GATEWAY GROUNDWATER CONSERVATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

DISTRICT MISSION

The mission of Gateway Groundwater Conservation District is to manage, protect and conserve the groundwater resources of the District for the citizens, economy and environment of the District; while protecting personal property rights, and promoting the constructive and beneficial uses of the available groundwater in the District.

TIME PERIOD FOR THIS PLAN

The District may review the plan annually and must review and readopt the plan with or without revisions at least once every five years.

STATEMENT OF GUIDING PRINCIPLES

The District recognizes the vital importance of groundwater resources in the region. The District is committed to the following principles, which we believe will maximize the benefits of these water resources for the citizens of the District. The goals of the Management Plan are consistent with those of Panhandle, Region B, and Llano Estacado regional water planning areas.

1. Citizens of the District benefit economically and aesthetically by the natural resources of the District.
2. These natural resources will be preserved for present and future generations.
3. To achieve the District's mission, it is necessary to understand the amount and quality of available groundwater, and factors affecting the sustainable use of the groundwater.
4. Landowner property rights will be honored. Groundwater resources will be managed by local interest; therefore, landowners will be partners with the District in managing and protecting groundwater resources.
5. All citizens will be treated equally, without preference or prejudice.
6. The District will coordinate with the regional water planning groups, other affected water planning groups, private or public water supply entities, and State water management agencies.
7. The District does not wish to become a tax burden to citizens; therefore, District water resources will not be over-managed or become an impediment to the beneficial uses of groundwater.

GENERAL DESCRIPTION

On February 1, 2001, citizens of Hardeman and Foard counties formed the District through election. The original name of the District was Tri-county Groundwater Conservation District, due to anticipation of all or part of Wilbarger County joining in the future. After citizens of

Childress and Cottle counties elected to join the District, the new name, Gateway Groundwater Conservation District (GGCD), was adopted. Since that time, citizens of Motley and King counties have also elected to join the District.

The District is comprised of 12 directors, with two directors representing each of the six counties. Current District Officers are Jason Poole, president; Brent Whitaker, vice-president; and Jim Sweeney, secretary/treasurer. Current District Directors are Weldon Tabor, Johnny Kajs, James Gillespie, Bill Luckett, Todd Smith, H.L. Ayers, True Burson, Gage Moorhouse, and Rick Husband.

LOCATION AND EXTENT OF GATEWAY GCD

The District encompasses an area of 4,880 square miles, which contains all of Cottle, Foard, Hardeman, King and Motley counties, and approximately 94 percent of Childress County. These counties are located in the northern, low rolling plains area of Texas and within the Red River watershed. Topography of Foard and Hardeman counties consists of level to rolling plains farmland in eastern parts to rough, juniper covered hills of the Blaine Escarpment in western parts. The ground surface elevation generally slopes downward from west to east with the highest land surface elevations in Motley County, located above the "Caprock" of the Llano Estacado Plateau.

Much of the District is rough rangeland and is not suitable for cultivated crops. About 70 percent of Cottle, Foard and Motley counties are comprised of rangeland while Childress and Hardeman counties are about 40 percent. King County is about 90 percent rangeland and has little suitable acreage for cultivated crops. Low rainfall, on average 23 inches annually, and heavy clay soils causing low water infiltration in large parts of the District also limit cropland production.

The economy is dominated by agriculture; primarily beef cattle, wheat and cotton production. Sport hunting, solar and land leases for wind energy development have increased significantly in recent years and has been a boost to the otherwise generally depressed agricultural economy. A slow but steady decline in population for the counties in the District, and a slight decline in irrigation water use indicates future water use demand is unlikely to increase.

Agriculture accounts for about 75 percent of the groundwater use in the District. Compared to other groundwater districts, the groundwater use, and its economic impact in GGCD is small.

The State of Texas has designated groundwater management areas and regional water planning groups throughout the state. Currently, the District is a part of Groundwater Management Area (GMA) 6 and three Water Planning Groups including Panhandle, Childress County; Region B, Cottle, Foard, Hardeman, and King counties; and Llano Estacado, Motley County. The District coordinates with these planning groups regularly through joint planning meetings.

GROUNDWATER RESOURCES

The Seymour and Blaine aquifers are the District's two significant groundwater sources. The Seymour Aquifer is located in eastern and northwest Hardeman County, northeastern Foard County, northern and central Motley County, and central Childress and Cottle counties; and the

Blaine Aquifer is located in western parts of Foard and Hardeman counties, eastern parts of Cottle and Childress counties, and northeastern King County. There is a limited source of groundwater from the Ogallala and Dockum Aquifers in southwestern Motley County.

The geologic and hydrologic character of the Seymour Aquifer is quite variable. Typically, wells are 30 to 60 feet deep and are completed in the lower part of the formation, which consists of sand and gravel. Well yields average 270 gallons per minute and can be as high as 1,300 gallons per minute. Saturated thickness is typically between 20 and 40 feet.

The Seymour Aquifer is frequently disconnected hydraulically from one area to another. Since it is an alluvial aquifer, porosity and continuity is quite variable. Artificial recharge by pumping would not be an efficient way to store water in this aquifer, except in areas where the formation is fairly uniform. However, there may be effective ways to increase recharge from rainwater. Furrow diking is an experimental farming method used to increase soil infiltration into the root zone of cultivated crops. It creates small water pockets in the furrows after rainfall and reduces runoff. This method should also increase infiltration into the shallow Seymour Aquifer, especially in the lighter soils. Other methods may be building small berms to trap runoff water in shallow ponds to allow more time for infiltration. Mesquite is a costly invader in the rangelands of the District. Brush control to remove or kill mesquite will increase groundwater recharge, because the large amount of deep soil moisture taken by mesquite would be reduced.

Nearly all recharge to the Seymour Aquifer is by direct infiltration of precipitation on the land surface. The RWPG-B report estimates the annual recharge from rainfall on the aquifer outcrop area to be from 5 to 7 percent. The outcrop area is directly above the aquifer; therefore, local rainfall determines the amount of recharge. The average annual recharge to the Seymour Aquifer in the District is estimated to be 51,968 acre-feet per year (GAM Run19-023).

The water quality in the Seymour Aquifer is variable. The dissolved solids content varies from about 50 to 300 milligrams per liter. Dissolved solids are typically lower for the more prolific wells in the high infiltration rate sands of the major recharge and irrigation areas. Therefore, the dissolved solid concentrations are normally not a problem for irrigation or for public supplies. However, nitrate levels often exceed the state standard of 10 milligrams per liter recommended for public water supplies. These high nitrate concentrations are the result of leaching natural soil nitrogen and nitrogen fertilizers from the land above the Seymour Aquifer.

The Blaine Aquifer consists of water stored in cavities of gypsum and limestone rock. This aquifer is typically encountered about 100 to 150 feet below the ground surface and has a saturated thickness less than 300 feet. The primary source of recharge to the Blaine Aquifer is precipitation that falls on the High Plains Escarpment to the west of the Blaine outcrop area. The openings and fractures in the gypsum provide access for water to percolate downward. The RWPG-B report estimates the annual recharge from rainfall on the aquifer outcrop area to be from 5 to 7 percent. The average annual recharge to the Blaine Aquifer in the District is estimated to be 51,284 acre-feet per year (GAM Run19-023). Artificial recharge to the aquifer might be achieved by creating small ponds to retain runoff or through furrow diking. Controlling mesquite and juniper in the outcrop area should also increase recharge by limiting soil moisture intake.

The Blaine Aquifer water is high in dissolved solids, typically about 3,000 milligrams per liter. This salinity is too high for public water supply use. However, local farmers report that it has been used to irrigate cotton fields since the 1950’s without significant problems due to salinity buildup in the soil. The high solids result from the natural dissolving of gypsum and limestone rock within the aquifer; therefore, there are no feasible methods to reduce the dissolved solids levels.

The Ogallala Aquifer is present in the southwest corner of Motley County. The formation thickness at the western edge of the county is approximately 100 feet. The formation thins rapidly to the east and does not reach the north-south State Highway 70. The maximum saturated thickness is about 30 feet in the western portion.

The sediments are primarily sands with silt and clay, and a gravel conglomerate is often present at the base. The formation is highly eroded, and the topography is not suitable for widespread irrigation activities. Water quality is generally good, and water production rates are generally less than 300 gallons per minute.

The Dockum Aquifer is under the Ogallala Aquifer and extends farther to the east where it is exposed on the surface. The sediments are primarily sandstones, conglomerates, and sandy shales. Irrigation wells completed in the Dockum Group formations have had yields as high as 700 gallons per minute in the past; however, current yields are generally lower. Water quality is good to fair.

TECHNICAL INFORMATION
The Groundwater Management Plan Data packet provided by TWDB is in Appendix A.

PROJECTED SURFACE WATER SUPPLIES (Please refer to the 2017 State Water Plan in Appendix A)

Currently Available Surface Water Supplies – Reservoirs Region A
There are two lakes in Childress with limited potential for water supply. The following was extracted from the Region A Water Plan, 2016:

Baylor Lake is on Baylor Creek in the Red River Basin, ten miles northwest of Childress in western Childress County. The reservoir is owned and operated by the city of Childress. Although the City has water rights to divert up to 397 acre-feet per year from the reservoir (TCEQ, 2009), there is currently no infrastructure to divert water for municipal use. Construction of the earth fill dam was started on April 1, 1949 and completed in February 1950. Deliberate impoundment of water was begun in December 1949. Baylor Lake has a capacity of 9,220 acre-feet and a surface area of 610 acres at the operating elevation of 2,010 feet above mean sea level. The drainage area above the dam is forty square miles. (Breeding, 1999).

Lake Childress is eight miles northwest of Childress in Childress County. This reservoir, built in 1923 on a tributary of Baylor Creek, in the Red River Basin, adjacent to Baylor Lake. In 1964 it was still part of the City of Childress' water supply system, as was the smaller Williams Reservoir to the southeast [Breeding, 1999]. It is no longer used for water supply. The reservoir is permitted to store 4,725 acre-feet for recreational purposes (TCEQ, 2009).

From the above, there may be up to 397 acre-feet per year available should the necessary infrastructure be reconstructed.

Currently Available Surface Water Supplies – Reservoirs Region B (ac-ft per year)
Lake Pauline is located on the upper reaches of Wanderers Creek near Quanah in Hardeman County. The dam was completed in 1928 and the reservoir had a reported conservation capacity of 4,137 acre-feet in 1968 (Bisset, 1999). Lake Pauline was formerly used as cooling water for a steam electric power plant. This facility is now privately owned and is used for recreation

No Currently Available Surface Water Supplies – Reservoirs were identified in Region O (Motley County)

MANAGEMENT OF GROUNDWATER SUPPLIES

This management plan has been adopted by the Board in accordance with Section 36.1071 of the Texas Water Code and will remain in effect for a period of five years unless modified by the Board prior to the end of the planning period. The District, in partnership with the landowners of the District, will manage the groundwater within the District in accordance with its mission and goals while seeking to maintain the economic viability of all resource user groups, public and private. The District will strive to identify and implement practices which will result in the sustainability of the groundwater resources within the District, including reductions of groundwater use where necessary to achieve that result.

The District will implement monitoring programs, collect any available information to increase our understanding of the groundwater resources, and help determine any trends in groundwater availability and quality.

The District will have rules which may regulate groundwater withdrawals by means of production limits and fees, spacing regulations, and export fees and requirements. The District may deny a well construction permit or limit groundwater withdrawals in accordance with District rules. In making a determination to deny a permit or limit groundwater withdrawals or export, the District will weigh the public benefit against individual hardship after considering all appropriate testimony. However, the conservation and preservation of the groundwater resource is a major consideration in any such determination.

In pursuit of the District's mission of preserving and protecting the resource, the District will enforce the terms and conditions of permits and the rules of the District by enjoining the permit holder in a court of competent jurisdiction, as provided for in TWC Chapter 36.102, if necessary.

MANAGEMENT ISSUES

The total amount of water supply within the District remains greater than the projected water demands. The challenge for the District will be to protect and conserve the available water supply.

Even though the estimated sustainable use for the District is higher than the current use, conservation and avoidance of water wasteful practices will be a concern of the District. Localized areas of high irrigation use can exceed supply, especially in the Seymour Aquifer. Permeability through the Seymour alluvium is variable and typically slow. Farmers report that their wells draw down during prolonged dry spells. Certain areas are more prone to well drawdown and pumping limitations than other areas nearby. There are some areas within the Seymour Aquifer that do not appear to be well connected hydraulically with other nearby areas. Proper management will be difficult in these areas. Avoidance of waste will help to maximize the sustainable benefits of the groundwater resource and will be a District goal.

Another challenge for the District will be to prevent degradation of the water quality in the aquifers. Primary concerns are

(1) Contamination of the Blaine and Seymour aquifers water resulting from improperly plugged or capped abandoned wells, due to inflow from the surface or other water bearing strata.
(2) Increasing nitrate concentrations in the Seymour Aquifer due to leaching of nitrates from fertilizer, nitrogen fixing crops, or naturally occurring nitrogen.

An additional management concern for the District is the District's operating expenses. These aquifers have been used for many years without becoming depleted, without significant avoidable deterioration in water quality, and without serious conflicts between water users. If the District cannot provide positive benefits to the District's citizens, then we believe we should spend a minimum of tax dollars in this effort. Litigation expenses are out of proportion to the economy and the lifestyles of the citizens and landowners of the District. We will not commit our citizens to these types of expenses, and we are concerned the State mandated management of groundwater districts amounts to an unfunded State mandate, and we will not be an economic burden upon our own citizens.

ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN IMPLEMENTATION

The District will implement and utilize the provisions of this plan as guidelines for determining the direction or priority for all District activities. All operations of the District, all agreements entered into by the District, and any additional planning efforts in which the District may participate will be consistent with the provisions of this plan.

The District has adopted District rules for permitting wells and the production of groundwater. All District rules will be enforced. The promulgation and enforcement of the District rules will be based on the best technical evidence available. Rules can be found at: http://www.gatewaygroundwater.com/rules.html.

The District will treat all citizens equally. Citizens may apply to the District for a waiver in the enforcement of one or more of the District rules on the grounds of adverse economic effects or unique local conditions. In granting or denying any waiver to District rules, the Board shall consider the potential for adverse effects on adjacent landowners. The exercise of discretion in granting or denying of any waiver by the Board shall not be construed as limiting the power of the Board.

In the implementation of this plan and in the management of groundwater resources within the District, the District will seek the cooperation of all residents, landowners and well owners. All activities of the District will be undertaken in cooperation and coordination with any appropriate state, regional or local water management entity

MODELED AVAILABLE GROUNDWATER

The estimates of modeled available groundwater are from GAM Run 16-031 MAG and is in Appendix B.

ESTIMATE OF GROUNDWATER BEING USED IN THE DISTRICT

The estimates of amount of groundwater being used within the District are from the 2017 State Water Plan data packet and are in Appendix A.

ESTIMATES OF RECHARGE, DISCHARGE, AND FLOWS

The estimates of the amount of recharge from precipitation, water that discharges from the aquifer, and estimates of annual volume of flow into and out of the district, and between aquifers are from GAM Run 19-023 and are in Appendix C.

ESTIMATE OF PROJECTED TOTAL DEMAND FOR WATER

The estimates of the projected total demand for water is from the 2017 State Water Plan data packet and are in Appendix A.

CONSIDERING WATER NEEDS AND STRATEGIES MANAGEMENT GOALS AND PERFORMANCE STANDARDS

Water supply needs exist for these categories: irrigation (Hardeman County), livestock (Motley County), and mining (Motley County). The strategy to address these needs is demand reduction. In addition, there are water management strategies to develop added groundwater supplies for county-other, municipal, and manufacturing from the Ogallala Aquifer. There are numerous water management strategies for water conservation for municipal, irrigation, and mining in the 2017 State Water Plan data packet provided from the TWDB in Appendix A.

METHODOLOGY
The methodology that the District will use to track its progress on an annual basis in achieving all of its management goals will be as follows: The District manager will prepare and present an annual report to the Board on District performance in regards to achieving management goals and objectives (during the first quarterly Board of Directors meeting each fiscal year). The report will include the number of instances each activity was engaged in during the year. The annual report will be maintained on file at the District office.

GOAL 1: PROVIDING THE MOST EFFICIENT USE OF GROUNDWATER
MANAGEMENT OBJECTIVE: To encourage and assist farmers in the District to improve their irrigation systems to be more efficient by assistance through Federal cost share programs such as EQIP or District grant programs.

PERFORMANCE STANDARD: Post information on the District's Web Site and give a presentation at least once per year containing information about assistance available to farmers in the District and report annually to the Board in the annual report.

GOAL 2: CONTROLLING AND PREVENTING WASTE OF GROUNDWATER
MANAGEMENT OBJECTIVE: Identify and address local wasteful irrigation practices.

PERFORMANCE STANDARDS: Review District rules at least once per year and report to the District Board incidences of complaints and problems concerning overuse, water waste, interference between wells, water quality problems and other problems. Perform sight inspections on each incident of wasteful practices and report annually to Board in annual report.

MANAGEMENT OBJECTIVE: Post available information on the District's Web Site at least once per year promoting the efficient uses and avoidance of waste of groundwater.

PERFORMANCE STANDARDS: Report at least annually in the annual report to the Board articles posted to website.

GOAL 4: ADDRESSING CONJUNCTIVE SURFACE WATER MANAGEMENT ISSUES
MANAGEMENT OBJECTIVE: Each year on at least two occasions the District will attend meetings of Region A, Region B, or Region O RWPG to remain current on surface water issues.

PERFORMANCE STANDARD: At least twice annually District Staff will attend RWPG meetings and will report annually in the annual report.

GOAL 5: ADDRESSING NATURAL RESOURCE ISSUES
MANAGEMENT OBJECTIVE: Enforce District rules concerning capping and plugging of abandoned wells, and other actions as necessary to protect the quality of the groundwater in the District.

PERFORMANCE STANDARD: Report to the Board the number of complaints, reports, and actions taken concerning groundwater quality in the annual report and report to the Board annually.

MANAGEMENT OBJECTIVE: Disseminate information concerning the requirements and recommended practices to prevent the contamination of groundwater.

PERFORMANCE STANDARD: Post information on the District's web site at least once per year concerning the prevention of contamination of groundwater and report the articles posted in the annual report to the board annually.

GOAL 6: ADDRESSING DROUGHT CONDITIONS
MANAGEMENT OBJECTIVE: Provide Drought Severity Information

PERFORMANCE STANDARD: Post the Palmer Drought Severity Index value on the District's Facebook page at least once quarterly and report a summary to the Board in the annual report.

PERFORMANCE STANDARD: Share TWDB drought link, with useful drought information at least once quarterly on the District's Facebook page and report a summary to the Board in the annual report. That link is: https://www.waterdatafortexas.org/drought .

MANAGEMENT OBJECTIVE: In the next five years, the District will study the possibility of cooperating with TWDB to install a weather station in the District. This would allow District residents to have daily information regarding drought and weather patterns.

