HPWD
Management Plan
2019-2024

Contents

Section 1—Introduction

District Mission

As defined in statute, the purpose of groundwater conservation districts in Texas is to provide for the conservation, preservation, and protection of the groundwater resources within their jurisdictional boundaries. Therefore, it is the mission of the High Plains Underground Water Conservation District No. 1 (The District) to provide for the conservation, preservation, and protection of groundwater resources within the jurisdictional boundaries of the District, in order to make every effort to ensure that an abundant and high quality supply of groundwater will be available for future water users.

Guiding Principles/Groundwater Management Planning

The District was formed, and is operated, with the guiding belief that the ownership and production of groundwater is a private property right. It is understood that, without the District, there is no protection of private property rights.

In developing its management plan, the Board of Directors of the District considers private property rights, historical groundwater use, water demand projections, current and projected water supply availability, and water supply needs to establish its policies. Rules promulgated by the Board of Directors are carefully considered and are adopted only after considerable public input. The rules provide a fair and equal opportunity for all users to produce groundwater for beneficial purposes, while at the same time meeting the goals of the District. The Board of Directors also establishes the processes by which the District will monitor changes in supply and demand, which affect the near- and long-term viability of the aquifers.

Additionally, the Board realizes that the aquifers extend beyond the District's boundaries, and the sharing of information, programs and ideas with neighboring districts is important. As a result, the District will consider the joint administration of certain programs when appropriate.

This document is a dynamic management plan meant to be reviewed, evaluated and revised as necessary to ensure that the District's goals are being met. As conditions change, the Board of Directors will re-evaluate its policies and rules. Recent changes in Texas law related to groundwater management clearly illustrate the need to routinely review, evaluate, and revise District management plans and rules in order to meet new requirements and changed conditions. The goals, management objectives, and performance standards set forth in this document are considered by the Board of Directors to be reasonable and prudent. Whenever the Board of Directors determines that a change is needed, they will act accordingly after careful consideration of all the facts, and after receiving public input. The following guidelines are used to determine if the management objectives are set at a sufficient level to be realistic and effective:

- The duly elected Board will guide and direct the staff and measure the achievement of the goals established in this document.
- The Board will maintain local management of the privately-owned resource over which the District has jurisdictional authority, as provided by Chapter 36, Texas Water Code.
- The Board will evaluate District activities on a fiscal year basis. The District's fiscal year is October 1-September 30.

Section 2—History and Description of the HPWD

District Creation, Location and Extent

The Texas State Board of Water Engineers delineated the original boundaries of the High Plains Underground Water Conservation District No. 1 (the District) in March 1951. Later that year, voters in 13 Southern High Plains counties created the District in accordance with the Underground Water Conservation Districts Act passed by the Texas Legislature in 1949. After several annexation elections, the District now consists of Bailey, Cochran, Hale, Lamb, Lubbock, Lynn, Parmer and Swisher counties, and portions of Armstrong, Castro, Crosby, Deaf Smith, Floyd, Hockley, Potter and Randall counties (see Figure 1). The District's jurisdictional area now consists of approximately 11,850 square miles or 7,584,000 acres.

The District is represented by a five member elected board of directors. The directors represent precincts, which are comprised of multiple counties. Table 1 lists the current Board of Directors and the officer designation of each.

Table 1: Board of Directors of the High Plains Underground Water Conservation District No. 1

Office	Name	Precinct	Whole Counties	Partial Counties
President	Lynn Tate	4		Armstrong, Deaf Smith, Potter and Randall
Vice-President	Brad Heffington	2	Cochran and Lamb	Hockley
Secretary	Mike Beauchamp	3	Bailey and Parmer	Castro
Member	Dan Seale	1	Lubbock and Lynn	Crosby
Member	Ronnie Hopper	5	Hale and Swisher	Floyd

Other groundwater conservation districts (GCDs) that border HPWD include Garza UWCD, Mesa UWCD, Panhandle GCD, Sandy Land UWCD, and South Plains UWCD. HPWD boundaries also overlie several other administrative boundaries. HPWD counties Armstrong, Potter and Randall are in the Region A Water Planning area, as well as Groundwater Management Area #1. The remaining counties of the HPWD are in Region O Water Planning Area and Groundwater Management Area #2. Figures 2-4 illustrate these boundaries.

Figure 1: HPWD Boundary and Precincts

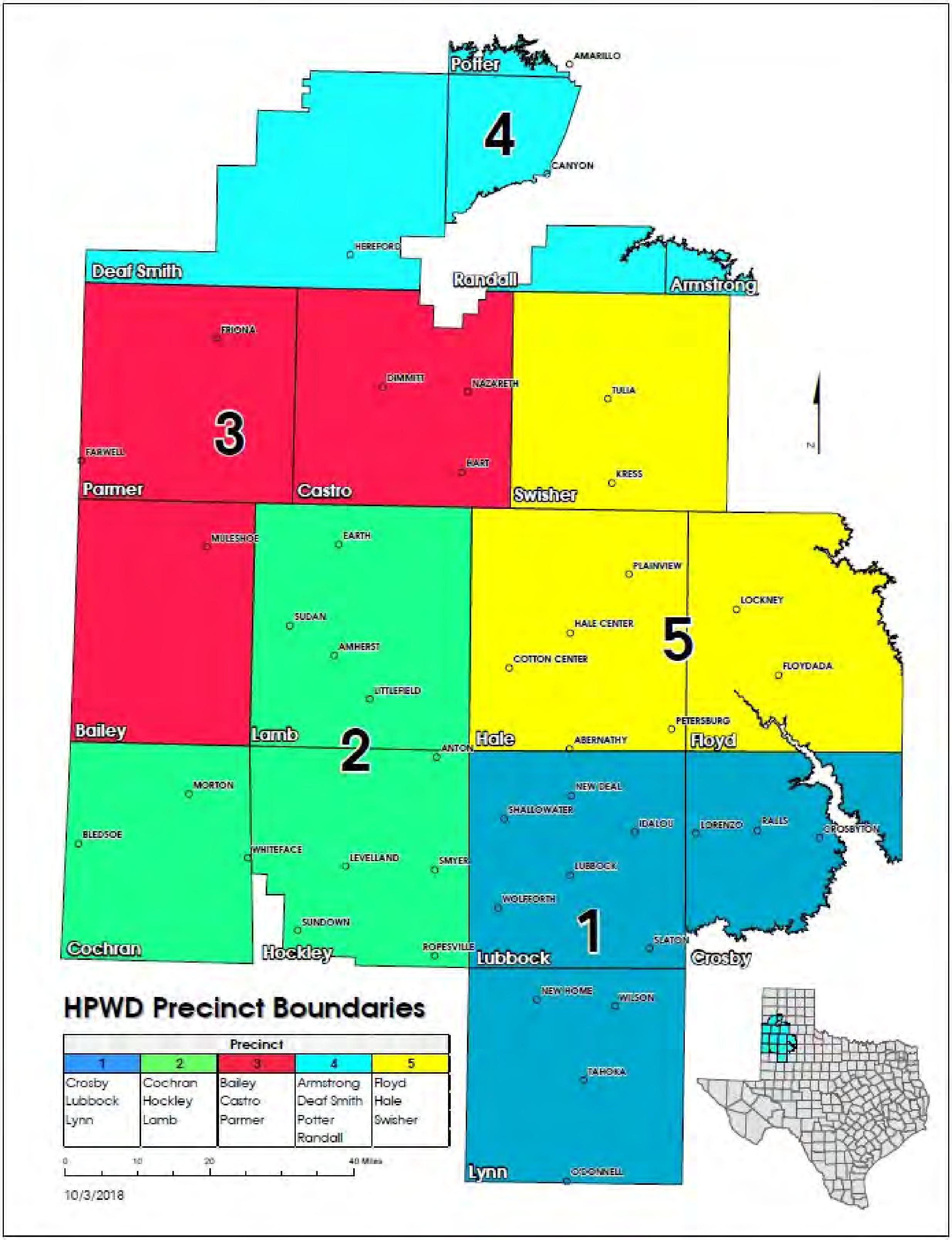


Figure 2: Locations of GMAs and GCDs

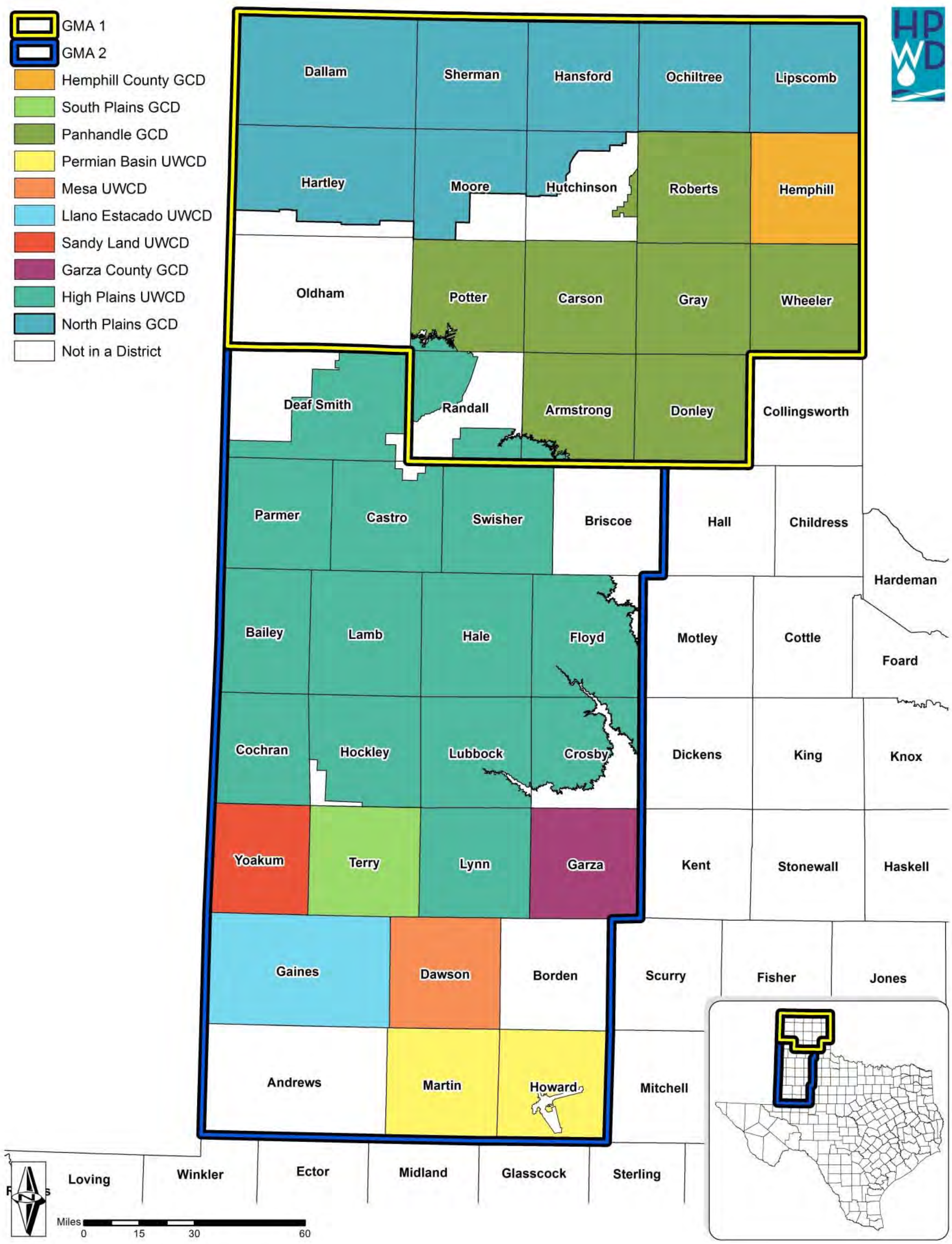


Figure 3: Boundaries of Regional Water Planning Areas

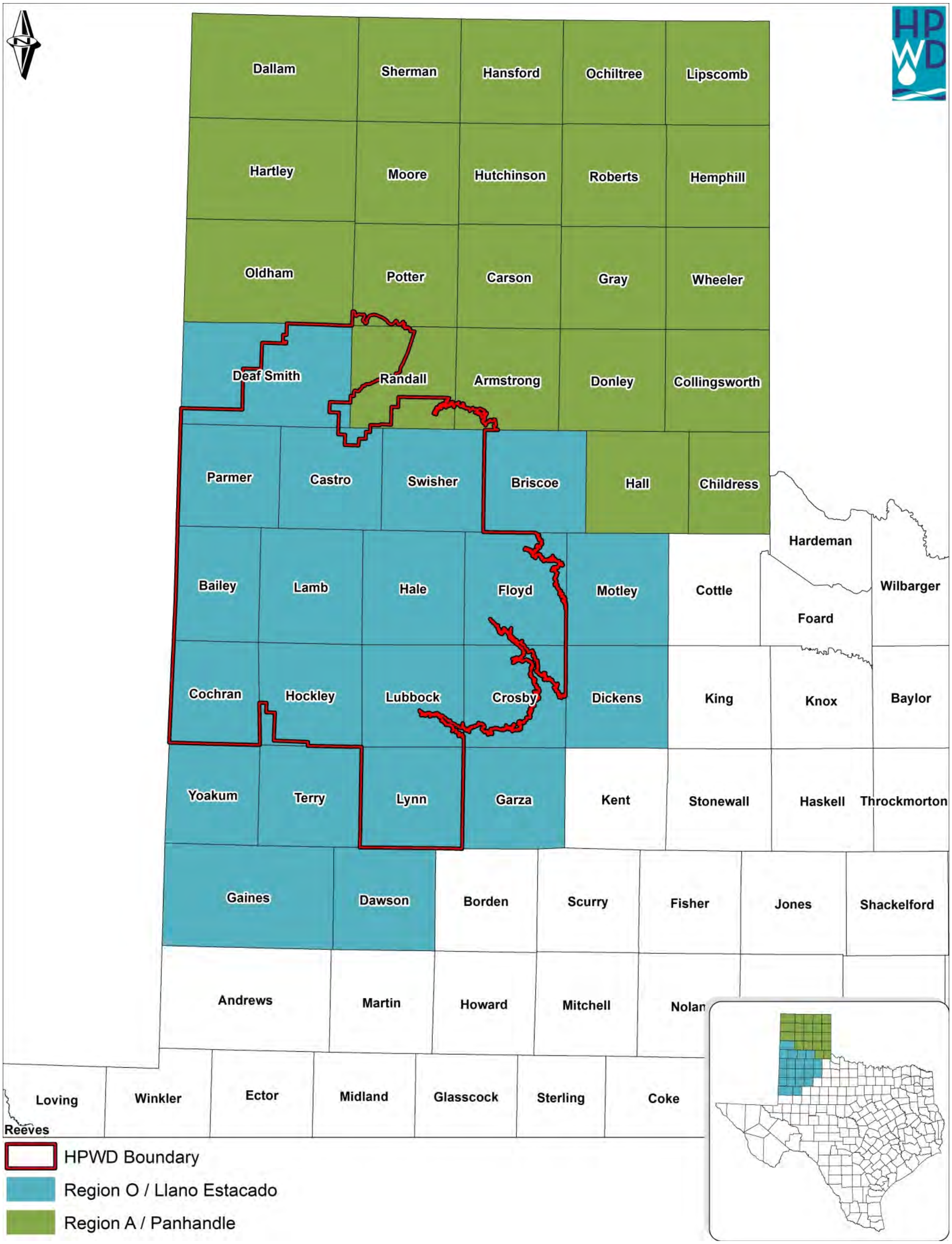
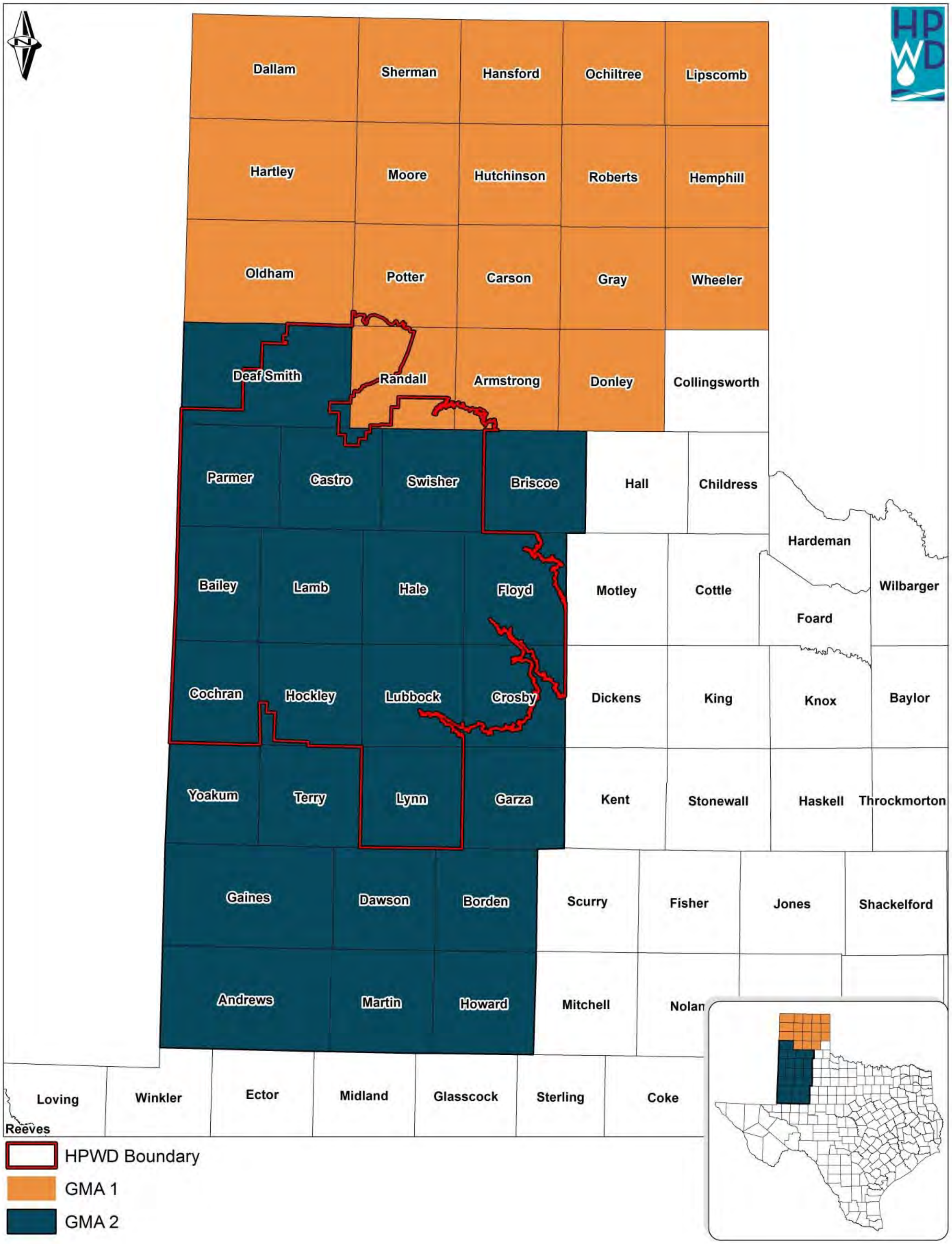


Figure 4: Boundaries of Groundwater Management Areas



General Description

The economy of the District is supported predominately by agriculture. Approximately 2.5 million acres of the District are irrigated using groundwater. These irrigated farms afford economic stability to the area, and support a number of other industries. Major animal feeding operations are in the HPWD, and include 65 beef cattle feed yards. Also, the dairy industry relies heavily on the resources of this region, as 76 dairies currently operate in this area. Various agri-businesses also support these industries, and may include animal health businesses, crop fertilizer and pesticide dealers, cotton gins, grain elevators, farm equipment dealers, irrigation dealers, and many more.

