservoir]	0	0	0	2	3	5

	Purchase Additional Supply from Brandon-Irene WSC	Brazos River Authority Aquilla Lake/Reservoir System [Reservoir]	12	12	12	12	11	13
			12	**12**	**12**	**14**	**14**	**18**
Double Diamond Utilities, Brazos (G)								
	BRA System Operation--Surplus	BRA System Operations Permit Supply [Reservoir]	345	355	366	366	366	351
	Municipal Water Conservation - Double Diamond Utilities	DEMAND REDUCTION [Hill]	0	36	70	108	139	144
			345	**391**	**436**	**474**	**505**	**495**
Files Valley WSC, Brazos (G)								
	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	1	3	4
	TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	0	1	1
	TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	1	1
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	0	0
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
	TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	0
	TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	0	2	2
	TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	0	1	1
	TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	0	0	1
	TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	1	1
	Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	4	2	1
	Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	5	3	1	0
	Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	5	2	1	0
	Waxahachie - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	12	0	0	0	0
	Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	3	1	1	0
	Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	1
			0	**12**	**13**	**11**	**14**	**13**
Files Valley WSC, Trinity (G)								
	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	2	7	8
	TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	1	2	2
	TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	1	1
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0

TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	1
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	1	4	4
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	0	2	3
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	0	1	1
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
Waxahachie - Dredge Waxahachie Lake	Waxahachie Lake/Reservoir [Reservoir]	0	0	0	8	4	2
Waxahachie - Unallocated Supply Utilization	Indirect Reuse [Ellis]	0	0	10	6	3	1
Waxahachie - Unallocated Supply Utilization	Bardwell Lake/Reservoir [Reservoir]	0	0	10	5	1	1
Waxahachie - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	27	0	0	0	0
Waxahachie - Unallocated Supply Utilization	Waxahachie Lake/Reservoir [Reservoir]	0	0	7	4	1	1
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	3
		0	**27**	**27**	**27**	**26**	**28**

Hillsboro, Brazos (G)

Municipal Water Conservation - Hillsboro	DEMAND REDUCTION [Hill]	0	157	320	493	516	523
		0	**157**	**320**	**493**	**516**	**523**

Irrigation, Hill, Brazos (G)

Irrigation Water Conservation	DEMAND REDUCTION [Hill]	35	59	82	82	82	82
Woodbine Aquifer Development	Woodbine Aquifer [Hill]	0	0	0	0	0	0
		35	**59**	**82**	**82**	**82**	**82**

Irrigation, Hill, Trinity (G)

Irrigation Water Conservation	DEMAND REDUCTION [Hill]	18	29	41	41	41	41
Woodbine Aquifer Development	Woodbine Aquifer [Hill]	158	158	158	158	158	158
		176	**187**	**199**	**199**	**199**	**199**

Johnson County SUD, Brazos (G)

Increase SWATS WTP Capacity - Acton MUD, Johnson County SUD	Brazos River Authority Main Stem Lake/Reservoir System [Reservoir]	0	0	5	5	5	5
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	5	6	5
Trinity Aquifer Development	Trinity Aquifer [Johnson]	1	0	0	0	2	5
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	3	3	2	2	1
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	1	1	1	1
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer	0	0	1	0	0	0

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
	[Anderson]						
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	2	3	2	3	3
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	1	2	1	2	2
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	1	1	1	1
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	1	0	0	0	0	0
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	2
		2	**6**	**16**	**17**	**22**	**25**
Mining, Hill, Brazos (G)							
Industrial Water Conservation	DEMAND REDUCTION [Hill]	39	48	43	22	25	26
		39	**48**	**43**	**22**	**25**	**26**
Mining, Hill, Trinity (G)							
Industrial Water Conservation	DEMAND REDUCTION [Hill]	10	12	11	6	6	7
		10	**12**	**11**	**6**	**6**	**7**
Parker WSC, Brazos (G)							
Trinity Aquifer Development	Trinity Aquifer [Johnson]	0	0	0	0	2	5
		0	**0**	**0**	**0**	**2**	**5**
Parker WSC, Trinity (G)							
Trinity Aquifer Development	Trinity Aquifer [Johnson]	0	0	0	0	0	0
		0	**0**	**0**	**0**	**0**	**0**
Post Oak SUD, Brazos (G)							
Corsicana - Halbert/Richland Chambers WTP	Richland Chambers Lake/Reservoir Non-System Portion [Reservoir]	0	0	0	6	10	16
		0	**0**	**0**	**6**	**10**	**16**
Post Oak SUD, Trinity (G)							
Corsicana - Halbert/Richland Chambers WTP	Richland Chambers Lake/Reservoir Non-System Portion [Reservoir]	0	0	1	29	57	86
		0	**0**	**1**	**29**	**57**	**86**
Whitney, Brazos (G)							
Municipal Water Conservation - Whitney	DEMAND REDUCTION [Hill]	0	38	76	74	75	77
		0	**38**	**76**	**74**	**75**	**77**
Sum of Projected Water Management Strategies (acre-feet)		**664**	**1,000**	**1,283**	**1,517**	**1,622**	**1,693**

JOHNSON COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Acton MUD, Brazos (G)							
Increase SWATS WTP Capacity - Acton MUD, Johnson County SUD	Brazos River Authority Main Stem Lake/Reservoir	0	0	49	49	49	49

	System [Reservoir]						
Trinity Aquifer Development	Trinity Aquifer [Hood]	0	1	1	1	1	3
Trinity Aquifer Development	Trinity Aquifer [Johnson]	0	0	0	0	0	3
		0	**1**	**50**	**50**	**50**	**55**

Bethesda WSC, Brazos (G)

Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	21	29	35
Municipal Water Conservation - Bethesda WSC	DEMAND REDUCTION [Johnson]	0	15	35	56	63	70
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	6	8	7	8	8
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	1	1	1	1
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	3	2	3	4
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	1
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	2	1	2	2
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	4	8	9	14	18
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	2	5	5	9	12
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	3	3	4	4
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	1	2
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	12
		0	**27**	**65**	**105**	**134**	**169**

Bethesda WSC, Trinity (G)

Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	432	585	701
Municipal Water Conservation - Bethesda WSC	DEMAND REDUCTION [Johnson]	0	312	700	1,134	1,268	1,417
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	121	171	132	163	170
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	5	14	13	17	21
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	57	49	66	79
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	8	7	10	10
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	31	28	36	45
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	76	170	183	294	370
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	39	91	103	175	252
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	64	54	74	88
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	7	10	10	18	37
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	237

Burleson, Brazos (G)		**0**	**560**	**1,316**	**2,145**	**2,706**	**3,427**
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	1	1	1
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	0	0	0
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	0
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	0	1	1
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	0	0	1
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	0	0	0
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	0
Burleson, Trinity (G)		**0**	**0**	**0**	**1**	**2**	**3**
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	1,013	1,270	1,382
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	400	456	311	352	336
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	17	41	30	38	41
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	154	114	143	156
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	22	20	87	123
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	85	64	80	87
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	251	453	429	635	726
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	131	243	242	380	494
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	171	127	160	174
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	20	26	24	40	72
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	468
Cleburne, Brazos (G)		**0**	**819**	**1,651**	**2,374**	**3,185**	**4,059**
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	4,791	4,563	3,911
Municipal Water Conservation - Cleburne	DEMAND REDUCTION [Johnson]	0	561	942	1,018	1,171	1,302
Reuse- Cleburne	Direct Reuse [Johnson]	4,490	5,839	7,045	7,045	7,045	7,045

TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	1,547	1,469	1,269	951
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	138	143	136	117
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	519	538	513	440
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	73	76	72	62
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	290	301	287	245
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	1,539	2,025	2,284	2,056
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	827	1,144	1,362	1,401
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	581	603	574	492
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	87	112	142	204
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	1,323
		4,490	**6,400**	**13,588**	**19,265**	**19,418**	**19,549**

County-Other, Johnson, Brazos (G)

Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	115	118	108
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	26	59	72	64	54	51
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	90	65	35	33	26
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	4	6	3	4	3
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	19	11	11	10
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	3	2	2	2
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	13	8	8	7
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	57	65	49	59	56
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	30	35	27	35	39
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	25	14	15	14
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	4	5	4	3	4	5
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	36
		30	**245**	**307**	**331**	**343**	**357**

County-Other, Johnson, Trinity (G)

Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	242	252	226
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	56	123	153	134	116	107
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	190	138	75	70	56
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	7	12	7	8	7

	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	40	23	24	22
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	6	3	3	3
	TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	27	16	17	14
	TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	119	137	103	126	119
	TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	62	74	58	75	81
	TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	52	31	32	28
	TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	9	9	8	6	8	12
	Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	76
			65	**510**	**647**	**698**	**731**	**751**
Crowley, Trinity (G)								
	Conservation - Crowley	DEMAND REDUCTION [Johnson]	0	1	1	2	0	2
	Conservation, Irrigation Restrictions – Crowley	DEMAND REDUCTION [Johnson]	0	0	1	1	1	1
	Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	3	6	7
	TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	1	1	1	1	2
	TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	0	0	0
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	0	1	1
	TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
	TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	0	0	0
	TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	1	1	3	3
	TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	1	1	2	2
	TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	0	1	1
	TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	0	0	0
	Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	2
			0	**2**	**5**	**9**	**15**	**21**
Double Diamond Utilities, Brazos (G)								
	BRA System Operation--Surplus	BRA System Operations Permit Supply [Reservoir]	22	23	24	24	24	39
	Municipal Water Conservation - Double Diamond Utilities	DEMAND REDUCTION [Johnson]	0	2	5	7	9	16
			22	**25**	**29**	**31**	**33**	**55**
Fort Worth, Trinity (G)								
	Alliance Direct Reuse	Direct Reuse [Tarrant]	0	0	0	11	16	19
	Conservation - Fort Worth	DEMAND REDUCTION [Johnson]	0	0	0	19	37	50

Conservation, Irrigation Restrictions – Fort Worth	DEMAND REDUCTION [Johnson]	0	0	0	29	46	57
Conservation, Water Loss Control - Fort Worth	DEMAND REDUCTION [Johnson]	0	0	0	19	15	0
Fort Worth - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	81	104	97
Fort Worth - Village and Mary Creek WRF Future Direct Reuse	Direct Reuse [Tarrant]	0	0	0	20	30	34
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	90	181	239
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	0	0	28	50	58
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	0	0	3	5	7
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	0	10	20	27
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	1	3	4
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	0	6	11	15
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	0	0	38	91	126
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	0	0	21	54	86
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	0	11	23	30
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	0	0	4	9	19
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	81
		0	**0**	**0**	**391**	**695**	**949**

Godley, Brazos (G)

Trinity Aquifer Development	Trinity Aquifer [Johnson]	3	12	22	35	49	65
		3	**12**	**22**	**35**	**49**	**65**

Irrigation, Johnson, Brazos (G)

BRA System Operation--Surplus	BRA System Operations Permit Supply [Reservoir]	123	118	112	112	112	112
Irrigation Water Conservation	DEMAND REDUCTION [Johnson]	9	14	20	20	20	20
		132	**132**	**132**	**132**	**132**	**132**

Irrigation, Johnson, Trinity (G)

BRA System Operation--Surplus	BRA System Operations Permit Supply [Reservoir]	129	123	117	117	117	117
Irrigation Water Conservation	DEMAND REDUCTION [Johnson]	8	14	20	20	20	20
		137	**137**	**137**	**137**	**137**	**137**

Johnson County SUD, Brazos (G)

Increase SWATS WTP Capacity - Acton MUD, Johnson County SUD	Brazos River Authority Main Stem Lake/Reservoir System [Reservoir]	0	0	495	495	495	496
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	547	579	537
Trinity Aquifer Development	Trinity Aquifer [Johnson]	67	0	0	0	239	483

TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	309	288	168	161	131
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	13	26	16	17	16
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	96	62	65	61
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	14	9	9	9
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	54	34	36	34
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	195	287	231	290	282
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	102	154	131	173	192
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	108	69	73	68
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	82	15	16	13	18	28
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	182
		149	**634**	**1,538**	**1,775**	**2,155**	**2,519**

Johnson County SUD, Trinity (G)

Increase SWATS WTP Capacity - Acton MUD, Johnson County SUD	Brazos River Authority Main Stem Lake/Reservoir System [Reservoir]	0	0	1,029	1,029	1,029	1,028
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	1,137	1,203	1,116
Trinity Aquifer Development	Trinity Aquifer [Johnson]	140	0	0	0	496	1,003
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	641	597	348	334	271
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	27	53	35	37	34
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	202	127	135	124
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	28	17	19	17
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	112	72	76	70
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	403	594	481	602	586
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	210	319	272	358	400
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	225	143	151	140
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	170	32	35	26	38	58
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	377
		310	**1,313**	**3,194**	**3,687**	**4,478**	**5,224**

Mansfield, Trinity (G)

Conservation - Mansfield	DEMAND REDUCTION [Johnson]	7	0	0	0	0	0
Conservation, Irrigation Restrictions – Mansfield	DEMAND REDUCTION [Johnson]	18	29	38	47	57	68

Conservation, Water Loss Control - Mansfield	DEMAND REDUCTION [Johnson]	3	5	0	0	0	0
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	301	391	434
Municipal Water Conservation - Mansfield	DEMAND REDUCTION [Johnson]	0	87	223	407	641	922
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	118	124	92	109	106
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	5	11	9	12	13
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	38	31	41	45
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	6	5	6	7
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	26	21	28	31
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	74	123	127	196	228
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	39	66	72	117	156
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	46	38	49	55
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	20	6	7	7	12	23
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	147
		48	**363**	**708**	**1,157**	**1,659**	**2,235**

Mining, Johnson, Brazos (G)

Industrial Water Conservation	DEMAND REDUCTION [Johnson]	62	70	53	36	41	47
Reuse- Cleburne	Direct Reuse [Johnson]	1,285	606	0	0	0	0
		1,347	**676**	**53**	**36**	**41**	**47**

Mining, Johnson, Trinity (G)

Industrial Water Conservation	DEMAND REDUCTION [Johnson]	62	69	53	35	40	47
Reuse- Cleburne	Direct Reuse [Johnson]	1,270	600	0	0	0	0
		1,332	**669**	**53**	**35**	**40**	**47**

Mountain Peak SUD, Trinity (G)

Conservation, Irrigation Restrictions – Mountain Peak SUD	DEMAND REDUCTION [Johnson]	22	30	34	42	49	55
Conservation, Water Loss Control - Mountain Peak SUD	DEMAND REDUCTION [Johnson]	33	111	121	149	173	197
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	144	245	274
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	8	74	0	0	0
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	5	10	13	16	16
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	38	50	58	61
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	5	7	8	9
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	21	28	33	34

TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	83	112	188	261	282
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	43	60	106	156	192
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	42	56	66	68
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	7	6	10	16	28
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	181
		55	**287**	**523**	**793**	**1,081**	**1,397**
Parker WSC, Brazos (G)							
Trinity Aquifer Development	Trinity Aquifer [Johnson]	0	0	0	0	34	108
		0	**0**	**0**	**0**	**34**	**108**
Parker WSC, Trinity (G)							
Trinity Aquifer Development	Trinity Aquifer [Johnson]	0	0	0	0	12	32
		0	**0**	**0**	**0**	**12**	**32**
Steam-Electric Power, Johnson, Brazos (G)							
Reuse- Cleburne	Direct Reuse [Johnson]	571	571	571	571	571	571
		571	**571**	**571**	**571**	**571**	**571**
Venus, Trinity (G)							
Marvin Nichols (328) Strategy for NTMWD, TRWD, and UTRWD	Marvin Nichols Lake/Reservoir [Reservoir]	0	0	0	93	123	138
Midlothian - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	86	180	116	97	80	70
Municipal Water Conservation - Venus	DEMAND REDUCTION [Johnson]	0	59	115	126	140	157
TRWD - Additional Cedar Creek and Richland-Chambers	Indirect Reuse [Navarro]	0	28	46	29	34	34
TRWD - Aquifer Storage and Recovery Pilot	Trinity Aquifer ASR [Tarrant]	0	1	4	3	4	4
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Anderson]	0	0	16	11	14	15
TRWD - Carrizo-Wilcox Groundwater	Carrizo-Wilcox Aquifer [Freestone]	0	0	0	0	0	0
TRWD - Carrizo-Wilcox Groundwater	Queen City Aquifer [Anderson]	0	0	9	6	8	9
TRWD - Cedar Creek Wetlands	Indirect Reuse [Henderson]	0	18	46	40	62	72
TRWD - Reuse from TRA Central WWTP	Indirect Reuse [Dallas]	0	10	24	22	37	49
TRWD - Tehuacana	Tehuacana Lake/Reservoir [Reservoir]	0	0	17	12	15	17
TRWD - Unallocated Supply Utilization	TRWD Lake/Reservoir System [Reservoir]	0	2	3	2	5	8
Wright Patman Reallocation for NTMWD, TRWD, and UTRWD	Wright Patman Lake/Reservoir [Reservoir]	0	0	0	0	0	46
		86	**298**	**396**	**441**	**522**	**619**
Sum of Projected Water Management Strategies (acre-feet)		**8,777**	**13,681**	**24,985**	**34,199**	**38,223**	**42,528**

SOMERVELL COUNTY

WUG, Basin (RWPG) All values are in acre-feet

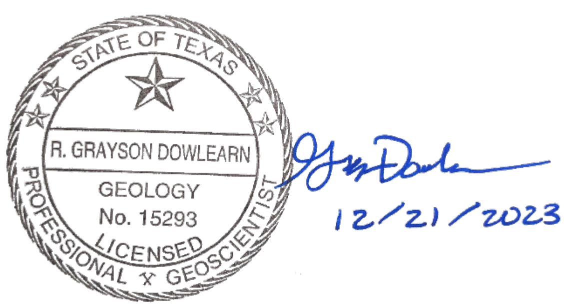
Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
County-Other, Somervell, Brazos (G)							
Somervell County WSP Surplus	Wheeler Branch Off-Channel Lake/Reservoir [Reservoir]	0	183	183	183	183	183
		0	**183**	**183**	**183**	**183**	**183**
Glen Rose, Brazos (G)							
Municipal Water Conservation - Glen Rose	DEMAND REDUCTION [Somervell]	0	52	108	169	179	184
Somervell County WSP Surplus	Trinity Aquifer [Somervell]	0	50	50	50	50	50
		0	**102**	**158**	**219**	**229**	**234**
Mining, Somervell, Brazos (G)							
BRA System Operation--Surplus	BRA System Operations Permit Supply [Reservoir]	54	54	54	54	54	54
Industrial Water Conservation	DEMAND REDUCTION [Somervell]	33	64	80	74	70	68
Trinity Aquifer Development	Trinity Aquifer [Somervell]	426	426	426	426	426	426
		513	**544**	**560**	**554**	**550**	**548**
Somervell County Water District, Brazos (G)							
Somervell County WSP Surplus	Wheeler Branch Off-Channel Lake/Reservoir [Reservoir]	0	600	600	600	600	600
		0	**600**	**600**	**600**	**600**	**600**
Steam-Electric Power, Somervell, Brazos (G)							
Somervell County WSP Surplus	Trinity Aquifer [Somervell]	0	83	83	83	83	83
Somervell County WSP Surplus	Wheeler Branch Off-Channel Lake/Reservoir [Reservoir]	0	617	617	617	617	617
		0	**700**	**700**	**700**	**700**	**700**
Sum of Projected Water Management Strategies (acre-feet)		**513**	**2,129**	**2,201**	**2,256**	**2,262**	**2,265**

Appendix F
GAM Run 23-025

GAM Run 23-025: Prairielands Groundwater Conservation District Management Plan

Dwight Zedric Q. Capus, GIT and Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-936-2404

December 21, 2023



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GAM RUN 23-025: PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Dwight Zedric Q. Capus, GIT and Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-936-2404
December 21, 2023

EXECUTIVE SUMMARY:

Texas Water Code § 36.1071(h), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

The TWDB provides data and information to the Prairielands Groundwater Conservation District in two parts. Part 1 is the Estimated Historical Water Use/State Water Plan dataset report, which will be provided to you separately by the TWDB Groundwater Technical Assistance Department. Please direct questions about the water data report to Mr. Stephen Allen at 512-463-7317 or stephen.allen@twdb.texas.gov. Part 2 is the required groundwater availability modeling information, which includes:

1. the annual amount of recharge from precipitation, if any, to the groundwater resources within the district;

2. the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers, for each aquifer within the district; and

3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Prairielands Groundwater Conservation District should be adopted by the district on or before March 2, 2024 and submitted to the TWDB Executive Administrator on or before April 1, 2024. The current management plan for the Prairielands Groundwater Conservation District expires on May 31, 2024.