PERFORMANCE STANDARD: Within this 5-year period, the District will determine the feasibility of partnering with TWDB to install a weather station in the District and report the results to the Board in the annual report.

GOAL 7: ADDRESSING CONSERVATION
MANAGEMENT OBJECTIVE: Construct a database and comprehensive maps of the District showing all permitted wells. Obtain and include other available information from the Texas Water Development Board and other water resource agencies including well logs.

PERFORMANCE STANDARDS: Annually report to the Board the number of wells in the database and the number of requests for information and provide a well location map in the annual report.

MANAGEMENT OBJECTIVE: Publicize the need for efficient use of groundwater to schools, producers, ag teachers, and community members through use of education programs and educational trailer.

PERFORMANCE STANDARDS: Give a presentation to a public group at least once annually and report the number of presentations to the Board in the annual report.

GOAL 8: RAINWATER HARVESTING
MANAGEMENT OBJECTIVE: Hold at least 1 rainwater workshop annually for interested members of the public. Seek grants and other sources of funding to assist interested members of the community in installation of rainwater harvesting equipment.

PERFORMANCE STANDARD: Hold 1 rainwater harvesting workshop and report it to the Board in the annual report in the following fiscal year.

GOAL 9: ADDRESSING BRUSH CONTROL
MANAGEMENT OBJECTIVE: Support the NRCS Brush Control conferences and workshops.

PERFORMANCE STANDARDS: At least once per year attend the NRCS Brush Control Conference and post information regarding the conference on the District's website, and report to the Board annually in the annual report.

GOAL 10. ADDRESSING THE DESIRED FUTURE CONDITIONS
MANAGEMENT OBJECTIVE: The District will annually measure water levels in at least one monitoring well in Seymour Aquifer Pod 3; at least one monitoring well in each of the counties in Seymour Aquifer Pod 4, at least one monitoring well in the Ogallala/Dockum area of Motley County, and at least one monitoring well in each of the counties in the Blaine Aquifer.

PERFORMANCE STANDARDS: The District will construct water level tracking charts using the annual water level measurements measured by the District and TWDB, prepare annual water level trend analysis, compare the trend results to the desired future conditions of each aquifer subdivision, and provide the results in the District's annual report to the Board in the following fiscal year.

SB-1 MANAGEMENT GOALS DETERMINED NOT APPLICABLE

The following goals mandated to be addressed by Senate Bill 1 of the 75th Texas Legislature, 1997, have been determined not to apply to the Gateway Groundwater Conservation District for the reasons stated below.

GOAL 3.0 CONTROLLING AND PREVENTING SUBSIDENCE

The District examined subsidence by calculating Risk factors using the Texas Aquifer Potential Subsidence Prediction Screening Tool, v.1.0, March 21, 2018, Risk values were calculated for the aquifers in each County where present and a Desired Future Condition had been established. Input data sources included District data, District hydrographs and the TWDB Groundwater Database. If no input values were available from those sources, the default values from the Model were used. The calculated values are in the table below.

The calculated Weighted Risk values indicated a low to medium subsidence risk. However, the Blaine Formation area has existing areas of sinkhole development. These sinkholes have developed where soluble gypsum and high-water tables occur. Rising water tables can increase the risk of sinkhole development in the gypsum outcrop areas. The calculated risk values for these areas may be understated.

CALCULATED RISK FACTORS by SUBSIDENCE SCREENING PREDICTION TOOL

COUNTY	AQUIFER				SEYMOUR POD
	BLAINE	DOCKUM	OGALLALA	SEYMOUR	POD No.
CHILDRESS	3.75	-	-	3.75	4
COTTLE	2.34	-	-	-	-
FOARD	3.59	-	-	3.91	4
HARDEMAN	3.75	-	-	3.13	4
KING	2.76	-	-	-	-
MOTLEY	-	3.59	4.38	3.91	3

General subsidence is not observed in the District. Local sinkholes caused by groundwater dissolving the gypsum commonly found in the Blaine formation do occur occasionally. There are no available measures to prevent groundwater from dissolving gypsum.

2.0 ADDRESSING RECHARGE ENHANCEMENT

Not applicable due to limitations of topography and soil conditions.

3.0 ADDRESSING PRECIPITATION ENHANCEMENT

Presently is cost prohibitive.

APPROVAL AND ADOPTION

Be it resolved that the Board of Directors of the Gateway Groundwater Conservation District does hereby approve and adopt this Groundwater Management Plan in open meeting on December 2, 2020

President	Member
Vice-President	Member
Secretary	Member
Member	Member
Member	Member
Member	Member

Appendix A
Estimated Historical Water Use and 2017 State Water Plan

Estimated Historical Groundwater Use And 2017 State Water Plan Datasets:

Gateway Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
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December 18, 2020

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 2017 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 Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2017 SWP data available as of 12/18/2020. 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 2017 SWP. District personnel must review these datasets and correct any discrepancies in order 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 2017 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 perfect 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 2019. TWDB staff anticipates the calculation and posting of these estimates at a later date.

CHILDRESS COUNTY *93.94% (multiplier)* All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	52	0	0	0	13,776	217	14,045
	SW	1,310	0	0	0	0	24	1,334
2017	GW	32	0	0	0	13,232	208	13,472
	SW	1,400	0	0	0	0	23	1,423
2016	GW	32	0	0	0	14,176	192	14,400
	SW	1,443	0	0	0	0	22	1,465
2015	GW	18	0	0	0	10,842	189	11,049
	SW	1,466	0	0	0	0	21	1,487
2014	GW	20	0	0	0	19,038	186	19,244
	SW	1,402	0	0	0	0	21	1,423
2013	GW	22	0	0	0	12,433	182	12,637
	SW	1,407	0	0	0	0	21	1,428
2012	GW	26	0	0	0	17,430	235	17,691
	SW	1,528	0	0	0	0	26	1,554
2011	GW	34	0	0	0	16,402	267	16,703
	SW	1,658	0	0	0	0	30	1,688
2010	GW	57	0	0	0	8,883	259	9,199
	SW	1,533	0	0	0	0	29	1,562
2009	GW	79	0	0	0	16,556	257	16,892
	SW	1,548	25	0	0	0	28	1,601
2008	GW	113	0	0	0	12,905	286	13,304
	SW	1,627	25	0	0	0	32	1,684
2007	GW	107	0	0	0	8,816	343	9,266
	SW	1,489	25	0	0	0	38	1,552
2006	GW	117	0	0	0	9,309	286	9,712
	SW	1,675	25	0	0	0	32	1,732
2005	GW	107	0	0	0	12,502	300	12,909
	SW	1,347	51	0	0	0	33	1,431
2004	GW	101	0	0	0	10,034	33	10,168
	SW	1,662	48	0	0	0	293	2,003
2003	GW	110	0	0	0	9,552	33	9,695
	SW	1,342	22	0	0	0	293	1,657

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

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	462	0	0	0	4,191	264	4,917
	SW	13	0	0	0	0	113	126
2017	GW	356	0	0	0	3,773	252	4,381
	SW	13	0	0	0	0	108	121
2016	GW	322	0	2	0	4,319	208	4,851
	SW	12	0	0	0	0	89	101
2015	GW	391	0	0	0	3,923	205	4,519
	SW	12	0	0	0	0	88	100
2014	GW	387	0	7	0	4,465	200	5,059
	SW	11	0	0	0	0	86	97
2013	GW	396	0	1	0	5,125	204	5,726
	SW	12	0	0	0	0	87	99
2012	GW	403	0	2	0	5,337	280	6,022
	SW	12	0	0	0	0	120	132
2011	GW	475	0	0	0	3,219	316	4,010
	SW	13	0	0	0	0	135	148
2010	GW	359	0	17	0	1,483	307	2,166
	SW	12	0	4	0	0	132	148
2009	GW	368	0	9	0	2,492	358	3,227
	SW	12	0	2	0	0	154	168
2008	GW	324	0	2	0	2,701	346	3,373
	SW	12	0	0	0	0	148	160
2007	GW	397	0	0	0	2,394	381	3,172
	SW	11	0	0	0	0	163	174
2006	GW	596	0	0	0	3,999	322	4,917
	SW	11	0	0	0	0	138	149
2005	GW	382	0	0	0	4,132	322	4,836
	SW	12	0	0	0	0	138	150
2004	GW	301	0	0	0	4,548	50	4,899
	SW	9	0	0	0	0	449	458
2003	GW	439	0	0	0	3,569	52	4,060
	SW	12	0	0	0	0	464	476

FOARD COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	29	0	0	0	2,168	38	2,235
	SW	199	0	0	0	0	345	544
2017	GW	27	0	0	0	2,112	36	2,175
	SW	207	0	0	0	0	328	535
2016	GW	22	0	0	0	2,489	25	2,536
	SW	207	0	0	0	0	225	432
2015	GW	20	0	0	0	1,974	25	2,019
	SW	258	0	0	0	0	221	479
2014	GW	23	0	0	0	2,800	24	2,847
	SW	261	0	0	0	0	216	477
2013	GW	35	0	0	0	2,055	24	2,114
	SW	218	0	0	0	0	220	438
2012	GW	42	0	0	0	3,919	24	3,985
	SW	223	0	0	0	0	220	443
2011	GW	41	0	0	0	4,991	28	5,060
	SW	259	0	0	0	0	254	513
2010	GW	42	0	10	0	2,300	29	2,381
	SW	241	0	2	0	0	257	500
2009	GW	30	0	5	0	3,747	35	3,817
	SW	324	0	1	0	0	320	645
2008	GW	34	0	1	0	3,636	33	3,704
	SW	328	0	0	0	0	298	626
2007	GW	32	0	0	0	3,269	35	3,336
	SW	315	0	0	0	0	312	627
2006	GW	37	0	0	0	4,062	35	4,134
	SW	334	0	0	0	0	317	651
2005	GW	35	0	0	0	3,877	38	3,950
	SW	335	0	0	0	0	342	677
2004	GW	34	0	0	0	4,351	34	4,419
	SW	311	0	0	0	0	305	616
2003	GW	36	0	0	0	3,636	32	3,704
	SW	313	0	0	0	0	290	603

HARDEMAN COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	51	65	3	0	16,936	168	17,223
	SW	410	133	12	0	0	252	807
2017	GW	63	122	2	0	15,948	165	16,300
	SW	407	73	8	0	0	247	735
2016	GW	62	123	3	0	14,178	149	14,515
	SW	416	80	13	0	0	224	733
2015	GW	59	123	0	0	12,310	143	12,635
	SW	398	81	0	0	0	215	694
2014	GW	60	38	0	0	14,396	141	14,635
	SW	431	155	0	0	0	212	798
2013	GW	74	0	0	0	9,708	139	9,921
	SW	428	182	0	0	0	208	818
2012	GW	96	252	0	0	17,067	194	17,609
	SW	462	188	16	0	0	290	956
2011	GW	84	252	0	0	15,624	249	16,209
	SW	543	188	32	0	0	374	1,137
2010	GW	92	252	9	0	5,697	227	6,277
	SW	527	170	73	0	0	341	1,111
2009	GW	110	0	6	0	8,187	240	8,543
	SW	632	236	39	0	0	360	1,267
2008	GW	134	0	3	0	7,659	241	8,037
	SW	548	236	13	0	0	362	1,159
2007	GW	127	0	0	0	5,788	160	6,075
	SW	618	274	50	0	0	240	1,182
2006	GW	143	310	0	0	7,024	182	7,659
	SW	699	0	42	0	265	274	1,280
2005	GW	140	0	4	0	7,682	166	7,992
	SW	546	238	0	0	0	250	1,034
2004	GW	170	0	0	0	5,451	184	5,805
	SW	581	238	24	0	0	277	1,120
2003	GW	171	0	0	0	5,126	184	5,481
	SW	721	238	29	254	0	276	1,518

KING COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	188	0	0	0	245	312	745
	SW	0	0	0	0	0	134	134
2017	GW	126	0	0	0	0	303	429
	SW	0	0	0	0	0	130	130
2016	GW	111	0	31	0	0	109	251
	SW	0	0	0	0	0	47	47
2015	GW	134	0	1	0	0	107	242
	SW	0	0	0	0	0	46	46
2014	GW	146	0	2	0	0	106	254
	SW	0	0	0	0	0	46	46
2013	GW	140	0	3	0	0	109	252
	SW	0	0	0	0	0	47	47
2012	GW	122	0	0	0	0	199	321
	SW	0	0	0	0	0	85	85
2011	GW	143	0	0	0	0	240	383
	SW	0	0	0	0	0	103	103
2010	GW	123	0	1,493	0	0	241	1,857
	SW	0	0	339	0	0	104	443
2009	GW	148	0	804	0	0	252	1,204
	SW	0	0	183	0	0	108	291
2008	GW	189	0	115	0	0	240	544
	SW	0	0	27	0	0	104	131
2007	GW	156	0	0	0	27	240	423
	SW	0	0	0	0	0	102	102
2006	GW	193	0	0	0	28	263	484
	SW	0	0	0	0	0	113	113
2005	GW	186	0	0	0	25	275	486
	SW	0	0	0	0	0	118	118
2004	GW	166	0	0	0	21	21	208
	SW	0	0	0	0	0	373	373
2003	GW	170	0	0	0	20	20	210
	SW	0	0	0	0	0	359	359

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

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	188	0	0	0	9,663	295	10,146
	SW	16	0	0	0	0	98	114
2017	GW	202	0	0	0	8,799	288	9,289
	SW	12	0	0	0	0	96	108
2016	GW	214	0	0	0	9,337	230	9,781
	SW	15	0	0	0	0	77	92
2015	GW	189	0	0	0	8,753	223	9,165
	SW	10	0	0	0	0	74	84
2014	GW	234	0	0	0	10,194	235	10,663
	SW	14	0	0	0	0	78	92
2013	GW	295	0	0	0	6,516	241	7,052
	SW	11	0	0	0	0	80	91
2012	GW	313	0	0	0	12,980	278	13,571
	SW	0	0	0	0	0	92	92
2011	GW	353	0	0	0	11,373	315	12,041
	SW	15	0	0	0	0	105	120
2010	GW	284	0	88	0	6,067	320	6,759
	SW	12	0	87	0	0	106	205
2009	GW	294	0	76	0	10,554	350	11,274
	SW	14	0	75	0	0	116	205
2008	GW	303	0	64	0	11,621	337	12,325
	SW	21	0	63	0	0	112	196
2007	GW	284	0	0	0	8,651	375	9,310
	SW	19	0	0	0	0	125	144
2006	GW	294	0	0	0	9,326	375	9,995
	SW	16	0	0	0	0	125	141
2005	GW	267	0	0	0	8,522	337	9,126
	SW	17	0	0	0	0	112	129
2004	GW	259	0	0	0	9,943	37	10,239
	SW	14	0	0	0	0	336	350
2003	GW	304	0	0	0	10,234	36	10,574
	SW	15	0	0	0	0	321	336

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

CHILDRESS COUNTY

93.94% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	CHILDRESS	RED	GREENBELT LAKE/RESERVOIR	1,087	1,161	1,228	1,301	1,379	1,457
A	COUNTY-OTHER, CHILDRESS	RED	GREENBELT LAKE/RESERVOIR	112	121	130	138	147	154
A	IRRIGATION, CHILDRESS	RED	RED RUN-OF-RIVER	18	18	18	18	18	18
A	LIVESTOCK, CHILDRESS	RED	RED LIVESTOCK LOCAL SUPPLY	46	46	46	46	46	46
	Sum of Projected Surface Water Supplies (acre-feet)			**1,263**	**1,346**	**1,422**	**1,503**	**1,590**	**1,675**

COTTLE COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
B	IRRIGATION, COTTLE	RED	RED RUN-OF-RIVER	13	13	13	13	13	13
B	LIVESTOCK, COTTLE	RED	RED LIVESTOCK LOCAL SUPPLY	294	294	294	294	294	294
	Sum of Projected Surface Water Supplies (acre-feet)			**307**	**307**	**307**	**307**	**307**	**307**

FOARD COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
B	COUNTY-OTHER, FOARD	RED	GREENBELT LAKE/RESERVOIR	33	35	36	38	39	40
B	CROWELL	RED	GREENBELT LAKE/RESERVOIR	92	94	96	99	102	105
B	LIVESTOCK, FOARD	RED	RED LIVESTOCK LOCAL SUPPLY	368	368	368	368	368	368
	Sum of Projected Surface Water Supplies (acre-feet)			**493**	**497**	**500**	**505**	**509**	**513**

HARDEMAN COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
B	CHILLICOTHE	RED	GREENBELT LAKE/RESERVOIR	44	44	44	46	48	50
B	COUNTY-OTHER, HARDEMAN	RED	GREENBELT LAKE/RESERVOIR	40	42	44	45	47	48
B	IRRIGATION, HARDEMAN	RED	RED RUN-OF-RIVER	148	148	148	148	148	148
B	LIVESTOCK, HARDEMAN	RED	RED LIVESTOCK LOCAL SUPPLY	400	400	400	400	400	400
B	MANUFACTURING, HARDEMAN	RED	GREENBELT LAKE/RESERVOIR	185	206	228	251	259	267

B	QUANAH	RED	GREENBELT LAKE/RESERVOIR	266	274	283	298	310	321
	Sum of Projected Surface Water Supplies (acre-feet)			**1,083**	**1,114**	**1,147**	**1,188**	**1,212**	**1,234**

KING COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
B	LIVESTOCK, KING	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	61	61	61	61	61	61
B	LIVESTOCK, KING	RED	RED LIVESTOCK LOCAL SUPPLY	103	103	103	103	103	103
	Sum of Projected Surface Water Supplies (acre-feet)			**164**	**164**	**164**	**164**	**164**	**164**

MOTLEY COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, MOTLEY	RED	RED LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
	Sum of Projected Surface Water Supplies (acre-feet)			**0**	**0**	**0**	**0**	**0**	**0**

Projected Water Demands
TWDB 2017 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.