Other important industries of the area include beef processing, steam electric power generation, and oilfield operations. These industries supply a good portion of the tax base for the District, and employ a number of people in this region.

Most of the communities of the HPWD are small, rural towns. The larger cities of the HPWD include Amarillo, Lubbock and Plainview. The total population of the HPWD, according to the 2010 U.S. Census, is about538,000. These residents depend on the groundwater available locally, as well as the water available from several other sources outside the District. For instance, the Canadian River Municipal Water Authority (CRMWA) delivers water to the following cities within the HPWD service area: Amarillo, Levelland, Lubbock, O'Donnell, Plainview, Slaton and Tahoka. The CRMWA supply is predominately found in Roberts County, where its well field draws water from the Ogallala Aquifer. Other surface water providers include White River Municipal Water District (WRMWD) and Mackenzie Municipal Water Authority (MMWA). Communities within HPWD that receive water from these include Ralls and Crosbyton (WRMWD), and Tulia, Lockney and Floydada (MMWA).

Lubbock depends on water supplied by CRMWA, Lake Alan Henry in Garza County, and groundwater from its well field in Bailey County. Some Ogallala wells within the city limits also supply landscape irrigation water for local residents, schools, and parks.

Topography and Drainage

The land surface elevation ranges from about 2,659 feet above sea level in the southeastern part of the District to 4,442 feet in the northwestern part. The eastern boundary of the District lies along the Caprock Escarpment in Floyd and Crosby Counties. A number of draws also cross the District, generally running from northwest to southeast. They are mostly shallow and seldom contain water. Playa lakes are numerous in the District, and most prevalent in Hale and Floyd Counties. These provide some surface drainage, and may contribute to aquifer recharge. The HPWD also covers four major river basins in Texas, including the Canadian River, Red River, Brazos River, and the Colorado River.

Section 3—Groundwater Resources

Ogallala

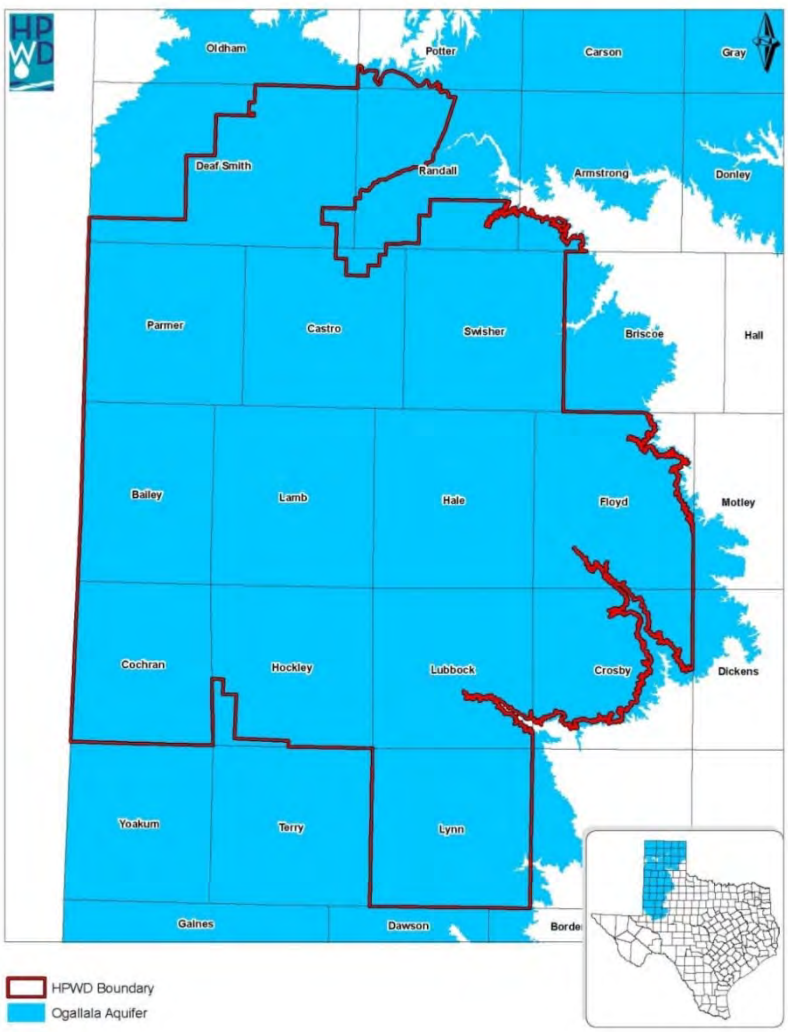
The Ogallala is the major aquifer within the District. It is an unconfined (water table) aquifer, and depths to water cover a wide range. District water level measurements vary from 10 feet below land surface, to over 450 feet below land surface. The Ogallala overlies Cretaceous Period sediments in parts of Bailey, Lamb, Hale, Floyd, Cochran, Hockley, Lubbock and Lynn counties. (Ashworth and Hopkins, 1995) In these areas, the Ogallala section is generally thinner than where it directly overlies the Triassic red beds.

The Ogallala Formation is heterogeneous, and contains sequences of clay, silt, sand and gravel. These sediments are thought to have been deposited by ancient streams that filled buried valleys which were eroded into pre-Ogallala rocks.

Groundwater moves slowly downhill through the formation, which is generally southeast. Saturated thickness of the aquifer may be only a few feet in some areas, while others still have over 150 feet of saturated thickness.

Discharge of the aquifer occurs primarily through pumping. According to GAM studies, recharge occurs primarily through precipitation, although some areas are also influenced by upward leakage from underlying aquifers.

Figure 5: Extent of the Ogallala Within the HPWD



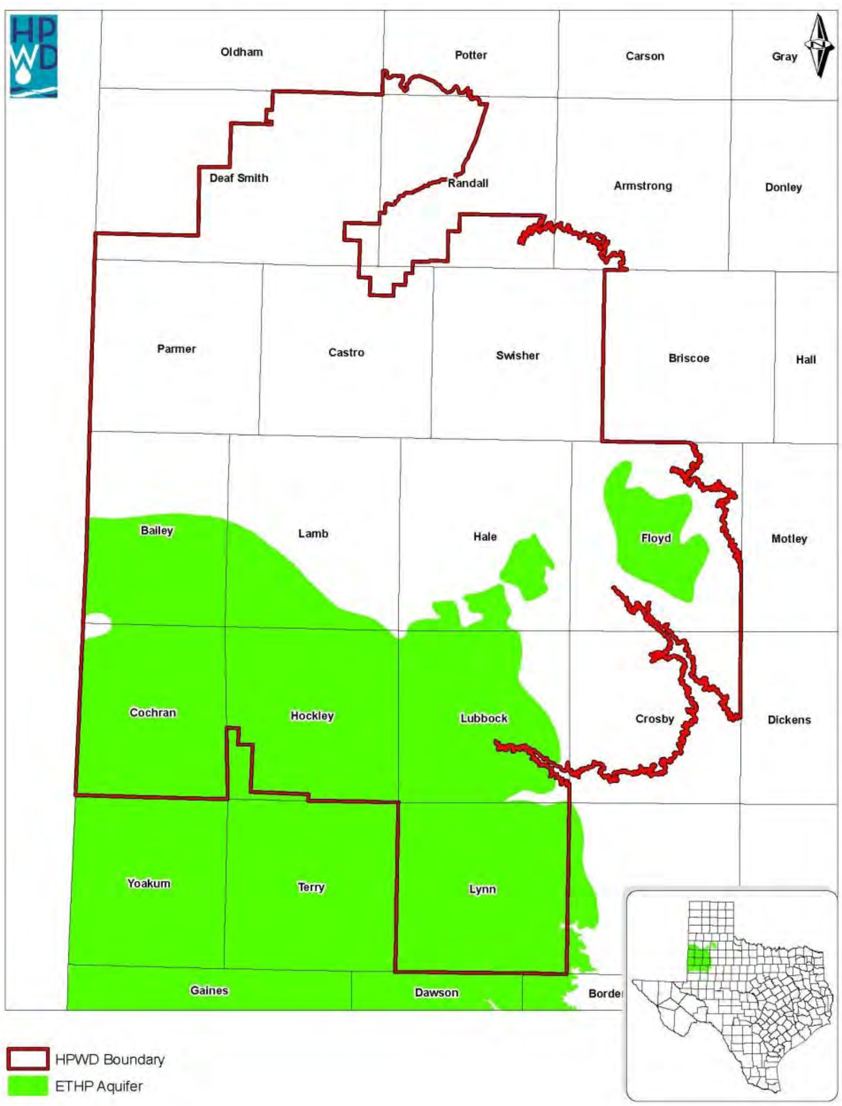
Edwards-Trinity (High Plains)

Cretaceous Period sediments are contained in the Edwards-Trinity (High Plains) Aquifer, which is considered a minor aquifer. In some areas of the District, this aquifer and the Ogallala may be hydraulically connected. This occurs where Ogallala sand and gravel directly overlie Edwards Limestone or Antlers Sand. (Blandford, et. al, 2008)

In some instances, water wells may be completed in both the Ogallala section and the Edwards-Trinity (High Plains) aquifer. As Ogallala water levels decline, this minor aquifer may provide usable quantities of water in some locations. Groundwater in this minor aquifer is generally fresh to slightly saline, but typically poorer in quality than the overlying Ogallala (Ashworth and Hopkins, 1995).

Recharge of this aquifer may occur from the bounding Ogallala Formation, or the underlying Dockum. Movement of water is generally east to southeast.

Figure 6: Location of the Edwards-Trinity (High Plains) Aquifer Within the HPWD

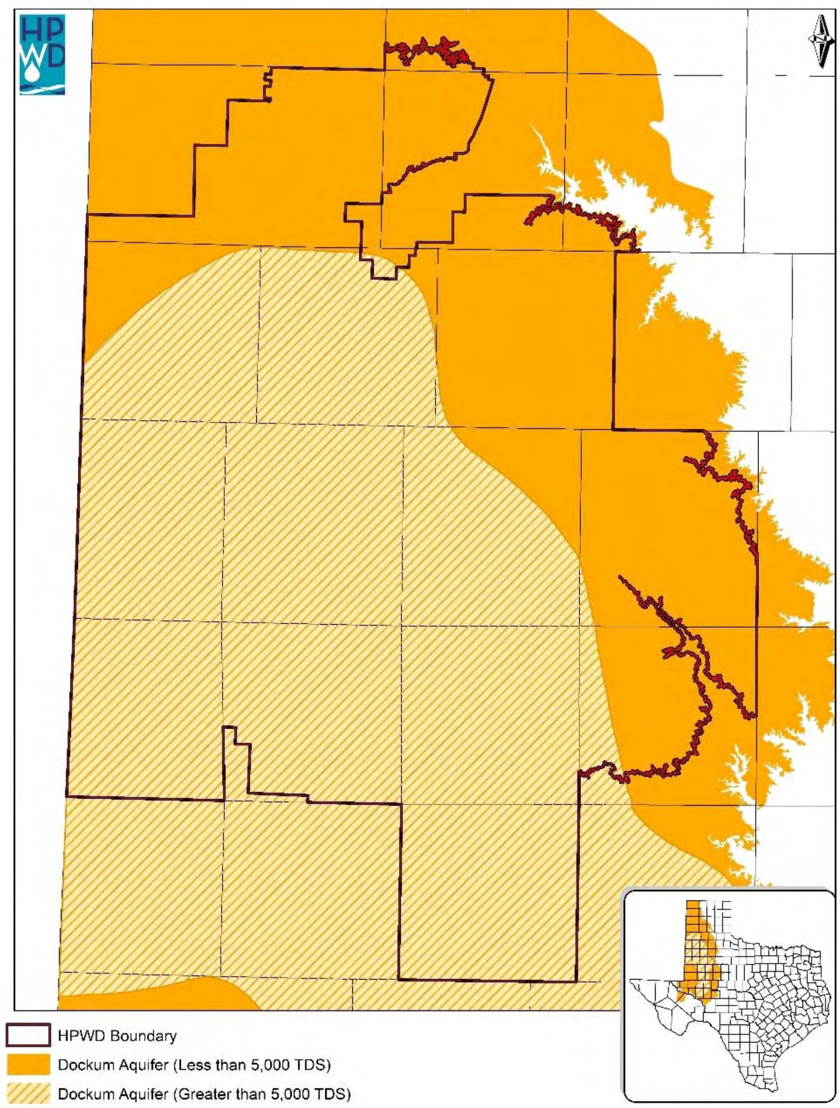


Dockum

The Dockum Aquifer underlies the Ogallala and Edwards-Trinity (High Plains) Aquifers throughout the District. It contains layers of silt and shale, interbedded with other conglomerates. The Santa Rosa Sandstone is likely the most productive zone in this aquifer.

Water quality of the Dockum is the primary limiting factor when considering its use. In most of the District, it is highly saline, and tends to deteriorate with depth. In fact, total dissolved solids (TDS) concentrations may exceed 60,000 mg/L in the deeper parts of the aquifer (Bradley and Kalaswad, 2003). However, in parts of Deaf Smith, Randall and Swisher counties, there are Dockum wells that provide fresh water to users.

Figure 7: Location of the Dockum Aquifer Within the HPWD



Section 4—Technical Water Data

Estimates of Modeled Available Groundwater

Estimates of modeled available groundwater for the adopted DFC are found in Appendix A.

Estimates of Annual Groundwater Use

The estimates of annual groundwater use from the TWDB are taken from the Water Use Survey (WUS). These are used as a guide, and may have limitations, but are useful when examining trends in groundwater withdrawals. Refer to Appendix C for estimates of annual usage.

Estimates of Annual Groundwater Recharge from Precipitation

Refer to GAM Run 19-002 found in Appendix B.

Estimates of Annual Groundwater Discharge to Springs/Surface Water Bodies

Refer to GAM Run 19-002 found in Appendix B.

Estimates of Annual Groundwater Flow Into/Out of the District Within Each Aquifer; Estimates of Annual Groundwater Flow Between Aquifers in the District

Refer to GAM Run 19-002 found in Appendix B.

Estimates of Projected Surface Water Supply

Refer to Appendix C for estimates of projected surface water supply.

Estimates of Projected Total Demand for Water in the District

Projecting water demand is a challenging task, and contains some uncertainty. Irrigation demand projections are particularly difficult, since rainfall, commodity prices, and federal farm policy are but a few factors that complicate the matter.

Refer to Appendix C for projected total demand for water in the District.

Section 5—Needs and Strategies

Water Supply Needs and Water Management Strategies

Water supply needs and resulting water management strategies are developed within each Regional Water Planning Group every five years as part of the State Water Plan. These needs and strategies are initially formed by specific water user groups (WUGs), and reflect the unique circumstances and challenges for the respective WUGs. Looking at this data helps the District understand the anticipated needs, strategies and usage trends over the planning period. The innovative water management strategies and anticipated needs may help the District communicate groundwater conservation information to water users. Refer to Appendix C for water supply needs and water management strategies included in the most recently adopted State Water Plan.