This analysis used version 2.01 of the groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer (Kelley and others, 2014), version 1.01 of the groundwater availability model for the Brazos River Alluvium Aquifer (Ewing and Jigmond, 2016), and version 1.01 of the groundwater availability model for the Nacatoch Aquifer (Beach and others, 2009), to estimate the management plan information for the aquifers within the Prairielands Groundwater Conservation District.

This report replaces the results of GAM Run 16-007 (Boghici, 2016) since it includes groundwater budgets for the Nacatoch and Brazos River Alluvium aquifers. Values may differ from the previous report as a result of routine updates to the spatial grid files used to define county, groundwater conservation district, and aquifer boundaries, which can impact the calculated water budget values. Additionally, the approach used for analyzing model results is reviewed during each update and may have been refined to better delineate groundwater flows. Tables 1 through 4 summarize the groundwater availability model data required by statute. Figures 1, 3, 5, and 7 show the areas of the respective models from which the values in Tables 1 through 4 were extracted. Figures 2, 4, 6, and 8 provide generalized diagrams of the groundwater flow components provided in Tables 1 through 4. If, after review of the figures, the Prairielands Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

The flow components presented in this report do not represent the full groundwater budget. If additional inflow and outflow information would be helpful for planning purposes, the district may submit a request in writing to the TWDB Groundwater Modeling Department for the full groundwater budget.

METHODS:

In accordance with Texas Water Code § 36.1071(h), the groundwater availability models mentioned above were used to estimate information for the Prairielands Groundwater Conservation District management plan. Water budgets were extracted for the historical model periods for the Trinity and Woodbine aquifers (1980 through 2012) and Nacatoch Aquifer (1980 through 1997) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Water budgets were extracted using ZONEBUDGET USG Version 1.00 (Panday and others, 2013) for the historical model period of the Brazos River Alluvium Aquifer (1980 through 2012). The average annual water budget values for recharge, surface-water outflow, inflow to the district, outflow from the district, and the flow between aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer

- We used version 2.01 of the groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer (Kelley and others, 2014). See Kelley and others (2014) for assumptions and limitations of the model.
- The groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer contains the following eight layers:
    - Layer 1 represents the surficial outcrop of the units in Layers 2 through 8.
    - Layer 2 represents the Woodbine Aquifer.
    - Layer 3 represents the Washita and Fredericksburg groups, and the Edwards (Balcones Fault Zone) Aquifer.
    - Layers 4 through 8 represent the Trinity Group.
- Water budget values for the district were determined for the Trinity (Layers 4 through 8) and Woodbine aquifers (Layer 2).
- Perennial rivers and reservoirs were simulated using the MODFLOW River package. Ephemeral streams, flowing wells, springs, and evapotranspiration in riparian zones along perennial rivers were simulated using the MODFLOW Drain package.
- Water budget terms were averaged for the historical calibration period 1980 through 2012 (stress periods 92 through 124).
- The model was run with MODFLOW-NWT (Niswonger and others, 2011).

Groundwater availability model for the Brazos River Alluvium Aquifer

- We used version 1.01 of the groundwater availability model for the Brazos River Alluvium Aquifer (Ewing and Jigmond, 2016). See Ewing and Jigmond (2016) for assumptions and limitations of the model.
- The groundwater availability model for the Brazos River Alluvium Aquifer contains the following three layers:
    - Layers 1 and 2 represent the Brazos River Alluvium Aquifer.
    - Layer 3 represents the surficial portions of the Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, and Gulf Coast aquifers as well as various geologic units of the Cretaceous System.
- Perennial rivers and streams were simulated using the MODFLOW Streamflow-Routing package and ephemeral streams were simulated using the MODFLOW River package. Springs were simulated using the MODFLOW Drain package.
- Water budget terms were averaged for the period 1980 through 2012 (stress periods 32 through 427).
- The model was run with MODFLOW-USG (Panday and others, 2013)

Groundwater availability model for the Nacatoch Aquifer

- We used version 1.01 of the groundwater availability model for the Nacatoch Aquifer (Beach and others, 2009). See Beach and others (2009) for assumptions and limitations of the groundwater availability model.
- The groundwater availability model contains the following two layers:
    - Layer 1 represents overlying Midway and Upper Navarro Group, as well as major alluvium and terrace deposits.
    - Layer 2 represents the Nacatoch Aquifer with some minor alluvial and terrace deposits.
- Water budgets terms were averaged for the period of 1980 through 1997 (stress periods 4 through 21).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving an aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the aquifers located within the Prairielands Groundwater Conservation District and averaged over the historical calibration period, as shown in Tables 1 through 4.

1. Precipitation recharge—the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.
2. Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs.
3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.
4. Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

The information needed for the district's management plan is summarized in Tables 1 through 4. Figures 1, 3, 5, and 7 show the area of the model from which the values in Tables 1 through 4 were extracted. Figures 2, 4, 6, and 8 provide generalized diagrams of the groundwater flow components provided in Tables 1 through 4. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

Table 1: Summarized information for the Trinity Aquifer for the Prairielands Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

<table>
<tr><th>Management plan requirement</th><th>Aquifer or confining unit</th><th>Results</th></tr>
<tr><td>Estimated annual amount of recharge from precipitation to the district</td><td>Trinity Aquifer</td><td>7,351</td></tr>
<tr><td>Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers</td><td>Trinity Aquifer</td><td>27,166</td></tr>
<tr><td>Estimated annual volume of flow into the district within each aquifer in the district</td><td>Trinity Aquifer</td><td>27,537</td></tr>
<tr><td>Estimated annual volume of flow out of the district within each aquifer in the district</td><td>Trinity Aquifer</td><td>15,052</td></tr>
<tr><td rowspan="2">Estimated net annual volume of flow between each aquifer in the district</td><td>From Trinity Aquifer to Trinity equivalent units</td><td>64</td></tr>
<tr><td>To Trinity Aquifer from overlying Washita and Fredericksburg groups</td><td>8,317</td></tr>
</table>

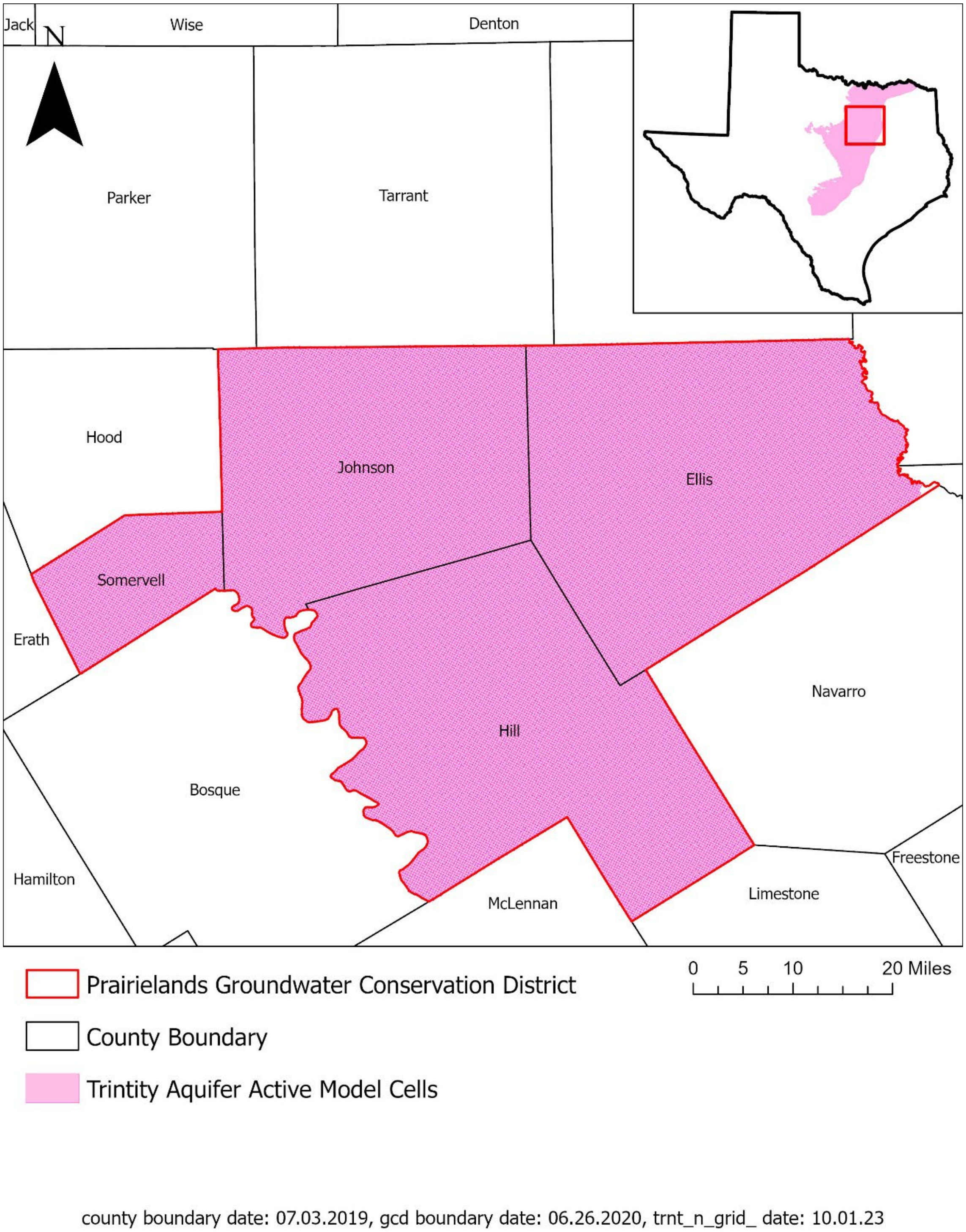
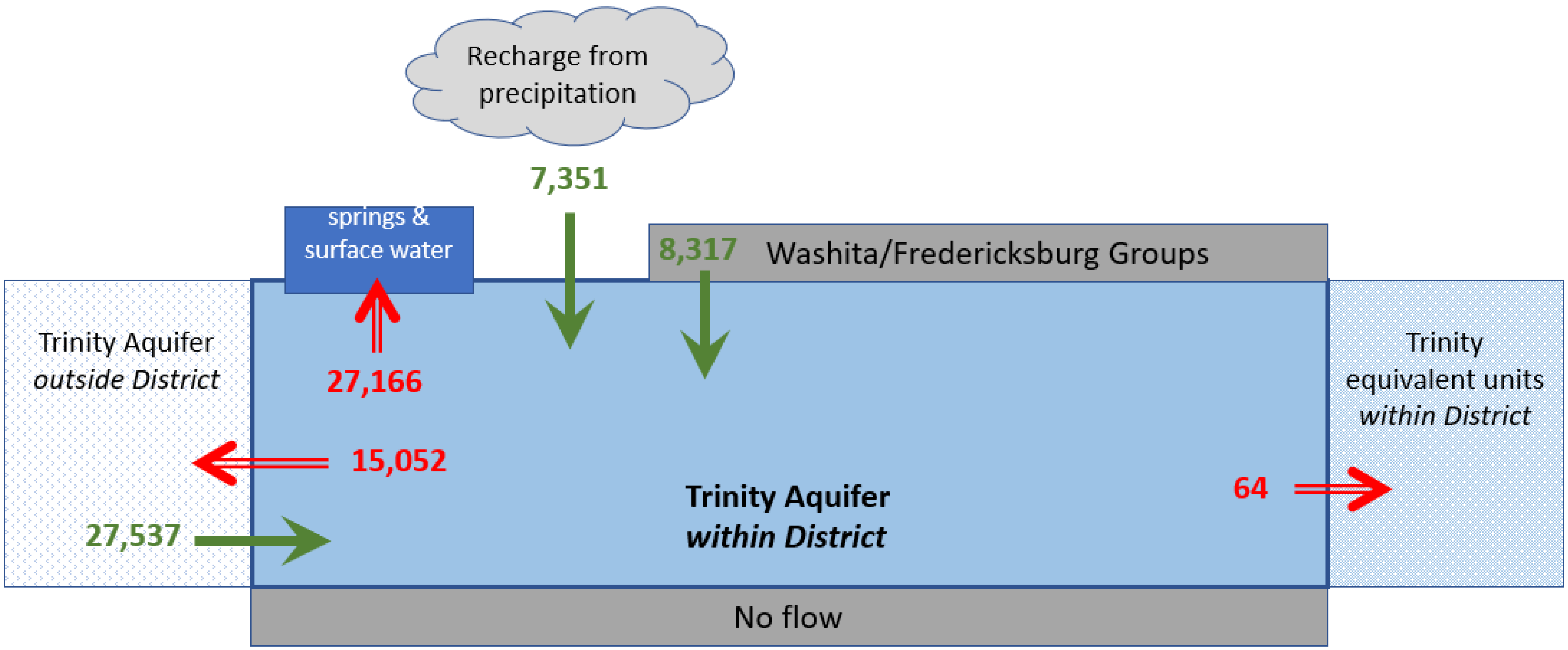


Figure 1: Area of the groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer from which the information in Table 1 was extracted (the Trinity Aquifer extent within the district boundary).



Caveat: This diagram only includes the water budget items provided in Table 1. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.

Figure 2: Generalized diagram of the summarized budget information from Table 1, representing directions of flow for the Trinity Aquifer within the Prairielands Groundwater Conservation District. Flow values are expressed in acre-feet per year.

Table 2: Summarized information for the Woodbine Aquifer for the Prairielands Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Woodbine Aquifer	21,777
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Woodbine Aquifer	17,084
Estimated annual volume of flow into the district within each aquifer in the district	Woodbine Aquifer	720
Estimated annual volume of flow out of the district within each aquifer in the district	Woodbine Aquifer	754
Estimated net annual volume of flow between each aquifer in the district	To Woodbine Aquifer from Woodbine equivalent units	19
	To Woodbine Aquifer from younger sediments	3,686
	From Woodbine Aquifer to underlying Washita and Fredericksburg groups	8,299

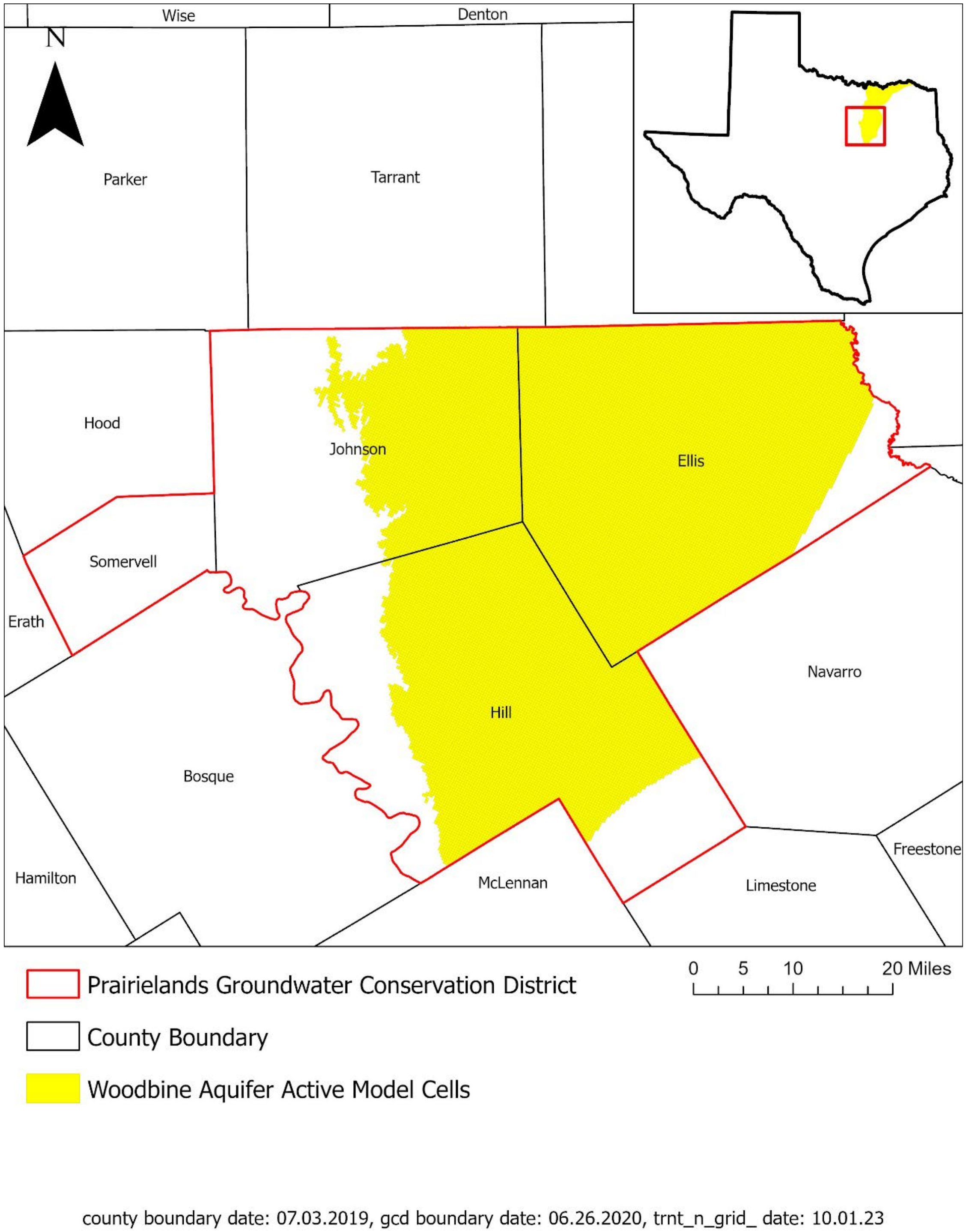
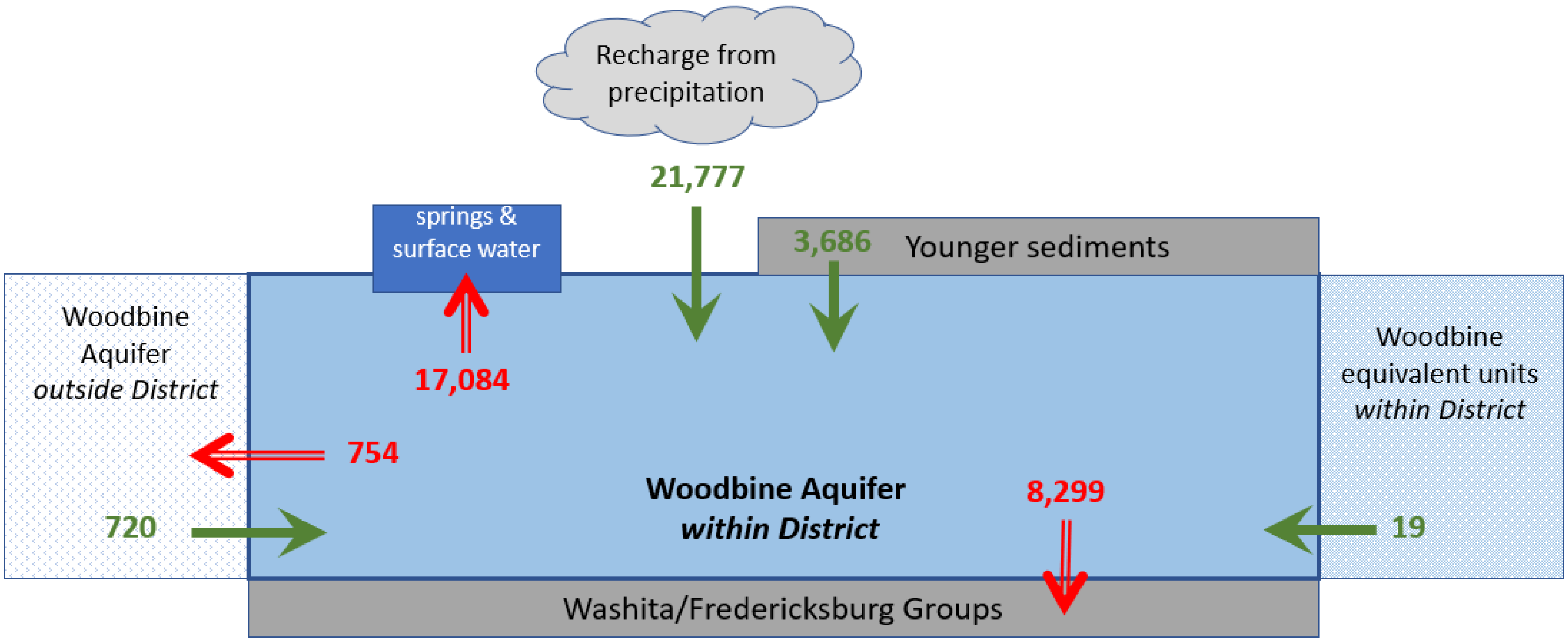


Figure 3: Area of the groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer from which the information in Table 2 was extracted (the Woodbine Aquifer extent within the district boundary).