CHILDRESS COUNTY

93.94% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	CHILDRESS	RED	1,624	1,658	1,686	1,722	1,768	1,814
A	COUNTY-OTHER, CHILDRESS	RED	186	192	197	203	209	213
A	IRRIGATION, CHILDRESS	RED	6,865	6,600	6,201	5,512	4,823	4,134
A	LIVESTOCK, CHILDRESS	RED	460	463	465	467	470	473
		Sum of Projected Water Demands (acre-feet)	**9,135**	**8,913**	**8,549**	**7,904**	**7,270**	**6,634**

COTTLE COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	COUNTY-OTHER, COTTLE	RED	46	44	43	43	43	43
B	IRRIGATION, COTTLE	RED	4,004	3,884	3,767	3,655	3,655	3,655
B	LIVESTOCK, COTTLE	RED	544	544	544	544	544	544
B	MINING, COTTLE	RED	41	41	38	34	31	31
B	PADUCAH	RED	297	290	289	289	288	288
		Sum of Projected Water Demands (acre-feet)	**4,932**	**4,803**	**4,681**	**4,565**	**4,561**	**4,561**

FOARD COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	COUNTY-OTHER, FOARD	RED	75	73	72	72	72	72
B	CROWELL	RED	138	134	132	131	131	131
B	IRRIGATION, FOARD	RED	3,939	3,820	3,706	3,595	3,595	3,595
B	LIVESTOCK, FOARD	RED	399	399	399	399	399	399
B	MINING, FOARD	RED	12	12	12	12	11	11
		Sum of Projected Water Demands (acre-feet)	**4,563**	**4,438**	**4,321**	**4,209**	**4,208**	**4,208**

HARDEMAN COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	CHILLICOTHE	RED	65	63	60	61	62	62
B	COUNTY-OTHER, HARDEMAN	RED	130	129	127	129	130	131
B	IRRIGATION, HARDEMAN	RED	7,939	7,701	7,470	7,246	7,246	7,246
B	LIVESTOCK, HARDEMAN	RED	631	631	631	631	631	631
B	MANUFACTURING, HARDEMAN	RED	276	294	313	332	332	332

B	MINING, HARDEMAN	RED	17	17	18	18	18	18
B	QUANAH	RED	397	391	388	394	397	400
		Sum of Projected Water Demands (acre-feet)	**9,455**	**9,226**	**9,007**	**8,811**	**8,816**	**8,820**

KING COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	COUNTY-OTHER, KING	BRAZOS	8	8	8	8	8	8
B	COUNTY-OTHER, KING	RED	71	73	73	73	72	72
B	IRRIGATION, KING	BRAZOS	10	10	10	10	10	10
B	IRRIGATION, KING	RED	18	18	18	18	18	18
B	LIVESTOCK, KING	BRAZOS	146	146	146	146	146	146
B	LIVESTOCK, KING	RED	248	248	248	248	248	248
B	MINING, KING	BRAZOS	141	122	107	93	81	81
B	MINING, KING	RED	239	209	182	158	138	138
		Sum of Projected Water Demands (acre-feet)	**881**	**834**	**792**	**754**	**721**	**721**

MOTLEY COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, MOTLEY	RED	109	105	104	103	103	103
O	IRRIGATION, MOTLEY	RED	9,439	9,159	8,884	8,617	8,359	8,123
O	LIVESTOCK, MOTLEY	RED	481	490	499	509	519	529
O	MANUFACTURING, MOTLEY	RED	6	6	6	6	6	6
O	MATADOR	RED	213	209	208	207	207	207
O	MINING, MOTLEY	RED	240	213	205	198	179	161
		Sum of Projected Water Demands (acre-feet)	**10,488**	**10,182**	**9,906**	**9,640**	**9,373**	**9,129**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

CHILDRESS COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	CHILDRESS	RED	0	0	0	0	0	0
A	COUNTY-OTHER, CHILDRESS	RED	20	20	19	18	18	17
A	IRRIGATION, CHILDRESS	RED	181	185	188	191	196	200
A	LIVESTOCK, CHILDRESS	RED	15	12	10	8	5	2
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**0**	**0**	**0**	**0**

COTTLE COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	COUNTY-OTHER, COTTLE	RED	154	156	157	157	157	157
B	IRRIGATION, COTTLE	RED	9	29	46	58	58	58
B	LIVESTOCK, COTTLE	RED	0	0	0	0	0	0
B	MINING, COTTLE	RED	0	0	0	0	0	0
B	PADUCAH	RED	197	204	205	205	206	206
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**0**	**0**	**0**	**0**

FOARD COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	COUNTY-OTHER, FOARD	RED	10	12	13	13	13	13
B	CROWELL	RED	0	0	0	0	0	0
B	IRRIGATION, FOARD	RED	572	691	805	916	916	916
B	LIVESTOCK, FOARD	RED	0	0	0	0	0	0
B	MINING, FOARD	RED	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**0**	**0**	**0**	**0**

HARDEMAN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	CHILLICOTHE	RED	45	45	45	45	45	45
B	COUNTY-OTHER, HARDEMAN	RED	10	11	13	11	10	9
B	IRRIGATION, HARDEMAN	RED	-2,491	-2,253	-2,022	-1,798	-1,798	-1,798
B	LIVESTOCK, HARDEMAN	RED	0	0	0	0	0	0
B	MANUFACTURING, HARDEMAN	RED	0	0	0	0	0	0

B	MINING, HARDEMAN	RED	2	2	1	1	1	1
B	QUANAH	RED	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-2,491**	**-2,253**	**-2,022**	**-1,798**	**-1,798**	**-1,798**

KING COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
B	COUNTY-OTHER, KING	BRAZOS	182	182	182	182	182	182
B	COUNTY-OTHER, KING	RED	20	18	18	18	19	19
B	IRRIGATION, KING	BRAZOS	0	0	0	0	0	0
B	IRRIGATION, KING	RED	0	0	0	0	0	0
B	LIVESTOCK, KING	BRAZOS	0	0	0	0	0	0
B	LIVESTOCK, KING	RED	0	0	0	0	0	0
B	MINING, KING	BRAZOS	0	0	0	0	0	0
B	MINING, KING	RED	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**0**	**0**	**0**	**0**

MOTLEY COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, MOTLEY	RED	1	5	1	2	2	2
O	IRRIGATION, MOTLEY	RED	262	542	822	1,089	1,347	1,583
O	LIVESTOCK, MOTLEY	RED	-161	-170	-179	-189	-199	-209
O	MANUFACTURING, MOTLEY	RED	0	0	0	0	0	0
O	MATADOR	RED	6	10	11	12	12	12
O	MINING, MOTLEY	RED	-136	-109	-101	-94	-75	-57
	Sum of Projected Water Supply Needs (acre-feet)		**-297**	**-279**	**-280**	**-283**	**-274**	**-266**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

CHILDRESS COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
CHILDRESS, RED (A)							
MUNICIPAL CONSERVATION - CHILDRESS	DEMAND REDUCTION [CHILDRESS]	51	52	54	55	57	57
WATER AUDITS AND LEAK REPAIR - CHILDRESS	DEMAND REDUCTION [CHILDRESS]	81	83	84	86	88	91
		132	**135**	**138**	**141**	**145**	**148**
IRRIGATION, CHILDRESS, RED (A)							
IRRIGATION CONSERVATION - CHILDRESS COUNTY	DEMAND REDUCTION [CHILDRESS]	351	632	1,100	1,220	1,324	1,378
		351	**632**	**1,100**	**1,220**	**1,324**	**1,378**
Sum of Projected Water Management Strategies (acre-feet)		**483**	**767**	**1,238**	**1,361**	**1,469**	**1,526**

COTTLE COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION, COTTLE, RED (B)							
IRRIGATION CONSERVATION - COTTLE	DEMAND REDUCTION [COTTLE]	400	388	377	366	366	366
		400	**388**	**377**	**366**	**366**	**366**
MINING, COTTLE, RED (B)							
MINING CONSERVATION - COTTLE	DEMAND REDUCTION [COTTLE]	10	10	10	9	8	8
		10	**10**	**10**	**9**	**8**	**8**
Sum of Projected Water Management Strategies (acre-feet)		**410**	**398**	**387**	**375**	**374**	**374**

FOARD COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, FOARD, RED (B)							
DEVELOP OGALLALA AQUIFER IN DONLEY COUNTY - GREENBELT MIWA	OGALLALA AQUIFER [DONLEY]	5	3	0	0	0	0
MUNICIPAL CONSERVATION - FOARD COUNTY OTHER	DEMAND REDUCTION [FOARD]	0	0	1	4	7	8
		5	**3**	**1**	**4**	**7**	**8**

CROWELL, RED (B)

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
DEVELOP OGALLALA AQUIFER IN DONLEY COUNTY - GREENBELT MIWA	OGALLALA AQUIFER [DONLEY]	28	27	24	19	13	10
MUNICIPAL CONSERVATION - CROWELL	DEMAND REDUCTION [FOARD]	0	0	2	7	13	16
		28	**27**	**26**	**26**	**26**	**26**
IRRIGATION, FOARD, RED (B)							
IRRIGATION CONSERVATION - FOARD	DEMAND REDUCTION [FOARD]	394	382	371	360	360	360
		394	**382**	**371**	**360**	**360**	**360**
MINING, FOARD, RED (B)							
MINING CONSERVATION - FOARD	DEMAND REDUCTION [FOARD]	3	3	3	3	3	3
		3	**3**	**3**	**3**	**3**	**3**
Sum of Projected Water Management Strategies (acre-feet)		**430**	**415**	**401**	**393**	**396**	**397**

HARDEMAN COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, HARDEMAN, RED (B)							
DEVELOP OGALLALA AQUIFER IN DONLEY COUNTY - GREENBELT MIWA	OGALLALA AQUIFER [DONLEY]	16	15	12	11	8	4
MUNICIPAL CONSERVATION - HARDEMAN COUNTY OTHER	DEMAND REDUCTION [HARDEMAN]	0	0	0	4	8	13
		16	**15**	**12**	**15**	**16**	**17**
IRRIGATION, HARDEMAN, RED (B)							
IRRIGATION CONSERVATION - HARDEMAN	DEMAND REDUCTION [HARDEMAN]	794	770	747	725	725	725
		794	**770**	**747**	**725**	**725**	**725**
MANUFACTURING, HARDEMAN, RED (B)							
DEVELOP OGALLALA AQUIFER IN DONLEY COUNTY - GREENBELT MIWA	OGALLALA AQUIFER [DONLEY]	55	59	63	66	66	66
		55	**59**	**63**	**66**	**66**	**66**
MINING, HARDEMAN, RED (B)							
MINING CONSERVATION - HARDEMAN	DEMAND REDUCTION [HARDEMAN]	4	4	5	5	5	5
		4	**4**	**5**	**5**	**5**	**5**
QUANAH, RED (B)							
DEVELOP OGALLALA AQUIFER IN DONLEY COUNTY - GREENBELT MIWA	OGALLALA AQUIFER [DONLEY]	79	78	73	56	38	32
MUNICIPAL CONSERVATION - QUANNAH	DEMAND REDUCTION [HARDEMAN]	0	0	5	23	41	48
		79	**78**	**78**	**79**	**79**	**80**
Sum of Projected Water Management Strategies (acre-feet)		**948**	**926**	**905**	**890**	**891**	**893**

KING COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION, KING, BRAZOS (B)							
IRRIGATION CONSERVATION - KING	DEMAND REDUCTION [KING]	1	1	1	1	1	1
		1	**1**	**1**	**1**	**1**	**1**
IRRIGATION, KING, RED (B)							
IRRIGATION CONSERVATION - KING	DEMAND REDUCTION [KING]	2	2	2	2	2	2
		2	**2**	**2**	**2**	**2**	**2**
MINING, KING, BRAZOS (B)							
MINING CONSERVATION - KING	DEMAND REDUCTION [KING]	35	31	27	23	20	20
		35	**31**	**27**	**23**	**20**	**20**
MINING, KING, RED (B)							
MINING CONSERVATION - KING	DEMAND REDUCTION [KING]	60	52	45	40	35	35
		60	**52**	**45**	**40**	**35**	**35**
Sum of Projected Water Management Strategies (acre-feet)		**98**	**86**	**75**	**66**	**58**	**58**

MOTLEY COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, MOTLEY, RED (O)							
MOTLEY COUNTY-OTHER MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [MOTLEY]	5	5	5	5	5	5
		5	**5**	**5**	**5**	**5**	**5**
IRRIGATION, MOTLEY, RED (O)							
MOTLEY COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [MOTLEY]	485	485	971	971	1,456	1,456
		485	**485**	**971**	**971**	**1,456**	**1,456**
MATADOR, RED (O)							
MOTLEY COUNTY - MATADOR MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [MOTLEY]	11	10	10	10	10	10
		11	**10**	**10**	**10**	**10**	**10**
Sum of Projected Water Management Strategies (acre-feet)		**501**	**500**	**986**	**986**	**1,471**	**1,471**

GAM RUN 16-031 MAG: MODELED AVAILABLE GROUNDWATER FOR THE SEYMOUR, BLAINE, OGALLALA, AND DOCKUM AQUIFERS IN GROUNDWATER MANAGEMENT AREA 6

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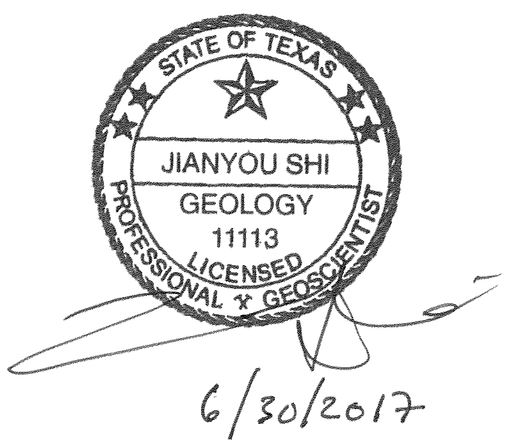
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
(512) 463-5076
June 30, 2017



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Appendix B
GAM Run 16-031 MAG

GAM RUN 16-031 MAG:
MODELED AVAILABLE GROUNDWATER FOR THE SEYMOUR, BLAINE, OGALLALA, AND DOCKUM AQUIFERS IN GROUNDWATER MANAGEMENT AREA 6

Jerry Shi, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
(512) 463-5076
June 30, 2017

EXECUTIVE SUMMARY:

The Texas Water Development Board (TWDB) estimated the modeled available groundwater values for the following relevant aquifers in Groundwater Management Area 6:

- Seymour Aquifer – The modeled available groundwater ranges from 181,589 acre-feet per year in 2020 to 173,102 acre-feet per year in 2070, and is summarized by groundwater conservation districts and counties in Table 1, and by river basins, regional planning areas, and counties in Table 5.
- Blaine Aquifer – The modeled available groundwater ranges from 74,182 acre-feet per year in 2020 to 70,874 acre-feet per year in 2070, and is summarized by groundwater conservation districts and counties in Table 2, and by river basins, regional planning areas, and counties in Table 6.
- Ogallala Aquifer – The modeled available groundwater remains at 409 acre-feet per year between 2020 and 2070, and is summarized by groundwater conservation districts and counties in Table 3, and by river basins, regional planning areas, and counties in Table 7.
- Dockum Aquifer – The modeled available groundwater ranges from 172 acre-feet per year in 2020 to 171 acre-feet per year in 2070, and is summarized by groundwater conservation districts and counties in Table 4, and by river basins, regional planning areas, and counties in Table 8.

The modeled available groundwater values for Groundwater Management Area 6 estimated for counties is slightly different from that estimated for groundwater conservation districts because of the process for rounding the values.

The modeled available groundwater estimates are based on the desired future conditions for the Seymour, Blaine, Ogallala, and Dockum aquifers adopted by groundwater conservation district representatives in Groundwater Management Area 6 on November 17, 2016. The district representatives declared the following aquifers to be non-relevant for purposes of joint planning: the Trinity Aquifer; the Ogallala Aquifer in Collingsworth and Dickens counties; the Blaine Aquifer in King and Stonewall counties; the Dockum Aquifer in Dickens and Kent counties; and the Seymour Aquifer in Wichita, Wilbarger, Archer, Clay, Stonewall, Throckmorton, Young, Kent, and Jones counties. The TWDB determined that the explanatory report and other materials submitted by the district representatives were administratively complete on May 5, 2017.

REQUESTOR:

Mr. Mike McGuire, General Manager of Rolling Plains Groundwater Conservation District and Groundwater Management Area 6 Coordinator.

DESCRIPTION OF REQUEST:

In a letter dated January 17, 2017, Mr. Mike McGuire provided the TWDB with the desired future conditions of the Seymour, Blaine, Ogallala, and Dockum aquifers. The desired future conditions were adopted on November 17, 2016 by the groundwater conservation district representatives in Groundwater Management Area 6. The desired future conditions are:

Dockum Aquifer (Resolution No. 2016-001)

"a. The Desired Future Condition for Fisher County, located in the Clear Fork Groundwater Conservation District is that condition whereby the total decline in water levels will be no more than 27 feet during the period from 2020 - 2070

b. The Desired Future Condition for Motley County, located in the Gateway Groundwater Conservation District is that condition whereby the total decline in water levels will be no more than 27 feet during the period from 2020 - 2070

c. The Dockum Aquifer in Dickens & Kent Counties, not located within a Groundwater Conservation District, has been determined to be non-relevant for joint planning purposes."

Trinity Aquifer (Resolution No. 2016-002)

"The Trinity Group Aquifers within Groundwater Management Area 6 have been determined to be non-relevant for joint planning purposes."

Ogallala Aquifer (Resolution No. 2016-003)

"a. The Desired Future Condition for Motley County, located in the Gateway Groundwater Conservation District, is that condition with average drawdown of between 23 and 27 feet, calculated from the end of 2012 conditions to the year 2070 as documented in GMA 2 Technical Memorandum 16-01.

b. The Ogallala Aquifer in Collingsworth County, located in the Mesquite Groundwater Conservation District, is insignificant or nonexistent, and is determined to be non-relevant for joint planning purposes

c. The Ogallala Aquifer in Dickens County, not located within a Groundwater Conservation District, is determined to be non-relevant for joint planning purposes."

Blaine Aquifer (Resolution No. 2016-004)

"a. The Desired Future Condition for that part of Childress County North of the Red River, located in the Mesquite Groundwater Conservation District, all of Collingsworth and Hall Counties, also located within the Mesquite Groundwater Conservation District; and that part of Childress County North of the Red River located in the Gateway Groundwater Conservation District is that condition whereby the total decline in water levels will be no more than 9 feet during the period from 2020 - 2070

b. The Desired Future Condition for that part of Childress County south of the Red River located in the Mesquite & Gateway Groundwater Conservation Districts; and all of Cottle, Foard, and Hardeman Counties, also located within the Gateway Groundwater Conservation District, is that condition whereby the total decline in water levels will be no more than 2 feet during the period from 2020 - 2070

c. The Desired Future Condition for Fisher County, located within the Clear Fork Groundwater Conservation District, is that condition whereby the total decline in water levels will be no more than 4 feet during the period from 2020 - 2070 *d. The Blaine Aquifer in Motley County, located within the Gateway Groundwater Conservation District, and in Knox County, located within the Rolling Plains Groundwater Conservation District, has been determined to be non-relevant for joint planning purposes.*

e. The Blaine Aquifer in Dickens, Kent, King, Jones, and Stonewall Counties, not located within a Groundwater Conservation District, has been determined to be non-relevant for joint planning purposes."