Section 6—Plan Implementation

Actions, Procedures, Performance and Avoidance for Plan Implementation and Groundwater Management

The District has rules that address the spacing of wells from property lines, as well as other valid well sites. There is also an annual production limit that limits total withdrawals from non-exempt wells.

The effectiveness of HPWD conservation programs is continually evaluated. Water conservation technology continues to improve, and the District has a history of supporting innovative research and demonstration programs.

The rules of the District have been evaluated by the County Advisory Committees, comprised of about 100 individuals. Other water user groups have also provided valuable input to the rules of the District. The board has developed this plan, as well as the rules, using a very transparent and deliberate process. A current copy of the rules is available at http://www.hpwd.org/rules.

Section 7—Goals, Objectives, Methodology and Performance Standards

The District staff will prepare an annual report of the District's achievement of its management goals and objectives. The report will be prepared in a format that is reflective of the performance standards for each management objective. The report will be presented to the Board at the end of each fiscal year. The report will be maintained on file in the open records of the District.

The District will enforce its rules in order to conserve, preserve, protect and prevent the waste of groundwater within its service area. The Board may periodically review the District's rules, and may modify the rules, following public input, to better manage the groundwater resources within the District and to carry out the duties prescribed by Chapter 36 Texas Water Code.

Goal 1: Providing the Most Efficient Use of Groundwater

Management Objective 1.1 (Monitor water levels):
Water level measurements are vital to the study of the aquifers in the District. Annual measurements are taken each winter, during which time most of the irrigation usage is at a minimum.

Performance Standards

1.1a Number of wells measured each year.

1.1b Number of wells District staff are unable to measure each year

1.1c Number of new wells added to the network of observation sites each year

1.1d Construct maps illustrating the yearly changes in water levels

1.1e Maintain continuous water level monitoring transducers in at least 10 water wells

Management Objective 1.2 (Monitor saturated thickness):
Saturated thickness represents the aquifer section where pumping occurs. Water users should be aware of changing saturated thickness.

Performance Standards

1.2a Once per year, calculate saturated thickness for water level observation wells that have a log of well construction

1.2b Provide saturated thickness data via the District website

Management Objective 1.3 (Technical field services):
The District is frequently asked to measure well capacities. A variety of tools are used by District staff for this purpose. These may include ultrasonic flow meters, e-lines, and others.

Performance Standards

1.3a Number of flow tests performed by District staff each year

1.3b Number of flow tests performed by the public using the metering equipment loaned to water users

1.3c Number of water level measurements performed for individual well owners

Management Objective 1.4 (Irrigation assessment program):
Agricultural irrigation comprises the majority of groundwater usage within the District. For this reason, it is important that the District understand the patterns of usage on different crops. Using a network of cooperators, the District should monitor application amounts and crop types.

Performance Standards

1.4a Number of sites enrolled in the District's irrigation assessment program each year

1.4b Document the types of crops being irrigated each year

1.4c Document the irrigation methods being utilized each year

Management Objective 1.5 (Data availability):
The District should provide the best available hydrologic information to water users of the District. This information should be usable on a variety of platforms, such as electronic or print. Timeliness of delivery and ease of access are also critically important.

Performance Standards

1.5a Once per year, summarize and describe new/improved data tools

1.5b Once per year, summarize and describe existing data tools

1.5c Once per year, inventory all data tools available to the public

Management Objective 1.6 (Irrigation system inventory):
As groundwater availability changes, it is expected that irrigated acreage does, too. Monitoring this change may be accomplished using remote imagery or other tools.

Performance Standards

1.6a Once per year, document the number of irrigation systems within the District

1.6b Calculate acreage covered by the irrigation systems once per year

Goal 2: Controlling and Preventing Waste of Groundwater

Management Objective 2.1 (Well permitting and well completion):
The District issues permits for wells expected to produce 17.5 gpm or more.

Performance Standards

2.1a Number of water well permits issued by aquifer each year

2.1b Production categories of well permits issued

Management Objective 2.2 (Open, deteriorated or uncovered wells):
Open, uncovered or deteriorated wells pose a threat to groundwater quality, as well as human and/or animal safety. A staff member may discover such a well during routine field work, or the office may receive notice of the same from a member of the public.

Performance Standards

2.2a Number of open, uncovered or deteriorated wells reported each year

2.2b Number of well caps provided to cover open wells each year

2.2c Number of open, uncovered or deteriorated wells that are capped, closed or repaired in accordance with District rules each year

Management Objective 2.3 (Waste of groundwater):
Waste of groundwater is typically reported to the District office by a member of the public, but may also be discovered by a staff member conducting routine field work. Since waste is prohibited by state law, these reports are investigated by staff and the corresponding well owner is notified of the wasteful practice.

Performance Standards

2.3a Number of waste reports investigated by District staff each year

2.3b Number of newsletter articles addressing waste prevention each year

Goal 3: Controlling and preventing subsidence (not applicable)

Using the TWDB subsidence predictor tool, we performed analysis for selected water level observation wells. The transient predictions ended at the year 2070. Minimum predicted subsidence values were about 0.15 feet, while the maximum predicted subsidence values were about 0.70 feet. We also reviewed the TWDB report, "Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping". The District concluded that this goal is not applicable to the operation of the District.

Goal 4: Conjunctive surface water management issues

Management Objective 4.1 (Coordination with surface water management agencies):

There are very limited surface water resources in the District. Attending Regional Water Planning Group (RWPG) meetings within HPWD will ensure that the District stays current with issues that affect surface water agencies in the region.

Performance Standard

4.1a Number of RWPG meetings attended by district staff each year

Goal 5: Natural resource issues

Management Objective 5.1 (Monitor Water Quality):

Water quality affects many different user groups within HPWD. The amount of total dissolved solids (TDS) in groundwater is of primary importance as a screening tool for assessing water quality. HPWD has several tools available for conducting this measurement.

Performance Standards

5.1a Document the aquifer(s) being sampled

5.1b Number of wells sampled each year

5.1c Document the type of sampling methods

Goal 6: Drought Conditions

Management Objective 6.1 (Provide ongoing and relevant drought information):

Drought awareness helps water users understand the level of conservation required to meet a particular need. The Texas Water Development Board (TWDB) has a very useful web site for drought information, which is http://www.waterdatafortexas.org/drought

Performance Standards

6.1a Number of drought related articles provided to the public each year

6.1b Number of rainfall maps provided to the public each year

Goal 7: Conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective

Management Objective 7.1 (Newsletter):

The District will produce a newsletter and distribute it to area residents and other interested parties.

Articles discussing methods to conserve and preserve groundwater quality and quantity will be included.

Performance Standards

7.1a Once per year, document the number of newsletter subscribers

7.2b Number of electronic newsletters produced each year

7.2c Number of articles addressing conservation practices each year

Management Objective 7.2 (News releases):
The District will prepare news releases about water conservation practices and other relevant subjects for distribution to print media, electronic media and other interested parties.

Performance Standards

7.2a Number of news releases sent to media and other interested parties each year

7.2b Number of news releases addressing conservation practices each year

Management Objective 7.3 (Radio announcements):
The District will distribute pre-recorded radio announcements about water conservation practices and other subjects to stations within the District.

Performance Standards

7.3a Number of radio announcements produced each year

Management Objective 7.4 (Public presentations):
HPWD representatives will present information about water conservation practices, HPWD programs, and other subjects to civic clubs, professional groups, and other interested parties.

Performance Standards

7.4a Number of public presentations delivered each year

7.4b Document the estimated attendance at each venue

Management Objective 7.5 (Conservation research):
The District will seek opportunity to participate and partner with other groups conducting water conservation research and development.

Performance Standards

7.5a Once per year, document the number of water conservation research projects in which the District participates

7.5b Number of newsletter articles describing the research projects each year

Management Objective 7.6 (Public information):
District staff will provide general water conservation information at suitable venues within the District each year. This may include exhibits at farm shows and information tables with publications at other meetings.

Performance Standards

7.6a Document the venues at which water conservation information is provided

7.6b Estimate the attendance at each venue

Management Objective 7.7 (Youth education):
The District will provide water conservation education to youth within its service area.

Performance Standards

7.7a Document the number of presentations and youth reached once per year

Management Objective 7.8 (Website):
The District will provide information about groundwater, water conservation, and other subjects on its website.

Performance Standards

7.8a Document annual web traffic using an analytical program

Goal 8: Recharge Enhancement

Management Objective 8.1 (Research/Demonstration Opportunities):
Since the District's creation, HPWD has committed many resources to recharge enhancement studies and demonstrations. Recharge wells and enhanced recharge structures are just several examples of this past work. As managed aquifer research (MAR) technologies evolve, we expect additional research and demonstration opportunities. HPWD may encourage work in this area through its policy of research and demonstration proposals.

Performance Standards

8.1a Number of research/demonstration MAR proposals received by HPWD each year

8.2b Number of research/demonstration MAR proposals funded by HPWD each year

Goal 9: Rainwater Harvesting

Management Objective 9.1 (Rainwater Harvesting):

The District will promote awareness of this conservation practice to residents of the District.

Performance Standards

9.1a Number of public presentations dedicated to rainwater harvesting each year

9.1b Number of articles or publications written regarding rainwater harvesting each year

9.1c Number of rainwater harvesting devices distributed to the public each year

Goal 10: Precipitation Enhancement (not applicable)

During the years 1997-2002, HPWD conducted a weather modification program. In late 2002, residents of the District voiced much opposition to this program, and several counties commissioners' courts adopted resolutions against the continuation of the program. The program was subsequently terminated by the HPWD board, and this goal is not applicable.

Goal 11: Brush Control (not applicable)

Existing programs administered by the USDA-NRCS are addressing this issue. This activity is not cost-effective and applicable for the District at this time. Therefore, this goal is not applicable to the operation of the District.

Goal 12: Desired future condition of the aquifers

Management Objective 12.1 (Calculate average yearly water level change):
The District's currently adopted desired future conditions (DFCs) were developed using an average yearly water level change within the GMAs. Each winter, HPWD and other GCDs obtain water level measurements to determine the change from the previous year.

Performance Standards

12.1a Number of wells included in the calculation

12.1b Calculated average water level change

12.1c Compare total cumulative change to the adopted DFC

Management Objective 12.2 (Estimating annual usage):
Calculating annual usage is necessary for monitoring progress toward achieving the desired future conditions. Although a regional groundwater model provides estimations of usage to meet that goal, a more specific local estimate may increase our understanding of the usage and corresponding changes in volume.

Performance Standards

12.2a Estimate total usage within the District using reported data and irrigation estimates

12.2b Compare estimated annual usage to data from the High Plains Aquifer System (HPAS) GAM

References

Ashworth, J. and Hopkins, J., 1995, Aquifers of Texas: Texas Water Development Board, 44-45 p.

Blandford, T.N., Kuchanur, M., Standen, A., Ruggiero, R., Calhoun, K.C., Kirby, P., and Shah, G., 2008, Groundwater availability model of the Edwards-Trinity (High Plains) Aquifer in Texas and New Mexico: Final report prepared for the Texas Water Development Board by Daniel B. Stephens & Associates, Inc., 80 p.

Bradley, R. and Kalaswad, S, 2003, The Groundwater Resources of the Dockum Aquifer in Texas: Texas Water Development Board, 51 p.

Appendix A

GAM Run 16-028 MAG: Modeled Available Groundwater for the Ogallala, Edwards-Trinity (High Plains), and Dockum Aquifers in Groundwater Management Area 2

Jerry Shi, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-5076
May 12, 2017

STATE OF TEXAS
JIANYOU SHI
GEOLOGY
11113
LICENSED
PROFESSIONAL GEOSCIENTIST

5/15/2017

This page is intentionally left blank.

MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA, EDWARDS-TRINITY (HIGH PLAINS), AND DOCKUM AQUIFERS IN GROUNDWATER MANAGEMENT AREA 2

Jerry Shi, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-5076
May 12, 2017

EXECUTIVE SUMMARY:

Modeled available groundwater for the Ogallala and Edwards-Trinity (High Plains) aquifers in Groundwater Management Area 2 ranges from 3,115,812 acre-feet per year in 2020 to 1,002,728 acre-feet per year in 2070. Modeled available groundwater for the Dockum Aquifer ranges from 30,566 acre-feet per year in 2020 to 29,705 acre-feet per year in 2070. The modeled available groundwater for the Ogallala and Edwards-Trinity (High Plains) aquifers is summarized by groundwater conservation districts and counties in Table 1, and by river basins, regional planning areas, and counties in Table 3. The modeled available groundwater for the Dockum Aquifer is summarized by groundwater conservation districts and counties in Table 2, and by river basins, regional planning areas, and counties in Table 4. The modeled available groundwater for Groundwater Management Area 2 calculated from counties is slightly different from that calculated from groundwater conservation districts because of the process for rounding the values.

The estimates are based on the desired future conditions for the High Plains Aquifer System (the Ogallala, Edwards-Trinity (High Plains), and Dockum aquifers) adopted by groundwater conservation district representatives in Groundwater Management Area 2 on October 19, 2016. The Pecos Valley Alluvium and Edwards-Trinity (Plateau) aquifers were declared not relevant for the purpose of joint planning. The Texas Water Development Board (TWDB) determined that the explanatory report and other materials submitted by the district representatives were administratively complete on December 19, 2016.

Please note that, for the High Plains Underground Water Conservation District No. 1, only the portion of relevant aquifers within Groundwater Management Area 2 is covered in this report.

REQUESTOR:

Mr. Jason Coleman, General Manager of High Plains Underground Water Conservation District No. 1 and Coordinator of Groundwater Management Area 2.

DESCRIPTION OF REQUEST:

In a letter dated November 1, 2016, Dr. William Hutchison, on behalf of Groundwater Management Area 2, provided the TWDB with the desired future conditions of the High Plains Aquifer System. The desired future conditions (defined by drawdown) were determined using a number of predictive groundwater flow simulations (Hutchison, 2016a, 2016b, 2016c, and 2016d). The predictive simulations were developed from the groundwater availability model for the High Plains Aquifer System (Version 1.01; Deeds and Jigmond, 2015). The predictive simulations modeled future pumping scenarios from 2013 through 2070 under different climatic conditions, with an initial water level equal to the last stress period (i.e. 2012) of the model by Deeds and Jigmond (2015). The drawdown was calculated as the water level difference between 2012 and 2070.

The desired future conditions for the High Plains Aquifer System, as described in Resolution No. 16-01, were adopted on October 19, 2016 by the groundwater conservation district representatives in Groundwater Management Area 2. The desired future conditions are described below:

Ogallala and Edwards-Trinity (High Plains) Aquifers

- [the] average drawdown of between 23 and 27 feet for all of [Groundwater Management Area] 2 as documented in [Groundwater Management Area] 2 Technical Memorandum 15-01 and [Groundwater Management Area] 2 Technical Memorandum 16-01. The drawdown is calculated from the end of 2012 conditions to the year 2070. The drawdown is expressed as a range due to link between future pumping and future rainfall. Since most of the water use in the Ogallala Aquifer is for irrigation, producers pump more groundwater in dry years than in normal or wet years.

Dockum Aquifer

- [the] average drawdown of 27 feet for all of [Groundwater Management Area] 2. The drawdown is calculated from the end of 2012 conditions to the year 2070 based on Scenario 16 as documented in [Groundwater Management Area] 2 Technical Memorandum 16-01.

After review of the submittal, TWDB sent an email on February 27, 2017 to Mr. Jason Coleman, Coordinator of Groundwater Management Area 2, to clarify pumping location and aquifer boundary. On April 20, 2017 TWDB received the final clarification email from Mr. Jason Coleman. TWDB then preceded the calculation of the modeled available groundwater which is summarized in the following sections.

METHODS:

To estimate the modeled available groundwater, TWDB used the predictive simulation for Scenario 16 (Hutchison, 2016d). TWDB reviewed the model files submitted by Hutchison (2016d) and slightly modified the groundwater pumping to achieve the adopted desired future conditions for the Ogallala and Edwards-Trinity (High Plains) aquifers. TWDB used the official aquifer boundaries to adjust the pumping in these two aquifers to achieve an average drawdown of 27 feet for all of Groundwater Management Area 2. This scenario represented drought conditions that are similar to the projected conditions used in the regional water planning process. For groundwater management purposes, pumping from this scenario may be adjusted to represent possible responses to various climatic conditions.

For the Dockum Aquifer, TWDB used the modeled extent submitted by Deeds and Jigmond (2015) to adjust the pumping to achieve an average drawdown of 27 feet for all of Groundwater Management Area 2, excluding the pass-through model cells. In addition to the Dockum Aquifer defined by TWDB, the modeled extent also includes the brackish/saline portion of the Dockum Group. According to Technical Memorandum 16-01 (Hutchison, 2016d), the groundwater conservation districts in Groundwater Management Area 2 wanted to include parts of the Dockum Group with poorer water quality for possible future development.

The modeled available groundwater values were extracted from the cell-by-cell budget file of the revised predictive model. Annual pumping rates were then divided by county, river basin, regional water planning area, and groundwater conservation district within Groundwater Management Area 2 (Figures 1 through 4 and Tables 1 through 4).

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 are described below:

- Version 1.01 of the groundwater availability model for the High Plains Aquifer System by Deeds and Jigmond (2015) was revised to construct the predictive model simulation for this analysis. See Hutchison (2016d) for details of the initial assumptions.

- The model has four layers which represent the Ogallala and Pecos Valley Alluvium aquifers (Layer 1), the Edwards-Trinity (High Plains) 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 Dockum Aquifer was absent but provided 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 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 2 went dry.