Caveat: This diagram only includes the water budget items provided in Table 2. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.

Figure 4: Generalized diagram of the summarized budget information from Table 2, representing directions of flow for the Woodbine Aquifer within the Prairielands Groundwater Conservation District. Flow values are expressed in acre-feet per year.

Table 3: Summarized information for the Brazos River Alluvium Aquifer for the Prairielands Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Brazos River Alluvium Aquifer	383
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Brazos River Alluvium Aquifer	823
Estimated annual volume of flow into the district within each aquifer in the district	Brazos River Alluvium Aquifer	234
Estimated annual volume of flow out of the district within each aquifer in the district	Brazos River Alluvium Aquifer	214
Estimated net annual volume of flow between each aquifer in the district	To the Brazos River Alluvium Aquifer from underlying units	60

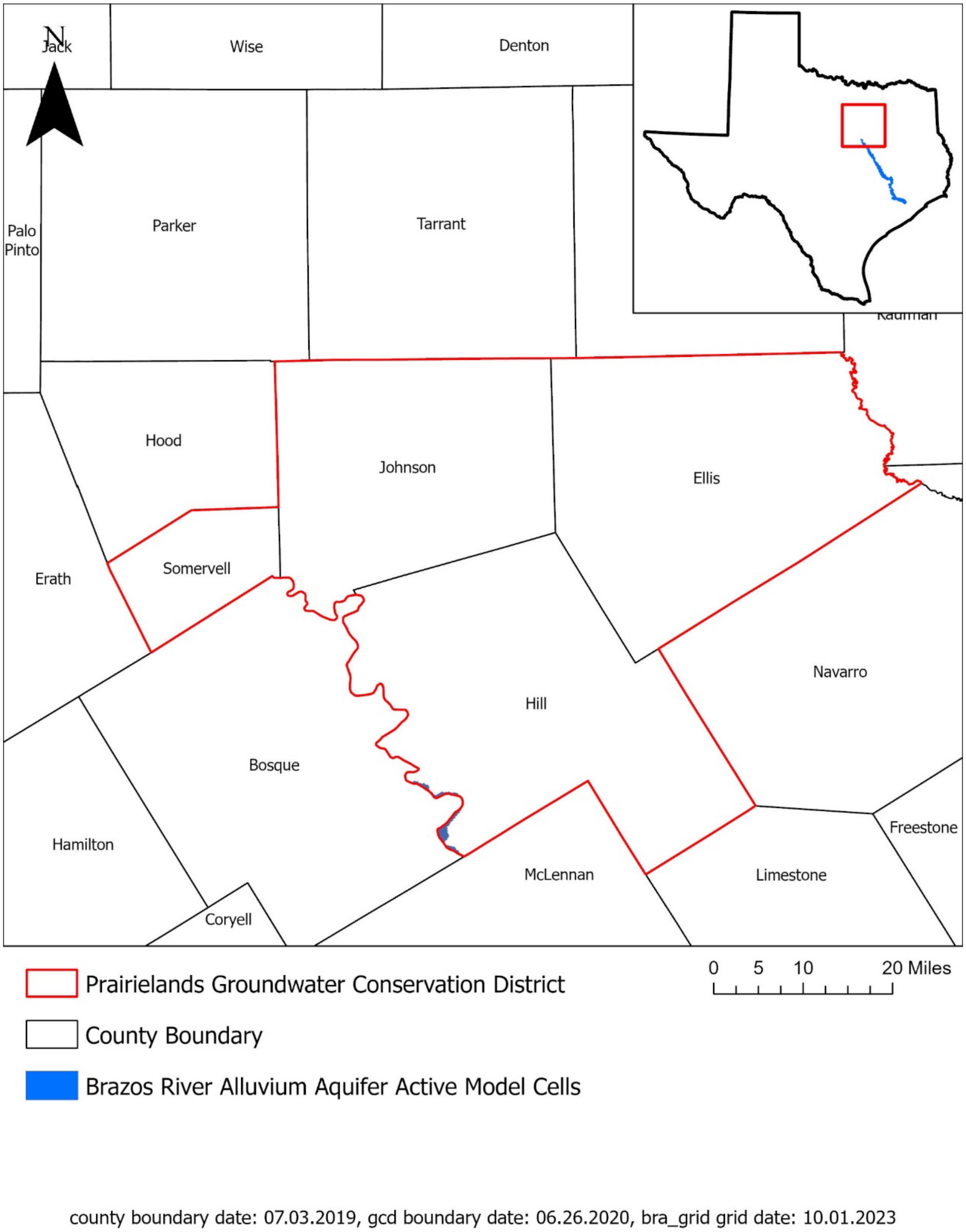
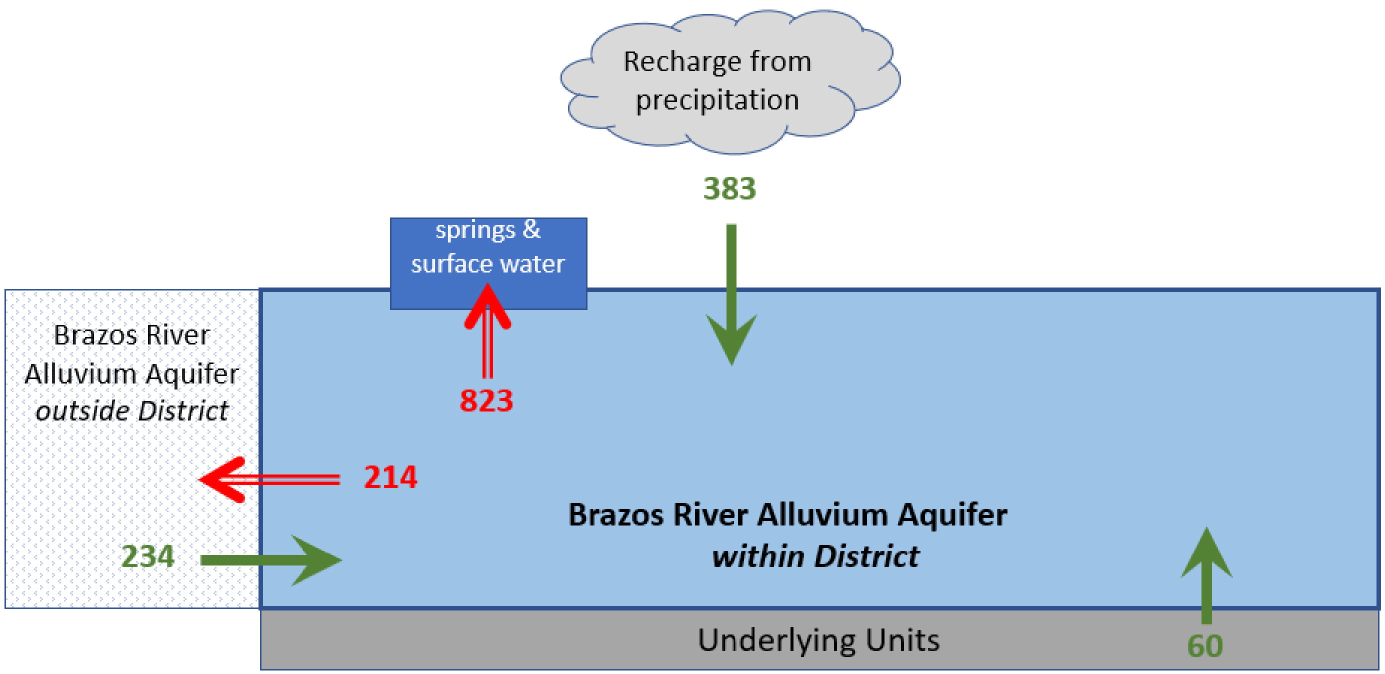


Figure 5: Area of the groundwater availability model for the Brazos River Alluvium Aquifer from which the information in Table 3 was extracted (the Brazos River Alluvium Aquifer extent within the district boundary).



Caveat: This diagram only includes the water budget items provided in Table 3. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.

Figure 6: Generalized diagram of the summarized budget information from Table 3, representing directions of flow for the Brazos River Alluvium Aquifer within the Prairielands Groundwater Conservation District. Flow values are expressed in acre-feet per year.

Table 4: Summarized information for the Nacatoch Aquifer for the Prairielands Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Nacatoch Aquifer	1
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Nacatoch Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Nacatoch Aquifer	19
Estimated annual volume of flow out of the district within each aquifer in the district	Nacatoch Aquifer	8
Estimated net annual volume of flow between each aquifer in the district	From Nacatoch Aquifer to Quaternary Alluvium	14

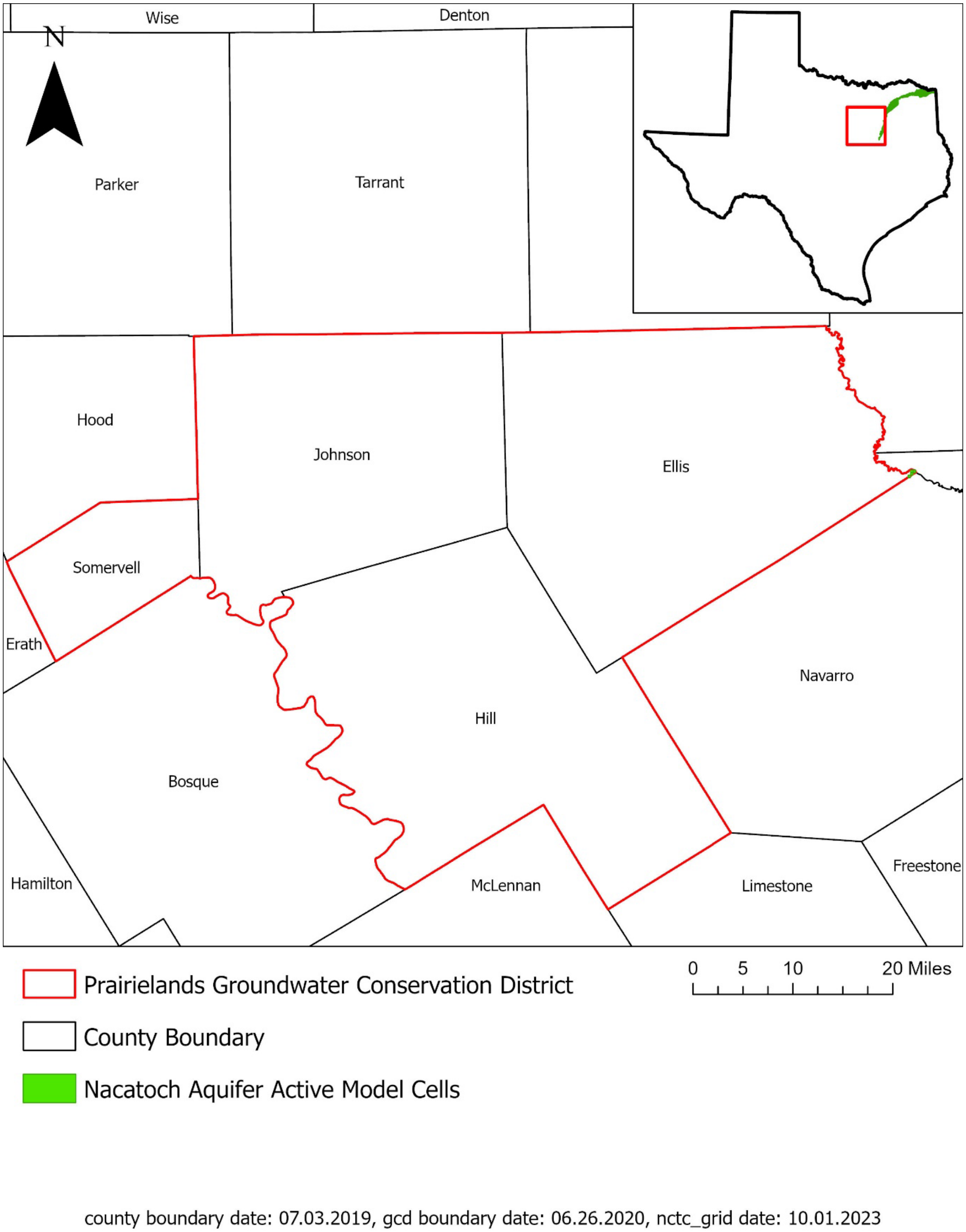
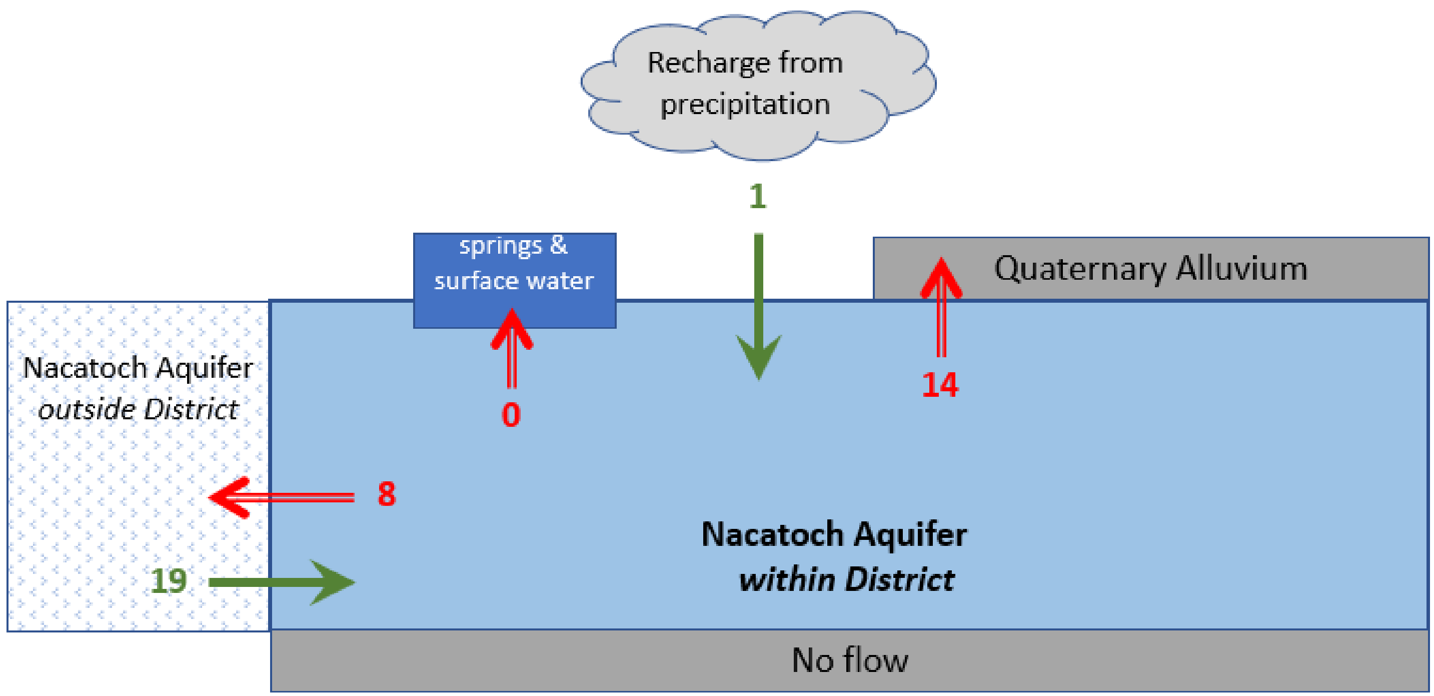


Figure 7: Area of the groundwater availability model for the Nacatoch Aquifer from which the information in Table 4 was extracted (the Nacatoch Aquifer extent within the district boundary).



Caveat: This diagram only includes the water budget items provided in Table 4. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.

Figure 8: Generalized diagram of the summarized budget information from Table 4, representing directions of flow for the Nacatoch Aquifer within the Prairielands Groundwater Conservation District. Flow values are expressed in acre-feet per year.

LIMITATIONS:

The groundwater models used in completing this analysis are the best available scientific tools that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> *"Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."*

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historical pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and interaction with streams are specific to particular historic time periods.
Because the application of the groundwater models was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations related to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Beach, J. A., Huang, Y., Symank, L., Ashworth, J. B., Davidson, T., Vreugdenhil, A. M., and Deeds, N. E., 2009, Final Report-Nacatoch Aquifer Groundwater Availability Model, 304 p., https://www.twdb.texas.gov/groundwater/models/gam/nctc/NCTC_Model_Report.pdf.

Boghici, R., 2016, GAM Run 16-007, Prairielands Groundwater Conservation District Management Plan, 12 p., http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR16-007.pdf.

Ewing, J.E., and Jigmond, M., 2016, Final Numerical Model Report for the Brazos River Alluvium Aquifer Groundwater Availability Model: Contract report to the Texas Water Development Board, 357 p., http://www.twdb.texas.gov/groundwater/models/gam/bzrv/BRAA_NM_REPORT_FINAL.pdf?d=1502891797831.

Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing subregional water budgets for MODFLOW ground-water flow models: U.S. Geological Survey Groundwater Software.

Harbaugh, A. W., Banta, E. R., Hill, M. C., and McDonald, M. G., 2000, MODFLOW-2000, the U.S. Geological Survey modular ground-water model -- User guide to modularization concepts and the Ground-Water Flow Process: U.S. Geological Survey Open-File Report 00-92, 121 p.