Seymour Aquifer (Resolution No. 2016-005)

"a. The Desired Future Condition for Pod 1 in Childress [and] Collingsworth Counties, located in the Mesquite and Gateway Groundwater Conservation Districts, is that condition whereby the total decline in water levels will be no more than 33 feet during the period from 2020 - 2070

b. The Desired Future Condition for Pod 2 in Hall County, located in Mesquite Groundwater Conservation District is that condition whereby the total decline in water levels will be no more than 15 feet during the period from 2020 - 2070

c. The Desired Future Condition for Pod 3 in Briscoe, Hall [and] Motley Counties, located in the Mesquite and Gateway Groundwater Conservation Districts, is that condition whereby the total decline in water levels will be no more than 15 feet during the period from 2020 - 2070

d. The Desired Future Condition for Pod 4 in Childress, Foard, and Hardeman counties, located in Gateway Groundwater Conservation District, is that condition whereby the total decline in water levels will be no more than 1 foot during the period from 2020 – 2070

e. The Desired Future Condition for Pod 6 in Knox County, located in Rolling Plains Groundwater Conservation District is that condition whereby the total decline in water levels will be no more than 18 feet during the period from 2020 –2070

f. The Desired Future Condition for that part of Pod 7 Baylor, Haskell, and Knox Counties, located in Rolling Plains Groundwater Conservation District is that condition whereby the total decline in water levels will be no more than 18 feet during the period from 2020 - 2070 *g. The Desired Future Condition for that part of Pod 8 in Baylor County, located in Rolling Plains Groundwater Conservation District is that condition whereby the total water level decline will be no more than 18 feet during the period from 2020 – 2070*

h. The Desired Future Condition for that part of Pod 11 in Fisher County, located in Clear Fork Groundwater Conservation District is that condition whereby the total water level decline will be no more than 1 foot during the period from 2020 - 2070

i. The Seymour Aquifer Pods 5, 9, 10, 12, 13, 14, 15, that part of 4 in Wichita and Wilbarger counties, that part of 7 in Stonewall County, that part of 8 in Throckmorton and Young counties, and that part of 11 in Jones and Stonewall counties have been determined to be non-relevant for joint planning purposes."

After review of the submittal, the TWDB sent a request for clarification email to Mr. Mike McGuire on February 28, 2017. On March 20, 2017, Mr. McGuire responded with additional information and clarifications as noted below.

a. Predictive model format - The six predictive model runs submitted for the Seymour and Blaine aquifers were in a format that the TWDB could not open. The TWDB asked for standard MODFLOW-2000 input and output files. Mr. McGuire sent the standard MODFLOW-2000 input packages to the TWDB on a flash drive.
b. Unclear baseline condition years and baseline water level conditions for the Blaine and Seymour aquifers – The explanatory report showed a baseline year of 2020, while the modeling technical report indicated 2010. Mr. McGuire confirmed in his response that the baseline year for calculating drawdown for these two aquifers was 2010. Because this baseline year is after the end of the calibration period for both groundwater availability models (Jigmond and others, 2014; Ewing and others, 2004), available water-level data between the end of the calibration period and the baseline year were evaluated. The result of the evaluation is included in Appendix A.
c. No pumping in the Blaine Aquifer in Fisher County - The groundwater availability model for the Seymour and Blaine aquifers (Ewing and others, 2004) does not contain pumping in the Blaine Aquifer in Fisher County between 1995 and 1999. This would not only result in a zero modeled available groundwater, but would also make it impossible to match the desired future condition for the Blaine Aquifer in Fisher County. Mr. McGuire then requested the TWDB to use an even pumping distribution within the Blaine Aquifer that meets the desired future condition in the county.

d. Desired future condition of the Blaine Aquifer in Foard County - A preliminary model run indicated that even the absence of pumping would cause a drawdown larger than the desired future condition (2 feet). Mr. McGuire clarified that a ten-foot drawdown for the Blaine Aquifer in Foard County is the desired future condition.

e. Unclear baseline condition years for the Dockum and Ogallala aquifers - The desired future conditions specify a timeline from 2020 to 2070. Mr. McGuire informed TWDB to use the year 2012 as Groundwater Management Area 2 did.

f. Desired future conditions of the Dockum and Ogallala aquifer in Fisher and Motley counties – Groundwater Management Area 6 intended to use the desired future conditions from Groundwater Management Area 2 for these two aquifers in Fisher and Motley counties. In his response, Mr. McGuire stated that Groundwater Management Area 6 intended to establish the desired future conditions for the Ogallala and Dockum aquifers in Fisher and Motley counties that reflected the pumping assumptions in those counties to achieve the average drawdown of 27 feet in Groundwater Management Area 2.

g. Aquifer boundaries – Mr. McGuire informed the TWDB that all desired future conditions and associated modeled available groundwater are based on model extent boundaries.

h. Unclear averaging method for recharge (Seymour Aquifer in Haskell, Knox, and Baylor counties) – Mr. McGuire confirmed with the TWDB that the recharge is the arithmetic mean from 2001 to 2005.

i. DFC statements of “no more than” – Mr. McGuire stated that the desired future conditions are based on the average decline within the individual geographical areas described in the Desired Future Conditions Table in Section 1 of the Explanatory Report. Decline is the difference between the baseline year and 2070.

METHODS:

The desired future conditions for Groundwater Management Area 6 are based on water-level declines or drawdowns defined as the difference in well water levels between a baseline year and 2070. Depending on the aquifer, one of three groundwater availability models were used to construct predictive simulations to estimate drawdowns over the same time interval and to calculate modeled available groundwater. The aquifers and corresponding groundwater availability models were:

- Seymour Aquifer of Pod 7 in Baylor, Haskell, and Knox counties – “refined” groundwater availability model for the Seymour Aquifer (Jigmond and others, 2014)

- Seymour Aquifer (except Pod 7) and Blaine Aquifer – groundwater availability model for the Seymour and Blaine aquifers (Ewing and others, 2004)
- Ogallala and Dockum aquifers – groundwater availability model for the High Plains Aquifer System (Deeds and Jigmond, 2015)

Some of the predictive simulations employed for the modeled available groundwater calculations were part of the Groundwater Management Area 6 submittal (Nelson, 2017), while the others were developed by the TWDB (Appendix B).

One of the first steps for a predictive simulation is to verify if the model reflects real-world conditions for the selected baseline year. If the baseline year for a desired future condition falls within the model calibration period, the water levels and/or fluxes for the baseline year have been calibrated to observed data. If the baseline year is after the end of the calibration period, water levels and/or fluxes must be evaluated between the end of the calibration period and the baseline year to confirm if the model reflects real-world conditions. If water levels and/or fluxes have remained steady during this interim period, the end of the calibration period can be used for the baseline year. However, if water levels and/or fluxes have not remained steady, pumping (and sometimes recharge) is typically adjusted until water levels and/or fluxes reflect real-world conditions.

The simulated drawdown for an area (such as a county) is the average of simulated drawdowns in active model cells with centroids located within each designated area. For the Seymour, Ogallala, and Dockum aquifers, the active model cells or modeled extents are the same as, or similar to, the official aquifer boundaries. However, the modeled extent for the Blaine Aquifer is significantly larger than the official aquifer footprint in some counties, such as in Hall and Foard counties. Therefore, in Hall and Foard counties, the drawdown for the desired future condition contains the Blaine Aquifer and equivalent geologic units in the subcrop.

Another factor that affects the drawdown calculation is related to dry model cells. For this study, a model cell is considered dry when its water level falls below a cell bottom at the baseline year. A dry cell is excluded from the average drawdown calculation. This analysis is presented in Appendix C.

The following sections summarize the predictive simulations submitted by Groundwater Management Area 6 and the predictive simulations by the TWDB. The water level drawdowns calculated by these predictive model runs are presented in Appendix B, which can be compared with the desired future conditions.

Seymour Aquifer of Pod 7 in Baylor, Haskell, and Knox Counties

Three predictive simulations submitted by Nelson (2017) were developed from runs using the refined groundwater availability model for the Seymour Aquifer in Baylor, Haskell, and Knox counties (Jigmond and others, 2014). This refined groundwater availability model only covers Pod 7 of the Seymour Aquifer (Figure 1). The predictive simulations included the calibrated period (1949 through 2005) and a predictive period (2006 through 2070). The predictive period used annual time intervals with three different pumping scenarios: 100, 80, or 75 percent of the average pumping of the last five years (2001-2005) of the calibration period (Jigmond and others, 2014).

Because the baseline year for the desired future condition (2010) is after the end of the calibration period, the TWDB evaluated the water-level data at selected wells from winter months between 2005 and 2010. Figure A1 (in Appendix A) shows the average water-level change from 2005 to 2010 in the Seymour Aquifer in Baylor, Haskell, and Knox counties. The average water levels have been stable over the selected time interval. As a result, the TWDB determined that further refinement of pumping was not necessary for the period between 2005 and 2010, and determined that conditions at the end of the calibration period can be used as conditions for the baseline year.

Next, the TWDB checked the MODFLOW-2000 well packages for the predictive simulations and found no problem with the pumping scenario that used 100 percent of the average pumping of the last five years of the groundwater availability model (2001 through 2005). As a result, the TWDB ran this scenario to obtain the MODFLOW-2000 output files. The head output file was used to calculate the drawdowns between 2010 and 2070. The TWDB then compared the drawdowns with the desired future conditions for the Seymour Aquifer in Pod 7 in these three counties. The comparison indicates that the drawdowns do not exceed the desired future conditions (Table B1 in Appendix B).

Seymour and Blaine Aquifers (excluding Pod 7 of Seymour)

The other three predictive simulations by Nelson (2017) were based on the groundwater availability model for the Seymour and Blaine aquifers (Figure 2; Ewing and others, 2004). The predictive simulations were used to determine the desired future conditions for the Blaine Aquifer and all the Seymour Aquifer except Pod 7, which was covered by the refined model described earlier. The predictive simulations included the calibrated period (1975 through 1999) and a predictive period (2000 through 2070). The predictive period used annual time interval with three different pumping scenarios: 100, 75, or 50 percent of the average pumping of the last five years of the calibrated model, 1995 through 1999 (Ewing and others, 2004).

Because the baseline year (2010) is after the end of the calibration period (1999), TWDB evaluated the water-level data at selected wells from winter months between 1999 and 2010. Figure A2 (in Appendix A) illustrates the average water-level change from 1999 to 2010 in the Seymour Aquifer within Groundwater Management Area 6. For the Blaine Aquifer, only one well from Childress County (State Well Number 1231804) meets the selection criterion and its hydrograph is presented in Figure A3. Nevertheless, Figures A2 and A3 indicate that the water level has not significantly changed over the selected time interval. As a result, the TWDB determined that further model refinement of pumping was not necessary for the period between 1999 and 2010, and determined that conditions at the end of the calibration period can be used as conditions for the baseline year.

The TWDB also checked the MODFLOW-2000 well packages for the predictive simulations from Nelson (2017) and discovered a significant inconsistency between the well package from the submittal and that from the TWDB's calculation for the 100-percent pumping scenario based on the last five years of the calibrated groundwater availability model for the Seymour and Blaine aquifers. As a result, the TWDB developed a new predictive simulation for the Seymour and Blaine aquifers using the groundwater availability model by Ewing and others (2004). Because, as discussed above, the water levels did not change much from 1999 to 2010, this predictive simulation uses the water levels of the last stress period (1999) of the groundwater availability model as the initial head for the baseline year (2010). This new predictive simulation runs from 2011 through 2070 with an annual interval and the average recharge of 1995 through 1999 of the calibrated groundwater availability model as stated in the explanatory report and Mr. McGuire's response. The initial pumping is based on the average of the last five years of the calibrated model but was adjusted during the model run to meet the desired future conditions for the Seymour Aquifer (excluding Pod 7) (Table B1 in Appendix B) and Blaine Aquifer (Table B2 in Appendix B).

Ogallala and Dockum Aquifers

Per Mr. McGuire's request, the TWDB used the predictive simulation for the desired future conditions adopted by Groundwater Management Area 2 to reproduce the desired future conditions and to calculate the modeled available groundwater for Groundwater Management Area 6. This predictive simulation ran from 2013 through 2017, with a baseline year of 2012, the same year as the last stress period of the calibrated groundwater availability model by Deeds and Jigmond (2015). The predictive simulation used all boundary conditions from the last stress period of the groundwater availability model except the pumping package, which was modified and adjusted during the model run to meet the desired future conditions of Groundwater Management Area 2 (see GAM Run 16-

028 for details). The simulated drawdown or desired future conditions are presented in Tables B3 and B4 of Appendix B.

Modeled Available Groundwater

Once the predictive simulations met the desired future conditions, the modeled available groundwater values were extracted from the MODFLOW cell-by-cell budget files. Annual pumping rates were then divided by county, river basin, regional water planning area, and groundwater conservation district within Groundwater Management Area 6 (Figures 1 through 6 and Tables 1 through 6).

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, "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:

Seymour Aquifer of Pod 7 in Baylor, Haskell, and Knox Counties

- The groundwater availability model for the Seymour Aquifer of Pod 7 by Jigmond and others (2014) was extended to include the predictive model simulation for this analysis (Nelson, 2017).

- The model has one layer, which represents the Seymour Aquifer.

- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

- During the predictive model run, some model cells went dry (Table C1 of Appendix C).

- Estimates of modeled drawdown and available groundwater from the model simulation were rounded to whole numbers.

Seymour and Blaine Aquifers

- Version 1.01 of the groundwater availability model for the Seymour and Blaine aquifers (Ewing and others, 2004) was updated to include the predictive model simulation for this analysis.
- The model has two layers that represent the Seymour Aquifer (Layer 1) and the Blaine Aquifer as well as other geologic units that underlie the Seymour Aquifer (Layer 2).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).
- During the predictive model run, some model cells went dry (Table C2 of Appendix C).
- Estimates of modeled drawdown and available groundwater from the model simulation were rounded to whole numbers.

Ogallala and Dockum Aquifers

- Version 1.01 of the groundwater availability model for the High Plains Aquifer System by Deeds and Jigmond (2015) was used to develop the predictive model simulation used for this analysis (Hutchison, 2016d).
- The model has four layers which represent the Ogallala and Pecos Valley Alluvium aquifers (Layer 1); the Edwards-Trinity (High Plains), Rita Blanca, and Edwards-Trinity (Plateau) aquifers (Layer 2); the Upper Dockum Aquifer (Layer 3); and the Lower Dockum Aquifer (Layer 4). Pass-through cells exist in layers 2 and 3 where the Upper Dockum Aquifer was absent but the cells provided a pathway for flow between the Lower Dockum and the Ogallala or Edwards-Trinity (High Plains) aquifers vertically. These pass-through cells were excluded from the modeled available groundwater calculation.
- The model was run with MODFLOW-NWT (Niswonger and others, 2011). The model uses the Newton-Raphson formulation and the upstream weighting package, which automatically reduces pumping as heads drop in a particular cell as defined by the user. This feature may simulate the declining production of a well as saturated

thickness decreases. Deeds and Jigmond (2015) modified the MODFLOW-NWT code to use a saturated thickness of 30 feet as the threshold (instead of percent of the saturated thickness) when pumping reductions occur during a simulation.

- During the predictive model run, no model cells within Groundwater Management Area 6 went dry.
- Estimates of modeled drawdown and available groundwater from the model simulation were rounded to whole numbers.

RESULTS:

The modeled available groundwater for the Seymour Aquifer that achieves the desired future condition adopted by Groundwater Management Area 6 slightly decreases from 181,589 to 173,102 acre-feet per year between 2020 and 2070. The modeled available groundwater is summarized by groundwater conservation district and county in Table 1. Table 5 summarizes the modeled available groundwater by county, river basin, and regional water planning area for use in the regional water planning process.

The modeled available groundwater for the Blaine Aquifer that achieves the desired future condition adopted by Groundwater Management Area 6 decreases slightly from 74,182 to 70,874 acre-feet per year between 2020 and 2070. The modeled available groundwater is summarized by groundwater conservation district and county in Table 2. Table 6 summarizes the modeled available groundwater by county, river basin, and regional water planning area for use in the regional water planning process.

The modeled available groundwater for the Ogallala Aquifer that achieves the desired future condition adopted by Groundwater Management Area 6 remains at 409 acre-feet per year between 2020 and 2070. The modeled available groundwater is summarized by groundwater conservation district and county in Table 3. Table 7 summarizes the modeled available groundwater by county, river basin, and regional water planning area for use in the regional water planning process.

The modeled available groundwater for the Dockum Aquifer that achieves the desired future condition adopted by Groundwater Management Area 6 remains at about 172 acre-feet per year between 2020 and 2070. The modeled available groundwater is summarized by groundwater conservation district and county in Table 4. Table 8 summarizes the modeled available groundwater by county, river basin, and regional water planning area for use in the regional water planning process.

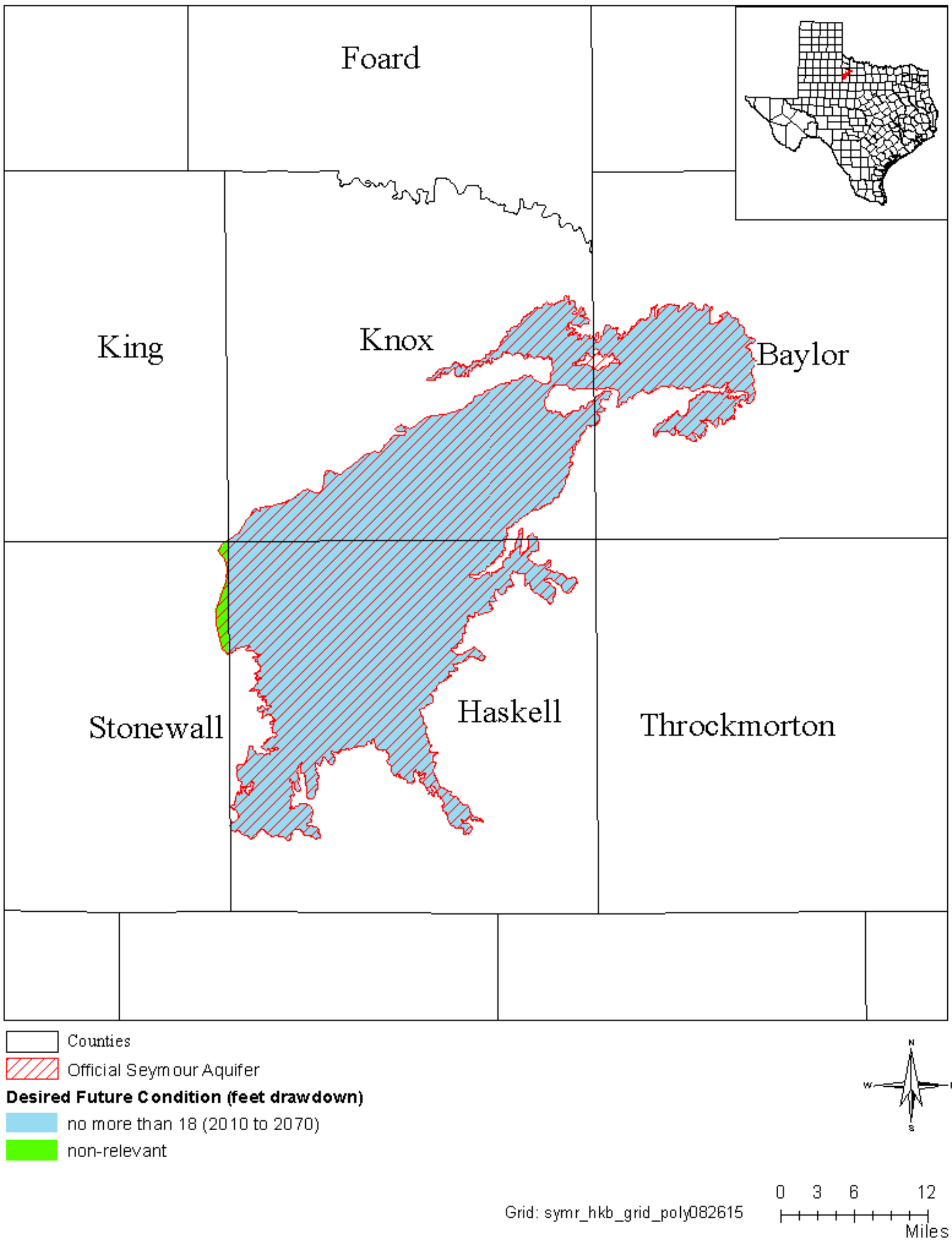

FIGURE 1. MAP SHOWING THE AREA COVERED BY THE REFINED GROUNDWATER AVAILABILITY MODEL FOR THE SEYMOUR AQUIFER POD 7, WHICH INCLUDES BAYLOR, HASKELL, AND KNOX COUNTIES WITHIN GROUNDWATER MANAGEMENT AREA 6.