- For the High Plains Underground Water Conservation District No. 1, only the portion within Groundwater Management Area 2 is covered in this report.

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

RESULTS:

The modeled available groundwater for the Ogallala and Edwards-Trinity (High Plains) aquifers combined that achieves the desired future condition adopted by Groundwater Management Area 2 decreases from 3,115,812 to 1,002,728 acre-feet per year between 2020 and 2070. The modeled available groundwater is summarized by groundwater conservation district and county in Table 1. Table 3 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 Group and Aquifer that achieves the desired future condition adopted by Groundwater Management Area 2 decreases slightly from 30,566 to 29,705 acre-feet per year between 2020 and 2070. The modeled available groundwater is summarized by groundwater conservation district and county in Table 2. Table 4 summarizes the modeled available groundwater by county, river basin, and regional water planning area for use in the regional water planning process.

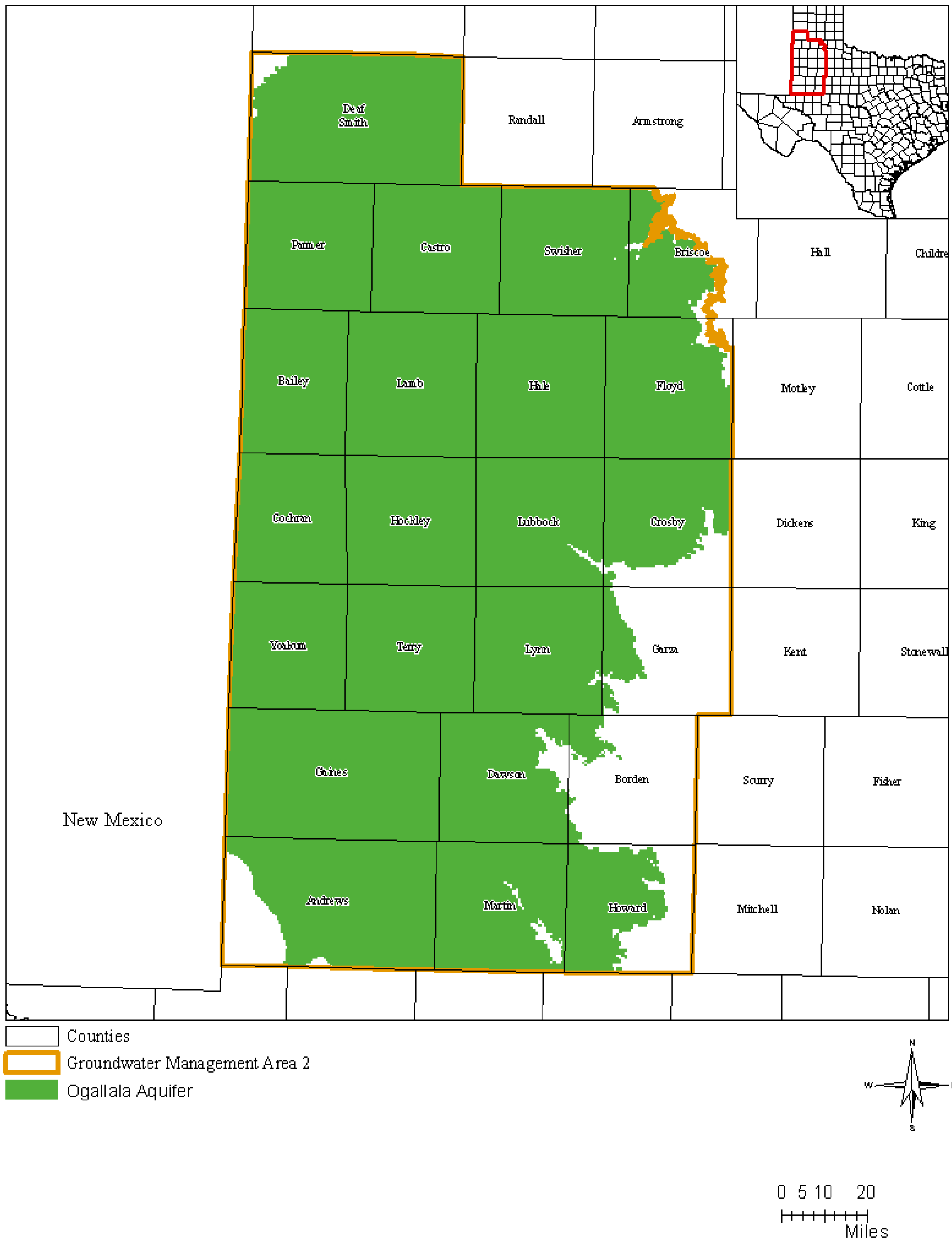


FIGURE 1. MAP SHOWING THE AREA COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE OGALLALA AQUIFER WITHIN GROUNDWATER MANAGEMENT AREA 2.

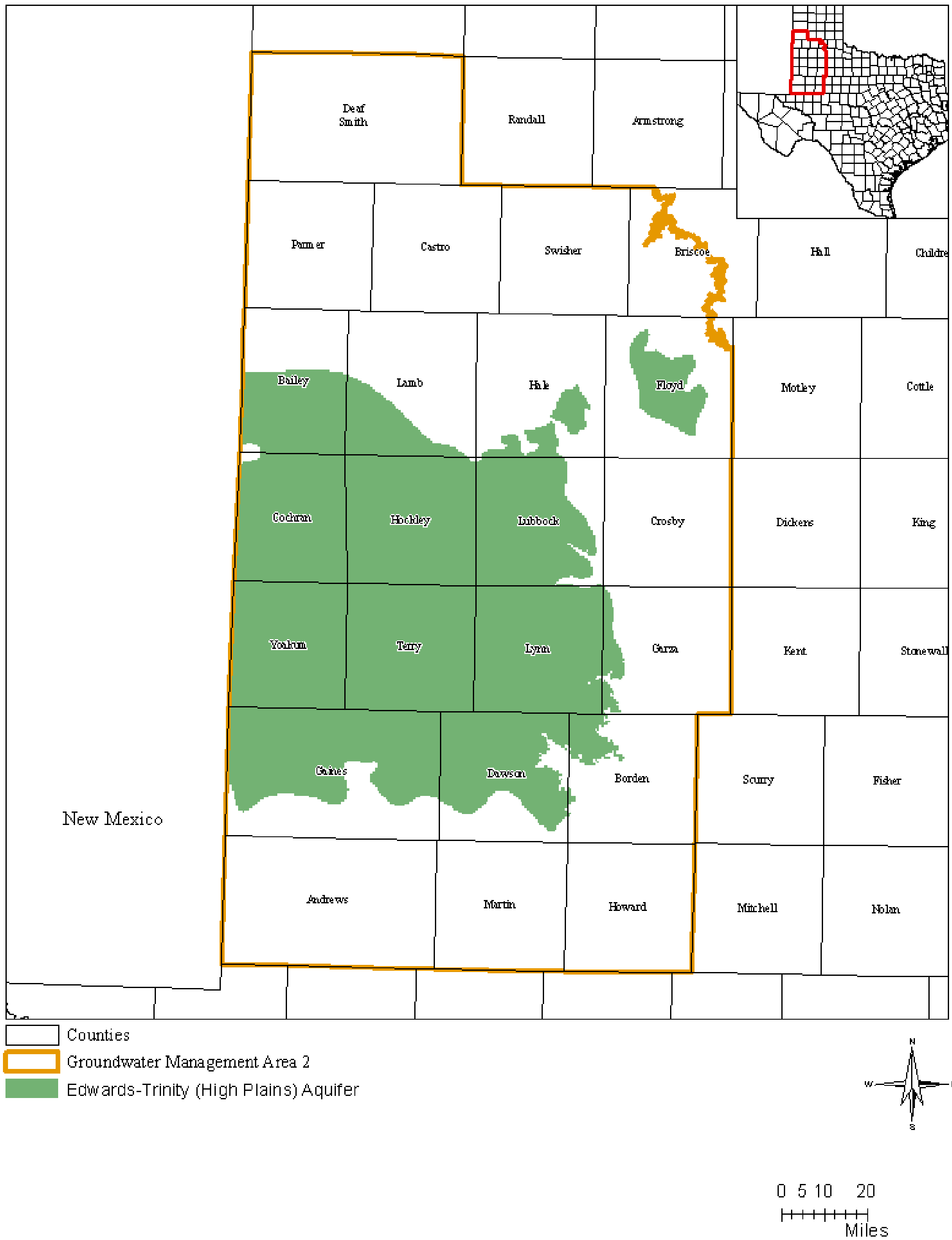


FIGURE 2. MAP SHOWING THE AREA COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (HIGH PLAINS) AQUIFER WITHIN GROUNDWATER MANAGEMENT AREA 2.

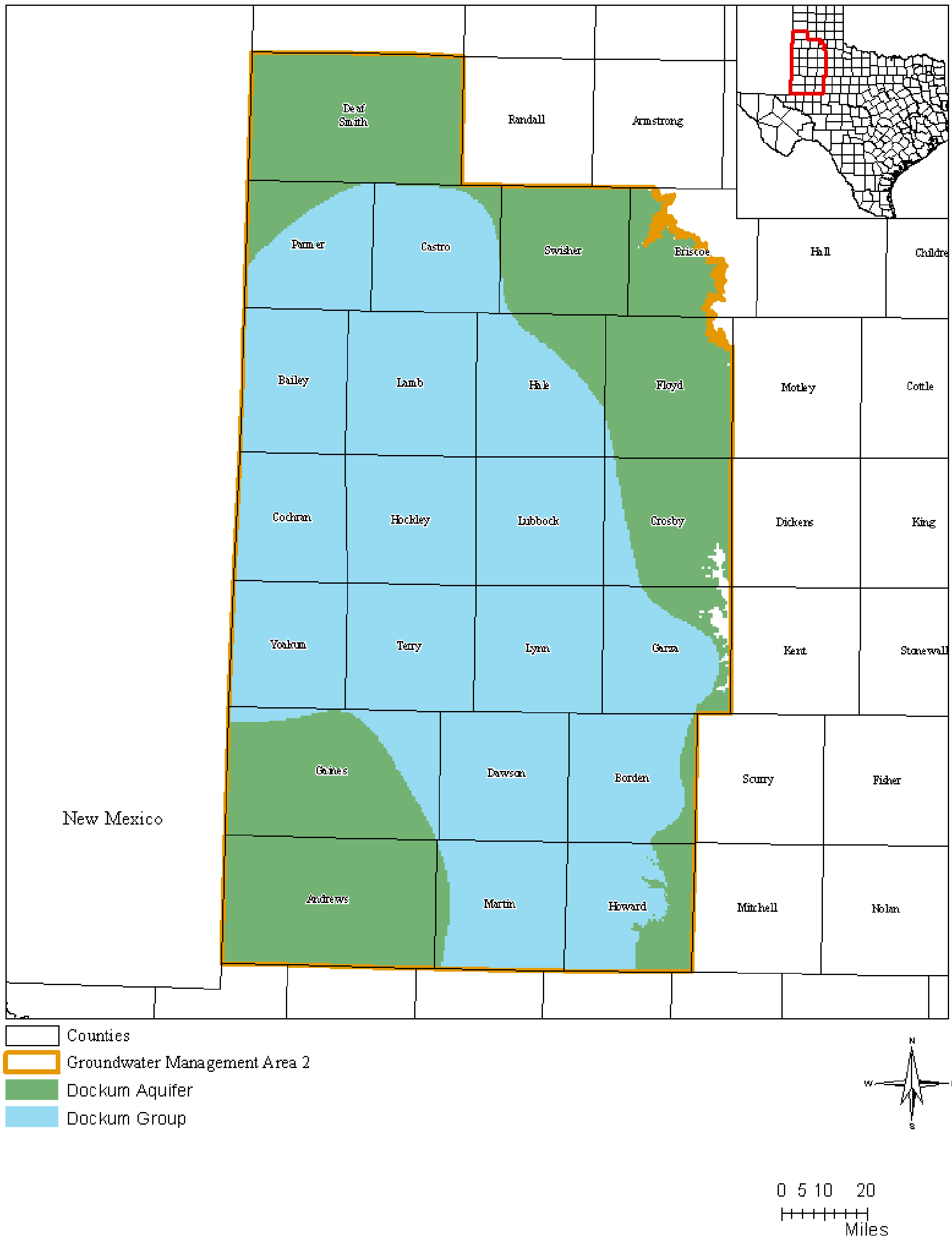


FIGURE 3. MAP SHOWING THE AREA COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE DOCKUM AQUIFER AND DOCKUM GROUP WITHIN GROUNDWATER MANAGEMENT AREA 2.

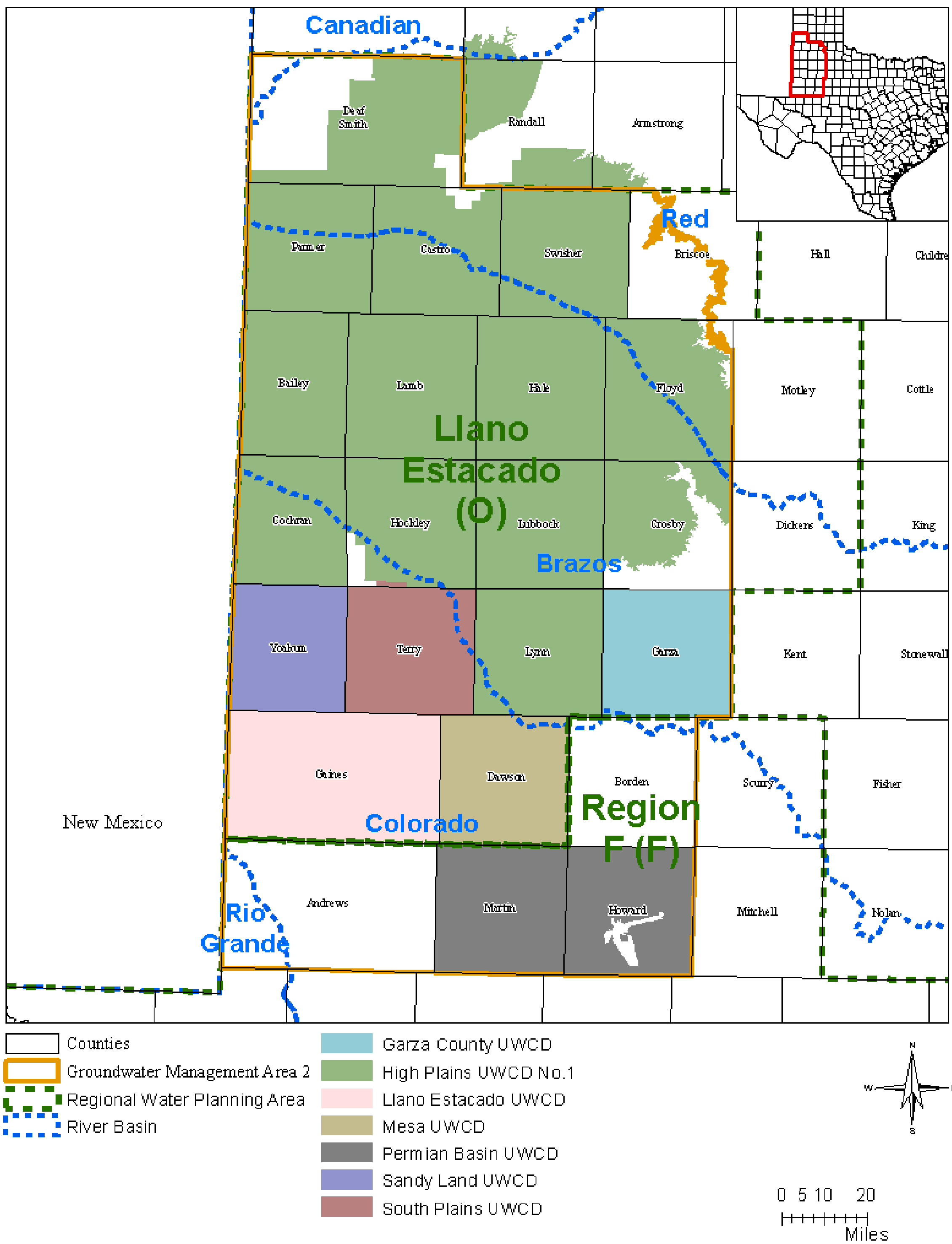


FIGURE 4. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS (ALSO KNOWN AS UNDERGROUND WATER CONSERVATION DISTRICT OR UWCD), COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 2.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA AND EDWARDS-TRINITY (HIGH PLAINS) AQUIFERS IN GROUNDWATER MANAGEMENT AREA 2 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR. (UWCD = UNDERGROUND WATER CONSERVATION DISTRICT)