Kelley, V.A., Ewing, J., Jones, T.L., Young, S.C., Deeds, N., and Hamlin, S., 2014, Updated Groundwater Availability Model of the Northern Trinity and Woodbine Aquifers – Final Model Report, 984 p., http://www.twdb.texas.gov/groundwater/models/gam/trnt_n/Final_NTGAM_Vol%20I%20Aug%202014_Report.pdf.

National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.

Niswonger, R.G., Panday, S., and Ibaraki, M., 2011, MODFLOW-NWT, a Newton formulation for MODFLOW-2005: USGS, Techniques and Methods 6-A37, 44 p.

Panday, S., Langevin, C.D., Niswonger, R.G., Ibaraki, M., and Hughes, J.D., 2013, MODFLOW-USG version 1: An unstructured grid version of MODFLOW for simulating groundwater flow and tightly coupled processes using a control volume finite-difference formulation: U.S. Geological Survey Techniques and Methods, book 6 chap. A45, 66 p.

Texas Water Code § 36.1071

Appendix G
District Monitoring Program Description

Groundwater Level Monitoring Program: Strategic Plan

PGCD
PRAIRIELANDS GROUNDWATER CONSERVATION DISTRICT
JOHNSON • ELLIS • HILL • SOMERVELL

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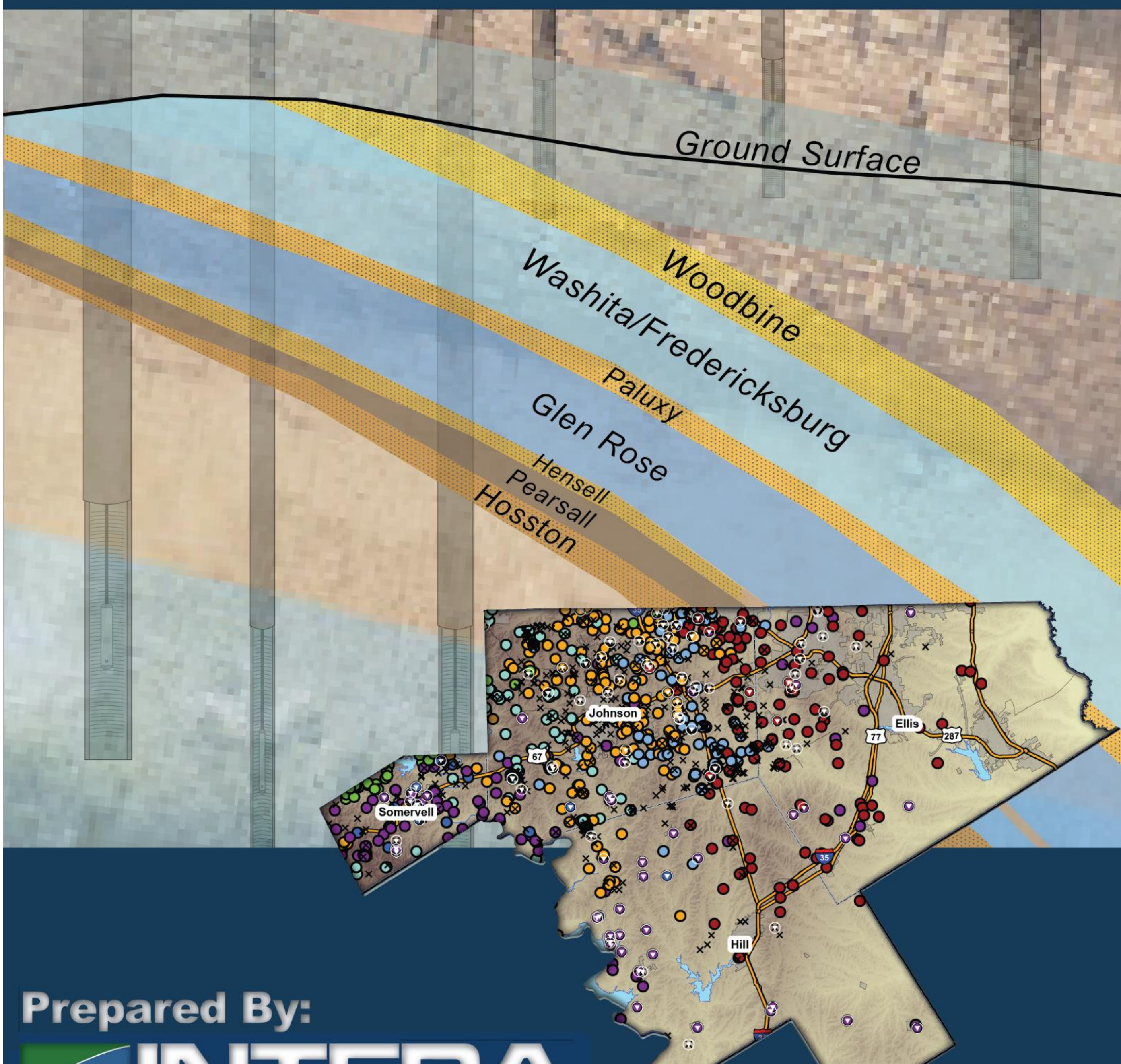
Cleburne, TX 76031
(817) 556-2299



Prepared By:

INTERA

12/9/2021

Monitoring Plan Program Development

Prepared for:

Prairielands Groundwater Conservation District
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January 2022

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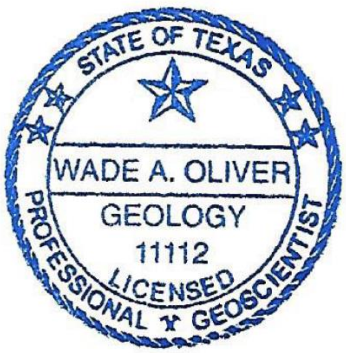

Wade A. Oliver, Texas Licensed Professional Geoscientist #11112

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ACROYNMS AND ABBREVIATIONS

GCD	Groundwater Conservation District
GMA	Groundwater Management Agency
DFC	Desired Future Condition
TAC	Texas Administrative Code
MAG	Modeled Available Groundwater
GAM	Groundwater Availability Model
GWDB	Groundwater Database
SDR	Submitted Drillers Report
TWDB	Texas Water Development Board
USGS	United States Geologic Survey
TCEQ	Texas Commission on Environmental Quality

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1.0 INTRODUCTION

The Prairielands Groundwater Conservation District (hereafter referred to as "the District") was created in 2009 by the 81st Texas Legislature, with a directive to conserve, protect, and enhance the groundwater resources of Ellis, Johnson, Hill, and Somervell Counties. To help manage groundwater resources prudently, the District monitors groundwater conditions via groundwater wells distributed throughout the District. There are currently 178 wells identified by the District as monitor wells. To date, no external review of the monitoring data has been performed.

This report provides an analysis of historical water level data, reviews the management objectives of the District, and makes recommendations regarding the current state of the monitoring network and explains why it should be expanded. Because of the large amount of coordination and logistics associated with developing a well monitoring network, INTERA recommends that District consider developing the monitoring network over a period of several years. INTERA has provided a strategic plan in Section 5.0 that details and defines the objectives of this multi-year effort.

1.1 Policy Background Information

A primary reason for the District to monitor groundwater conditions is to protect existing and historic users of groundwater. Through analysis of water level data from monitoring wells, the District can evaluate options for managing groundwater permits and productions in the different geographical areas and aquifers across the District. As a part of its responsibility to protect existing well owners and to adopt sound groundwater policies, the District participates in joint planning with neighboring GCDs in Groundwater Management Area (GMA) 8 (see Figure 1-1). Approximately every five years, the member GCDs in GMA 8 adopt Desired Future Conditions (DFCs). A DFC is a quantitative description of the desired condition of the groundwater resources in a management area at one or more specified future times.

DFCs are adopted by GMAs in accordance with the requirements of joint planning delineated in the Texas Administrative Code (TAC) Section 36.108. The DFCs adopted by GMA 8 are based on changes in water levels in aquifers over time. Typically, this water level is expressed in terms of drawdown measured from a reference year, such as 2010, and as an average drawdown across an aquifer of interest. According to Chapter 36 of the Texas Water Code, groundwater conservation districts must develop rules and manage the aquifer to achieve their DFC. The current monitoring network is unable to accurately quantify GCD-wide and countywide average drawdowns (discussed in more detail in Section 4.0). To address this issue, the District included an objective in the 2019 Management Plan to develop a comprehensive monitoring program that will enable quantification of average drawdowns within each county.

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 current Trinity Aquifer DFC and Model Available Groundwater (MAG) are couched in terms of Groundwater Availability Model (GAM) 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 1.2, where the aquifer specific DFCs are listed in Table 1-1.

1.2 Hydrogeology Background Information

To properly design a monitoring network, one of the key components is an understanding of the hydrostratigraphic units which comprise the resource. For this reason, the report provides a brief discussion of the Woodbine aquifer and the geologic formations that comprise the Northern Trinity Aquifer system.

The Northern Trinity Aquifer, shown in Figure 1-1, is defined by the Texas Water Development Board (TWDB) as a major aquifer composed of several individual aquifers contained within the Trinity Group. In the District, the Northern Trinity Aquifer consists of the aquifers of the Paluxy Sand, the Glen Rose Formation, the Hensell Formation, and the Hosston Formation. Throughout much of the District, limestones present in the Glen Rose Formation separate the Northern Trinity Aquifer into an upper and lower group (Figure 1-2a,b). The upper group of sands/sandstones are referred to as the Paluxy Aquifer. The lower portion of the Northern Trinity Group can be divided stratigraphically into three formations, the Hensell Formation, the Pearsall Formation, and the lowermost Hosston Formation. The Pearsall Formation is comprised of sands and shales, but the characteristics of these sand and shale units vary. Over most of the District, thick laterally continuous shale interbeds in the Pearsall Formation act as a confining unit separating the Hensall Formation from the Hosston Formation. However, in north-western portions of Johnson County and in northern Somervell County the shales present in the Pearsall Formation thin, and sands become more prevalent. This makes it challenging to differentiate between the three formations present in the lower Trinity Group. Where these units cannot be easily differentiated, they are collectively referred to as the Twin Mountains Formation. The water-bearing sandstones in the Twin Mountains Formation are locally referred to as the Twin Mountains Aquifer.

The Woodbine Aquifer, which outcrops in Johnson and Hill counties and is in subcrop in Ellis County, is separated from the underlying Trinity Aquifer by the Cretaceous-age Fredericksburg and Washita Groups, which are generally considered to be a regional hydrogeologic confining unit that separates the two aquifer systems. Lithologically, the Woodbine is quite heterogenous, consisting of friable, ferruginous, fine-grained sand and sandstone interbedded with shale, sandy shale, and laminated clay.

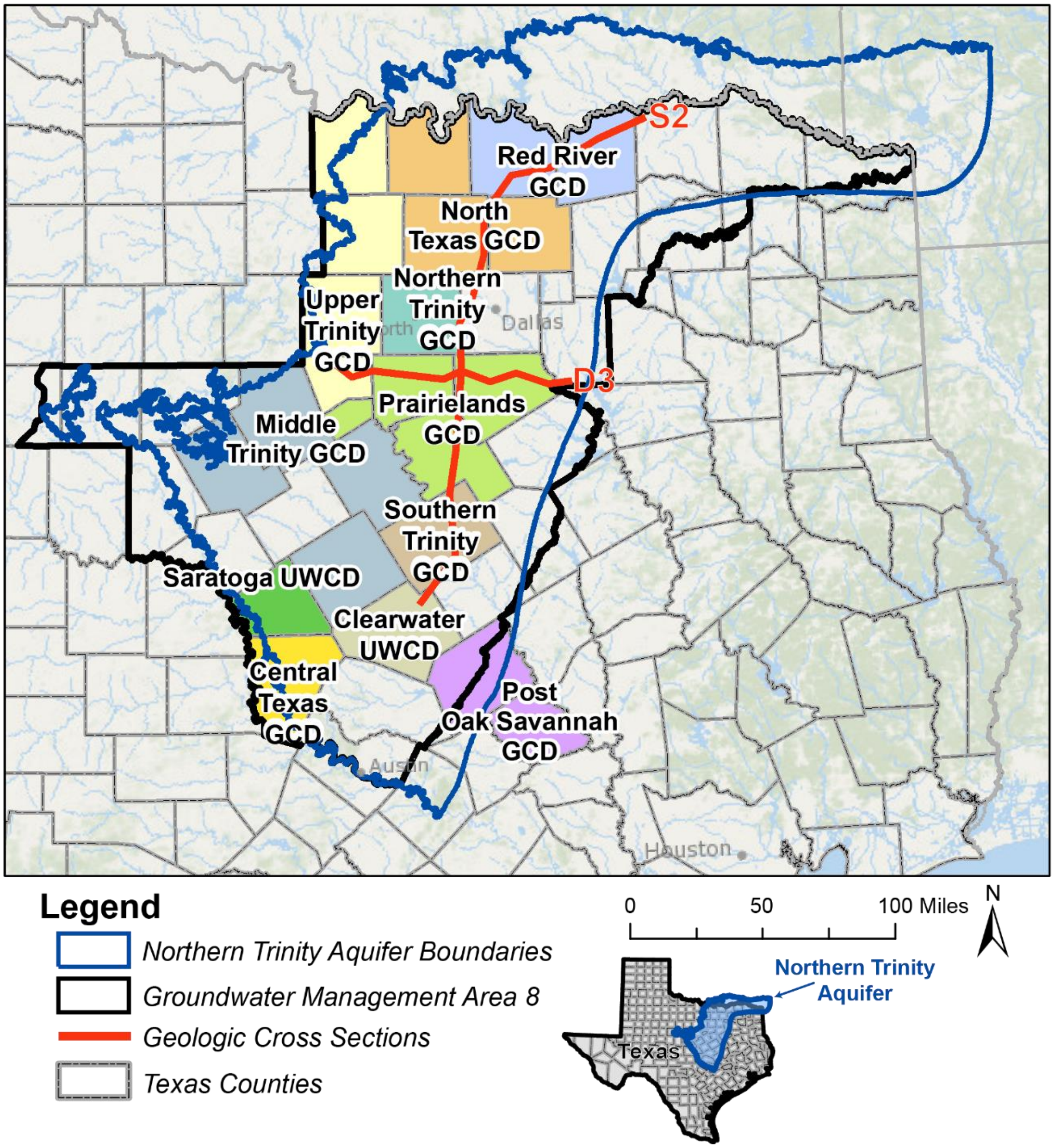

Figure 1-1 Extent of the Norther Trinity Aquifer System and the Groundwater Conservation Districts tasked with managing groundwater in the aquifer.

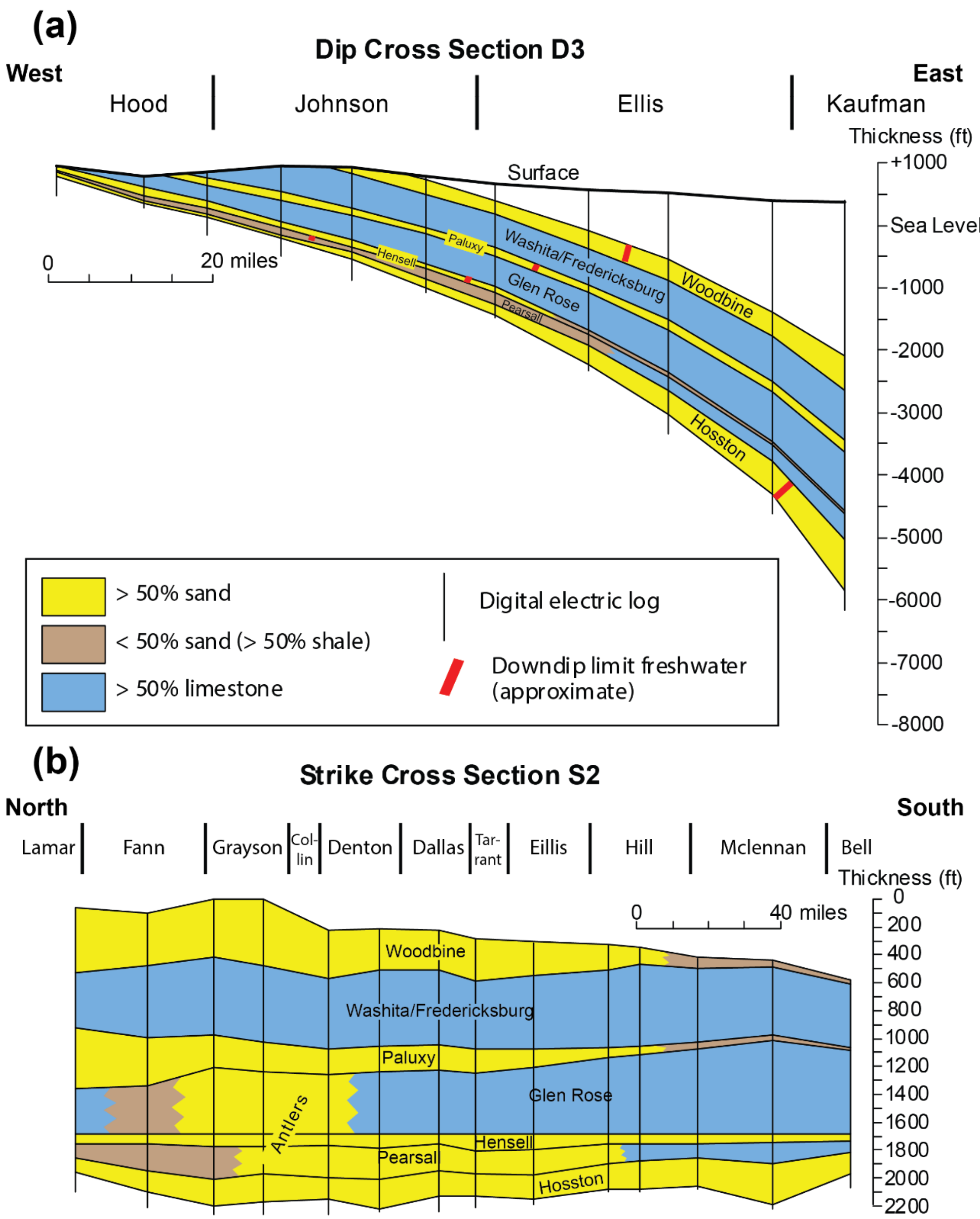

Figure 1-2 (a) Dip-oriented cross section D3 showing stratigraphic boundaries, dominant lithologies, depths in feet, and downdip limits of freshwater in sandstone and shale layers. (b) Strike-oriented cross section S2 showing stratigraphic boundaries, dominant lithologies, and thicknesses in feet. Both cross sections correspond to the cross-section lines (D3 and S2) shown in Figure 1 and Figure 4.1.29 in the Northern Trinity Groundwater Availability Model Report (Kelly and others, 2014).

Table 1-1 Desired Future Conditions between 2010 and 2070 in Prairielands GCD

	Woodbine	Paluxy	Glen Rose	Hensell	Hosston
Ellis	61	107	194	263	310
Hill	20	38	133	186	337
Johnson	2	-61	58	126	235
Somervell	Not present	1	4	26	83

Note: All values are in feet.

2.0 MONITORING APPROACH CONCEPTS

When developing a water level monitoring program there are many different concepts of a monitoring network that must be considered. The recommended approach to tracking progress toward DFCs is not solely based on scientific and statistical considerations. There are also practical and policy considerations that should also inform the development of the approach. Several of these concepts and considerations are described below.