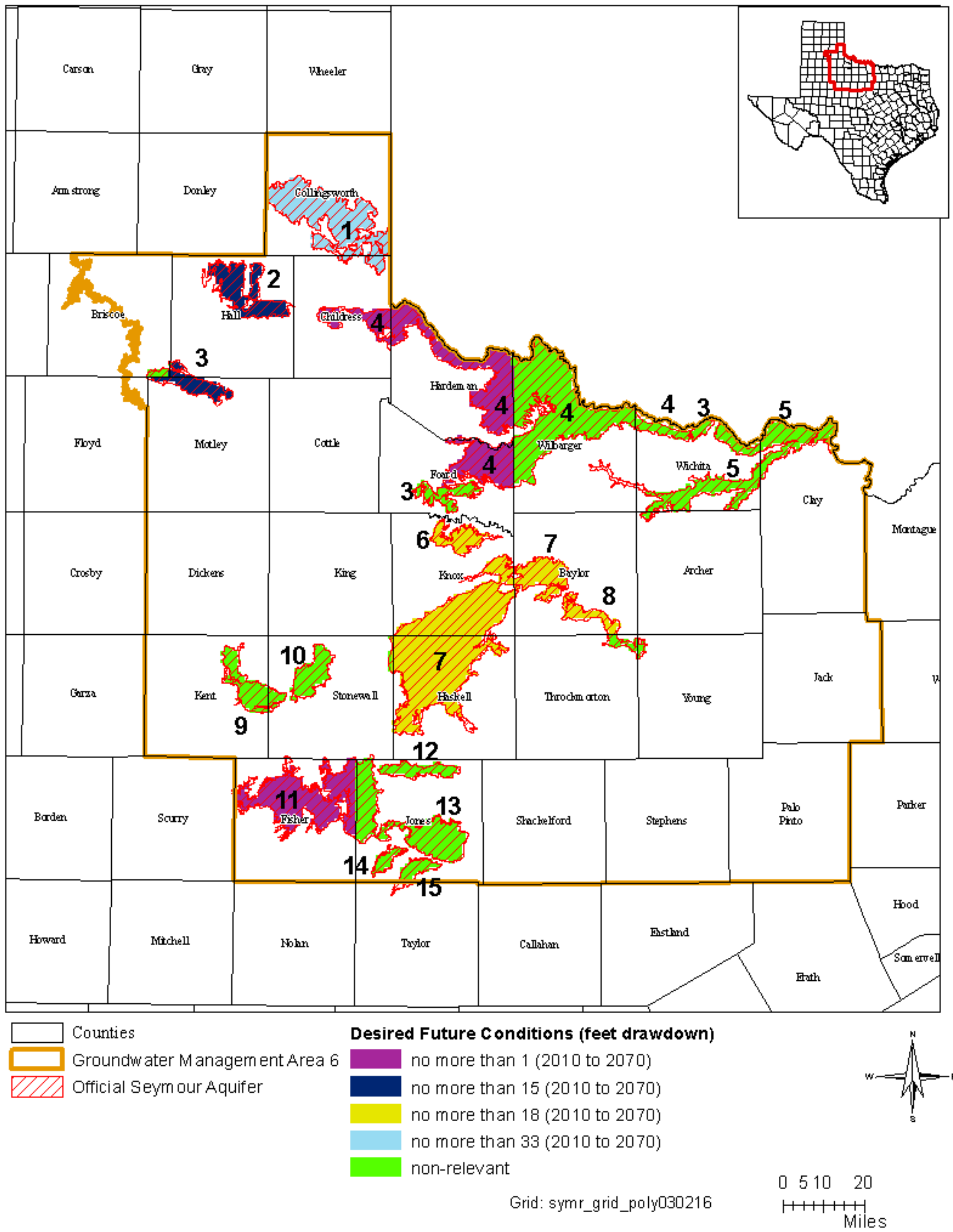

FIGURE 2. MAP SHOWING THE AREA COVERED BY THE SEYMOUR AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE SEYMOUR AND BLAINE AQUIFERS WITHIN GROUNDWATER MANAGEMENT AREA 6. THE INTEGERS IN THE FIGURE ARE SEYMOUR AQUIFER POD NUMBERS.

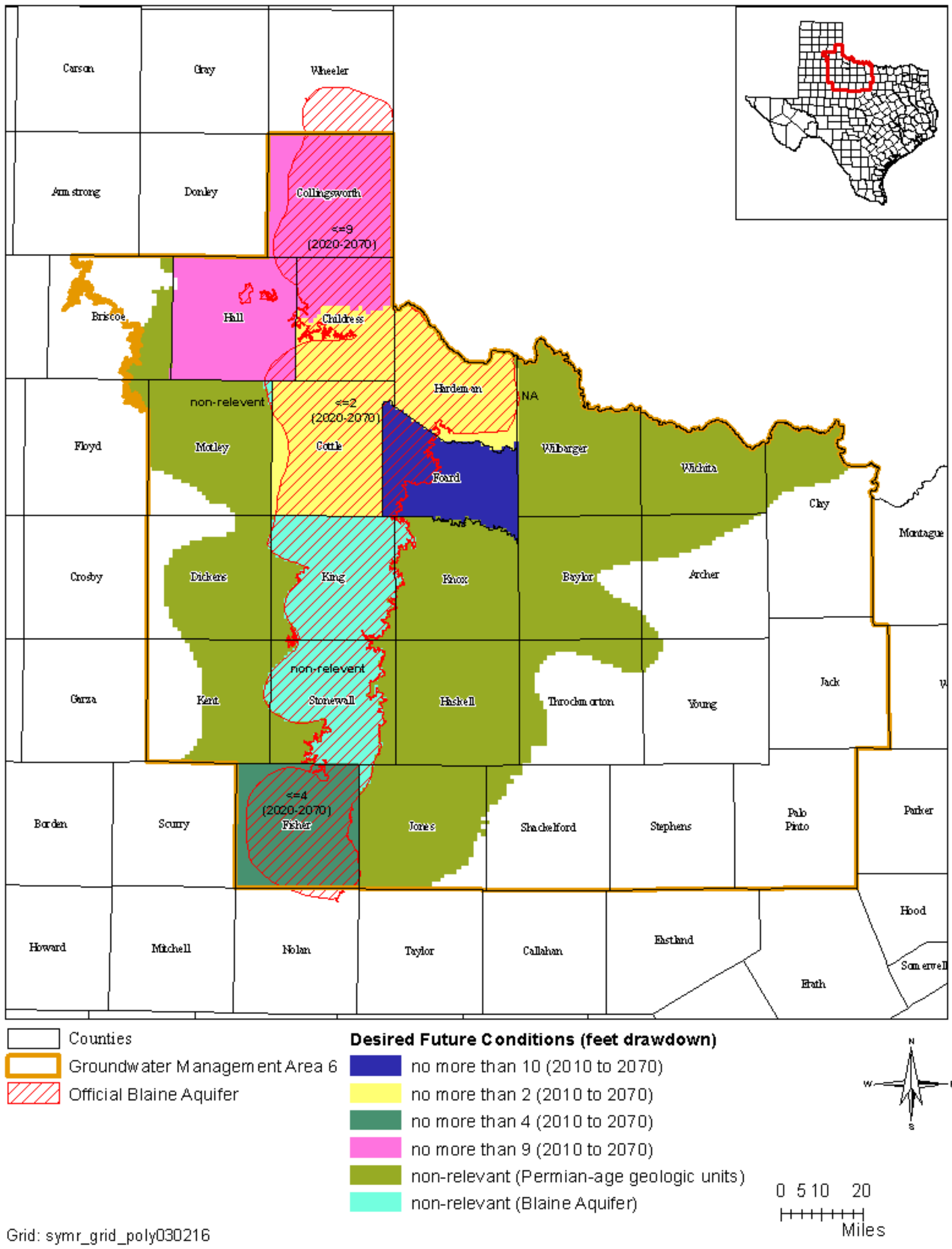

FIGURE 3. MAP SHOWING THE AREA COVERED BY THE BLAINE AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE SEYMOUR AND BLAINE AQUIFERS WITHIN GROUNDWATER MANAGEMENT AREA 6.

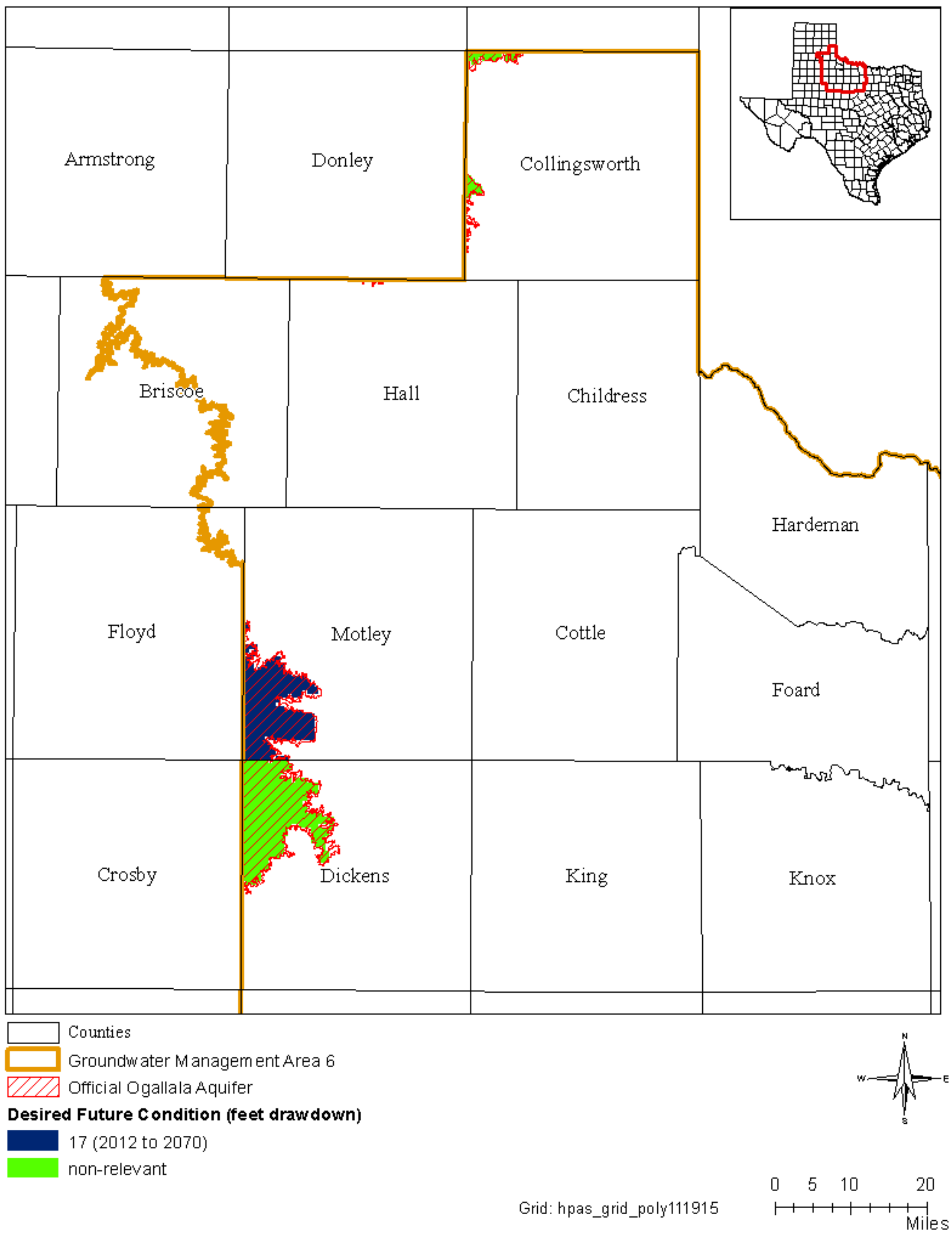

FIGURE 4. MAP SHOWING THE AREA COVERED BY THE OGALLALA AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HIGH PLAINS AQUIFER SYSTEM WITHIN GROUNDWATER MANAGEMENT AREA 6.

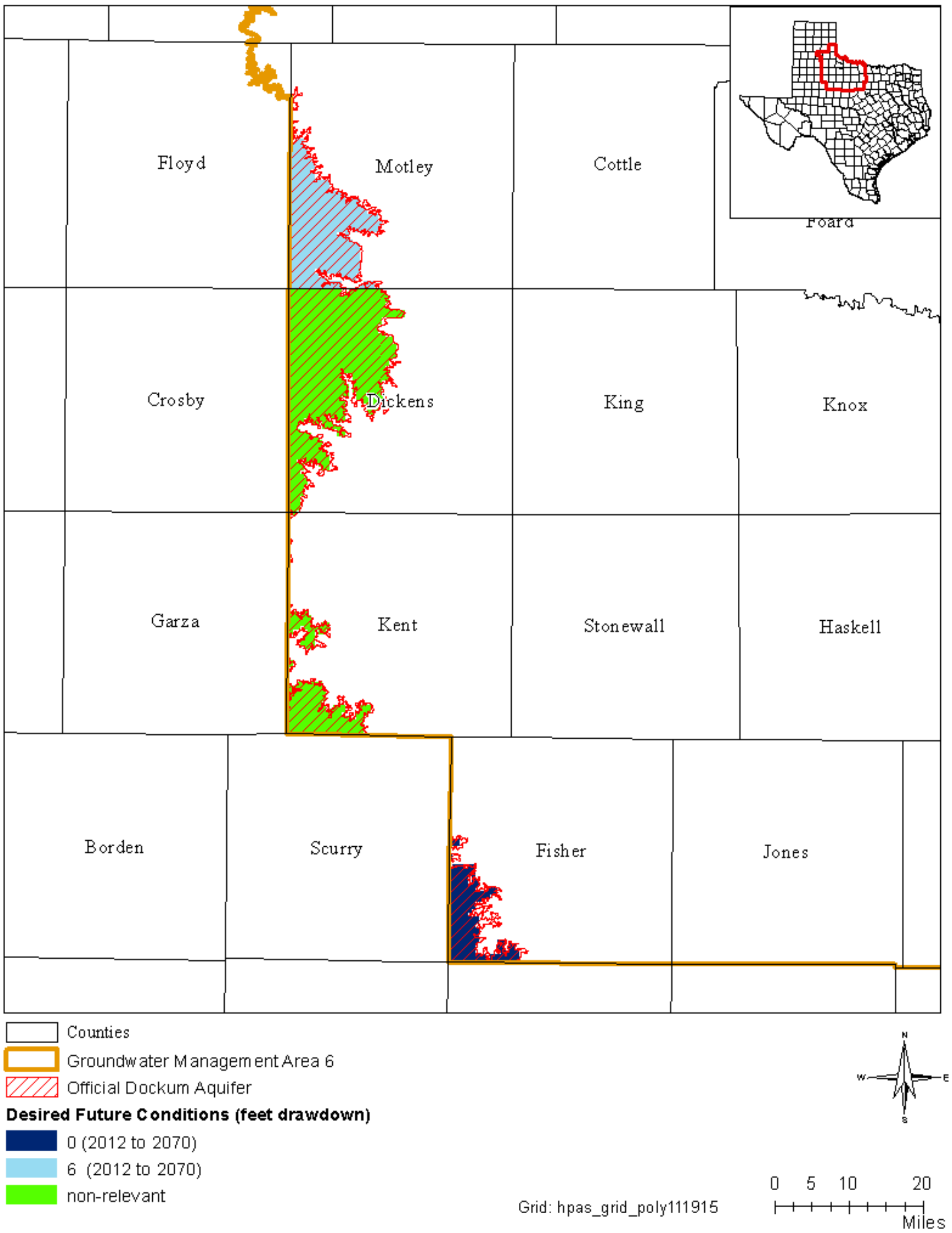

FIGURE 5. **MAP SHOWING THE AREA COVERED BY THE DOCKUM AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HIGH PLAINS AQUIFER SYSTEM WITHIN GROUNDWATER MANAGEMENT AREA 6.**