Groundwater Conservation District	County	2012	2020	2030	2040	2050	2060	2070
Garza County UWCD Total	**Garza**	**14,932**	**16,297**	**13,648**	**12,395**	**11,657**	**11,180**	**10,855**
High Plains UWCD No.1	Bailey	79,604	97,679	67,307	51,199	42,704	37,858	34,815
High Plains UWCD No.1	Castro	200,692	261,434	181,190	102,732	55,811	35,734	26,291
High Plains UWCD No.1	Cochran	67,032	101,762	79,152	64,503	55,408	47,858	42,674
High Plains UWCD No.1	Crosby	124,336	163,188	108,662	68,885	46,778	35,651	29,619
High Plains UWCD No.1	Deaf Smith	148,161	182,988	118,471	74,107	51,551	40,042	33,785
High Plains UWCD No.1	Floyd	124,867	170,451	94,139	67,802	54,090	46,197	41,537
High Plains UWCD No.1	Hale	283,391	220,111	114,928	70,663	48,719	37,740	31,954
High Plains UWCD No.1	Hockley	132,145	154,091	96,609	71,741	60,822	55,285	52,185
High Plains UWCD No.1	Lamb	244,726	223,477	112,082	71,220	56,582	50,140	46,816
High Plains UWCD No.1	Lubbock	131,793	151,056	121,404	109,134	100,850	94,935	90,798
High Plains UWCD No.1	Lynn	81,678	112,607	96,151	85,494	78,603	74,349	71,640
High Plains UWCD No.1	Parmer	150,001	152,014	91,098	59,259	43,737	35,469	30,537
High Plains UWCD No.1	Swisher	119,658	129,283	71,638	46,284	33,912	27,019	22,783
High Plains UWCD No.1 Total		**1,888,087**	**2,120,141**	**1,352,831**	**943,023**	**729,567**	**618,277**	**555,434**
Llano Estacado UWCD Total	**Gaines**	**266,072**	**277,954**	**218,338**	**184,298**	**162,643**	**147,743**	**138,294**
Mesa UWCD Total	**Dawson**	**122,802**	**172,851**	**123,476**	**96,796**	**82,283**	**74,610**	**69,928**
Permian Basin UWCD	Howard	12,428	19,285	16,865	15,737	15,105	14,738	14,513
Permian Basin UWCD	Martin	41,993	63,463	51,126	43,861	39,793	37,210	35,425
Permian Basin UWCD Total		**54,421**	**82,748**	**67,991**	**59,598**	**54,898**	**51,948**	**49,938**
Sandy Land UWCD Total	**Yoakum**	**131,815**	**138,940**	**92,952**	**69,400**	**58,308**	**52,469**	**48,940**
South Plains UWCD	Hockley	3,527	4,895	2,213	726	389	283	240
South Plains UWCD	Terry	205,507	190,768	132,777	105,892	94,696	88,883	85,518
South Plains UWCD Total		**209,034**	**195,663**	**134,990**	**106,618**	**95,085**	**89,166**	**85,758**

Groundwater Conservation District	County	2012	2020	2030	2040	2050	2060	2070
No District-County	Andrews	19,037	24,937	21,375	19,795	18,774	18,040	17,474
No District-County	Borden	5,025	5,922	4,639	4,069	3,737	3,421	3,212
No District-County	Briscoe	27,107	29,022	17,637	11,907	9,053	7,445	6,451
No District-County	Castro	3,159	5,859	3,280	2,367	1,814	1,452	1,214
No District-County	Crosby	1,691	3,135	2,918	2,292	1,959	1,783	1,671
No District-County	Deaf Smith	16,585	23,348	18,932	15,981	14,110	12,791	11,821
No District-County	Hockley	10,604	18,445	13,065	5,303	2,577	1,618	1,185
No District-County	Howard	352	550	527	526	534	543	553
Groundwater Management Area 2		**2,770,723**	**3,115,812**	**2,086,599**	**1,534,368**	**1,246,999**	**1,092,486**	**1,002,728**

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 2 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR. (UWCD = UNDERGROUND WATER CONSERVATION DISTRICT)

Groundwater Conservation District	County	2012	2020	2030	2040	2050	2060	2070
Garza County UWCD Total	**Garza**	**191**	**911**	**911**	**911**	**911**	**911**	**911**
High Plains UWCD No.1	Bailey	7	833	833	833	833	833	833
High Plains UWCD No.1	Castro	323	425	425	425	425	425	425
High Plains UWCD No.1	Cochran	0	972	972	972	972	972	972
High Plains UWCD No.1	Crosby	2,883	3,787	3,787	3,787	3,787	3,787	3,787
High Plains UWCD No.1	Deaf Smith	2,134	4,395	4,395	4,395	4,395	4,395	4,395
High Plains UWCD No.1	Floyd	2,456	3,226	3,226	3,226	3,226	3,226	3,226
High Plains UWCD No.1	Hale	135	1,121	1,121	1,121	1,121	1,121	1,121
High Plains UWCD No.1	Hockley	28	973	973	973	973	973	973
High Plains UWCD No.1	Lamb	4	923	923	923	923	923	923
High Plains UWCD No.1	Lubbock	3	1,086	1,086	1,086	1,086	1,086	1,086
High Plains UWCD No.1	Lynn	81	912	912	912	912	912	912
High Plains UWCD No.1	Parmer	0	5,450	5,450	5,450	5,450	4,689	4,589
High Plains UWCD No.1	Swisher	1,200	1,576	1,576	1,576	1,576	1,576	1,576
High Plains UWCD No.1 Total		**9,255**	**25,679**	**25,679**	**25,679**	**25,679**	**24,918**	**24,818**
Permian Basin UWCD	Howard	737	1,471	1,471	1,471	1,471	1,471	1,471
Permian Basin UWCD	Martin	6	8	8	8	8	8	8
Permian Basin UWCD Total		**743**	**1,479**	**1,479**	**1,479**	**1,479**	**1,479**	**1,479**
No District-County	Andrews	4	1,319	1,319	1,319	1,319	1,319	1,319
No District-County	Borden	114	900	900	900	900	900	900
No District-County	Crosby	54	71	71	71	71	71	71
No District-County	Deaf Smith	27	6	6	6	6	6	6
No District-County	Hockley	0	83	83	83	83	83	83
No District-County	Howard	1	118	118	118	118	118	118
Groundwater Management Area 2		**10,465**	**30,566**	**30,566**	**30,566**	**30,566**	**29,805**	**29,705**

TABLE 3. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE OGALLALA AND EDWARDS-TRINITY (HIGH PLAINS) AQUIFERS IN GROUNDWATER MANAGEMENT AREA 2. 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
Andrews	Region F	Colorado	24,937	21,375	19,795	18,774	18,040	17,474
Bailey	Llano Estacado	Brazos	97,679	67,307	51,199	42,704	37,858	34,815
Borden	Region F	Brazos	842	699	635	597	572	555
Borden	Region F	Colorado	5,080	3,940	3,433	3,140	2,849	2,657
Briscoe	Llano Estacado	Red	29,022	17,637	11,907	9,053	7,445	6,451
Castro	Llano Estacado	Red	107,563	72,432	43,208	25,577	17,236	12,970
Castro	Llano Estacado	Brazos	159,730	112,038	61,892	32,048	19,950	14,535
Cochran	Llano Estacado	Brazos	26,117	21,555	18,919	17,399	16,483	15,900
Cochran	Llano Estacado	Colorado	75,645	57,597	45,584	38,008	31,376	26,775
Crosby	Llano Estacado	Red	3,693	3,503	3,068	2,373	1,888	1,567
Crosby	Llano Estacado	Brazos	162,630	108,077	68,110	46,363	35,547	29,723
Dawson	Llano Estacado	Brazos	1,699	1,456	1,329	1,256	1,210	1,178
Dawson	Llano Estacado	Colorado	171,153	122,020	95,467	81,027	73,400	68,749
Deaf Smith	Llano Estacado	Red	206,336	137,403	90,088	65,661	52,833	45,606
Floyd	Llano Estacado	Red	25,808	25,101	24,583	23,926	22,995	22,109
Floyd	Llano Estacado	Brazos	144,643	69,038	43,219	30,165	23,203	19,428
Gaines	Llano Estacado	Colorado	277,954	218,338	184,298	162,643	147,743	138,294
Garza	Llano Estacado	Brazos	16,297	13,648	12,395	11,657	11,180	10,855
Hale	Llano Estacado	Red	472	455	358	266	197	150
Hale	Llano Estacado	Brazos	219,639	114,473	70,305	48,453	37,543	31,804

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Hockley	Llano Estacado	Brazos	130,832	85,716	66,206	56,994	52,150	49,382
Hockley	Llano Estacado	Colorado	46,599	26,171	11,564	6,793	5,037	4,228
Howard	Region F	Colorado	19,835	17,391	16,264	15,638	15,281	15,066
Lamb	Llano Estacado	Brazos	223,477	112,082	71,220	56,582	50,140	46,816
Lubbock	Llano Estacado	Brazos	151,056	121,404	109,134	100,850	94,935	90,798
Lynn	Llano Estacado	Brazos	104,528	88,796	79,406	73,546	69,934	67,598
Lynn	Llano Estacado	Colorado	8,079	7,355	6,088	5,057	4,414	4,042
Martin	Region F	Colorado	63,463	51,126	43,861	39,793	37,210	35,425
Parmer	Llano Estacado	Red	73,758	40,228	24,334	17,703	14,499	12,655
Parmer	Llano Estacado	Brazos	78,257	50,870	34,925	26,034	20,971	17,881
Swisher	Llano Estacado	Red	103,982	60,806	40,124	29,802	23,926	20,249
Swisher	Llano Estacado	Brazos	25,301	10,833	6,160	4,109	3,092	2,534
Terry	Llano Estacado	Brazos	8,367	7,167	6,548	6,142	5,864	5,670
Terry	Llano Estacado	Colorado	182,401	125,610	99,345	88,554	83,019	79,849
Yoakum	Llano Estacado	Colorado	138,940	92,952	69,400	58,308	52,469	48,940
Groundwater Management Area 2			**3,115,814**	**2,086,599**	**1,534,371**	**1,246,995**	**1,092,489**	**1,002,728**

TABLE 4. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 2. 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
Andrews	Region F	Colorado	1,319	1,319	1,319	1,319	1,319	1,319
Bailey	Llano Estacado	Brazos	833	833	833	833	833	833
Borden	Region F	Brazos	284	284	284	284	284	284
Borden	Region F	Colorado	617	617	617	617	617	617
Castro	Llano Estacado	Red	425	425	425	425	425	425
Cochran	Llano Estacado	Brazos	104	104	104	104	104	104
Cochran	Llano Estacado	Colorado	868	868	868	868	868	868
Crosby	Llano Estacado	Brazos	3,858	3,858	3,858	3,858	3,858	3,858
Deaf Smith	Llano Estacado	Red	4,401	4,401	4,401	4,401	4,401	4,401
Floyd	Llano Estacado	Red	250	250	250	250	250	250
Floyd	Llano Estacado	Brazos	2,976	2,976	2,976	2,976	2,976	2,976
Garza	Llano Estacado	Brazos	911	911	911	911	911	911
Hale	Llano Estacado	Red	29	29	29	29	29	29
Hale	Llano Estacado	Brazos	1,092	1,092	1,092	1,092	1,092	1,092
Hockley	Llano Estacado	Brazos	890	890	890	890	890	890
Hockley	Llano Estacado	Colorado	167	167	167	167	167	167
Howard	Region F	Colorado	1,589	1,589	1,589	1,589	1,589	1,589
Lamb	Llano Estacado	Brazos	923	923	923	923	923	923
Lubbock	Llano Estacado	Brazos	1,086	1,086	1,086	1,086	1,086	1,086
Lynn	Llano Estacado	Brazos	791	791	791	791	791	791

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Lynn	Llano Estacado	Colorado	121	121	121	121	121	121
Martin	Region F	Colorado	8	8	8	8	8	8
Parmer	Llano Estacado	Red	2,298	2,298	2,298	2,298	2,298	2,298
Parmer	Llano Estacado	Brazos	3,152	3,152	3,152	3,152	2,392	2,291
Swisher	Llano Estacado	Red	1,551	1,551	1,551	1,551	1,551	1,551
Swisher	Llano Estacado	Brazos	25	25	25	25	25	25
Groundwater Management Area 2			**30,568**	**30,568**	**30,568**	**30,568**	**29,808**	**29,707**

LIMITATIONS:

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

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

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

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

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

REFERENCES:

Deeds, Neil E. and Jigmond, Marius, 2015, Numerical Model Report for the High Plains Aquifer System Groundwater Availability Model: Prepared for Texas Water Development Board, 640 p., http://www.twdb.texas.gov/groundwater/models/gam/hpas/HPAS_GAM_Numerical_Report.pdf .

Hutchison, William, 2016a, GMA 2 Technical Memorandum 15-01 (Final): Ogallala Aquifer.

Hutchison, William, 2016b, GMA 2 Technical Memorandum 15-02 (Final): Edwards-Trinity (High Plains) Aquifer.

Hutchison, William, 2016c, GMA 2 Technical Memorandum 15-03 (Final): Dockum Aquifer.

Hutchison, William, 2016d, GMA 2 Technical Memorandum 16-01 (Final): Predictive Simulation of the Ogallala, Edwards-Trinity (High Plains), and Dockum Aquifers (Scenario 16).

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.

GAM RUN 16-029 MAG: MODELED AVAILABLE GROUNDWATER FOR THE AQUIFERS IN GROUNDWATER MANAGEMENT AREA 1

Rohit Raj Goswami, Ph.D., P.E.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
April 19, 2017

STATE OF TEXAS
ROHIT R. GOSWAMI
123986
LICENSED
PROFESSIONAL ENGINEER

4/20/17

This page is intentionally left blank.

GAM RUN 16-029 MAG: MODELED AVAILABLE GROUNDWATER FOR THE AQUIFERS IN GROUNDWATER MANAGEMENT AREA 1

Rohit Raj Goswami, Ph.D., P.E.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
April 19, 2017

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 1 for the Ogallala Aquifer (inclusive of the Rita Blanca Aquifer) is summarized by decade for the groundwater conservation districts (Table 1) and for use in the regional water planning process (Table 2). The modeled available groundwater estimates range from 3,553,273 acre-feet per year in 2020 to 2,236,434 acre-feet per year in 2062 (Table 1). The modeled available groundwater for Groundwater Management Area 1 for the Dockum Aquifer is summarized by decade for the groundwater conservation districts (Table 3) and for use in the regional water planning process (Table 4). The modeled available groundwater estimates for the Dockum Aquifer range from 261,079 acre-feet per year in 2020 to 229,900 acre-feet per year in 2062 (Table 4). The modeled available groundwater estimates were extracted from results of a model run using the groundwater availability model for the High Plains Aquifer System (version 1.01). The model run files, which meet the desired future conditions for the relevant aquifers in Groundwater Management Area 1, were submitted to the Texas Water Development Board (TWDB) as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 1 (Deeds and Walthour, 2016). The Executive Administrator of the TWDB determined that the explanatory report and other materials were administratively complete on March 10, 2017.

REQUESTOR:

Mr. Kyle G. Ingham, chair of Groundwater Management Area 1.

DESCRIPTION OF REQUEST:

On December 16, 2016, Mr. Kyle G. Ingham provided the TWDB with the desired future conditions of the Ogallala Aquifer (inclusive of the Rita Blanca Aquifer) and the Dockum Aquifer adopted by the groundwater conservation districts in Groundwater Management Area 1 on November 2, 2016. The Blaine Aquifer in Wheeler County was designated non-relevant. The desired future conditions for the aquifers in Groundwater Management Area 1, as described in Resolution No. 2016-2, are described below:

Ogallala Aquifer (inclusive of the Rita Blanca Aquifer)

- At least 40 percent of volume in storage remaining in 50 years, for the period 2012-2062 collectively in Dallam, Hartley, Moore, and Sherman counties;
- At least 50 percent of volume in storage remaining in 50 years, for the period 2012-2062 collectively in Hansford, Lipscomb, and Ochiltree counties and that portion of Hutchinson County with North Plains [Groundwater Conservation District;]
- At least 50 percent of volume in storage remaining in 50 years, for the period 2012-2062 in Carson, Donley, Gray, Hutchinson, Oldham, Roberts, and Wheeler counties; and portions of Armstrong and Potter counties within the Panhandle [Groundwater Conservation District];
- At least 80 percent of volume in storage remaining in 50 years, for the period 2012-2062, within the Hemphill County;
- Approximately 20 feet of total average drawdown in 50 years for the period 2012-2062 collectively in Randall County and in Armstrong and Potter counties within the High Plains [Underground Water Conservation District No. 1].

Dockum Aquifer

- At least 40 percent of the available drawdown remaining in 50 years for the period 2012-2062 collectively for Dallam, Hartley, Moore, and Sherman counties[;]
- No more than 30 feet average decline in water levels in 50 years for the period 2012-2062 collectively in Carson and Oldham counties and in Armstrong and Potter counties within the Panhandle [Groundwater Conservation District]; and
- The total average drawdown is approximately 40 feet in 50 years for the period 2012-2062, collectively in Randall County, and in Armstrong and Potter counties within the High Plains [Underground Water Conservation District No. 1].

METHODS:

The groundwater availability model for the High Plains Aquifer System was run using the model files submitted with the explanatory report. The modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates for the Ogallala Aquifer (inclusive of the Rita Blanca Aquifer) and Dockum Aquifer were divided by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed for all of Groundwater Management Area 1 (Figures 1 and 3 and Tables 1 and 3). Modeled available groundwater for the Ogallala Aquifer (inclusive of the Rita Blanca Aquifer) and Dockum Aquifer were also divided by county, river basin, regional water planning area, and groundwater conservation district (Figures 2 and 4 and Tables 2 and 4).