Simplicity

One of the considerations was the value of simplicity. This is both for the benefit of District staff, who must implement the monitoring approach; and for the public, who may want to understand the monitoring approach. This is particularly true if the results ever indicate that there is a need to reduce pumping to achieve the District's DFCs.

There are complex statistical and geostatistical approaches that could be considered for identifying ideal monitoring wells and analyzing water level results. We explored some of these approaches, such as developing Thiessen polygons to dynamically reprioritize the list of potential monitoring wells as each new well was added. While this could lead to an optimized placement of monitoring wells over time, it would take considerable effort by District staff and could be confusing to stakeholders.

Diminishing Returns

The second concept that guided our recommended monitoring approach was that of diminishing returns. This is the common concept that generally refers to getting less incremental benefit from each additional item added. For well monitoring, more wells result in a higher confidence in the resulting average drawdown, but beyond a certain point the cost and effort of adding more wells to the network and regularly monitoring their water levels outweigh the benefit.

Flexibility

The third concept that guided our recommended monitoring approach was flexibility. The approach should be flexible enough to easily handle situations that are inevitable when monitoring over several decades. Wells will be added to, and removed from, the network periodically. This can occur if a well is plugged or destroyed, if a well is drilled nearby that negatively affects the representativeness of the water levels, or if a well owner no longer wishes to have their well included in the monitoring network. The monitoring and analysis approach must be flexible enough to account for these situations as they occur.

3.0 RECOMMENDED MONITORING NETWORK CHARACTERISTICS

There are many different characteristics of a monitoring network that must be considered. These include the number of wells that are monitored, how frequently water levels are measured, and how to spatially distribute wells across the county. Each of these are described below.

3.1 Number of Wells

A fundamental question that must be asked is how many monitoring wells are needed to accurately track groundwater levels in each aquifer present within the District. There is no silver bullet to defining this number because the number of wells the District needs depends on many factors including the variability of aquifer conditions and the degree of groundwater production, which drives variability in observed water level changes. For example, in areas with large amounts of groundwater production water level changes are likely more variable among wells, so more wells must be monitored to characterize the average change in aquifer conditions. Conversely, areas with little to no groundwater production, such as the eastern portion of Ellis and Hill Counties, groundwater level changes are likely more consistent, so only a small number of monitoring wells would be needed.

There is a physical limitation to the number of wells that District staff can visit seasonally to measure water level while still performing their other duties. This constraint has been discussed with the Planning and Development Committee and the General Manager and at this time it is the District's opinion that the development of a monitoring program is a key priority, so funds will be made available to increase the number of wells monitored.

Using data from the District's well registration database, the TWDB groundwater database (GWDB), and the TWDB Submitted Drillers Reports (SDR), Figure 3-1 shows the distribution of groundwater wells colored by aquifer in the District and within a 3-mile buffer of the District boundaries. Wells within the 3-mile buffer were included because they inform regional groundwater trends at no cost to the District. Groundwater wells with at least one measurement after 2010 were considered to be an existing monitoring well. In total, there were 1,164 identified wells with screen information. Of these, 632 were screened over a single aquifer (Table 3-). The remaining 532 wells were screened over multiple aquifers. According to the District's database, 178 wells are currently identified by the District as monitoring wells. Only 65 of these wells are screened over a single aquifer. Under the proposed expansion strategy detailed in Section 5.0, 209 monitoring wells will be needed.

3.2 Sampling Frequency and Procedures

INTERA recommends that water levels be measured in the groundwater monitoring wells at least once per year. Water levels typically fluctuate seasonally within an aquifer. This can be partly due to seasonal changes in precipitation and recharge in some areas but is more often due to seasonal changes in pumping. To ensure that water level measurements from one year to the next are as comparable as possible, it is best to take the measurement at approximately the same time each year. Typically, annual water level measurements are taken during the winter months (December through March) to minimize potential impacts from higher seasonal pumping.

Some wells in the current monitoring network have recorded water levels at daily and monthly intervals. While only annual measurements are required for DFC tracking, this information can be useful for other purposes, such as drought planning. While outside of the scope of this initial study, the District may want to identify key observation wells where sub-annual monitoring would be useful. If multiple measurements are taken in a well during the winter months, we recommend that the highest (that is, the shallowest) water level be used to represent that year's level for the DFC analysis.

As a regulatory agency, the District is responsible for making sure that the groundwater data it uses to develop policies and to enact enforcement is defensible and admissible in court. While it is beyond the scope of this study, INTERA recommends that the District adopt procedures for measurement of water levels. This will assure that water level measurement methods are consistent through time, a key practice needed to maintain a reliable monitoring network. For relevant information on water level measuring the District should refer to the TWDB's water level measuring manual (Hopkins, 1994).

As part of the procedures for measuring water levels, INTERA recommends that close attention be paid to documenting field conditions in the database that houses the measured values. Table 3-1 and Table 3- list the comments that Post Oak Savannah GCD uses to help document field conditions. Table 3-1 lists comments that were primarily copied from a TWDB water level database. Table 3- lists comments developed by Post Oak Savannah GCD to document recent pumping at the well. A potential problem with collected appropriate water-level data for wells that pump heavily and regularly regards the delay between turning off the pump and measuring the water level. At Post Oak Savannah GCD, the policy is to call one week before visiting the wells to work out a sampling date and time where the water level can be measured after at least a 12-hour recovery period. However, this goal is often not met; in such a case, the differences in the water levels is not a reliable metric to monitor changes in the regional water level.

3.3 Spatial Distribution

To ensure that the wells in the monitoring network are generally distributed throughout the county, we propose that the U.S. Geological Survey 7.5-minute quadrangles be used as a standard grid. These quadrangles (hereafter referred to as "quads") are shown in grey in Figure 3-1. The TWDB also uses these quads to guide water well numbering (e.g., the first four digits of a State Well Number correspond to the quad in which the well lies). Due to the spatial variability in aquifer extents and groundwater production throughout the District we tailored the grid of quads to best suit each aquifer. In Figure 3-2 - Figure 3-8, quads highlighted in blue identify areas where a groundwater monitoring well is needed to accurately track regional changes in groundwater levels. We recommend that at a minimum, one monitoring well be located within each blue quad. Quads that are not colored blue will not need a monitoring well because the aquifer of interest is not present or there is little to no current groundwater production.

This approach was proposed because it offers a simple solution to evenly distributing wells across each aquifer over the District. In later phases of the monitoring program expansion, it may be necessary to add monitoring wells to achieve a finer resolution then the 7.5-minute quads. For instance, in areas with highly variable water level changes, resulting from large amounts of fluctuating groundwater production, more wells will be needed to accurately determine the averages changes in water level through time.

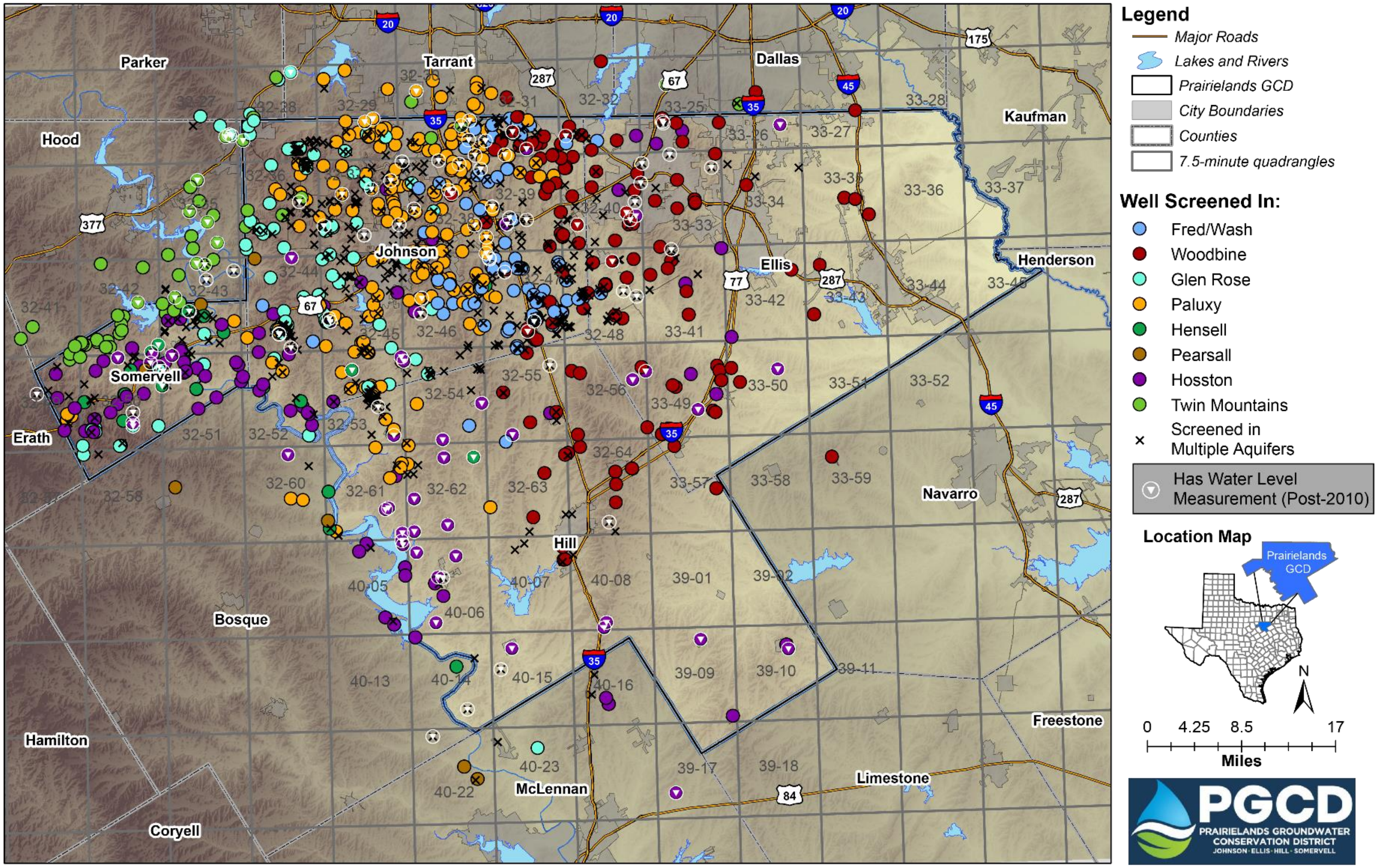

Figure 3-1 All wells identified within the Prairielands Groundwater Conservation District and wells within a 3-mile buffer around the District's boundary.

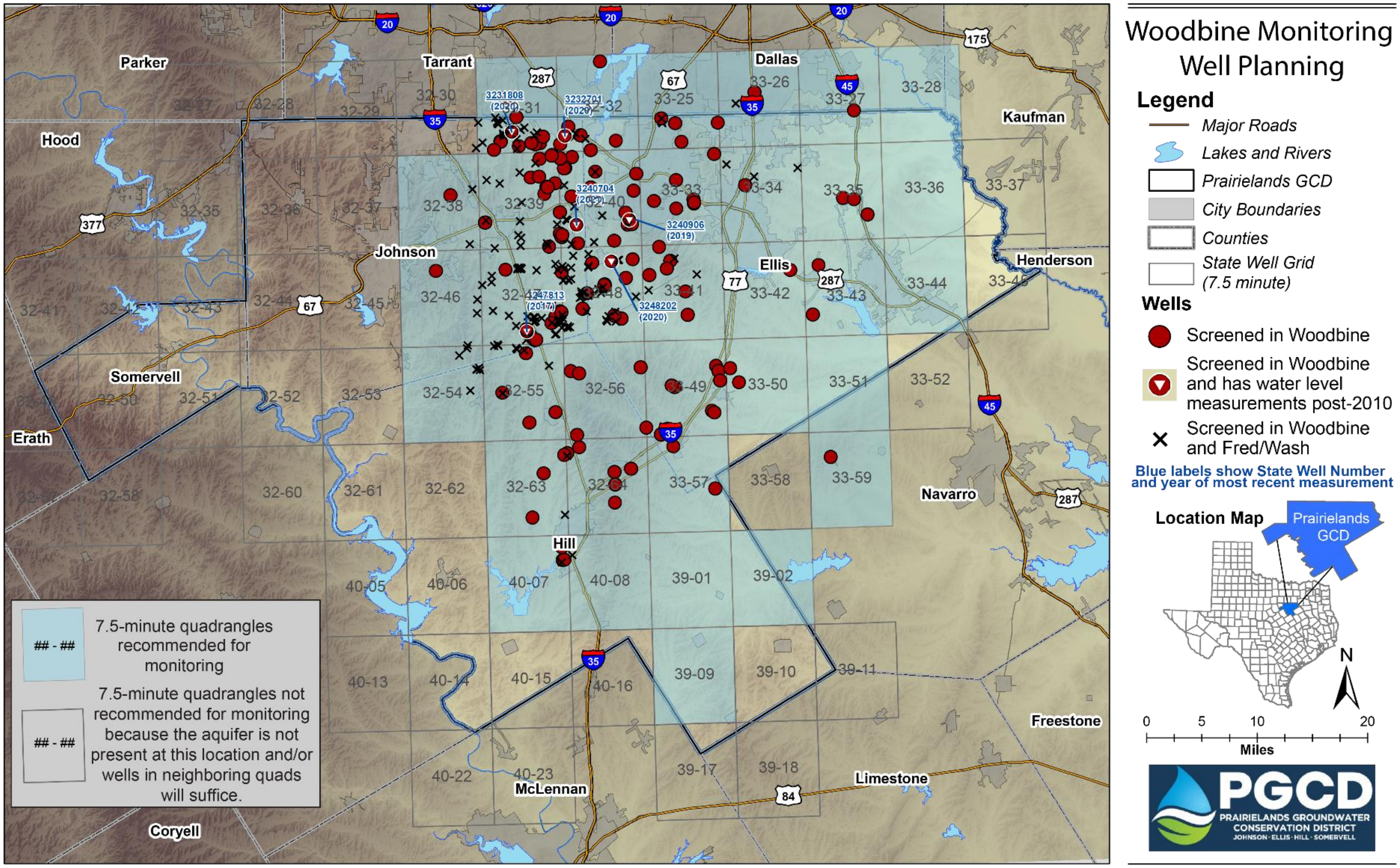

Figure 3-2 Wells screened in the Woodbine aquifer.

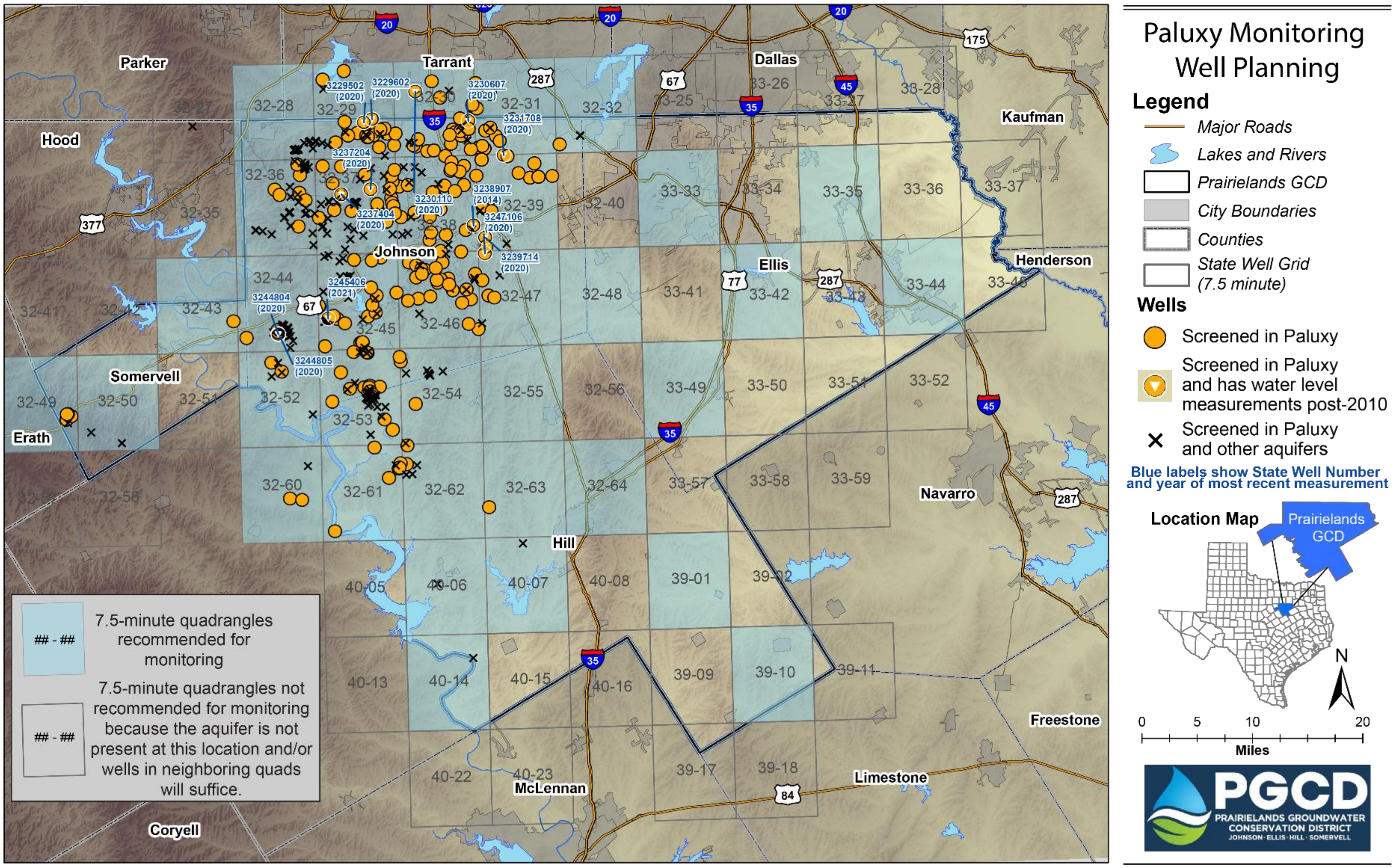

Figure 3-3 Wells screened in the Paluxy aquifer.