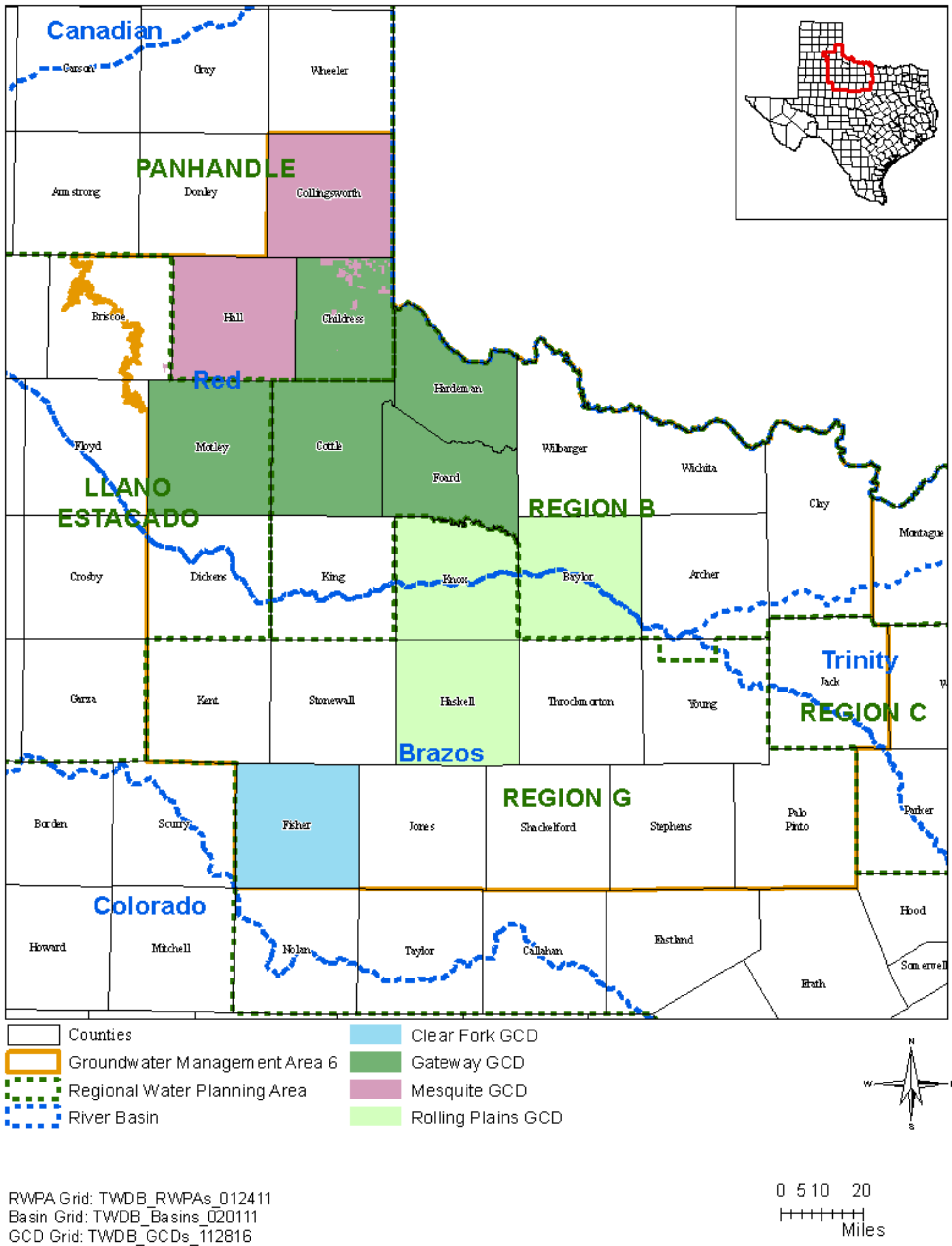

FIGURE 6. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS (GCD), COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 6.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE SEYMOUR AQUIFER IN GROUNDWATER MANAGEMENT AREA 6 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Seymour Aquifer Pod	2010	2020	2030	2040	2050	2060	2070
Clear Fork GCD	**Fisher**	**11**	**2,325**	**6,718**	**6,132**	**6,149**	**6,472**	**6,490**	**6,131**
Gateway GCD	Childress	4	40	2,875	3,230	3,301	3,292	3,301	3,282
Gateway GCD	Foard	4	4,278	11,897	4,945	5,389	8,066	7,815	3,943
Gateway GCD	Hardeman	4	531	20,378	13,040	18,885	17,520	20,002	32,868
Gateway GCD	Motley	3	2,098	4,843	6,679	4,843	4,830	3,972	3,961
Gateway GCD Total			**6,947**	**39,993**	**27,894**	**32,418**	**33,708**	**35,090**	**44,054**
Mesquite GCD	Childress	1	15	86	16	16	16	16	16
Mesquite GCD	Collingsworth	1	17,628	41,345	31,492	28,657	27,165	22,395	22,769
Mesquite GCD	Hall	2	6,837	15,446	16,751	19,666	22,861	25,861	24,595
Mesquite GCD Total			**24,480**	**56,877**	**48,259**	**48,339**	**50,042**	**48,272**	**47,380**
Rolling Plains GCD	Baylor	7	1,426	1,430	1,426	1,430	1,426	1,430	1,426
Rolling Plains GCD	Baylor	8	14	5,785	5,903	5,547	5,304	5,177	5,503
Rolling Plains GCD	Haskell	7	41,636	41,750	41,636	41,750	41,636	41,750	41,636
Rolling Plains GCD	Knox	7	25,641	25,712	25,641	25,712	25,641	25,712	25,641
Rolling Plains GCD	Knox	6	12	3,324	998	512	888	3,454	1,331
Rolling Plains GCD Total			**68,729**	**78,001**	**75,604**	**74,951**	**74,895**	**77,523**	**75,537**
Groundwater Management Area 6			**102,481**	**181,589**	**157,889**	**161,857**	**165,117**	**167,375**	**173,102**

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE BLAINE AQUIFER IN GROUNDWATER MANAGEMENT AREA 6 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	2010	2020	2030	2040	2050	2060	2070
ClearFork GCD	**Fisher**	**0**	**12,855**	**12,820**	**12,855**	**12,820**	**12,855**	**12,820**
Gateway GCD	Childress	3,577	17,618	17,570	17,618	17,570	17,618	17,570
Gateway GCD	Cottle	2,688	14,766	11,621	11,653	11,621	11,653	11,621
Gateway GCD	Foard	26	6,582	6,564	6,582	6,564	6,582	6,564
Gateway GCD	Hardeman	4,233	8,488	8,465	8,488	8,465	8,488	8,465
Gateway GCD Total		**10,524**	**47,454**	**44,220**	**44,341**	**44,220**	**44,341**	**44,220**
Mesquite GCD	Childress	1,034	5,957	5,940	5,957	5,940	5,957	5,940
Mesquite GCD	Collingsworth	6,851	2,060	2,054	2,060	2,054	2,060	2,054
Mesquite GCD	Hall	10	5,856	5,840	5,856	5,840	5,856	5,840
Mesquite GCD Total		**7,895**	**13,873**	**13,834**	**13,873**	**13,834**	**13,873**	**13,834**
Groundwater Management Area 6		**18,419**	**74,182**	**70,874**	**71,069**	**70,874**	**71,069**	**70,874**

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA AQUIFER IN GROUNDWATER MANAGEMENT AREA 6 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2012 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	2012	2020	2030	2040	2050	2060	2070
Gateway GCD	Motley	409	409	409	409	409	409	409
Groundwater Management Area 6		**409**	**409**	**409**	**409**	**409**	**409**	**409**

TABLE 4. MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 6 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2012 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

GCD	County	2012	2020	2030	2040	2050	2060	2070
Gateway GCD	Motley	93	93	93	93	92	92	92
Clear Fork GCD	Fisher	79	79	79	79	79	79	79
Groundwater Management Area 6		**172**	**172**	**172**	**172**	**171**	**171**	**171**

TABLE 5. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE SEYMOUR AQUIFER IN GROUNDWATER MANAGEMENT AREA 6. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	Seymour Pod Number	2020	2030	2040	2050	2060	2070
Baylor	Region B	Brazos	7	1,136	1,133	1,136	1,133	1,136	1,133
Baylor	Region B	Red	7	294	294	294	294	294	294
Baylor	Region B	Brazos	8	5,785	5,903	5,547	5,304	5,177	5,503
Childress	Panhandle	Red	1 and 4	2,961	3,246	3,317	3,308	3,317	3,297
Collingsworth	Panhandle	Red	1	41,345	31,492	28,657	27,165	22,395	22,769
Fisher	Region G	Brazos	11	6,718	6,132	6,149	6,472	6,490	6,131
Foard	Region B	Red	4	11,897	4,945	5,389	8,066	7,815	3,943
Hall	Panhandle	Red	2 and 3	15,446	16,751	19,666	22,861	25,861	24,595
Hardeman	Region B	Red	4	20,378	13,040	18,885	17,520	20,002	32,868
Haskell	Region G	Brazos	7	41,750	41,636	41,750	41,636	41,750	41,636
Knox	Region G	Brazos	7	25,699	25,629	25,699	25,629	25,699	25,629
Knox	Region G	Red	7	13	13	13	13	13	13
Knox	Region G	Red	6	3,324	998	512	888	3,454	1,331
Motley	Llano Estacado	Red	3	4,843	6,679	4,843	4,830	3,972	3,961
Groundwater Management Area 6				**181,589**	**157,891**	**161,857**	**165,119**	**167,375**	**173,103**

TABLE 6. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE BLAINE AQUIFER IN GROUNDWATER MANAGEMENT AREA 6. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Childress	Panhandle	Red	23,575	23,510	23,575	23,510	23,575	23,510
Collingsworth	Panhandle	Red	2,060	2,054	2,060	2,054	2,060	2,054
Cottle	Region B	Red	14,766	11,621	11,653	11,621	11,653	11,621
Fisher	Region G	Brazos	12,855	12,820	12,855	12,820	12,855	12,820
Foard	Region B	Red	6,582	6,564	6,582	6,564	6,582	6,564
Hall	Panhandle	Red	5,856	5,840	5,856	5,840	5,856	5,840
Hardeman	Region B	Red	8,488	8,465	8,488	8,465	8,488	8,465
Groundwater Management Area 6			**74,182**	**70,874**	**71,069**	**70,874**	**71,069**	**70,874**

TABLE 7. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE OGALLALA AQUIFER IN GROUNDWATER MANAGEMENT AREA 6. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Motley	Llano Estacado	Red	409	409	409	409	409	409
Groundwater Management Area 6			**409**	**409**	**409**	**409**	**409**	**409**

TABLE 8. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 6. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Fisher	Region G	Brazos	79	79	79	79	79	79
Motley	Llano Estacado	Red	93	93	93	92	92	92
Groundwater Management Area 6			**172**	**172**	**172**	**171**	**171**	**171**

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.

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Appendix A

Water Level Hydrograph

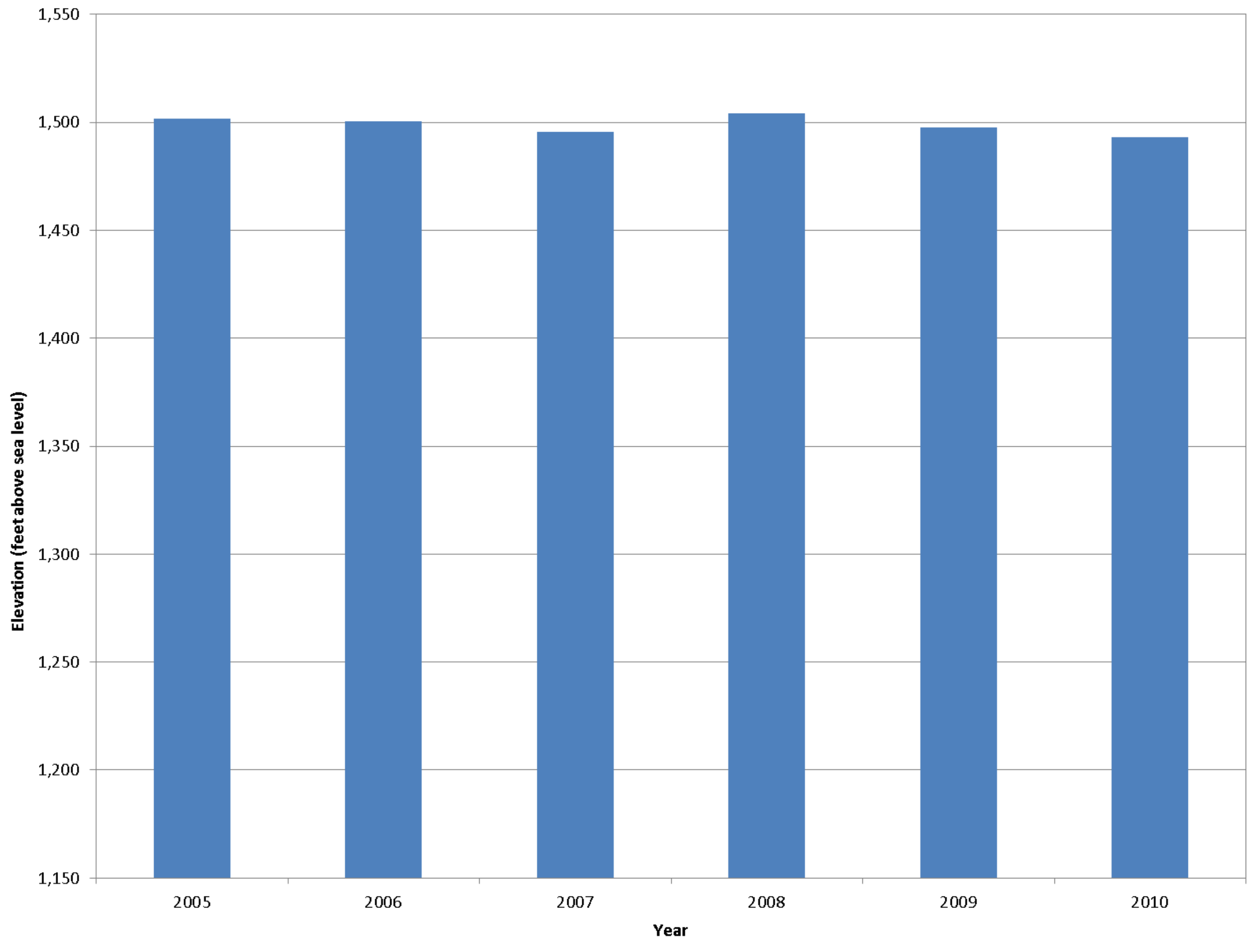

FIGURE A1. AVERAGE WATER-LEVEL HYDROGRAPH OF SEYMOUR AQUIFER IN BAYLOR, HASKELL, AND KNOX COUNTIES BETWEEN 2005 AND 2010.

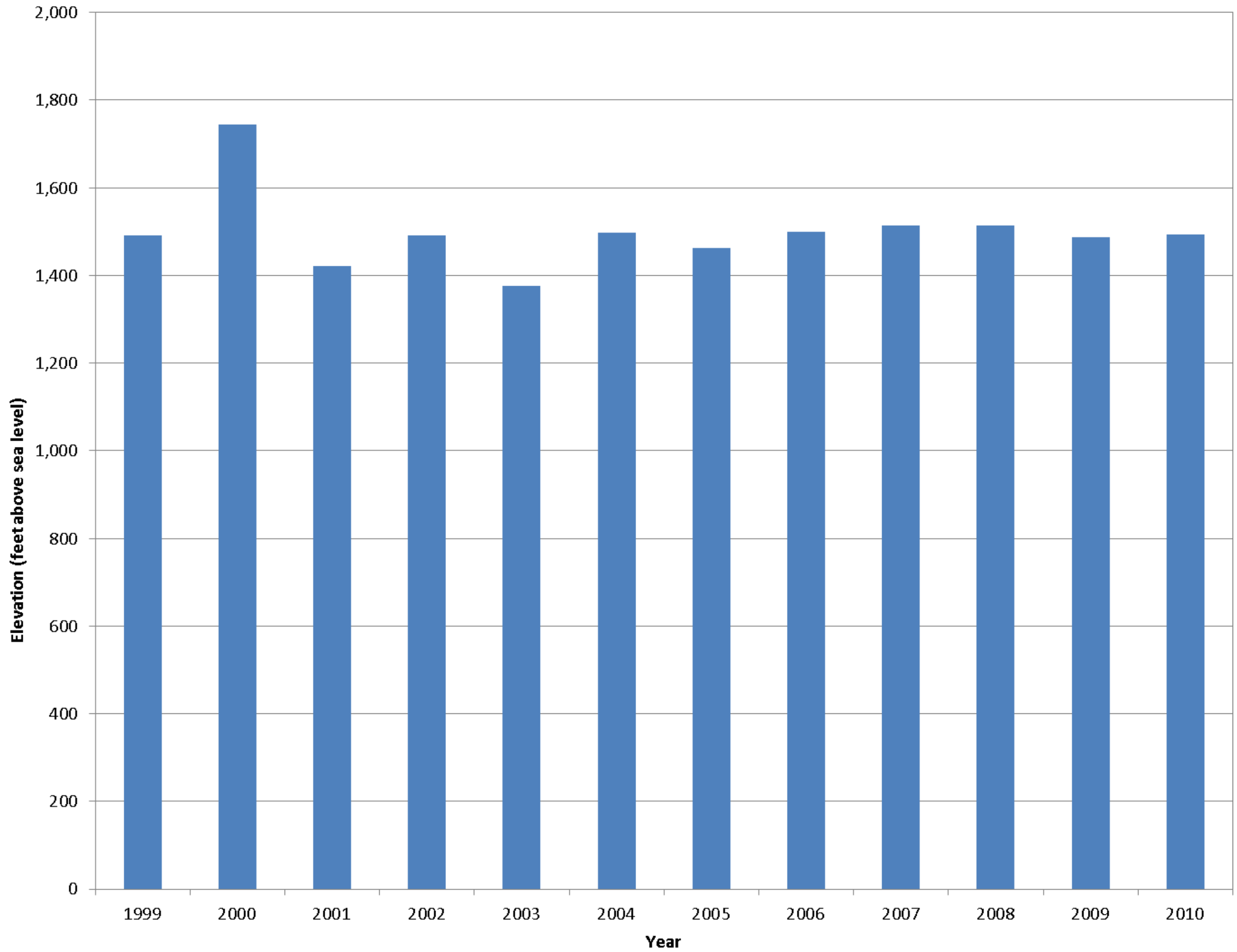

FIGURE A2. AVERAGE WATER-LEVEL HYDROGRAPH OF SEYMOUR AQUIFER IN BAYLOR, HASKELL, AND KNOX COUNTIES BETWEEN 1999 AND 2010.

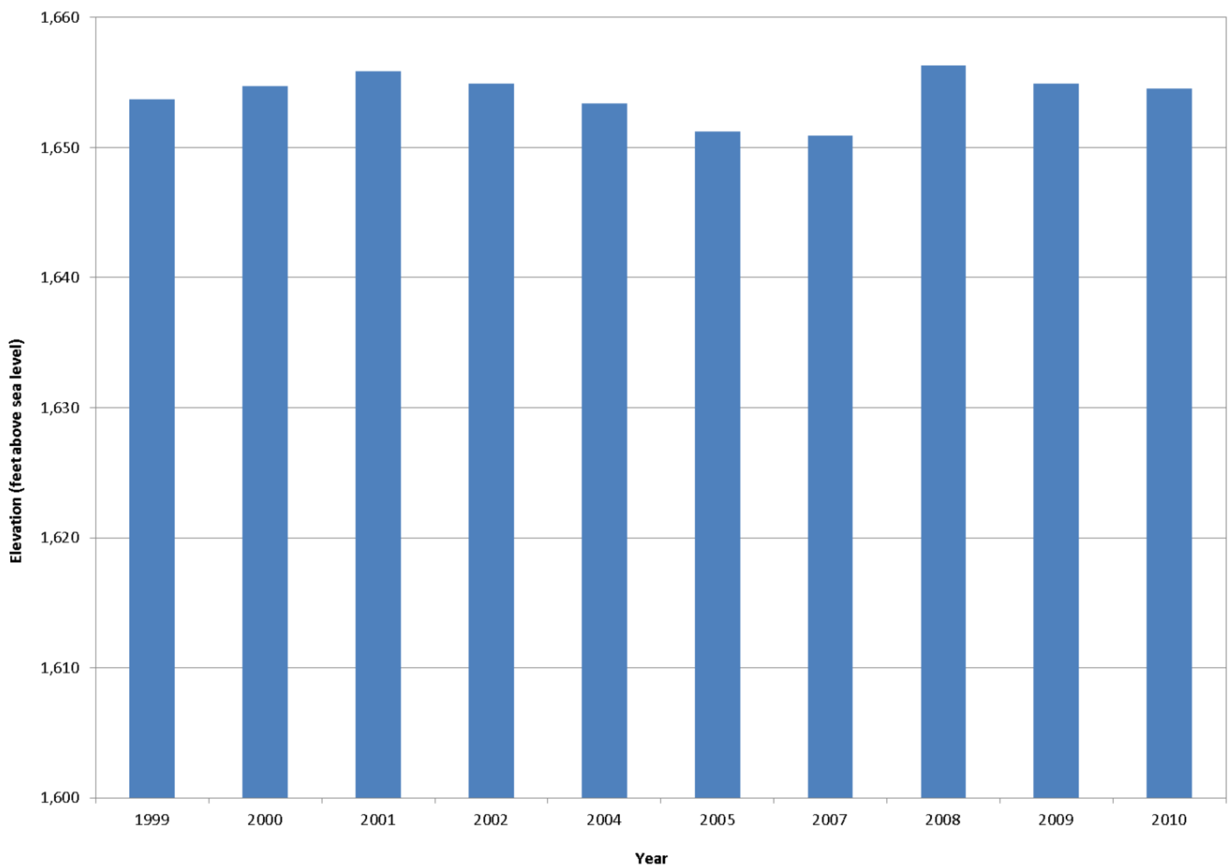

FIGURE A3. WATER-LEVEL HYDROGRAPH OF BLAINE AQUIFER IN CHILDRESS COUNTY (STATE WELL NUMBER 1231804) BETWEEN 1999 AND 2010.