Modeled Available Groundwater and Permitting

Chapter 36 of the Texas Water Code defines "modeled available groundwater" as 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 are described below:

- Version 1.01 of the groundwater availability model for the High Plains Aquifer System was used for this analysis. See Deeds and Jigmond (2015) for assumptions and limitations of the groundwater availability model.
- This groundwater availability model includes 4 layers which generally represent the Ogallala Aquifer and other younger geologic units (Layer 1), geologic units that directly overlie the Dockum Aquifer, the Rita Blanca and Edwards-Trinity (High Plains) aquifers (Layer 2), upper portion of the Dockum Aquifer (Layer 3), and the lower portion of the Dockum Aquifer (Layer 4).
- The model was run with MODFLOW-NWT (Niswonger and others, 2011) which is based on MODFLOW-2005 (Harbaugh, 2005).
- The analysis assumed model extent within Texas for all aquifers except for the Rita Blanca Aquifer, which assumed the official TWDB mapped aquifer boundary.

- Only the cells in Lower Dockum (Layer 4) were considered while processing results (desired future conditions and modeled available groundwater) for the Dockum Aquifer. The Groundwater Management Area consultant, Dr. Deeds (INTERA, Incorporated), confirmed this on March 6, 2017, in response to a clarification letter sent by Groundwater staff to Groundwater Management Area 1 on February 27, 2017. Mr. Ingham, chair of Groundwater Management Area 1, agreed with the assumptions while responding to the clarification letter on March 21, 2017.

RESULTS:

The modeled available groundwater estimates for the Ogallala Aquifer (including the Rita Blanca Aquifer) range from 3,553,273 acre-feet per year in 2020 to 2,236,434 acre-feet per year in 2062 (Table 1). The modeled available groundwater estimates for the Dockum Aquifer range from 261,079 acre-feet per year in 2020 to 229,900 acre-feet per year in 2062 (Table 3). Modeled available groundwater estimates for each aquifer are summarized by groundwater conservation district and by county, river basin, and regional water planning area for use in the regional water planning process (Figures 1 to 4 and Tables1 to 4). Small differences of values between table summaries are due to rounding.

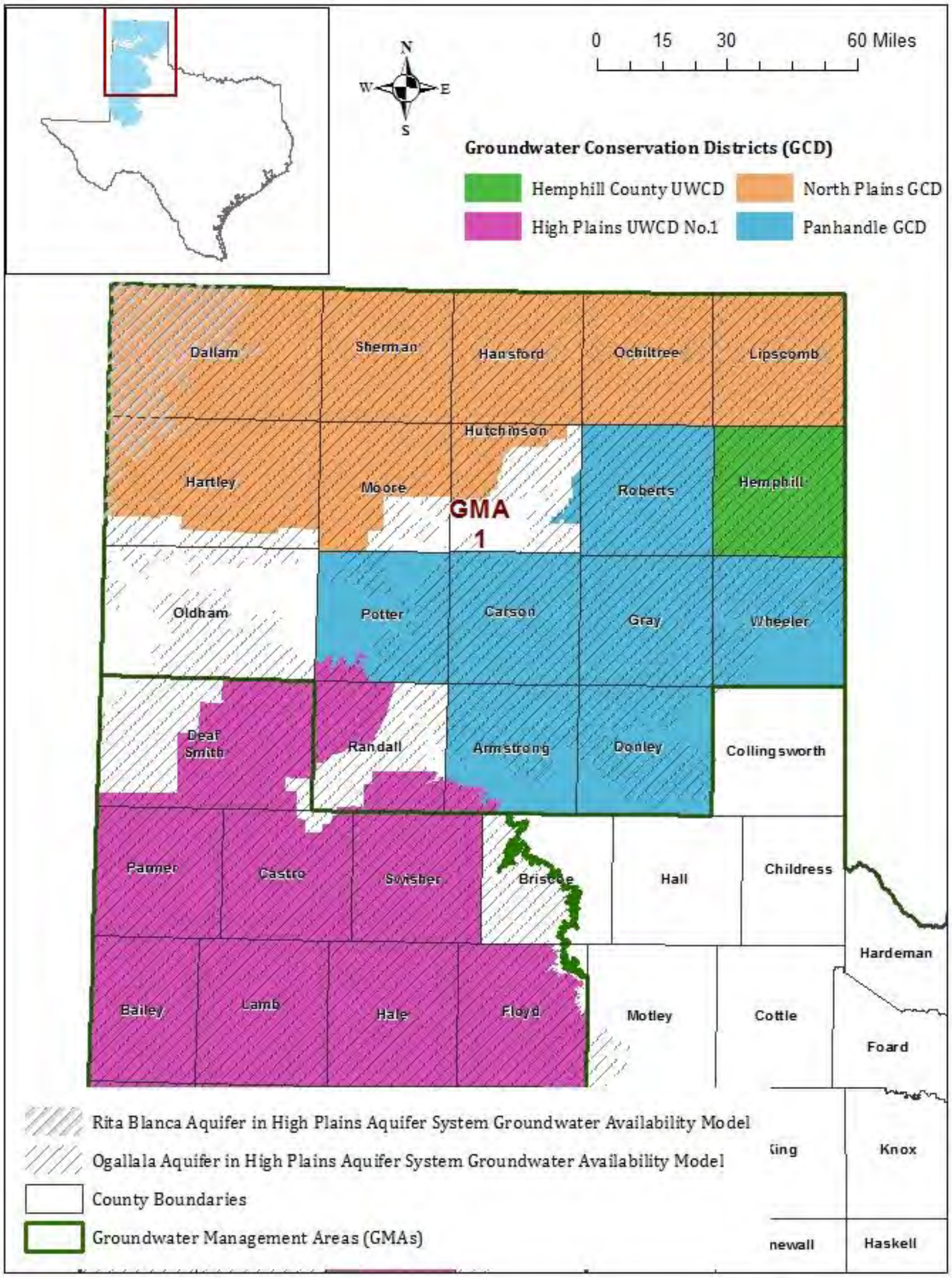


FIGURE 1. **MAP SHOWING THE OGALLALA AND RITA BLANCA AQUIFERS AND GROUNDWATER CONSERVATION DISTRICTS IN GROUNDWATER MANAGEMENT AREA 1 OVERLAIN BY THE GROUNDWATER AVAILABILITY MODEL EXTENT FOR THE HIGH PLAINS AQUIFER SYSTEM.**

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA AND RITA BLANCA AQUIFERS IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE (2020 TO 2060) AND THE YEAR 2062. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2062
High Plains UWCD No. 1	Armstrong	Ogallala	1,286	1,048	866	723	610	591
High Plains UWCD No. 1	Potter	Ogallala	225	225	225	223	221	221
High Plains UWCD No. 1	Randall	Ogallala	39,084	37,987	32,477	28,334	25,018	24,459
High Plains UWCD No. 1 Total		**Ogallala**	**40,595**	**39,260**	**33,568**	**29,280**	**25,849**	**25,271**
Hemphill County UWCD Total	Hemphill	Ogallala	52,196	52,218	52,267	52,305	52,336	52,341
North Plains GCD	Dallam	Ogallala/Rita Blanca	387,471	287,205	225,573	166,890	112,864	103,258
North Plains GCD	Hansford	Ogallala	275,016	272,656	271,226	270,281	269,589	269,479
North Plains GCD	Hartley	Ogallala	397,585	271,523	212,321	154,433	100,407	90,842
North Plains GCD	Hutchinson	Ogallala	62,803	64,522	65,652	66,075	66,027	65,956
North Plains GCD	Lipscomb	Ogallala	266,809	266,710	266,640	266,591	266,559	266,557
North Plains GCD	Moore	Ogallala	214,853	172,621	139,322	105,016	73,384	67,650
North Plains GCD	Ochiltree	Ogallala	243,778	243,932	244,002	244,051	244,082	244,085
North Plains GCD	Sherman	Ogallala	398,056	348,895	281,690	212,744	148,552	136,776
North Plains GCD Total		**Ogallala/Rita Blanca**	**2,246,371**	**1,928,064**	**1,706,426**	**1,486,081**	**1,281,464**	**1,244,603**

Table 1 (Continued)

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2062
Panhandle GCD	Armstrong	Ogallala	57,984	53,414	48,170	43,462	38,860	38,080
Panhandle GCD	Carson	Ogallala	192,135	184,263	169,931	153,767	137,215	134,055
Panhandle GCD	Donley	Ogallala	74,808	76,289	72,962	67,873	62,058	60,901
Panhandle GCD	Gray	Ogallala	181,105	175,267	162,653	148,713	134,431	131,744
Panhandle GCD	Hutchinson	Ogallala	15,734	16,740	15,156	13,324	11,742	11,455
Panhandle GCD	Potter	Ogallala	16,969	15,820	14,442	13,162	11,836	11,609
Panhandle GCD	Roberts	Ogallala	430,618	455,129	427,218	390,247	350,459	342,748
Panhandle GCD	Wheeler	Ogallala	130,425	138,810	137,385	132,312	124,778	123,309
Panhandle GCD Total		**Ogallala**	**1,099,778**	**1,115,732**	**1,047,917**	**962,860**	**871,379**	**853,901**
No District-County	Hartley	Ogallala	19,528	17,639	14,527	11,147	8,016	7,458
No District-County	Moore	Ogallala	8,932	8,598	7,592	6,186	4,788	4,532
No District-County	Oldham	Ogallala	44,599	40,203	33,423	26,207	19,590	18,617
No District-County	Randall	Ogallala	24,826	23,945	21,864	19,471	17,012	16,541
No District-County	Hutchinson	Ogallala	16,448	14,432	13,353	12,973	13,089	13,170
No District-County Total		**Ogallala**	**114,333**	**104,817**	**90,759**	**75,984**	**62,495**	**60,318**
GMA 1 - Total		**Ogallala/Rita Blanca**	**3,553,273**	**3,240,091**	**2,930,937**	**2,606,510**	**2,293,523**	**2,236,434**

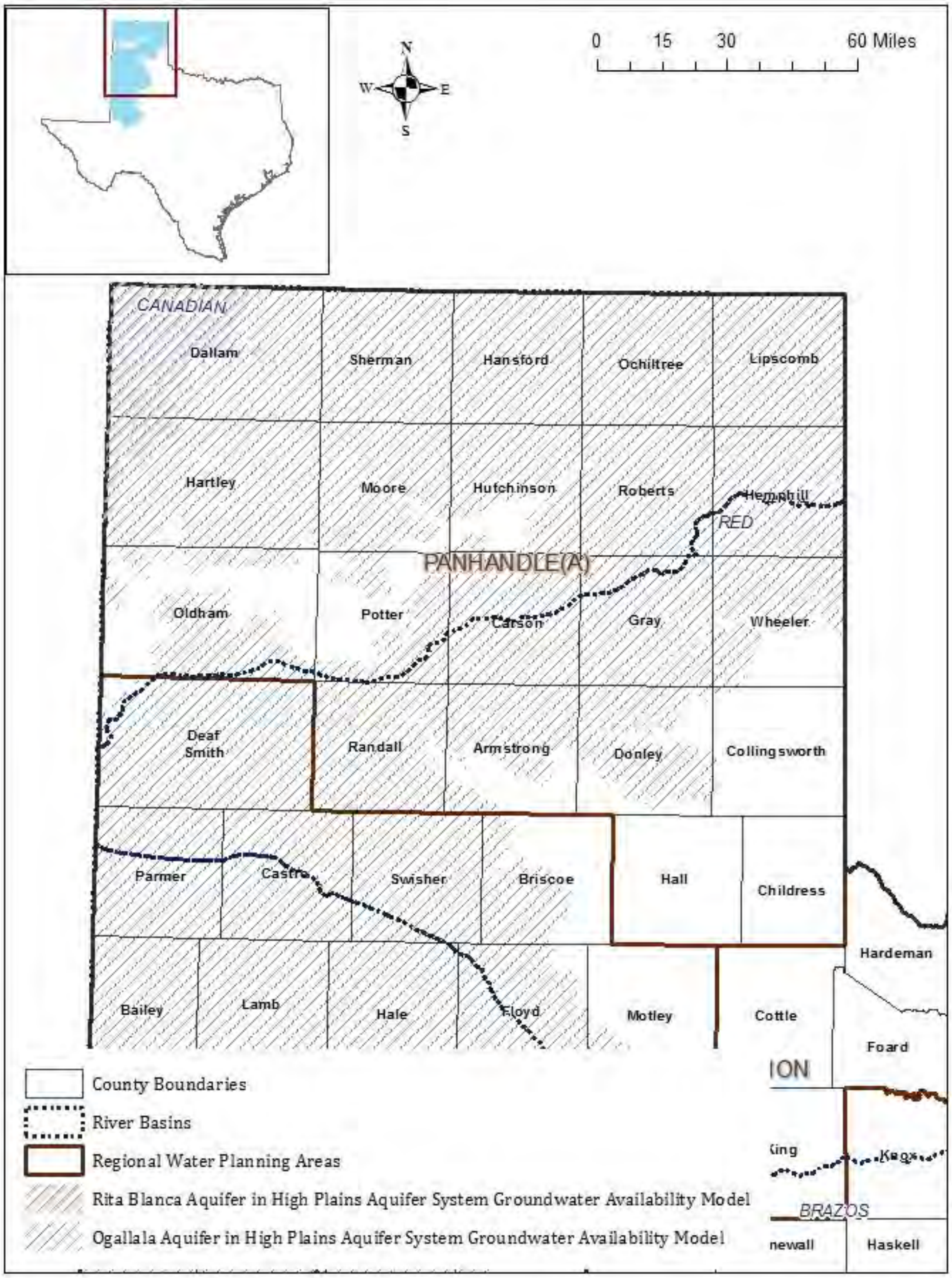


FIGURE 2. MAP SHOWING THE OGALLALA AND RITA BLANCA AQUIFERS AND REGIONAL WATER PLANNING AREAS, COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 1 OVERLAIN BY THE GROUNDWATER AVAILABILITY MODEL EXTENT FOR THE HIGH PLAINS AQUIFER SYSTEM.

TABLE 2. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE OGALLALA AND RITA BLANCA AQUIFERS IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA) FOR EACH DECADE (2020 TO 2060). VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Armstrong	A	Red	Ogallala	59,270	54,462	49,036	44,185	39,470
Carson	A	Canadian	Ogallala	77,157	74,542	69,042	62,520	55,902
Carson	A	Red	Ogallala	114,978	109,721	100,889	91,247	81,313
Dallam	A	Canadian	Ogallala/Rita Blanca	387,471	287,205	225,573	166,890	112,864
Donley	A	Red	Ogallala	74,808	76,289	72,962	67,873	62,058
Gray	A	Canadian	Ogallala	44,778	42,146	37,337	32,130	27,432
Gray	A	Red	Ogallala	136,327	133,121	125,316	116,583	106,999
Hansford	A	Canadian	Ogallala	275,016	272,656	271,226	270,281	269,589
Hartley	A	Canadian	Ogallala	417,113	289,162	226,848	165,580	108,423
Hemphill	A	Canadian	Ogallala	27,789	30,260	31,999	33,363	34,058
Hemphill	A	Red	Ogallala	24,407	21,958	20,268	18,942	18,278
Hutchinson	A	Canadian	Ogallala	94,985	95,694	94,161	92,372	90,858
Lipscomb	A	Canadian	Ogallala	266,809	266,710	266,640	266,591	266,559
Moore	A	Canadian	Ogallala	223,785	181,219	146,914	111,202	78,172
Ochiltree	A	Canadian	Ogallala	243,778	243,932	244,002	244,051	244,082
Oldham	A	Canadian	Ogallala	37,367	34,376	29,078	23,039	17,800
Oldham	A	Red	Ogallala	7,232	5,827	4,345	3,168	1,790
Potter	A	Canadian	Ogallala	9,552	9,196	8,519	7,898	7,214
Potter	A	Red	Ogallala	7,642	6,849	6,148	5,487	4,843
Randall	A	Red	Ogallala	63,910	61,932	54,341	47,805	42,030
Roberts	A	Canadian	Ogallala	408,968	430,269	401,642	365,119	326,457
Roberts	A	Red	Ogallala	21,650	24,860	25,576	25,128	24,002
Sherman	A	Canadian	Ogallala	398,056	348,895	281,690	212,744	148,552
Wheeler	A	Red	Ogallala	130,425	138,810	137,385	132,312	124,778
GMA 1 Total				**3,553,273**	**3,240,091**	**2,930,937**	**2,606,510**	**2,293,523**