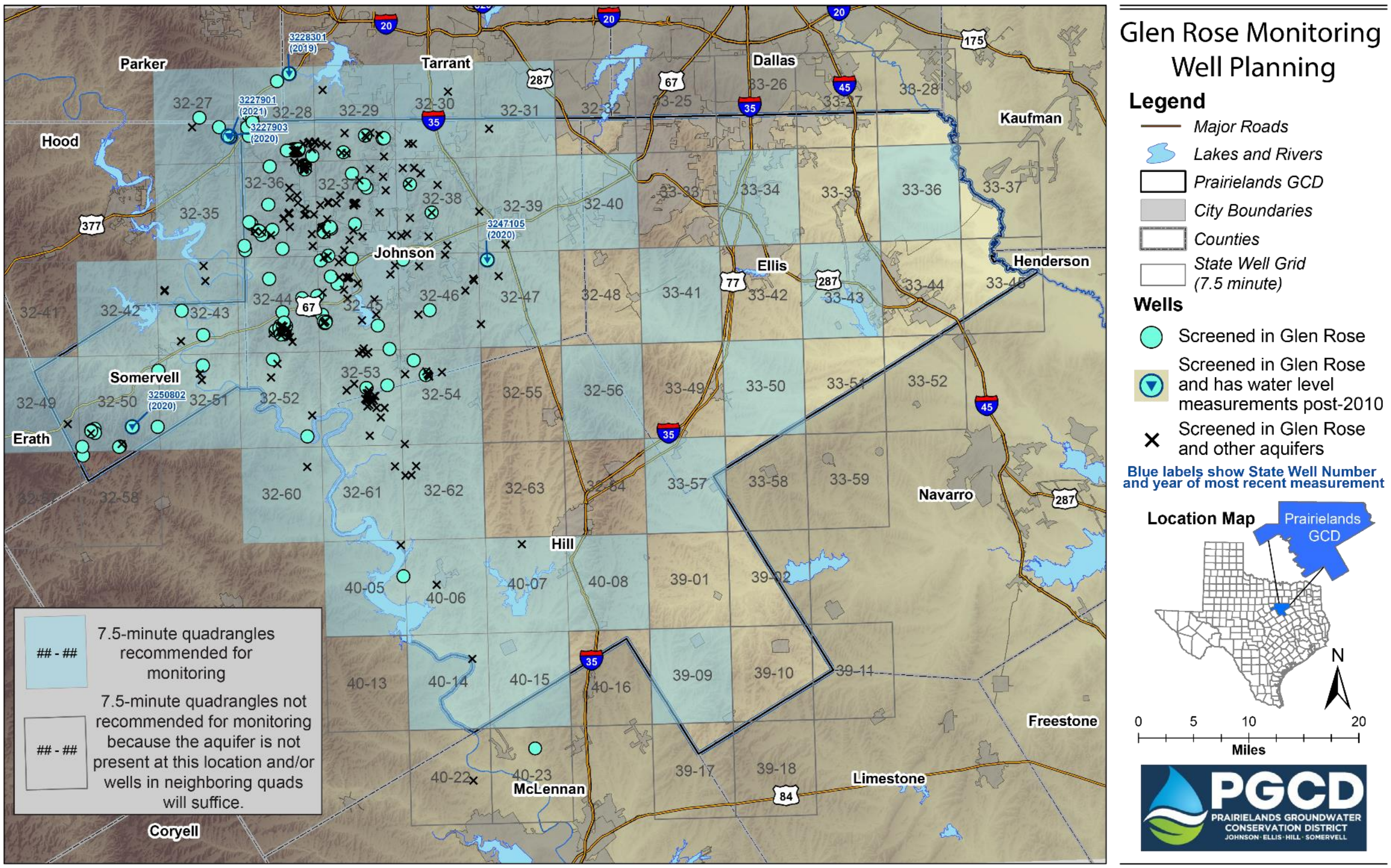

Figure 3-4 Wells screened in the Glen Rose aquifer.

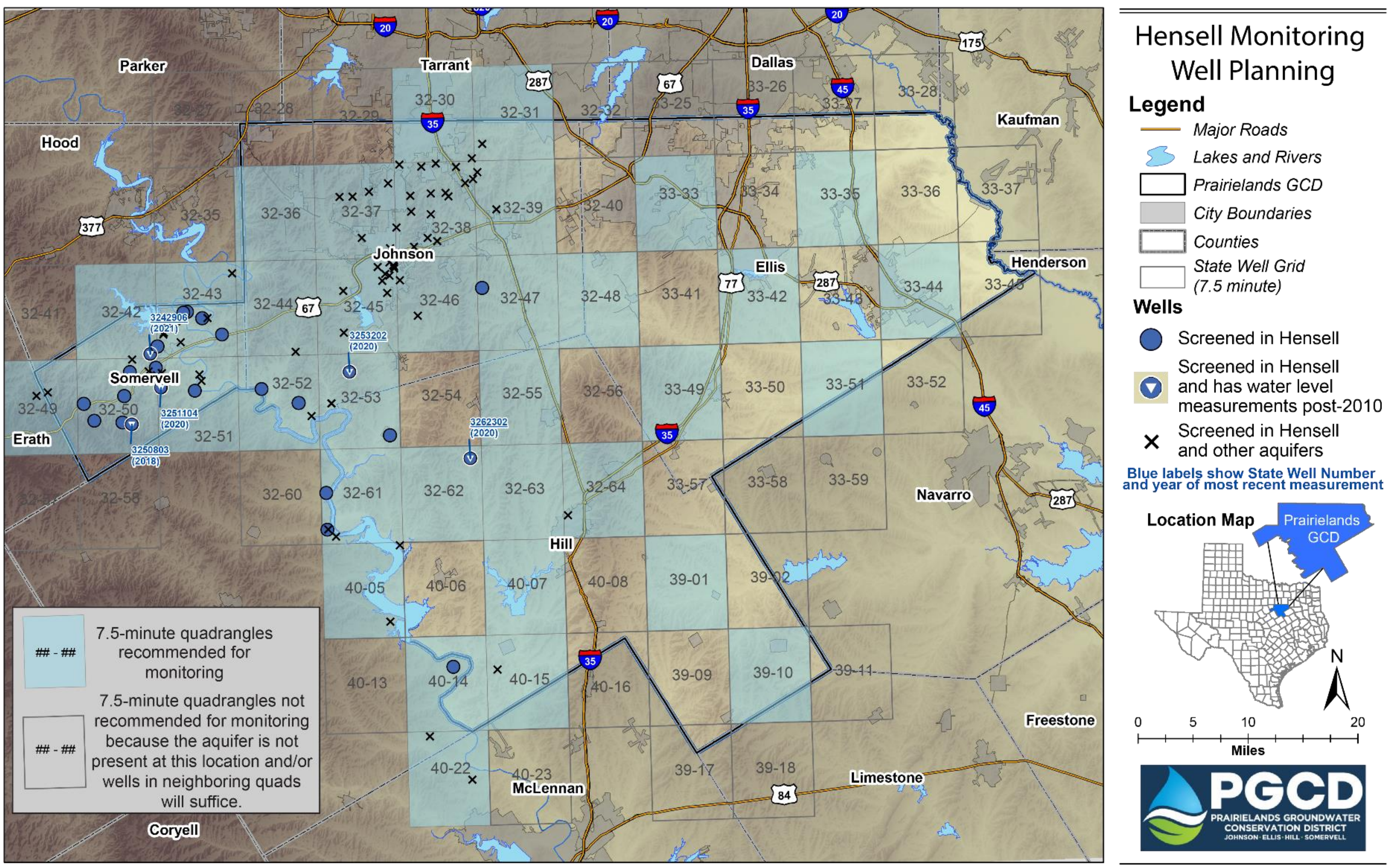

Figure 3-5 Wells screened in the Hensell aquifer.

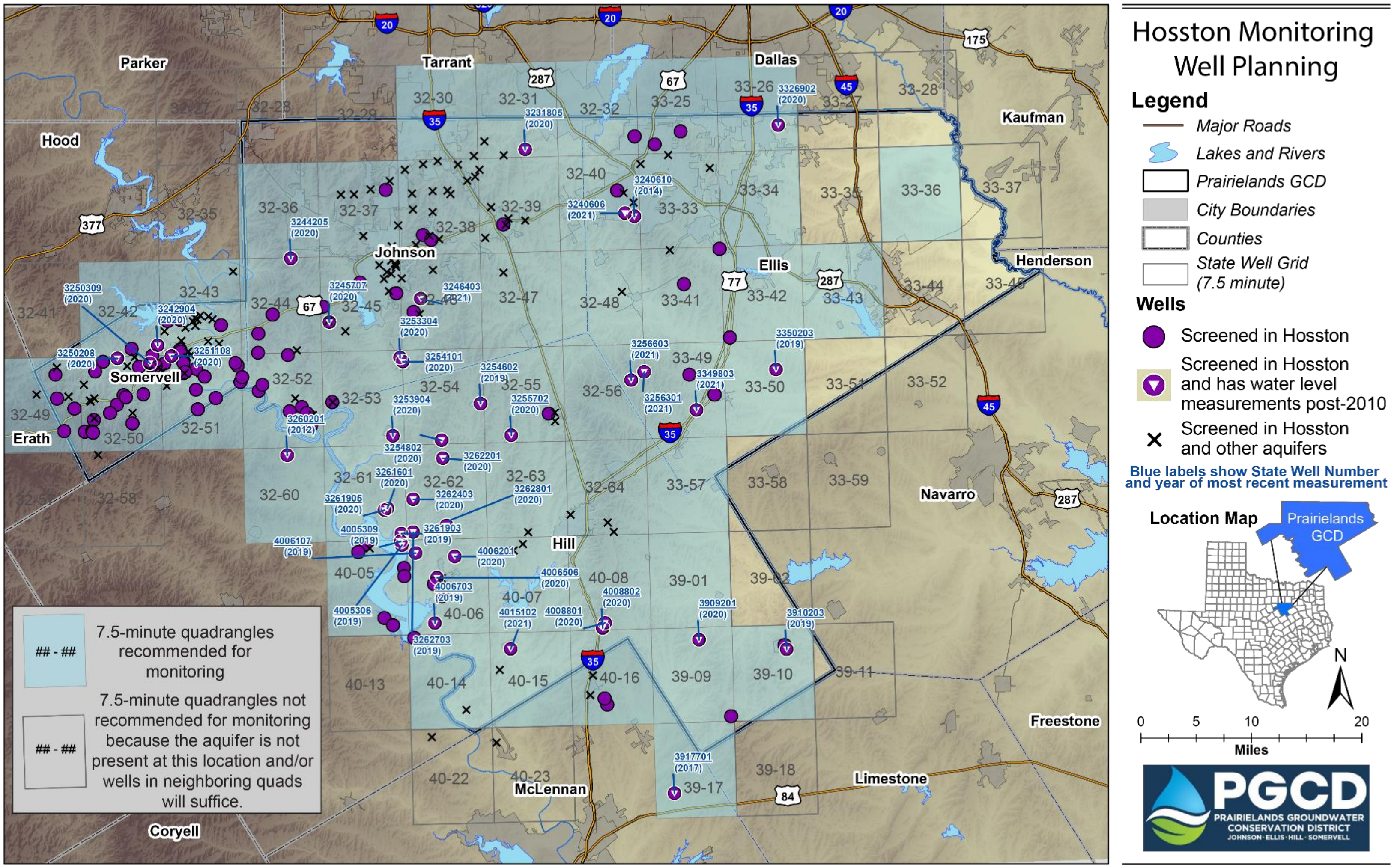

Figure 3-6 Wells screened in the Hosston aquifer.

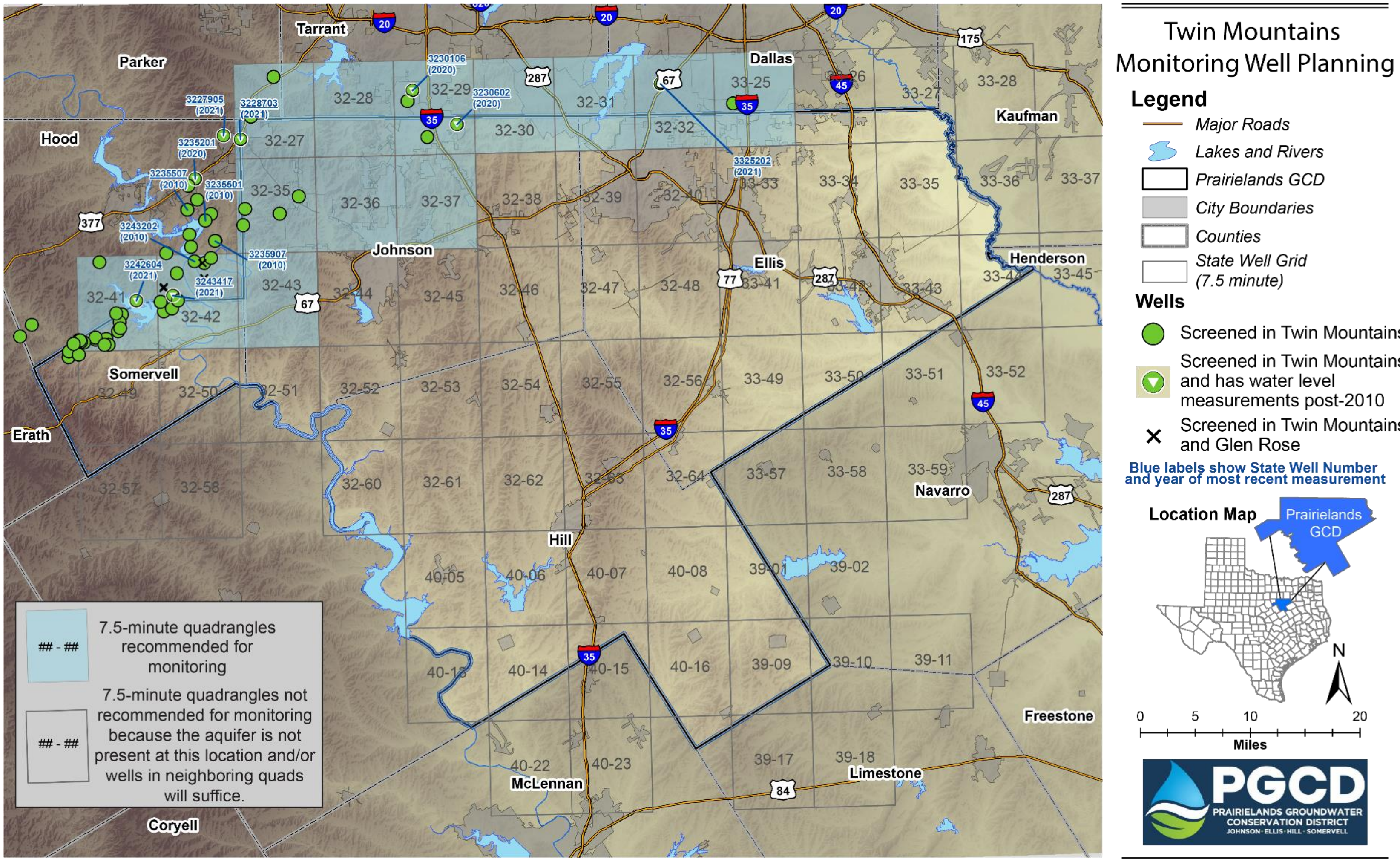

Figure 3-7 Wells screened in the Twin Mountains aquifer.

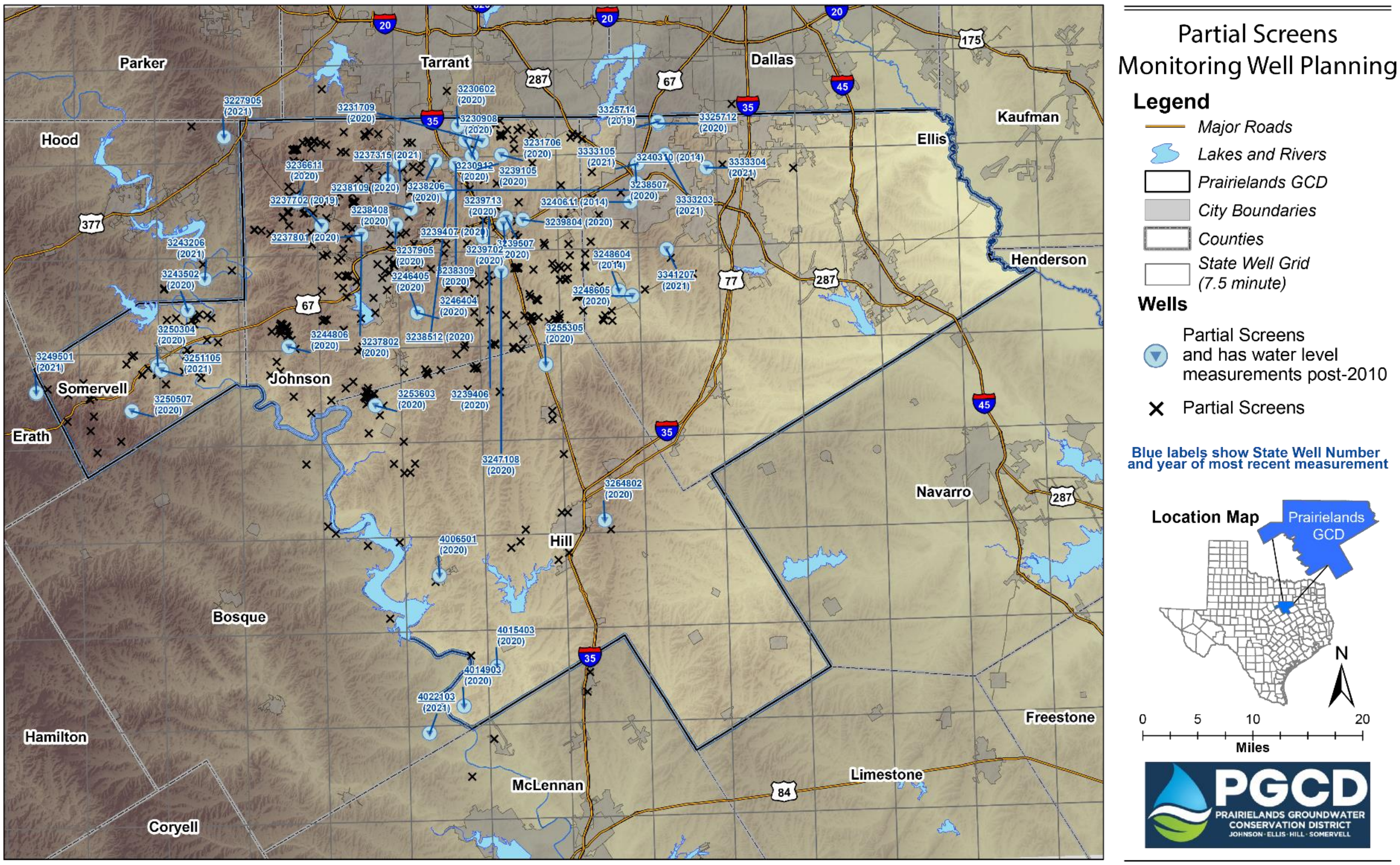

Figure 3-8 Wells screened in multiple aquifers.

Table 3-1 Identified wells screened in a single aquifer.

Aquifer	Total Single Aquifer Wells	Actively Monitored
Woodbine	141	6
Paluxy	198	12
Glen Rose	135	2
Hensell	22	5
Hosston	114	39
Twin Mountains	22	1
Total	632	65

Table 3-3 Comments related to Recent Pumping at well

Comment	
ID	Description
P1	Est. time since last pumped > 2 hrs
P2	Est. time since last pumped > 4 hrs
P3	Est. time since last pumped > 8 hrs
P4	Est. time since last pumped > 12 hrs
P5	Est. time since last pumped > 24 hrs
P6	Est. time since last pumped > 36 hrs
P7	Est. time since last pumped > 1 week
P8	Est. time since last pumped > 1 month
P9	Est. time since last pumped > 3 month
P8	Est. time since last pumped > 1 month
P9	Est. time since last pumped > 3 month

Table 3-2 Comments related to General Site Conditions.