Appendix B

Desired Future Conditions and Simulated Drawdowns

TABLE B1. MODELED DRAWDOWN IN SEYMOUR AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 6. MODELED DRAWDOWN WAS CALCULATED BY TWDB BASED ON MODFLOW HEAD FILE FROM GMA 6 SUBMITTAL, WHICH USED AVERAGE PUMPING OF LAST FIVE YEARS OF THE CALIBRATED MODEL. PUMPING WAS SLIGHTLY MODIFIED, AS NEEDED.

Seymour Aquifer Pod	County	Groundwater Conservation District	Modeled Drawdown (feet 2010 to 2070)	Desired Future Condition (feet drawdown)	Groundwater Availability Model
1	Childress, Collingsworth	Mesquite, Gateway	22.41	no more than 33	Ewing and others (2004)
2	Hall	Mesquite	9.91	no more than 15	Ewing and others (2004)
3	Briscoe, Hall, and Motley	Mesquite, Gateway	13.23	no more than 15	Ewing and others (2004)
4	Childress, Foard, and Hardeman	Gateway	0.97	no more than 1.0	Ewing and others (2004)
6	Knox	Rolling Plains	12.46	no more than 18	Ewing and others (2004)
7	Baylor, Haskell, and Knox	Rolling Plains	7.30	no more than 18	Jigmond and others (2014)
8	Baylor	Rolling Plains	14.80	no more than 18	Ewing and others (2004)
11	Fisher	Clear Fork	0.86	no more than 1.0	Ewing and others (2004)

TABLE B2. MODELED DRAWDOWN IN BLAINE AQUIFER IN GROUNDWATER MANAGEMENT AREA 6. MODELED DRAWDOWN WAS CALCULATED BASED ON A PREDICTIVE SIMULATION BY TWDB.

County	Groundwater Conservation District	Modeled Drawdown (feet 2010 to 2070)	Desired Future Condition (feet drawdown)	Groundwater Availability Model
Childress North of Red River	Mesquite, Gateway	5.94	no more than 9	Ewing and others (2004)
Childress South of Red River	Gateway	1.93	no more than 2	Ewing and others (2004)
Collingsworth	Mesquite	8.43	no more than 9	Ewing and others (2004)
Cottle	Gateway	1.68	no more than 2	Ewing and others (2004)
Fisher	Clear Fork	2.41	no more than 4	Ewing and others (2004)
Foard	Gateway	6.48	no more than 10	Ewing and others (2004)
Hall	Mesquite	4.79	no more than 9	Ewing and others (2004)
Hardeman	Gateway	1.15	no more than 2	Ewing and others (2004)

TABLE B3. MODELED DRAWDOWN IN OGALLALA AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 6. MODELED DRAWDOWN WAS BASED ON GMA 2 DESIRED FUTURE CONDITIONS GROUNDWATER PREDICTIVE MODEL.

County	Groundwater Conservation District	Modeled Drawdown (feet 2010 to 2070)	Desired Future Condition (feet drawdown)	Groundwater Availability Model
Motley	Gateway	17	17	Deeds and Jigmond (2015)

TABLE B4. MODELED DRAWDOWN IN DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA (GMA) 6. MODELED DRAWDOWN WAS BASED ON GMA 2 DESIRED FUTURE CONDITIONS GROUNDWATER PREDICTIVE MODEL.

County	Groundwater Conservation District	Modeled Drawdown (feet 2010 to 2070)	Desired Future Condition (feet drawdown)	Groundwater Availability Model
Fisher	Clear Fork	0	0	Deeds and Jigmond (2015)
Motley	Gateway	6	6	Deeds and Jigmond (2015)

Appendix C

Summary of Model Dry Cells

TABLE C1. MODEL DRY CELLS FROM PREDICTIVE SIMULATION OF SEYMOUR AQUIFER OF POD 7 IN BAYLOR, HASKELL, AND KNOX COUNTIES.

County	Stress Periods	Active Cells	Dry Cells	Wet Cells	Percent of Dry Cells
Baylor	1 to 408 (1980 to 2070)	5,753	401	5,352	7
Haskell	1 to 408 (1980 to 2070)	23,697	596	23,101	3
Knox	1 to 408 (1980 to 2070)	15,927	3,117	12,810	20

TABLE C2. MODEL DRY CELLS FROM PREDICTIVE SIMULATION OF SEYMOUR AND BLAINE AQUIFERS.

Desired Future Condition Zone	Stress Period	Active Cells	Dry Cells	Wet Cells	Percent of Dry Cells
Seymour (Pod 1)	1 to 60 (2011 to 2070)	296	109	187	37
Seymour (Pod 2)	1 to 60 (2011 to 2070)	133	48	85	36
Seymour (Pod 3)	1 to 60 (2011 to 2070)	66	30	36	45
Seymour (Pod 4)	1 to 60 (2011 to 2070)	453	85	368	19
Seymour (Pod 6)	1 to 60 (2011 to 2070)	58	33	25	57
Seymour (Pod 8)	1 to 60 (2011 to 2070)	45	11	34	24
Seymour (Pod 11)	1 to 60 (2011 to 2070)	280	94	186	34
Blaine (North of Red River of Childress)	1 to 60 (2011 to 2070)	309	0	309	0
Blaine (South of Red River of Childress)	1 to 60 (2011 to 2070)	408	0	408	0
Blaine (Collingsworth)	1 to 60 (2011 to 2070)	930	0	930	0
Blaine (Cottle)	1 to 60 (2011 to 2070)	907	0	907	0
Blaine (Fisher)	1 to 60 (2011 to 2070)	900	0	900	0
Blaine (Foard)	1 to 60 (2011 to 2070)	706	0	706	0
Blaine (Hall)	1 to 60 (2011 to 2070)	900	0	900	0
Blaine (Hardeman)	1 to 60 (2011 to 2070)	708	0	708	0

GAM Run 19-023: Gateway Groundwater Conservation District Management Plan

Ki Young Cha, Ph.D.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-5604
August 30, 2019

Cynthia K. Ridgeway is the manager of the Groundwater Availability Department and is responsible for the oversight of work performed by Ki Young Cha under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on August 30, 2019.

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Appendix C
GAM Run 19-023

GAM RUN 19-023: GATEWAY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Ki Young Cha, Ph.D.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-5604
August 30, 2019

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2011), 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 Gateway 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 and this information includes:

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

2. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; 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 Gateway Groundwater Conservation District should be adopted by the district on or before July 10, 2020 and submitted to the Executive Administrator of the TWDB on or before August 09, 2020. The current management plan for the Gateway Groundwater Conservation District expires on October 08, 2020.

We used two groundwater availability models to estimate the management plan information for the aquifers within the Gateway Groundwater Conservation District. Information for the Ogallala and Dockum aquifers is from version 1.01 of the groundwater availability model for the High Plains Aquifer System (Deeds and Jigmond, 2015). Information for the Seymour and Blaine aquifers is from version 1.01 of the groundwater available model for the Seymour Aquifer (Ewing and others, 2004).

This report replaces the results of GAM Run 14-013 (Kohlrenken, 2015), as the approach used for analyzing model results has been since refined and GAM Run 19-023 includes results from the groundwater availability model for the High Plains Aquifer System (Deeds and Jigmond, 2015), which was released after GAM Run 14-013 (Kohlrenken, 2015). Tables 1 through 4 summarize the groundwater availability model data required by statute and Figures 1 through 4 show the area of the models from which the values in the tables were extracted. If, after review of the figures, the Gateway 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.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2011), the two groundwater availability models mentioned above were used to estimate information for the Gateway Groundwater Conservation District management plan. Water budgets were extracted for the historical model periods for the Ogallala and Dockum aquifers (1980 through 2012) and Seymour and Blaine aquifers (1980 through 1999). We used ZONEBUDGET Version 3.01 (Harbaugh, 2009) to extract water budgets from the model results. The average annual water budget values for recharge, surface-water outflow, inflow to the district, and outflow from the district for the aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Ogallala and Dockum aquifers

- We used version 1.01 of the groundwater availability model for the High Plains Aquifer System for this analysis. See Deeds and Jigmond (2015) for assumptions and limitations of the model.
- The model has four layers which represent the Ogallala Aquifer (Layer 1), the Edwards-Trinity (High Plains) Aquifer and the Edwards-Trinity (Plateau) Aquifer (Layer 2), the upper Dockum Aquifer (Layer 3) and the lower Dockum Aquifer (Layer 4). The Edward-Trinity (High Plains and Plateau) aquifers do not occur within the Gateway Groundwater Conservation District and the Dockum Aquifer (layers 3 and 4) are lumped for calculating water budgets within the district.
- Water budgets for the Ogallala and Dockum aquifers within the district were averaged over the historical calibration period (1980 to 2012).
- The model was run with MODFLOW-NWT (Niswonger and others, 2011).

Seymour and Blaine aquifers

- We used version 1.01 of the groundwater availability model for the Seymour Aquifer for this analysis. See Ewing and others (2004) for assumptions and limitations of the model.
- The official boundary of the Blaine Aquifer was expanded after GAM Run 14-013 (Kohlrenken, 2015) was provided to the district; therefore, the values reported in this report are different.
- The model includes two layers which represent the Seymour Aquifer (Layer 1) and the Blaine Aquifer or various Permian units (Layer 2).
- Water budgets for the Seymour and Blaine aquifers within the district were averaged over the historical calibration period (1980 to 1999).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifers according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Ogallala, Dockum, Seymour and Blaine aquifers located within Gateway Groundwater Conservation District and averaged over the historical calibration periods, 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. 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 OGALLALA AQUIFER FOR GATEWAY GROUNDWATER CONSERVATION DISTRICT'S 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	Result
Estimated annual amount of recharge from precipitation to the district	Ogallala Aquifer	1,782
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Ogallala Aquifer	3,592
Estimated annual volume of flow into the district within each aquifer in the district	Ogallala Aquifer	1,701
Estimated annual volume of flow out of the district within each aquifer in the district	Ogallala Aquifer	373
Estimated net annual volume of flow between each aquifer in the district	From Ogallala Aquifer into underlying units	2,340

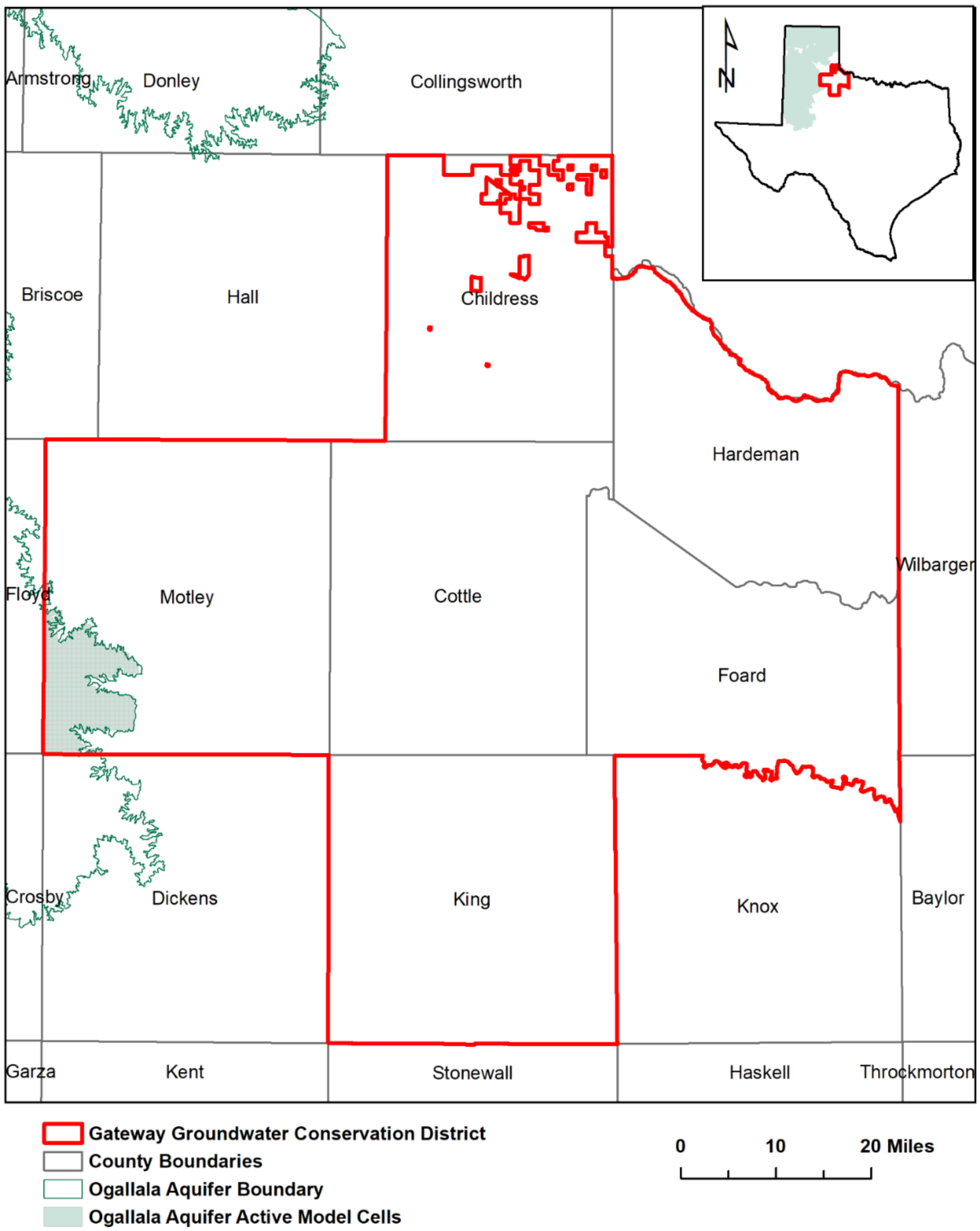

FIGURE 1 AREA OF THE HIGH PLAINS AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL FROM WHICH THE OGALLALA AQUIFER INFORMATION IN TABLE 1 WAS EXTRACTED (THE OGALLALA AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2. SUMMARIZED INFORMATION FOR THE DOCKUM AQUIFER FOR GATEWAY GROUNDWATER CONSERVATION DISTRICT'S 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	Result
Estimated annual amount of recharge from precipitation to the district	Dockum Aquifer	403
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Dockum Aquifer	5,090
Estimated annual volume of flow into the district within each aquifer in the district	Dockum Aquifer	1,584
Estimated annual volume of flow out of the district within each aquifer in the district	Dockum Aquifer	124
Estimated net annual volume of flow between each aquifer in the district	From other overlying units into Dockum Aquifer	2,346

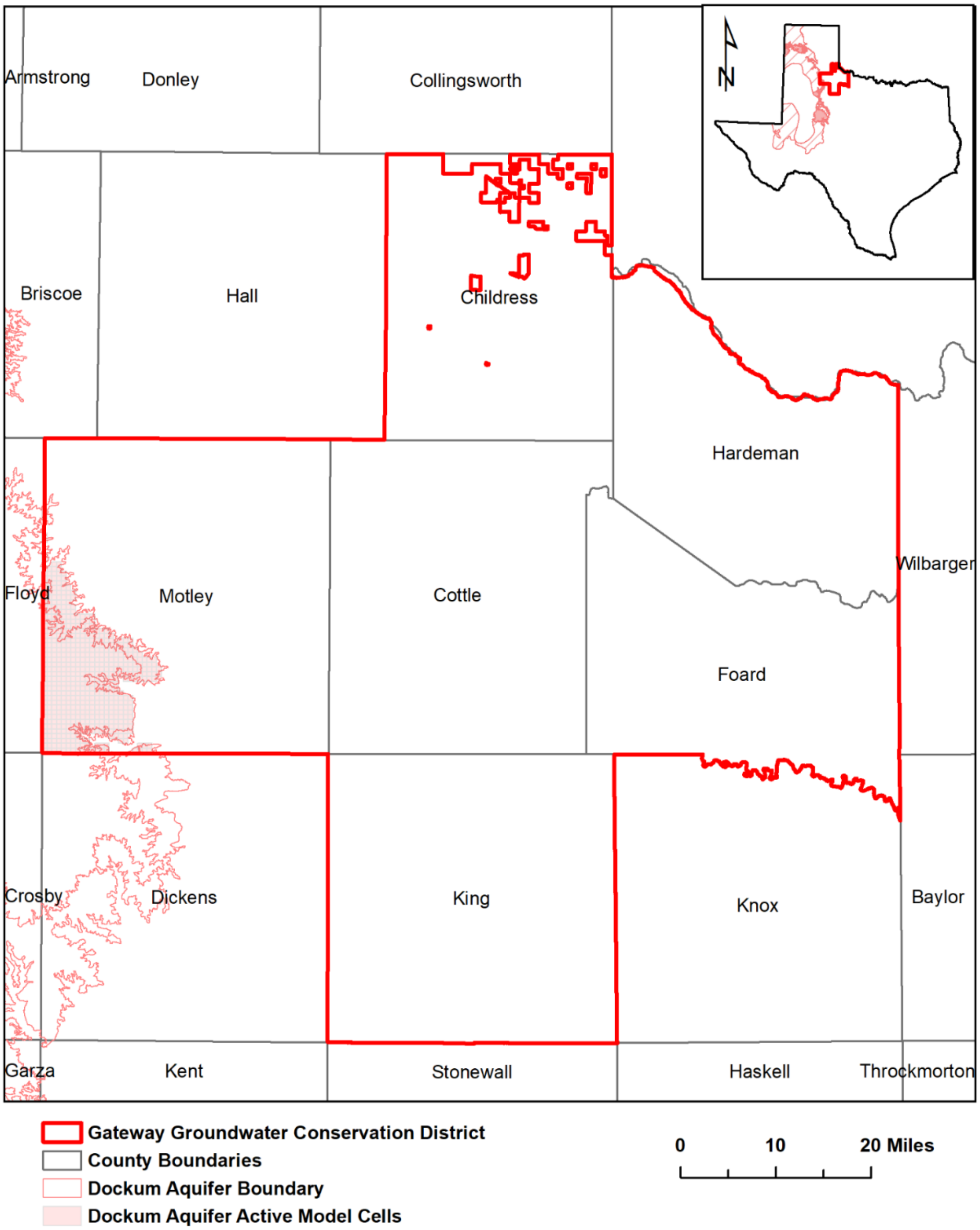

FIGURE 2 AREA OF THE HIGH PLAINS AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL FROM WHICH THE DOCKUM AQUIFER INFORMATION IN TABLE 2 WAS EXTRACTED (THE DOCKUM AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 3. SUMMARIZED INFORMATION FOR THE SEYMOUR AQUIFER FOR GATEWAY GROUNDWATER CONSERVATION DISTRICT'S 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	Result
Estimated annual amount of recharge from precipitation to the district	Seymour Aquifer	51,968
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Seymour Aquifer	5,613
Estimated annual volume of flow into the district within each aquifer in the district	Seymour Aquifer	1,400
Estimated annual volume of flow out of the district within each aquifer in the district	Seymour Aquifer	7,036
Estimated net annual volume of flow between each aquifer in the district	From underlying Permian units to Seymour Aquifer	7,484