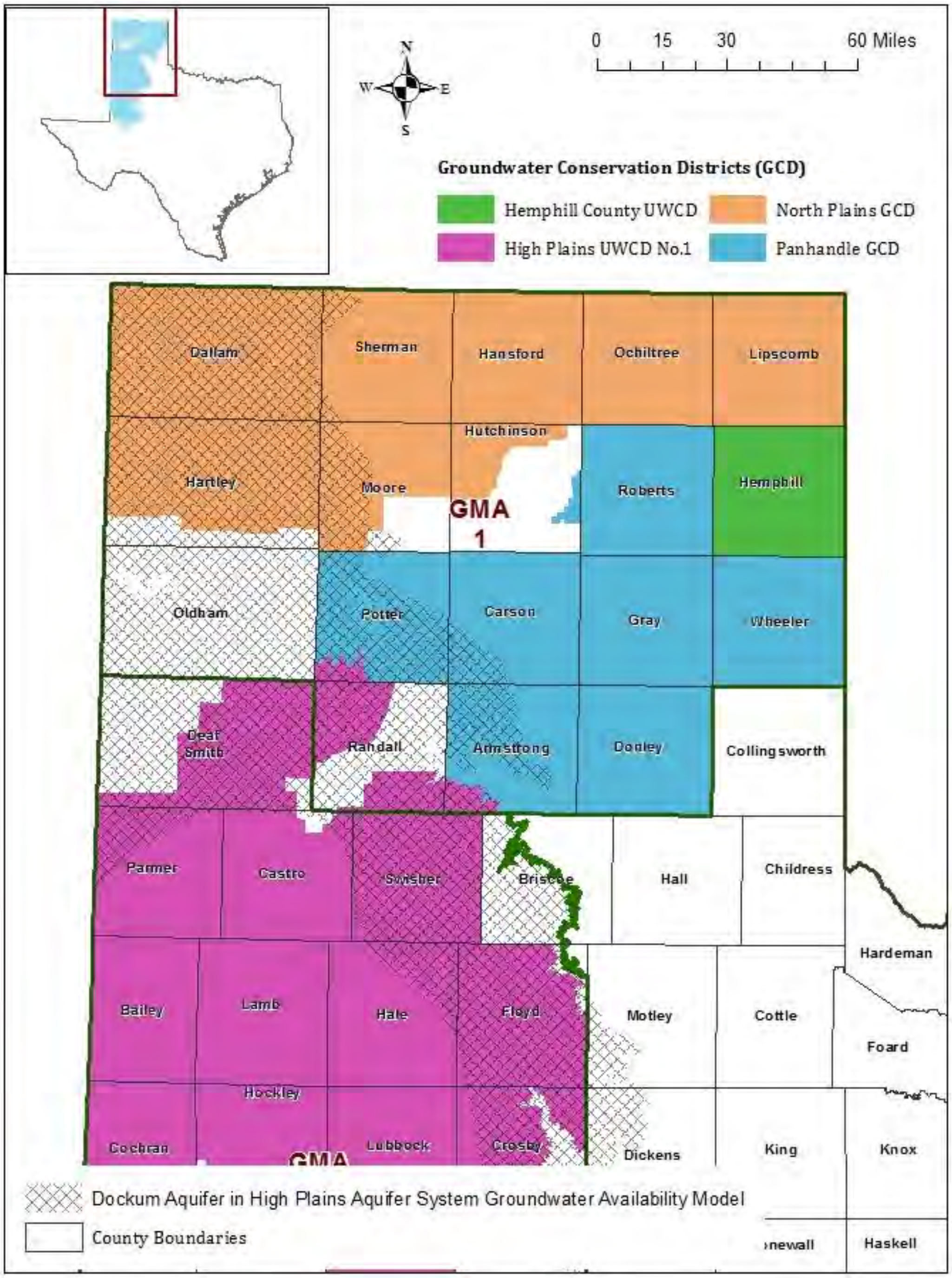


FIGURE 3. **MAP SHOWING THE DOCKUM AQUIFER AND GROUNDWATER CONSERVATION DISTRICTS IN GROUNDWATER MANAGEMENT AREA 1 OVERLAIN BY THE GROUNDWATER AVAILABILITY MODEL EXTENT FOR THE HIGH PLAINS AQUIFER SYSTEM.**

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE (2020 TO 2060) AND THE YEAR 2062.VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2062
High Plains UWCD No. 1	Armstrong	Dockum	96	0	0	0	0	0
High Plains UWCD No. 1	Potter	Dockum	21	0	0	0	0	0
High Plains UWCD No. 1	Randall	Dockum	2,189	2,714	2,954	3,111	3,214	3,229
High Plains UWCD No. 1 Total		**Dockum**	**2,306**	**2,714**	**2,954**	**3,111**	**3,214**	**3,229**
North Plains GCD	Dallam	Dockum	14,192	14,188	14,186	14,184	14,184	14,184
North Plains GCD	Moore	Dockum	4,801	4,532	4,493	4,417	4,289	4,261
North Plains GCD	Hartley	Dockum	11,602	10,766	10,524	10,560	10,815	10,895
North Plains GCD	Sherman	Dockum	127	127	127	127	95	93
North Plains GCD Total		**Dockum**	**30,722**	**29,613**	**29,330**	**29,288**	**29,383**	**29,433**
Panhandle GCD	Armstrong	Dockum	7,131	9,024	9,588	9,704	9,535	9,494
Panhandle GCD	Carson	Dockum	68	108	140	169	198	204
Panhandle GCD	Potter	Dockum	38,803	39,113	36,937	34,505	32,008	31,558
Panhandle GCD Total		**Dockum**	**46,002**	**48,245**	**46,665**	**44,378**	**41,741**	**41,256**
No District-County	Hartley	Dockum	43,647	44,269	44,404	44,304	44,022	43,941
No District-County	Moore	Dockum	418	575	527	509	500	498
No District-County	Oldham	Dockum	129,001	128,829	120,518	111,196	101,413	99,736
No District-County	Randall	Dockum	8,983	11,302	11,909	12,002	11,855	11,807
No District- County Total		**Dockum**	**182,049**	**184,975**	**177,358**	**168,011**	**157,790**	**155,982**
GMA 1 Total		**Dockum**	**261,079**	**265,547**	**256,307**	**244,788**	**232,128**	**229,900**

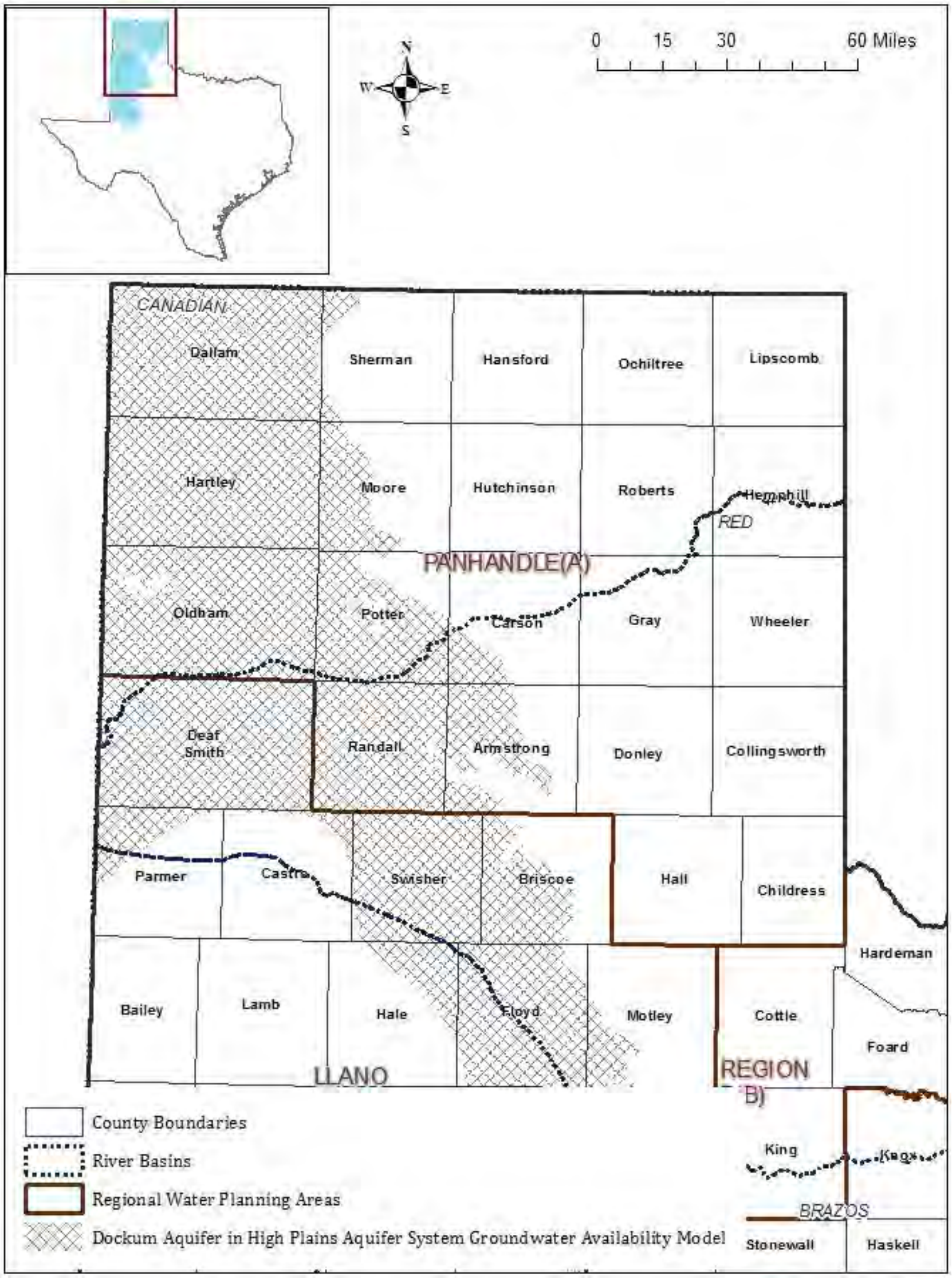


FIGURE 4. **MAP SHOWING THE DOCKUM AQUIFER AND REGIONAL WATER PLANNING AREAS, COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 1 OVERLAIN BY THE GROUNDWATER AVAILABILITY MODEL EXTENT FOR THE HIGH PLAINS AQUIFER SYSTEM.**

TABLE 4. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA) FOR EACH DECADE (2020 TO 2060). VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Armstrong	A	Red	Dockum	7,227	9,024	9,588	9,704	9,535
Carson	A	Canadian	Dockum	4	10	15	19	23
Carson	A	Red	Dockum	64	98	125	150	175
Dallam	A	Canadian	Dockum	14,192	14,188	14,186	14,184	14,184
Hartley	A	Canadian	Dockum	55,249	55,035	54,928	54,864	54,837
Moore	A	Canadian	Dockum	5,219	5,107	5,020	4,926	4,789
Oldham	A	Canadian	Dockum	128,938	128,771	120,466	111,146	101,365
Oldham	A	Red	Dockum	63	58	52	50	48
Potter	A	Canadian	Dockum	38,641	38,983	36,832	34,409	31,900
Potter	A	Red	Dockum	183	130	105	96	108
Randall	A	Red	Dockum	11,172	14,016	14,863	15,113	15,069
Sherman	A	Canadian	Dockum	127	127	127	127	95
GMA 1 Total			**Dockum**	**261,079**	**265,547**	**256,307**	**244,788**	**232,128**

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.

The TWDB is available to work with groundwater conservation districts to use ongoing data collection programs to compare the predictions of the model against how the aquifer responds to the actual amount and location of pumping. Besides groundwater pumping and use trends, historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Deeds, N.E., and Walthour, S.D., 2016, Groundwater Management Area 1 (GMA 1), Desired Future Conditions Explanatory Report (Groundwater Management Area 1), December 12, 2016.

Deeds, N.E., and Jigmond, M., 2015, Numerical model report for the High Plains Aquifer System Groundwater Availability Model, Submitted to Texas Water Development Board.

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

Harbaugh, A.W., 2005, MODFLOW-2005, The U.S. Geological Survey modular ground-water model- the ground-water flow process: U.S. Geological Survey, Techniques and Methods 6-A16.

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.

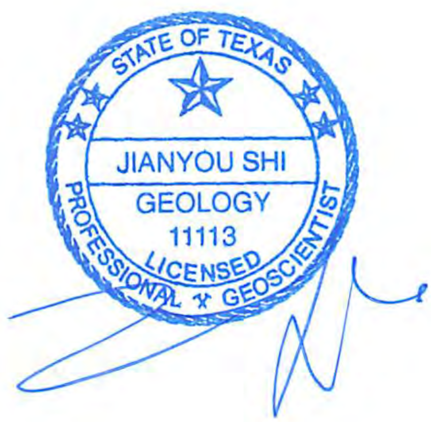
National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.

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

Appendix B

GAM RUN 19-002: HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1 GROUNDWATER MANAGEMENT PLAN

Jerry Shi, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-5076
March 1, 2019



This page is intentionally blank.

GAM RUN 19-002: HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1 GROUNDWATER MANAGEMENT PLAN

Jerry Shi, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-5076
March 1, 2019

EXECUTIVE SUMMARY:

Texas Water Code, Section 36.1071(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 High Plains Underground Water Conservation District No. 1 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 High Plains Underground Water Conservation District No. 1 should be adopted by the district on or before June 27, 2019, and submitted to the Executive Administrator of the TWDB on or before July 27, 2019. The current management plan for the High Plains Underground Water Conservation District No. 1 expires on September 25, 2019.

This report replaces the results of GAM Run 11-009 (Aschenbach, 2011). GAM Run 19-002 includes results from the groundwater availability model for the High Plains Aquifer System (Deeds and Jigmond, 2015). This groundwater availability model supersedes the models used for GAM Run 11-009. Tables 1, 2 and 3 summarize the groundwater availability model data for the Ogallala Aquifer, the Edwards-Trinity (High Plains) Aquifer, and the Dockum Aquifer required by statute. Figures 1, 2, and 3 show the area of the models from which the values in the tables were extracted. If, after review of the figures, the High Plains Underground Water Conservation District No. 1 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 Water Code, Section 36.1071(h), the groundwater availability model for the High Plains Aquifer System was used to estimate information for the High Plains Underground Water Conservation District No. 1 management plan. Water budgets were extracted for the historical period (1980 through 2012). The water budgets were extracted from the models using ZONEBUDGET Version 3.01 (Harbaugh, 2009). 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:

High Plains Aquifer System

- 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, in the area under the High Plains Underground Water District No. 1, represent the Ogallala Aquifer (Layer 1), the Edwards-Trinity (High Plains) Aquifer (Layer 2), and the Dockum Aquifer (Layers 3 and 4).

- Water budgets for the district were determined using the official aquifer boundaries from the associated model layers as described above.
- The model was run with MODFLOW-NWT (Niswonger and others, 2011).
- The groundwater discharge to surface water was calculated from the MODFLOW-NWT river and drain boundaries.

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifers according to the groundwater availability model. The groundwater budget components listed below and reported in Tables 1, 2, and 3 were extracted from the groundwater availability model results for the High Plains Aquifer System within High Plains Underground Water Conservation District No. 1 and averaged over the historical calibration periods.

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.

Water budgets are estimates because of 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 HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1'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	Results
Estimated annual amount of recharge from precipitation to the district	Ogallala Aquifer	269,768
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Ogallala Aquifer	11,795
Estimated annual volume of flow into the district within each aquifer in the district	Ogallala Aquifer	38,953
Estimated annual volume of flow out of the district within each aquifer in the district	Ogallala Aquifer	49,518
Estimated net annual volume of flow between each aquifer in the district	From Edwards-Trinity (High Plains) Aquifer to Ogallala Aquifer	299
	From Dockum brackish portion to Ogallala Aquifer	12,600
	From Ogallala Aquifer to Dockum Aquifer	2,273

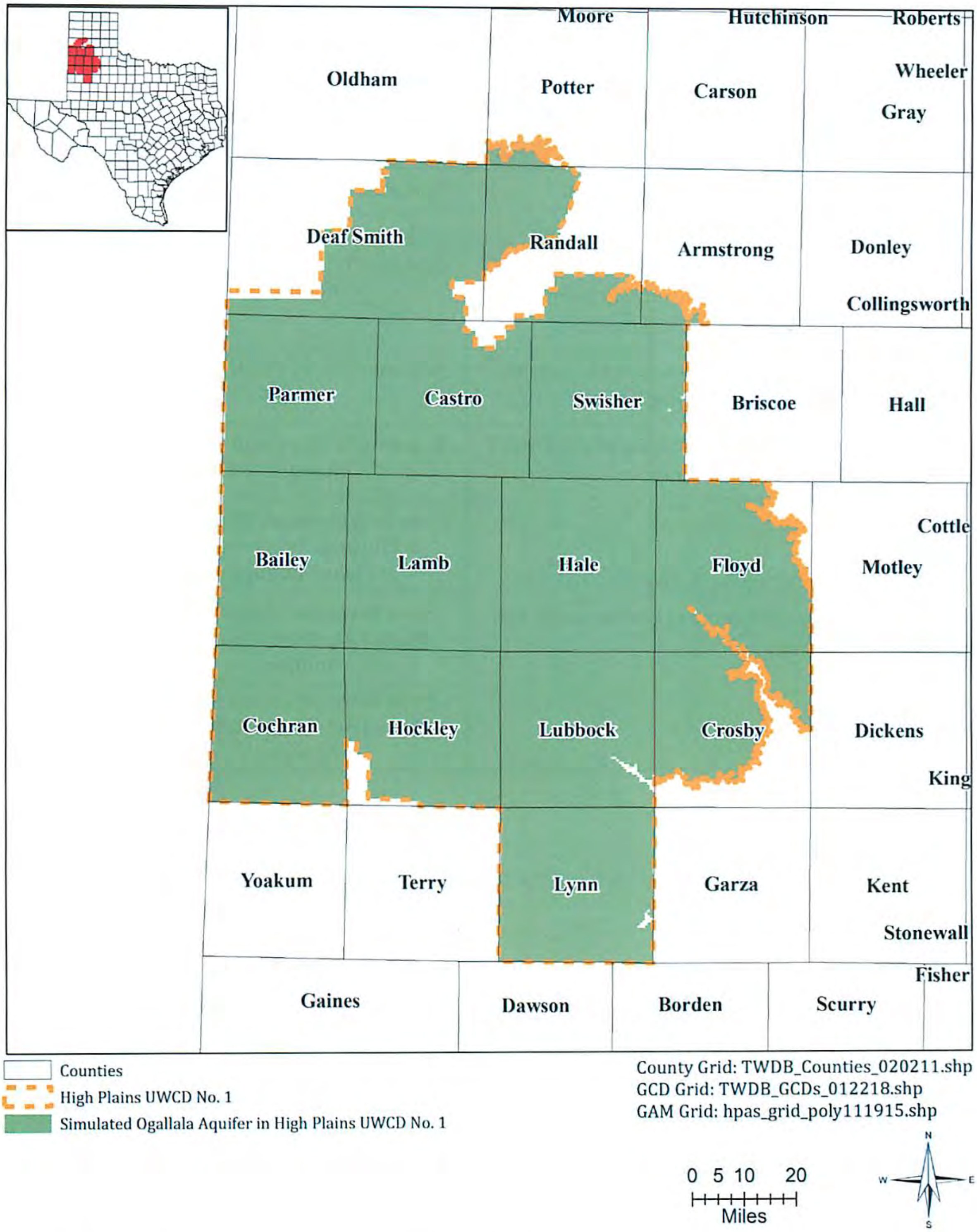


FIGURE 1. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE OGALLALA AQUIFER FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE OGALLALA AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2. SUMMARIZED INFORMATION FOR THE EDWARDS-TRINITY (HIGH PLAINS) AQUIFER FOR HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1'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	Results
Estimated annual amount of recharge from precipitation to the district	Edwards-Trinity (High Plains) Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Edwards-Trinity (High Plains) Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Edwards-Trinity (High Plains) Aquifer	4,637
Estimated annual volume of flow out of the district within each aquifer in the district	Edwards-Trinity (High Plains) Aquifer	9,187
Estimated net annual volume of flow between each aquifer in the district	From Dockum brackish portion to Edwards-Trinity (High Plains) Aquifer	1,918
	From Edwards-Trinity (High Plains) Aquifer to Ogallala Aquifer	299
	From Edwards-Trinity (High Plains) Aquifer to Dockum Aquifer	331