Comment	
ID	Description
	No unusual conditions noted at or near well site
1	Accurately reflect water-level conditions
2	Pumping-level measurement
3	Well or wells pumping nearby
4	Well pumped recently
5	Water level possibly affected by recent flooding
6	Measurement may reflect perched water table
7	Artificial recharge operation at or near well
8	Deviation due to recompletion in different zone
20	Questionable meas. - spotty tape
21	Questionable meas. - leaking airline
22	Questionable meas. - uncertain
23	Questionable meas. - deleted after review
24	Questionable meas. - may be from wrong well
25	Questionable meas. - tape does not fall free
26	Questionable meas. - spotty tape from oil/gas
40	No measurement - well destroyed
41	No measurement - well pumping
42	No measurement - can't insert tape/E-line in bore
43	No measurement - unable to reach water level
44	No measurement - tape or E-line hangs
45	No measurement - well bridged or caved
46	No measurement - well dry
47	No measurement - casing leaking or wet
48	No measurement - airline leaking or shut-in
50	No measurement - well flowing, unable to shut-in
51	No measurement - no reason stated
60	No measurement - unable to locate well
61	No meas. - temp. inaccessible (roads, gates, etc.)
62	No meas. - temp. inaccessible (vicious animals)
63	No meas. - temp. blocked
64	Deleted as Obs. well due to owner request
65	Deleted as Obs. well due to hazards to measurer
80	Discontinued - no reason stated (outside source)
81	Well deleted from C program
82	Well not measured due to admin decision

4.0 REVIEW OF EXISITING MONITORING NETWORK

A comprehensive monitoring program (i.e., one with an adequate number of wells spaced appropriately over the aquifer and region of interest), should be able to track regional water level declines due to large pumping centers as well as regions of the aquifer that appear stable. However, because only a certain density of spatial coverage can be achieved with a water level monitoring network, interpolation of the water level measurements is required to produce estimates of the water levels in inter-well areas. The common interpolation approach used to interpolate between inter-well areas is called kriging. After review of all water level measurements recorded using the current monitoring well network, INTERA concluded that due to sparsity of data, regional groundwater changes cannot be accurately determined with kriging/interpolation methods. As an alternative, INTERA evaluated water level changes on a well-by-well basis for each aquifer (Figure 4-1 – 4-6).

With expansion of the monitoring well network the District will be able to generate District-wide water level change maps for each aquifer, which will enable DFC tracking. The District can always test the reliability of their monitoring network by calculating the interpolation error in inter-well areas and ensuring that it is within some acceptable threshold.

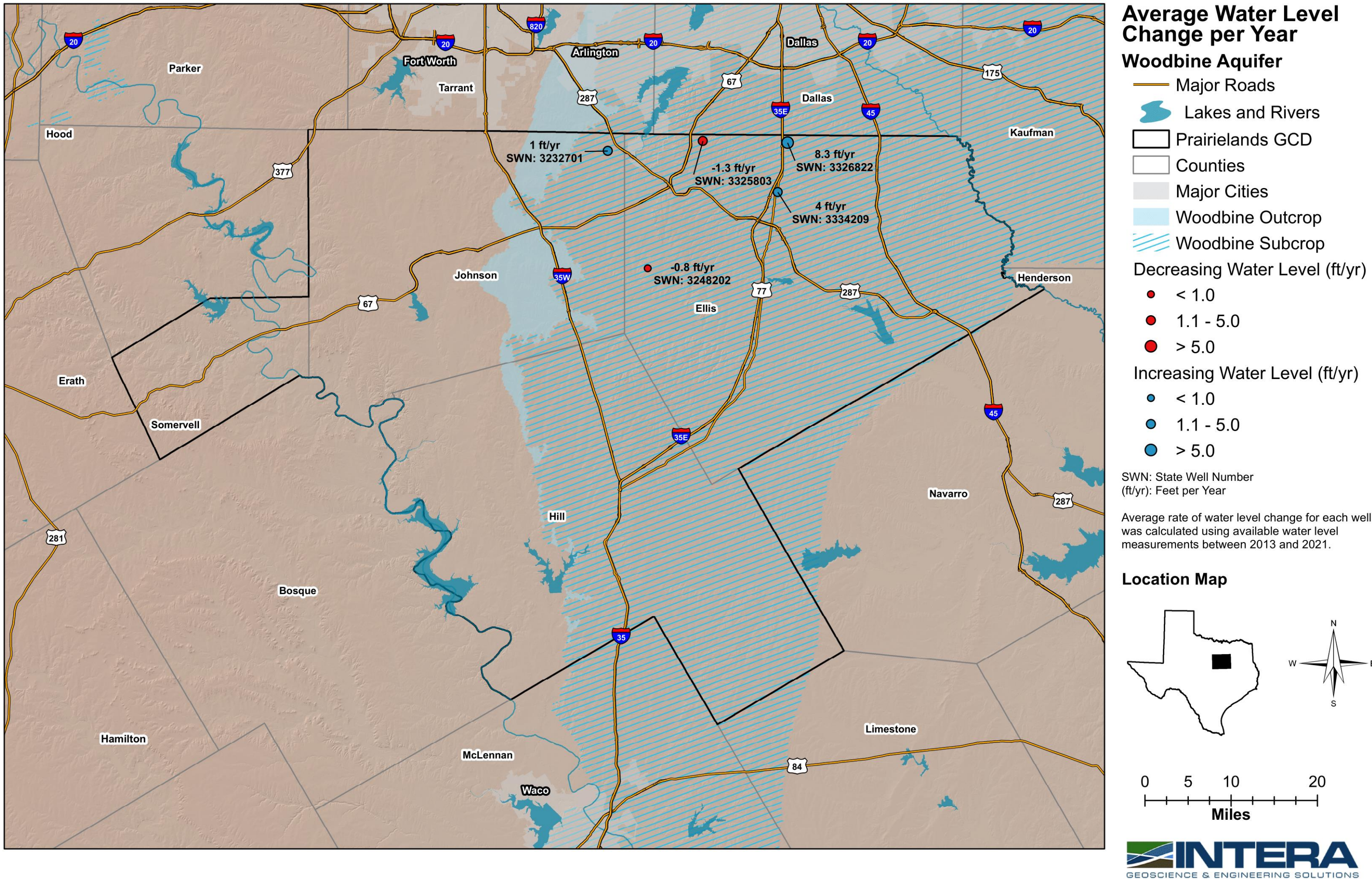

Figure 4-1 Average water level change in Woodbine aquifer between 2013 and 2021.

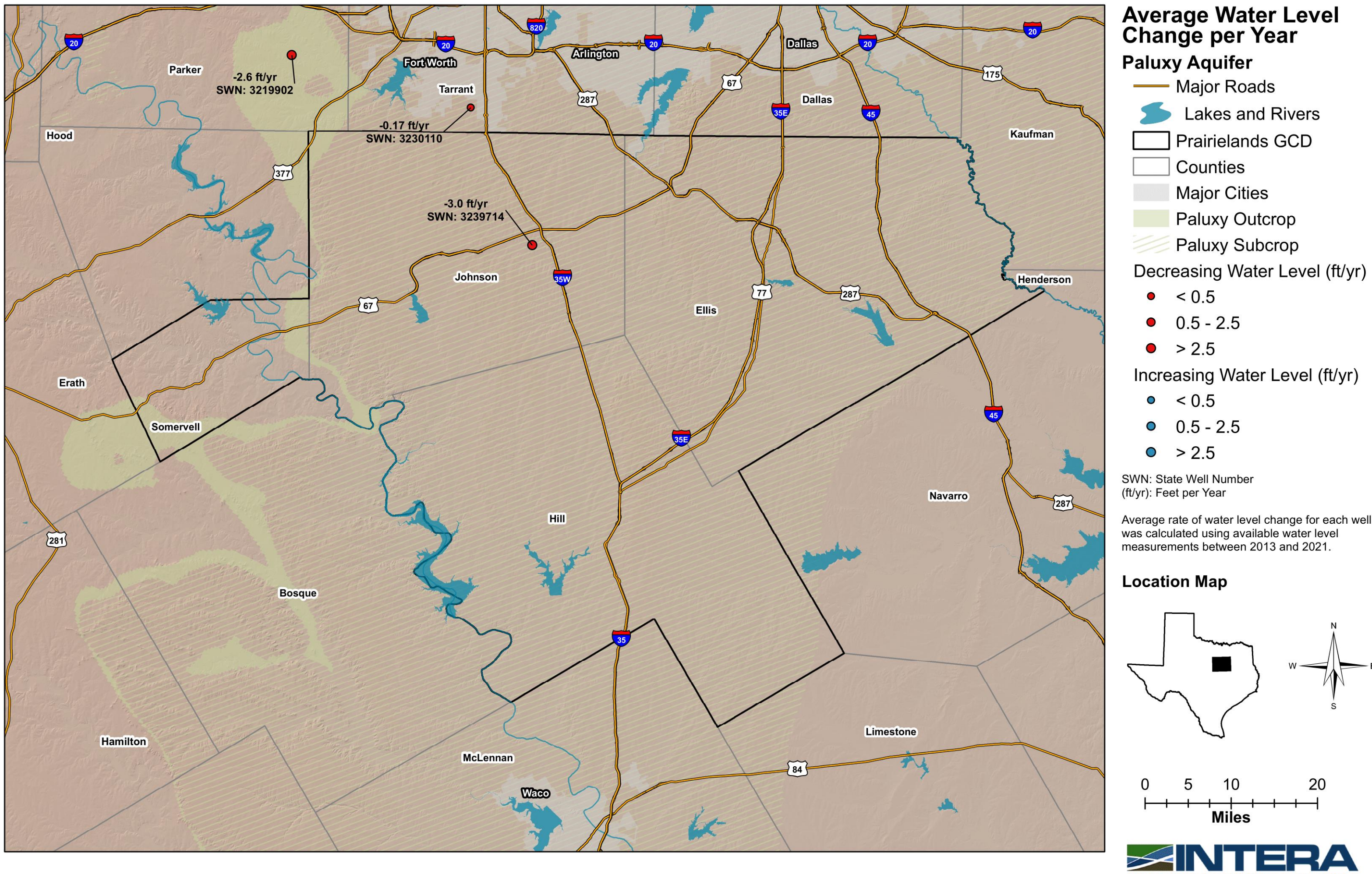

Figure 4-2 Average water level change in Paluxy aquifer between 2013 and 2021.

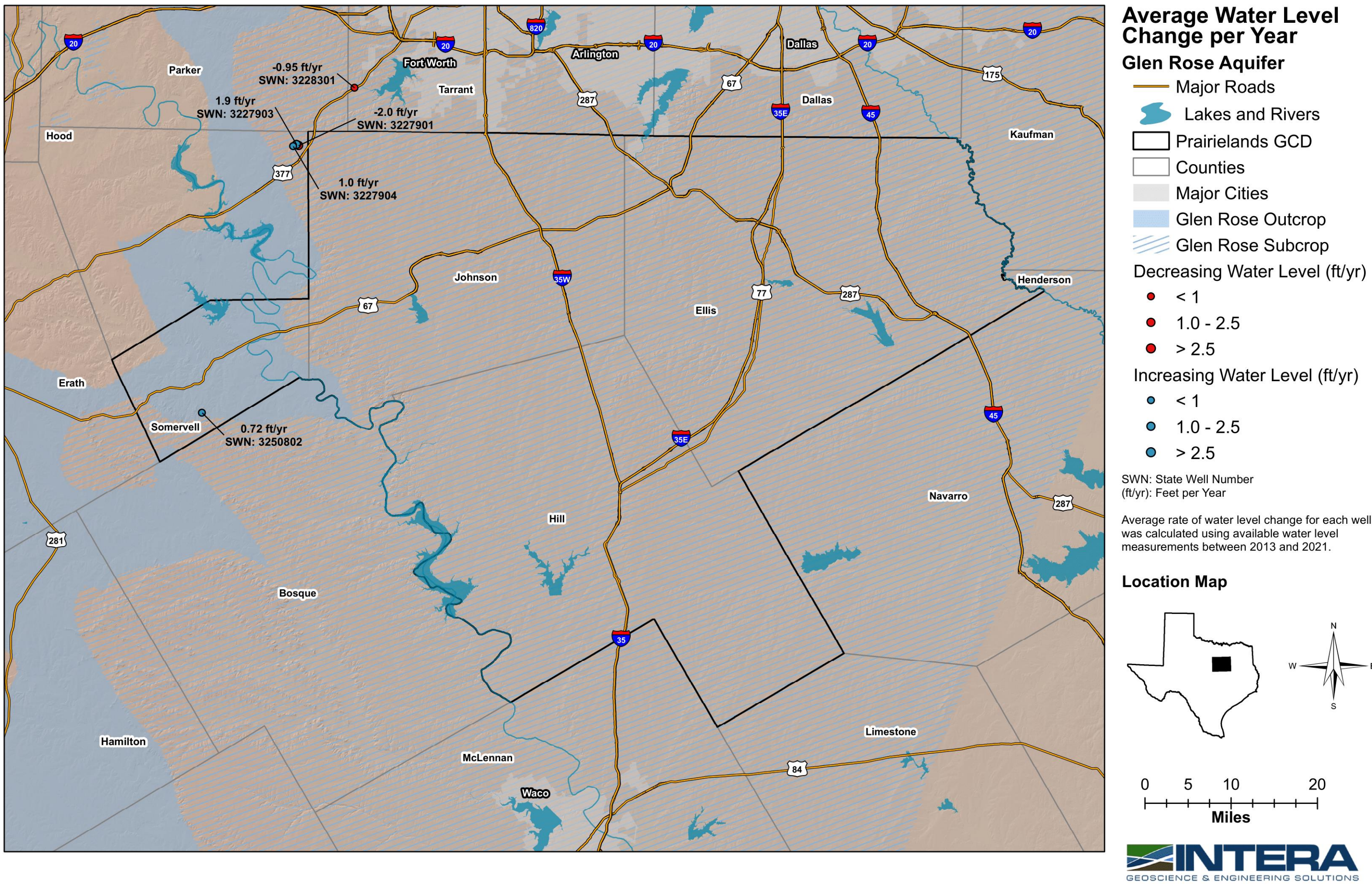

Figure 4-3 Average water level change in Glen Rose aquifer between 2013 and 2021.

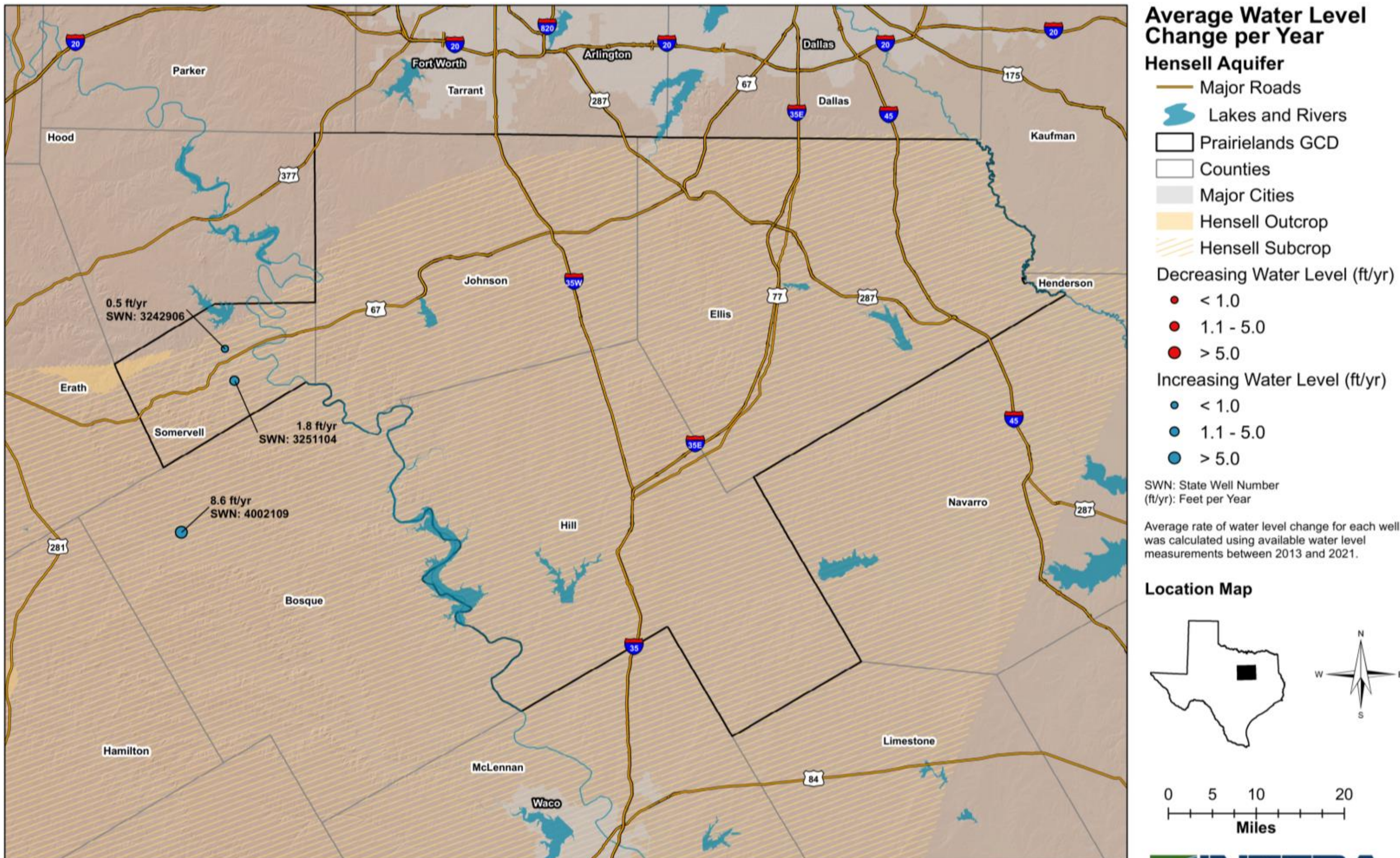

Figure 4-4 Average water level change in Hensell aquifer between 2013 and 2021.

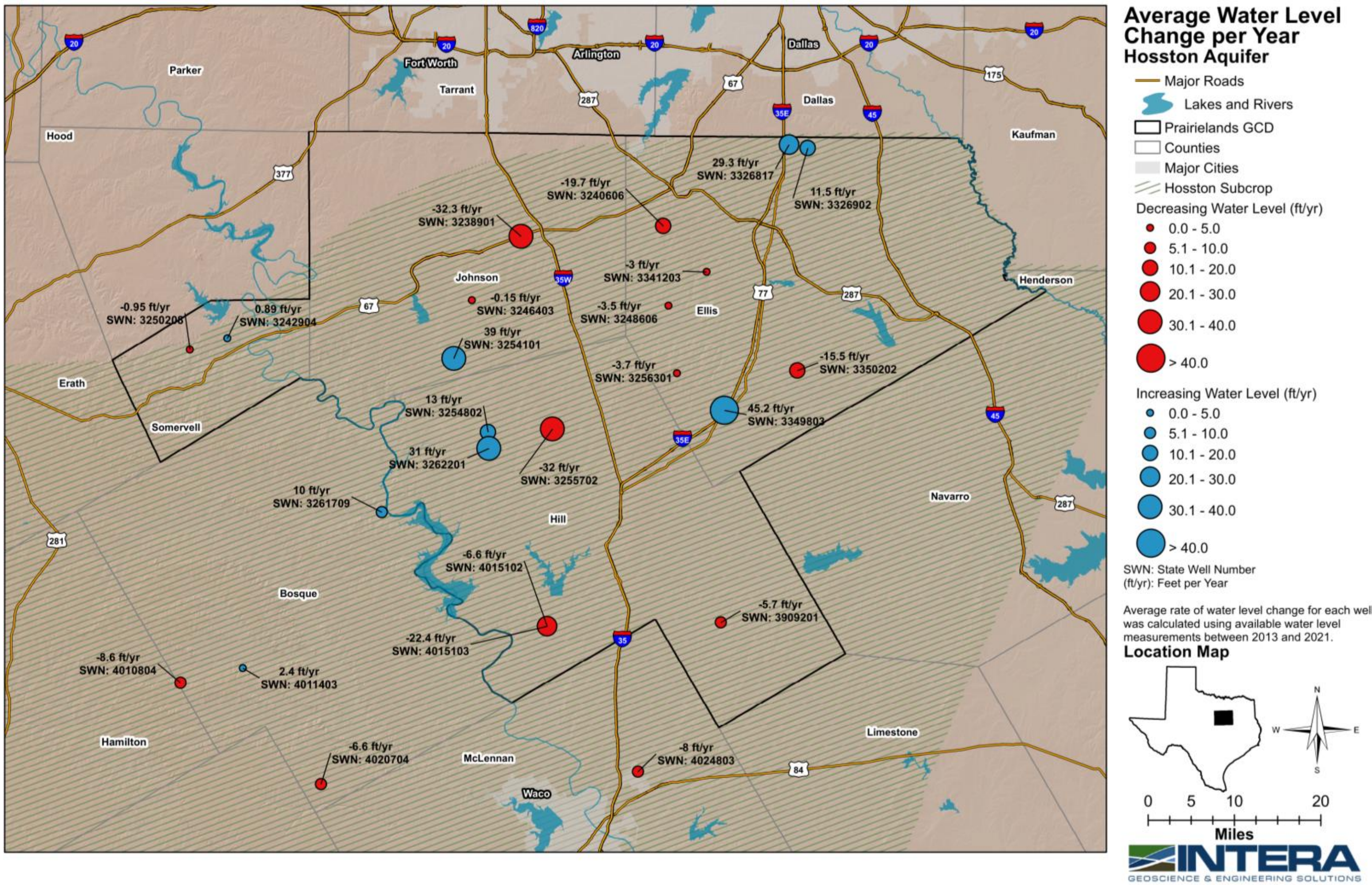

Figure 4-5 Average water level change in Hosston aquifer between 2013 and 2021.