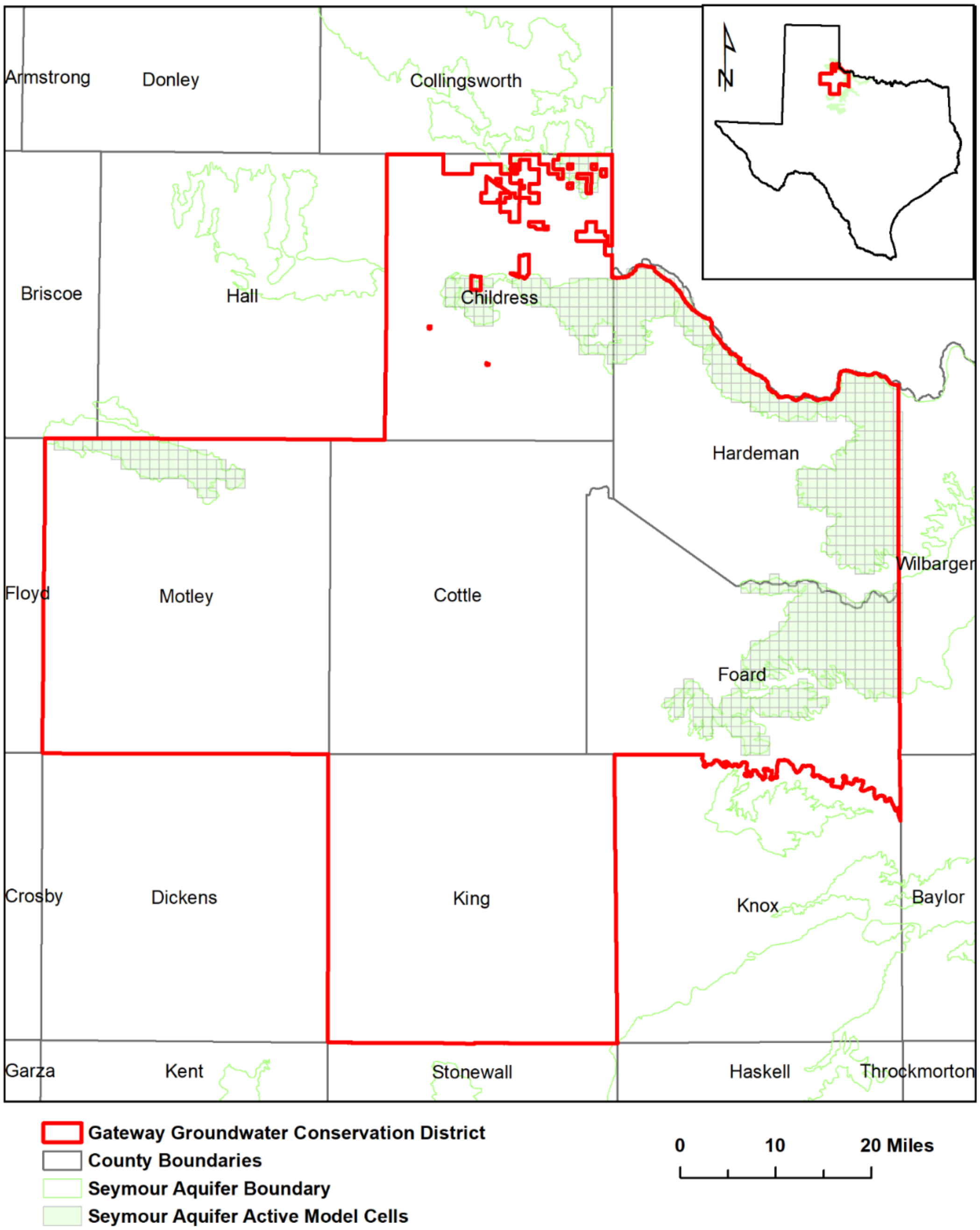

FIGURE 3 AREA OF THE SEYMOUR AQUIFER GROUNDWATER AVAILABILITY MODEL FROM WHICH THE SEYMOUR AQUIFER INFORMATION IN TABLE 3 WAS EXTRACTED (THE SEYMOUR AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 4. SUMMARIZED INFORMATION FOR THE BLAINE AQUIFER FOR GATEWAY GROUNDWATER CONSERVATION DISTRICT'S 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	Result
Estimated annual amount of recharge from precipitation to the district	Blaine Aquifer	51,284
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Blaine Aquifer	20,070
Estimated annual volume of flow into the district within each aquifer in the district	Blaine Aquifer	18,608
Estimated annual volume of flow out of the district within each aquifer in the district	Blaine Aquifer	7,413
Estimated net annual volume of flow between each aquifer in the district	From Blaine Aquifer to Seymour Aquifer and other overlying units	11,352
	From Blaine Aquifer to other Permian units	20,841

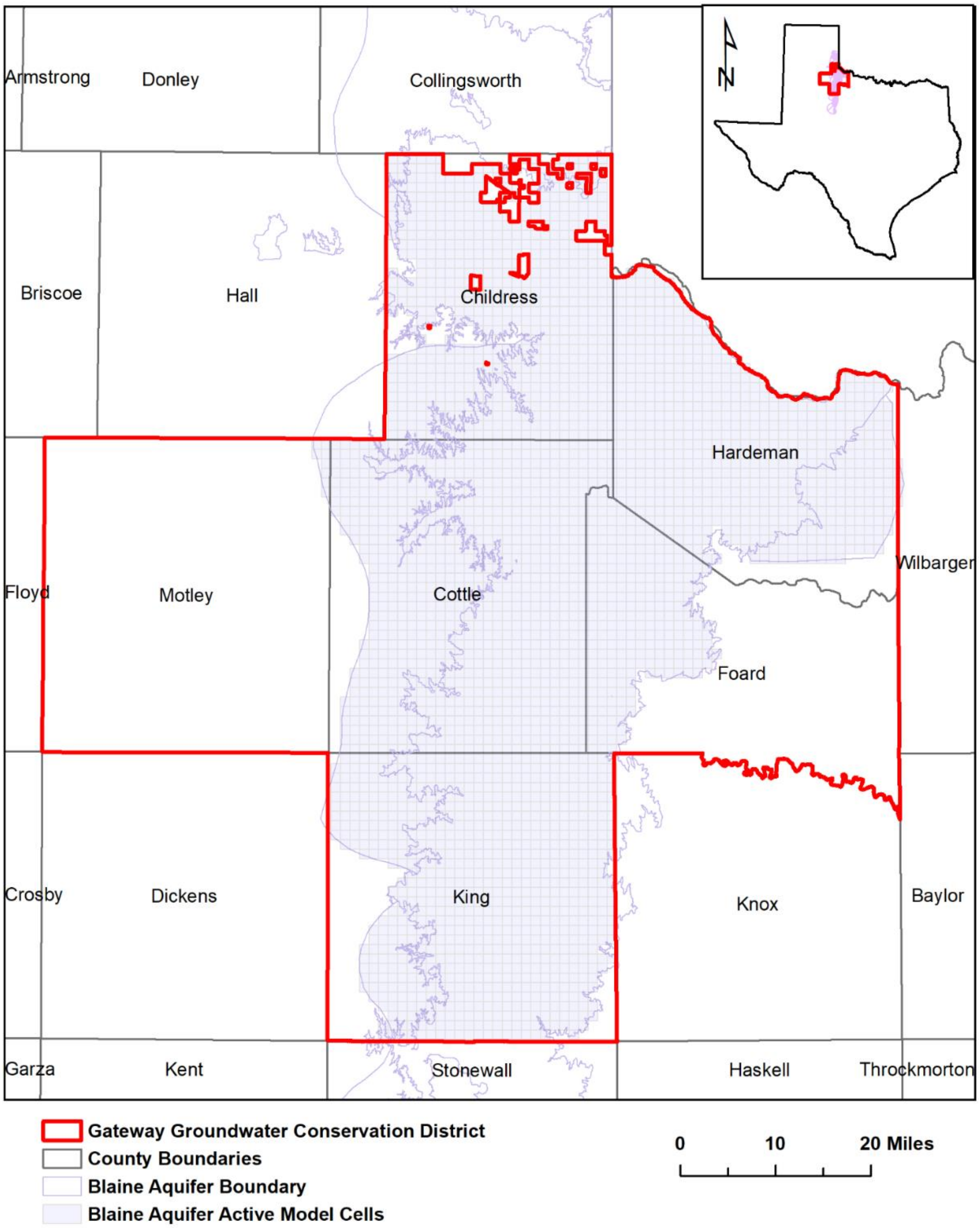

FIGURE 4 AREA OF THE SEYMOUR AQUIFER GROUNDWATER AVAILABILITY MODEL WHICH THE BLAINE AQUIFER INFORMATION IN TABLE 4 WAS EXTRACTED (THE BLAINE AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

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 historical groundwater flow conditions includes the assumptions about the location in the aquifer where historical 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 historical 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. Historical 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:

Deeds, N.E., and Jigmond, M., 2015, Numerical model report for the High Plains Aquifer System groundwater availability model, 640 p., http://www.twdb.texas.gov/groundwater/models/gam/hpas/HPAS_GAM_Numerical_Report.pdf.

Ewing, J.E., Jones, T.L., Pickens, J.F., Chastaun-Howley, A., Dean, K.E., and Spear, A.A., 2004, Groundwater availability model for the Seymour Aquifer: Final report prepared for the Texas Water Development Board by INTERA, Inc., 533p., http://www.twdb.texas.gov/groundwater/models/gam/symr/SYMR_Model_Report.pdf.

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.

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.

Kohlrenken, W., 2015, GAM Run 14-013: Gateway Groundwater Conservation District Management Plan, 18p., https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR14-013.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: United States Geological Survey, Techniques and Methods 6-A37, 44 p.

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

Appendix D
Notices & Agenda

GATEWAY GROUNDWATER CONSERVATION DISTRICT
PO BOX 338
QUANAH, TEXAS 79252
940-663-5722
940-663-2577 FAX
Directors: W.W. Tabor, Jason Poole,
Gage Moorhouse, H.L. Ayers, Brent Whitaker
Bill Haseloff, James Sweeney, Todd Smith
True Burson, William Luckett, and James Gillespie

Board of Directors Meeting
January 7, 2021
8:15 am
223 S. Main Street, Quanah, Texas 79252

1. Call to order by President.
   If during the course of the meeting, discussion of any item on the agenda should be held in a closed meeting, the Board will conduct a closed meeting.
2. Determination of Quorum by Secretary.
3. Public Comments-Please sign in and limit comments to three minutes general and three minutes per specific agenda item addressed not to exceed nine minutes in total.
4. Consider and act on Minutes of Sep 3, Sep 18 and Nov 7 Meetings
5. Swear in new Foard County Board member
6. Consider and act on assessment contract for Hardeman County
7. Consider clarification of Rules as written
8. Consider and act on seminars
9. Consider and act on budget modifications
10. Financial Report
11. Investment Report
12. Consider and possible action of all County Tax Deeds
13. Consider and possible action of well permits
14. Hydrogeologist report – Ray Brady/Amy Bush
15. Manager's Report
16. Adopt 2020 Gateway Groundwater Management Plan
17. Other Business
18. Set Date and Time for next Board Meeting
19. Adjournment

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at anytime. At anytime during the meeting and in compliance with the Texas Open Meetings Act, Chapter 551, Government Code, Vernon's Texas Codes. Annotated, the Gateway Groundwater Conservation District Board may meet in executive session on any of the above agenda items for consultation concerning attorney-client matter (551.071); deliberation regarding real property (551.072); deliberation regarding prospective gift (551.073); personal matters (551.074); and deliberation regarding security devices (551.075). Any subject discussed in executive session may be subject to action during an open meeting. THE AGENDA, IN DETAIL AND IN THE ABOVE LISTED ORDER IS ON THE BULLETIN BOARD ANY MAY BE OBTAINED IN THE COUNTY CLERK'S OFFICE OF THE HARDEMAN, FOARD, CHILDRESS, COTTLE, King, and MOTLEY COUNTY, COURTHOUSES.

Filed for record the 30 day of Dec
2020 at 1:00 o'clock P M
[signature]
Clerk, County Court, Foard County, Texas
By [signature] Deputy

GATEWAY GROUNDWATER CONSERVATION DISTRICT

PO BOX 338
QUANAH, TEXAS 79252
940-663-5722
940-663-2577 FAX

Directors: W.W. Tabor, Jason Poole,
Gage Moorhouse, H.L. Ayers, Brent Whitaker
Bill Haseloff, James Sweeney, Todd Smith
True Burson, William Luckett, and James Gillespie

Public Hearing
January 7, 2021
8:00 am
223 S. Main Street, Quanah, Texas 79252

1. Call to order by President
2. Determination of Quorum by Secretary
3. The Board will receive public comment on proposed revisions to the Management Plan of Gateway Groundwater Conservation District
4. Adjourn

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Filed for record the 30th day of Dec
2020 at 1:00 o'clock P M
Debra Hopkins
Clerk, County Court, Foard County, Texas
By Tamara Moore Deputy

GATEWAY GROUNDWATER CONSERVATION DISTRICT

PO BOX 338
QUANAH, TEXAS 79252
940-663-5722
940-663-2577 FAX

Public Hearing
January 7, 2021
8:00 am
223 S. Main Street, Quanah, Texas 79252

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GATEWAY GROUNDWATER CONSERVATION DISTRICT

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QUANAH, TEXAS 79252
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940-663-2577 FAX
Directors: W.W. Tabor, Jason Poole,
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Bill Haseloff, James Sweeney, Todd Smith
True Burson, William Luckett, and James Gillespie

Board of Directors Meeting
January 7, 2021
8:15 am
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FILED
The 30th day of Dec. 2020
at 1:28 o'clock P M.
ELLEN LONDON
Clerk County Court Hardeman County, Texas
By Ellen London

GATEWAY GROUNDWATER CONSERVATION DISTRICT
PO BOX 338
QUANAH, TEXAS 79252
940-663-5722
940-663-2577 FAX
Directors: W.W. Tabor, Jason Poole,
Gage Moorhouse, H.L. Ayers, Brent Whitaker
Bill Haseloff, James Sweeney, Todd Smith
True Burson, William Luckett, and James Gillespie

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GATEWAY GROUNDWATER CONSERVATION DISTRICT

PO BOX 338
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940-663-5722
940-663-2577 FAX

Directors: W.W. Tabor, Jason Poole,
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Public Hearing
January 7, 2021
8:00 am
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1. Call to order by President
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3. The Board will receive public comment on proposed revisions to the Management Plan of Gateway Groundwater Conservation District
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FILED FOR RECORD
at 1:45 o'clock P M
DEC 30 2020
JAMMYE D. TIMMONS
County Clerk, King County
__________ Deputy

GATEWAY GROUNDWATER CONSERVATION DISTRICT

PO BOX 338
QUANAH, TEXAS 79252
940-663-5722
940-663-2577 FAX

Directors: W.W. Tabor, Jason Poole, Gage Moorhouse, H.L. Ayers, Brent Whitaker Bill Haseloff, James Sweeney, Todd Smith True Burson, William Luckett, and James Gillespie

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Posted on Dec 31, 2020 @
08:58 am by
Lindsey R Aldrich

GATEWAY GROUNDWATER CONSERVATION DISTRICT

PO BOX 338
QUANAH, TEXAS 79252
940-663-5722
940-663-2577 FAX
Directors: W.W. Tabor, Jason Poole,
Gage Moorhouse, H.L. Ayers, Brent Whitaker
Bill Haseloff, James Sweeney, Todd Smith
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19. Adjournment

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Posted on Dec 31, 2020 @
08:58am by
Lindsey RAldrich

GATEWAY GROUNDWATER CONSERVATION DISTRICT

PO BOX 338
QUANAH, TEXAS 79252
940-663-5722
940-663-2577 FAX

Directors: W.W. Tabor, Jason Poole,
Gage Moorhouse, H.L. Ayers, Brent Whitaker
Bill Haseloff, James Sweeney, Todd Smith
True Burson, William Luckett, and James Gillespie

Board of Directors Meeting
January 7, 2021
8:15 am
223 S. Main Street, Quanah, Texas 79252

1. Call to order by President.
   If during the course of the meeting, discussion of any item on the agenda should be held in a closed meeting, the Board will conduct a closed meeting.
2. Determination of Quorum by Secretary.
3. Public Comments-Please sign in and limit comments to three minutes general and three minutes per specific agenda item addressed not to exceed nine minutes in total.
4. Consider and act on Minutes of Sep 3, Sep 18 and Nov 7 Meetings
5. Swear in new Foard County Board member
6. Consider and act on assessment contract for Hardeman County
7. Consider clarification of Rules as written
8. Consider and act on seminars
9. Consider and act on budget modifications
10. Financial Report
11. Investment Report
12. Consider and possible action of all County Tax Deeds
13. Consider and possible action of well permits
14. Hydrogeologist report – Ray Brady/Amy Bush
15. Manager's Report
16. Adopt 2020 Gateway Groundwater Management Plan
17. Other Business
18. Set Date and Time for next Board Meeting
19. Adjournment

FILED FOR RECORD
CHILDRESS COUNTY, TEXAS
2020 DEC 30 PM 12:
BARBARA SPITZER
DISTRICT-COUNTY CLERK

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