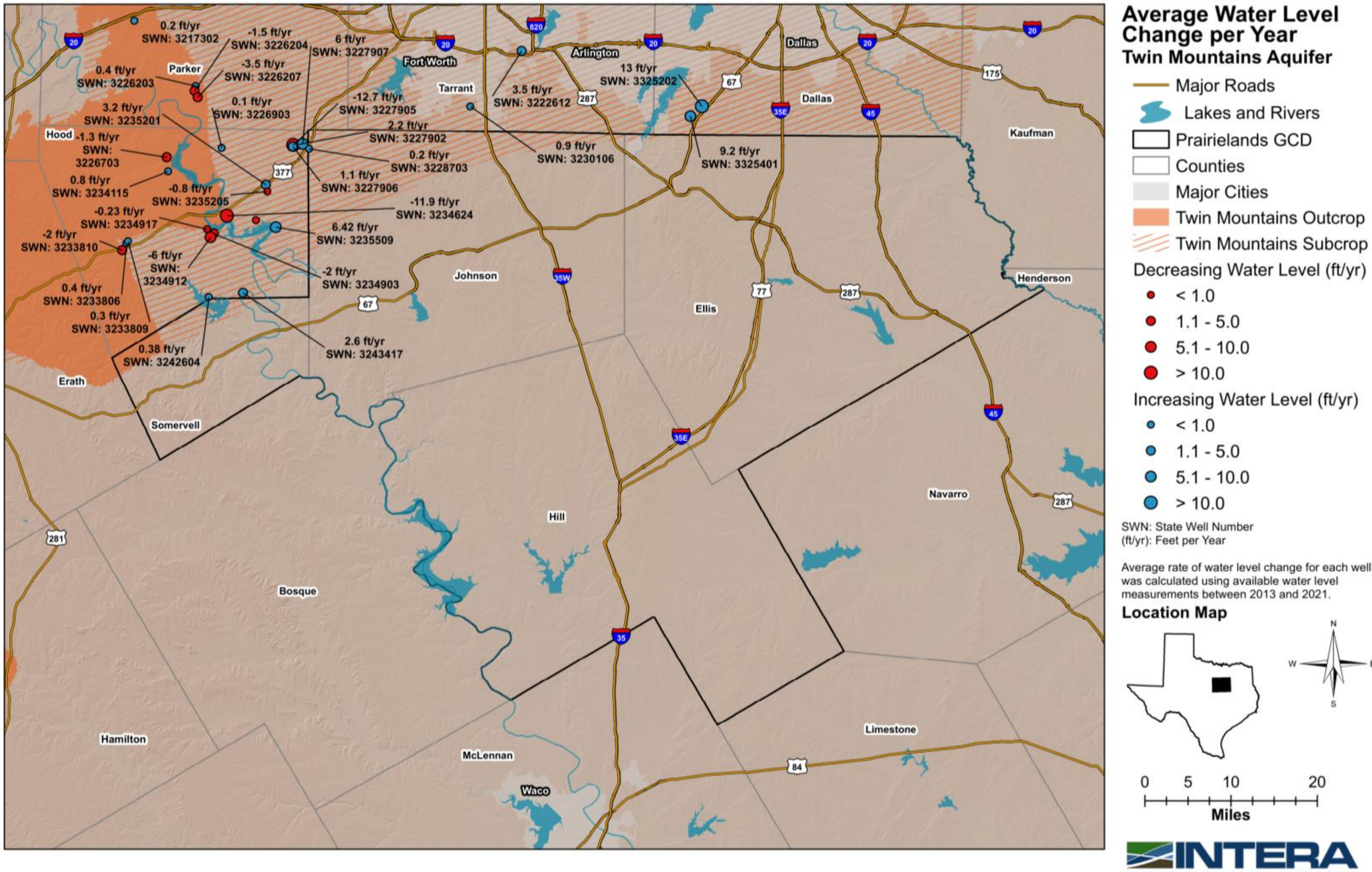

Figure 4-6 Average water level change in Twin Mountains aquifer between 2013 and 2021.

5.0 MONITORING PROGRAM EXPANSION STRATEGY

The monitoring strategy is meant to define a framework that will guide the evaluation of individual objectives defined in a monitoring program. Monitoring program objectives can be numerous and varied, but they all satisfy 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. INTERA's proposed expansion strategy focuses on this requirement, while also aiming to balance the approach concepts introduced in Section 2.0.

One of the primary challenges of expanding a monitoring program is the shear amount of data that must be analyzed and then organized in a manner that allows for strategic and efficient objective execution. The results from INTERA's analysis were incorporated into a master spreadsheet intended to help the District:

1. Identify gaps in the monitoring network that need to be filled by an existing well or by installation of a monitoring well
2. Prioritize incorporation of existing wells using a spatial ranking system
3. Readily access all relevant well information made available by the TWDB in the GWDB and the SDR.

This utility of this spreadsheet is described in detail in Section 5.1, below.

Tables 5-1 – 5-6 show the current status of the monitoring network (i.e., in 2021) under the proposed expansion strategy and provide guidance on how the monitoring network should be expanded each year. We are assuming that due to cost considerations, the early phases of expansion should overwhelmingly consist of incorporating existing wells. For this reason, each year the District should aim to add 10 existing wells to the network. For example, in 2022 Tables 5-1 – 5-6 show that the District should add three existing Woodbine wells, two existing Paluxy wells, and five Hosston wells to the monitoring network. The expansion of the monitoring network focuses on the aquifers that are most relied upon for water supply within the District. Most of the groundwater produced within the District each year is sourced from the Hosston aquifer, and for this reason the new monitoring wells are added to the Hosston monitoring network at a faster pace than the other aquifers. Under the proposed expansion strategy, the Hosston monitoring network will be complete in 2028. Expansion of the monitoring network for the lesser used aquifers will take more time because of their lower priority and the fact that there are fewer existing wells so the network will need new well installations. The Glen Rose monitoring network, the lowest priority aquifer, will be finished in 2054 under the proposed expansion strategy. It is important to note that Tables 5-1 – 5-6 are guidance documents. The pace of existing well additions and new well installations can be quickened if more resources are available.

Prioritizing additions of existing wells is a cost-effective strategy and a quick way to build out the monitoring network in the near term. However, INTERA recommends installing District-owned monitoring wells strategically throughout the District in order to increase the overall reliability of the network through time.

5.1 Utility of the Monitoring Program Master Spreadsheet

The monitoring program master spreadsheet was designed so the District could easily identify quads with a current monitoring well, quads that do not have a monitoring well but have existing wells that could be added to the network, and quads where a monitoring well must be drilled. The well data in the master spreadsheet is color-coded based on these three categories.

As an example of how this master spreadsheet should be used, reference the 2022 expansion strategy for the Hosston aquifer in Table 5-5, which plans for the addition of five existing wells and two new well installations. The District would then navigate to the Hosston data in the master spreadsheet and select two quads (shaded in orange) that need a new well installation. New well installations should be installed strategically with the primary aim to fill the largest gaps in the network. For example, quad number 32-64 (see Figure 3-6) would be a good candidate for a new well installation because it fills a large gap in the Hosston monitoring network. The District would then identify five quads (shaded in green) that do not have a current monitoring well but have existing wells that could be incorporated into the network. Many quads have more than one existing well that could be added to the network, so the question in these cases is which well would provide most useful data to the monitoring network? There is no straight forward answer to this question, as it will depend on a number of factors explained below.

> Historical water level data at well or near the well – Historical well data indicates that a water level can be measured at the well and that the well owner is likely to allow the district to monitor their well. In addition, historical water level data will help the district to document how aquifer conditions change over time in response to changes in pumping.
>
> Spatial Utility – Within a quad some well locations may be more advantageous than others because they do a better job filling a gap in coverage. INTERA used a geospatial technique that quantifies the positive impact each well has on water level maps estimated within a quad. The well with the greatest benefit gets a spatial rank of 1. Figure 5-1 shows the results of this spatial ranking technique for wells in the Woodbine aquifer and inside quad 32-55. The existing well labeled R1 had the greatest benefit followed by R2, R3, and R4. In this example there was only a small difference in the positive influence of R2 and R3, so this District should consider historical data and the other factors listed below.
>
> Low or seasonal pumping at the well – Ideally, a monitoring well should not be pumped because the water level in the well should reflect the water level in the vicinity of the well. As discussed in Section 3.2, in order to help compensate for the bias caused by pumping a monitoring well, the pump should be shut down long enough for the water level to recover to reflect non-pumping conditions. At wells that are pumped at high rates, there will always be unknowns and problems associating determining how representative the water level is local conditions. To help minimize any biases associated with these unknowns and problems, wells with seasonal pumping, intermittent pumping, or low pumping should be given more consideration than wells with higher or year-round pumping.
>
> Coordination with well owners - Voluntary cooperation from well owners is essential for most of the existing monitoring well networks. As such, it is imperative that District be proactive with identifying and addressing well owners' concerns prior to contacting them for permission to use their well as part of the district monitoring network. Among the ways the district can be

proactive is to run articles and advertisements in local newspapers and to provide information on the district's website that explains the purpose and value of groundwater monitoring. Typically, most well owners do not want a lease agreement when they volunteer their well as a monitoring well. However, in case either the District or a land owner is interested in having such an agreement, Appendix F provides an example of a monitoring lease agreement used by the Post Oak Savannah GCD.

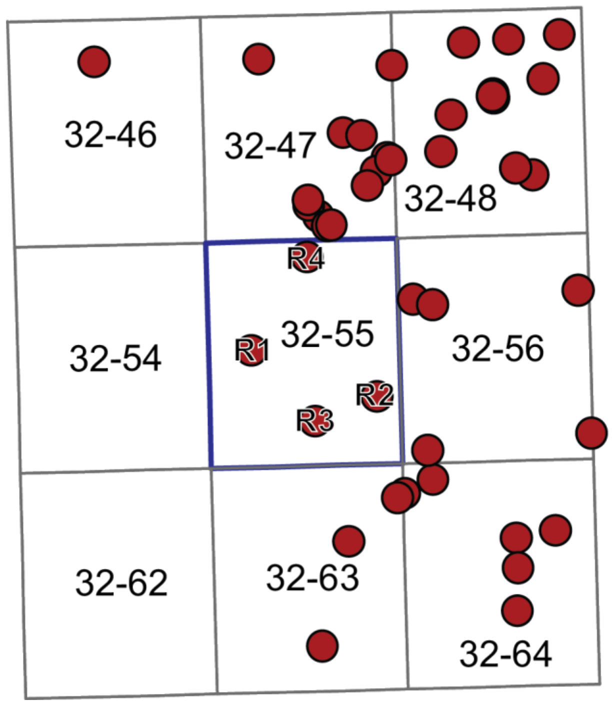

Figure 5-1 Example of spatial ranking for quad 32-35. Water level measurements at R1 have the greatest positive impact on water level maps

Table 5-1 Woodbine Expansion Strategy

Year	Woodbine			
	Type of well added		Total Number of Wells in Monitoring Network	Percent Complete (35 Woodbine wells needed to complete monitoring network)
	Exisitng Well	New Well		
2021	0	0	5	14%
2022	3	0	8	23%
2023	3	0	11	31%
2024	3	0	14	40%
2025	3	0	17	49%
2026	7	0	24	69%
2027	2	0	26	74%
2028	0	0	26	74%
2029	0	1	27	77%
2030	0	1	28	80%
2031	0	1	29	83%
2032	0	1	30	86%
2033	0	1	31	89%
2034	0	1	32	91%
2035	0	1	33	94%
2036	0	1	34	97%
2037	0	1	35	100%

Table 5-2 Paluxy Expansion Strategy

Year	Paluxy			
	Type of well added		Total Number of Wells in Monitoring Network	Percent Complete (36 Paluxy wells needed to complete monitoring network)
	Exisitng Well	New Well		
2021	0	0	9	25%
2022	2	0	11	31%
2023	2	0	13	36%
2024	2	0	15	42%
2025	3	0	18	50%
2026	3	0	21	58%
2027	0	0	21	58%
2028	0	1	22	61%
2029	0	1	23	64%
2030	0	1	24	67%
2031	0	1	25	69%
2032	0	1	26	72%
2033	0	1	27	75%
2034	0	1	28	78%
2035	0	1	29	81%
2036	0	1	30	83%
2037	0	1	31	86%
2038	0	1	32	89%
2039	0	1	33	92%
2040	0	1	34	94%
2041	0	1	35	97%
2042	0	1	36	100%

Table 5-3 Glen Rose Expansion Strategy

Year	Glen Rose			
	Type of well added		Total Number of Wells in Monitoring Network	Percent Complete (40 Glen Rose wells needed to complete monitoring network)
	Exisitng Well	New Well		
2021	0	0	4	10%
2022	0	0	4	10%
2023	0	0	4	10%
2024	0	0	4	10%
2025	0	0	4	10%
2026	3	0	7	18%
2027	10	0	17	43%
2028	0	0	17	43%
2029	0	0	17	43%
2030	0	0	17	43%
2031	0	0	17	43%
2032	0	0	17	43%
2033	0	0	17	43%
2034	0	0	17	43%
2035	0	0	17	43%
2036	0	0	17	43%
2037	0	0	17	43%
2038	0	0	17	43%
2039	0	0	17	43%
2040	0	0	17	43%
2041	0	0	17	43%
2042	0	0	17	43%
2043	0	0	17	43%
2044	0	0	17	43%
2045	0	0	17	43%
2046	0	2	19	48%
2047	0	3	22	55%
2048	0	3	25	63%
2049	0	3	28	70%
2050	0	3	31	78%
2051	0	3	34	85%
2052	0	3	37	93%
2053	0	2	39	98%
2054	0	1	40	100%

Table 5-4 Hensell Expansion Strategy

Year	Hensell			
	Type of well added		Total Number of Wells in Monitoring Network	Percent Complete (36 Hensell wells needed to complete monitoring network)
	Exisitng Well	New Well		
2021	0	0	5	14%
2022	0	0	5	14%
2023	0	0	5	14%
2024	2	0	7	19%
2025	3	0	10	28%
2026	0	0	10	28%
2027	0	0	10	28%
2028	0	0	10	28%
2029	0	1	11	31%
2030	0	1	12	33%
2031	0	1	13	36%
2032	0	1	14	39%
2033	0	1	15	42%
2034	0	1	16	44%
2035	0	1	17	47%
2036	0	1	18	50%
2037	0	1	19	53%
2038	0	2	21	58%
2039	0	2	23	64%
2040	0	2	25	69%
2041	0	2	27	75%
2042	0	2	29	81%
2043	0	2	31	86%
2044	0	2	33	92%
2045	0	2	35	97%
2046	0	1	36	100%

Table 5-5 Hosston Expansion Strategy

Year	Hosston			
	Type of well added		Total Number of Wells in Monitoring Network	Percent Complete (50 Hosston wells needed to complete monitoring network)
	Exisitng Well	New Well		
2021	0	0	25	50%
2022	5	2	32	64%
2023	5	2	39	78%
2024	2	2	43	86%
2025	0	2	45	90%
2026	0	2	47	94%
2027	0	2	49	98%
2028	0	1	50	100%

Table 5-6 Twin Mountains Expansion Strategy

Year	Twin Mountains			
	Type of well added		Total Number of Wells in Monitoring Network	Percent Complete (13 Twin Mountains wells needed to complete monitoring network)
	Exisitng Well	New Well		
2021	0	0	7	54%
2022	0	0	7	54%
2023	0	0	7	54%
2024	1	0	8	62%
2025	1	0	9	69%
2026	0	0	9	69%
2027	0	0	9	69%
2028	0	0	9	69%
2029	0	0	9	69%
2030	0	0	9	69%
2031	0	0	9	69%
2032	0	0	9	69%
2033	0	0	9	69%
2034	0	0	9	69%
2035	0	0	9	69%
2036	0	0	9	69%
2037	0	0	9	69%
2038	0	0	9	69%
2039	0	0	9	69%
2040	0	0	9	69%
2041	0	0	9	69%
2042	0	1	10	77%
2043	0	1	11	85%
2044	0	1	12	92%
2045	0	1	13	100%

6.0 RECOMMENDED ANALYIS APPROACH

The regular (at least annual) collection of water level data from the monitoring well network described above will enable the District to track water level changes over time. The steps outlined below describe the process for determining the average water level change for an individual year, which can be tracked to determine the average water level changes over longer periods of time.

Process for Determining Average Annual Water Level Change

1. Collect water level data from the monitoring well network as described in the sections above. If multiple water levels are collected from a single well during the winter months, select and use only the shallowest depth to water for this analysis.
2. Filter the wells to only those with a valid measurement in both the current year and the previous year.
3. Subtract the depth-to-water in the current year from the depth-to-water in the previous year for each well.
4. Search for anomalously large water level changes – either drawdowns or recoveries – that may indicate that one or both water level measurements was unreliable, impacted by nearby pumping, or otherwise erroneous. Outliers may be obvious upon inspection. Consider further investigating any wells where the water level change falls outside two standard deviations from the average water level change. Remove wells suspected of being or found to be erroneous from the calculation.
5. Average the water level changes among the remaining wells to determine the average across each aquifer within each County.

A major benefit to this method is that it allows for wells to be added to or taken out of the monitoring network over time while still making use of the data during the period that it is collected. The set of wells used to define the average water level change will be likely be slightly different from one year to the next, but the conclusions will still be valid. The methods described above for calculating the average annual water level change and accumulating these changes to define the average water level changes over longer periods of time provides the District with a defined and reliable method of tracking progress toward DFCs.

7.0 References

Hopkins, J., 1994. Explanation of the Texas Water Development Board Ground-Water Level Monitoring Program and Water-Level Manual. User Manual -52, Texas Water Development Board, Austin Texas.

Kelley, V.A., Ewing, J., Jones, T.L., Young, S.C., Deeds, N., and Hamlin, S., 2014, Updated Groundwater Availability Model of the Northern Trinity and Woodbine Aquifers – Final Model Report (August 2014), 990 p., http://www.twdb.texas.gov/groundwater/models/gam/trnt_n/Final_NTGAM_Vol%20I%20Aug%202014_Report.pdf?d=1503601407956.