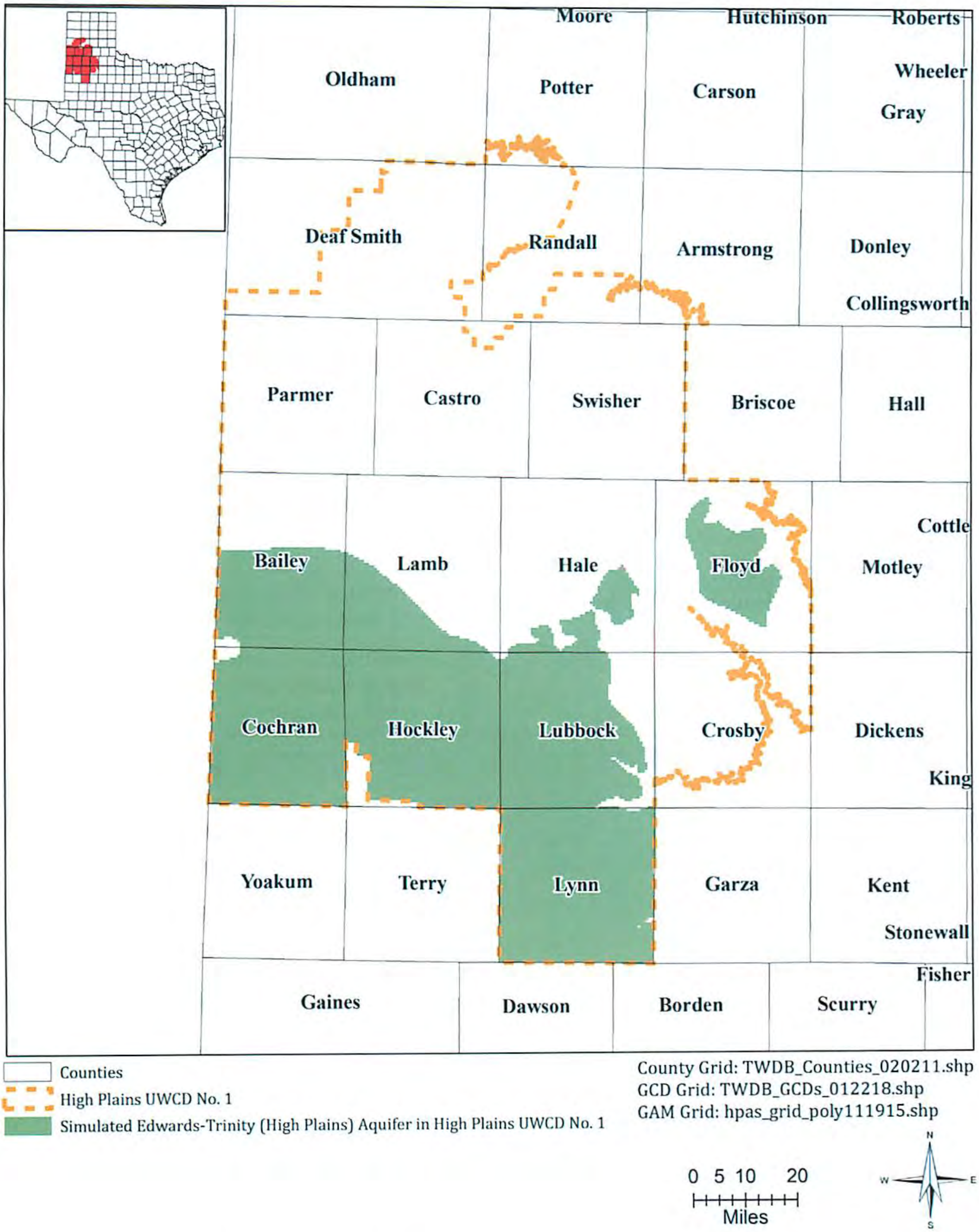


FIGURE 2. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (HIGH PLAINS) AQUIFER FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE EDWARDS-TRINITY (HIGH PLAINS) AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 3. SUMMARIZED INFORMATION FOR THE DOCKUM AQUIFER FOR HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1'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	Results
Estimated annual amount of recharge from precipitation to the district	Dockum Aquifer	31
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Dockum Aquifer	124
Estimated annual volume of flow into the district within each aquifer in the district	Dockum Aquifer	4,439
Estimated annual volume of flow out of the district within each aquifer in the district	Dockum Aquifer	14,851
Estimated net annual volume of flow between each aquifer in the district	From Dockum brackish portion to Dockum Aquifer	828
	From Ogallala Aquifer to Dockum Aquifer	2,273
	From Edwards-Trinity (High Plains) Aquifer to Dockum Aquifer	331

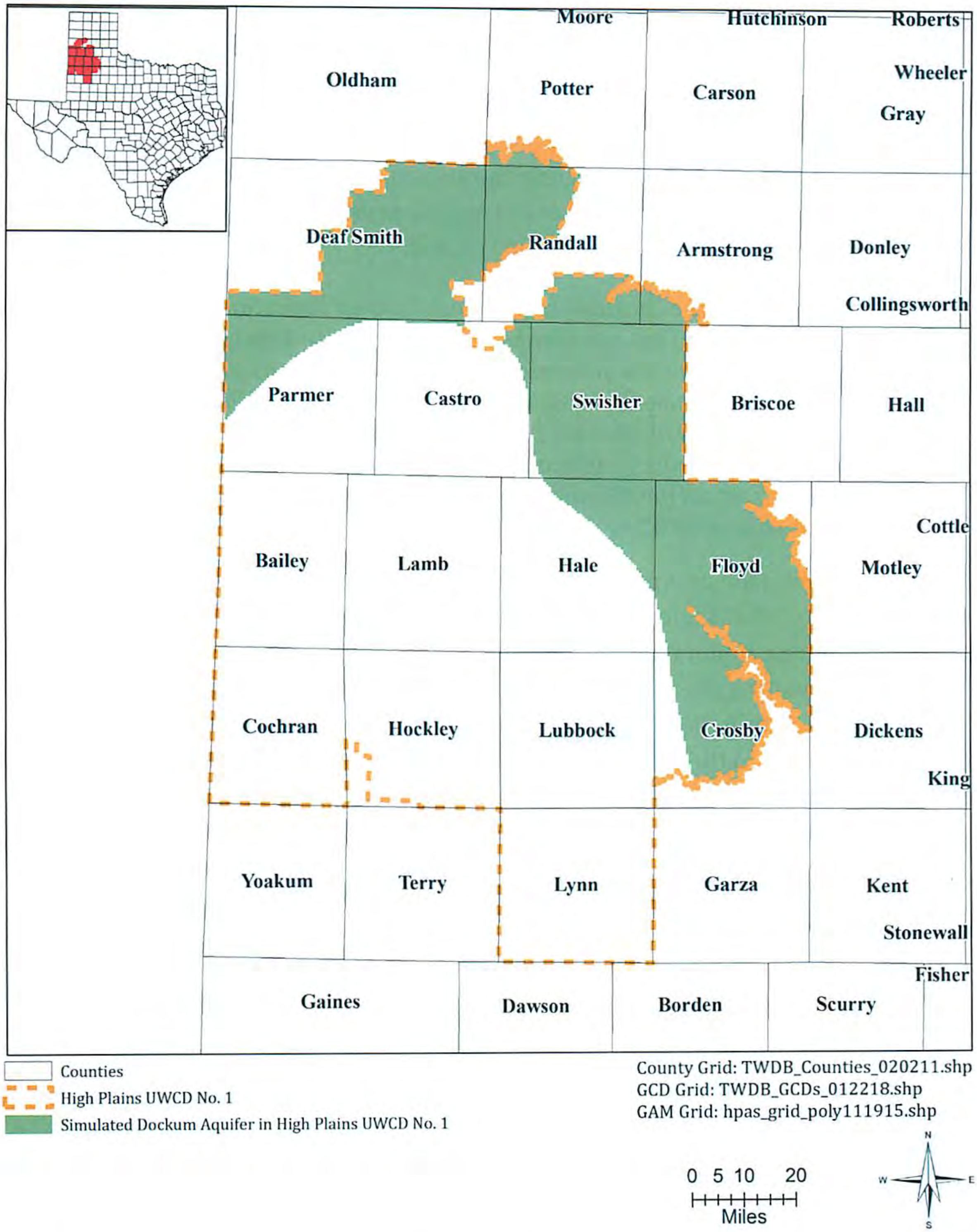


FIGURE 3. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE DOCKUM AQUIFER FROM WHICH THE INFORMATION IN TABLE 3 WAS EXTRACTED (THE DOCKUM AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

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 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 interaction with streams are specific to particular historic time periods.

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

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

REFERENCES:

Aschenbach, A., 2011, GAM Run 11-009: Texas Water Development Board GAM Run 11-009 Report, 14 p., https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR11-009.pdf.

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.

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.

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 Newtonian formulation for MODFLOW-2005: U.S. Geological Survey Survey Techniques and Methods 6-A37, 44 p.

Texas Water Code, 2011, https://statutes.capitol.texas.gov/docs/WA/pdf/WA.36.pdf

Appendix C

Estimated Historical Groundwater Use And 2017 State Water Plan Datasets:

High Plains Underground Water Conservation District No. 1

by Stephen Allen
Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
May 2, 2019

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 5/2/2019. 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 2017. TWDB staff anticipates the calculation and posting of these estimates at a later date.

ARMSTRONG COUNTY *7.63% (multiplier)* All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	25	0	0	0	520	20	565
	SW	0	0	0	0	0	2	2
2015	GW	24	0	0	0	342	20	386
	SW	0	0	0	0	0	2	2
2014	GW	26	0	0	0	414	19	459
	SW	0	0	0	0	0	2	2
2013	GW	29	0	0	0	592	19	640
	SW	0	0	0	0	0	2	2
2012	GW	33	0	0	0	726	36	795
	SW	0	0	0	0	0	4	4
2011	GW	35	0	0	0	640	38	713
	SW	0	0	0	0	0	4	4
2010	GW	27	0	0	0	335	34	396
	SW	0	0	0	0	0	4	4
2009	GW	29	0	0	0	457	41	527
	SW	0	0	0	0	0	5	5
2008	GW	31	0	0	0	539	41	611
	SW	0	0	0	0	0	5	5
2007	GW	30	0	0	0	441	39	510
	SW	0	0	0	0	0	4	4
2006	GW	36	0	0	0	502	70	608
	SW	0	0	0	0	0	8	8
2005	GW	29	0	0	0	585	63	677
	SW	0	0	0	0	0	7	7
2004	GW	30	0	0	0	549	59	638
	SW	0	0	0	0	0	15	15
2003	GW	32	0	0	0	582	60	674
	SW	0	0	0	0	0	15	15
2002	GW	27	0	0	0	784	40	851
	SW	0	0	0	0	0	10	10
2001	GW	29	0	0	0	590	34	653
	SW	0	0	0	0	0	9	9

BAILEY COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	1,031	0	0	0	64,783	3,110	68,924
	SW	0	0	0	0	0	346	346
2015	GW	940	0	0	0	54,952	3,077	58,969
	SW	0	0	0	0	0	342	342
2014	GW	1,020	0	0	0	76,333	2,956	80,309
	SW	0	0	0	0	0	328	328
2013	GW	1,145	0	0	0	89,383	2,837	93,365
	SW	0	0	0	0	0	315	315
2012	GW	1,284	0	0	0	103,617	2,951	107,852
	SW	0	0	0	0	0	328	328
2011	GW	1,386	0	0	0	109,351	2,720	113,457
	SW	0	0	0	0	0	302	302
2010	GW	1,112	0	0	0	61,429	2,454	64,995
	SW	0	0	0	0	0	273	273
2009	GW	1,106	0	0	0	123,620	2,866	127,592
	SW	0	0	0	0	0	318	318
2008	GW	1,168	0	0	0	164,328	2,498	167,994
	SW	0	0	0	0	0	278	278
2007	GW	1,120	0	0	0	161,030	2,145	164,295
	SW	0	0	0	0	0	238	238
2006	GW	1,244	0	0	0	96,024	3,531	100,799
	SW	0	0	0	0	0	392	392
2005	GW	1,138	0	0	0	64,963	2,175	68,276
	SW	0	0	0	0	0	242	242
2004	GW	1,332	0	0	0	151,583	1,547	154,462
	SW	0	0	0	0	0	387	387
2003	GW	1,341	0	0	0	152,977	1,616	155,934
	SW	0	0	0	0	0	404	404
2002	GW	1,358	0	0	0	167,951	1,471	170,780
	SW	0	0	0	0	0	368	368
2001	GW	1,249	0	0	0	185,648	1,637	188,534
	SW	0	0	0	0	0	409	409

CASTRO COUNTY

96.33% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	1,113	54	0	0	315,815	9,441	326,423
	SW	0	0	0	0	0	1,049	1,049
2015	GW	1,277	56	0	0	237,265	9,207	247,805
	SW	0	0	0	0	0	1,023	1,023
2014	GW	1,339	57	0	0	337,762	9,230	348,388
	SW	0	0	0	0	0	1,026	1,026
2013	GW	1,394	47	0	0	336,400	8,735	346,576
	SW	0	0	0	0	0	971	971
2012	GW	1,589	59	0	0	415,905	9,693	427,246
	SW	0	0	0	0	0	1,077	1,077
2011	GW	1,587	57	0	0	400,227	9,590	411,461
	SW	0	0	0	0	0	1,066	1,066
2010	GW	1,304	58	0	0	339,316	8,411	349,089
	SW	0	0	0	0	0	935	935
2009	GW	1,301	61	0	0	376,930	10,013	388,305
	SW	0	0	0	0	0	1,113	1,113
2008	GW	1,390	105	0	0	488,087	10,641	500,223
	SW	0	0	0	0	0	1,148	1,148
2007	GW	1,273	104	0	0	482,824	7,920	492,121
	SW	0	0	0	0	0	844	844
2006	GW	1,570	104	0	0	313,015	12,462	327,151
	SW	0	0	0	0	0	1,373	1,373
2005	GW	1,383	177	0	0	282,327	7,677	291,564
	SW	0	0	0	0	0	842	842
2004	GW	1,249	1,563	0	0	378,879	2,779	384,470
	SW	0	0	0	0	0	4,124	4,124
2003	GW	1,407	1,792	0	0	381,757	4,274	389,230
	SW	0	0	0	0	0	6,360	6,360
2002	GW	1,651	1,784	0	0	494,807	3,492	501,734
	SW	0	0	0	0	0	5,190	5,190
2001	GW	1,536	1,958	0	0	456,138	3,568	463,200
	SW	0	0	0	0	0	5,220	5,220

COCHRAN COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	471	0	44	0	85,102	377	85,994
	SW	0	0	0	0	0	42	42
2015	GW	478	0	13	0	74,529	366	75,386
	SW	0	0	0	0	0	41	41
2014	GW	521	0	42	0	98,148	363	99,074
	SW	0	0	0	0	0	41	41
2013	GW	538	0	4	0	109,500	360	110,402
	SW	0	0	0	0	0	40	40
2012	GW	624	0	4	0	123,608	446	124,682
	SW	0	0	0	0	0	49	49
2011	GW	841	0	10	0	99,504	444	100,799
	SW	0	0	0	0	0	49	49
2010	GW	618	0	14	0	66,485	360	67,477
	SW	0	0	3	0	0	40	43
2009	GW	681	0	163	0	99,287	416	100,547
	SW	0	0	41	0	0	46	87
2008	GW	659	0	312	0	118,899	416	120,286
	SW	0	0	78	0	0	46	124
2007	GW	688	0	0	0	155,577	477	156,742
	SW	0	0	0	0	0	53	53
2006	GW	712	0	0	0	86,849	622	88,183
	SW	0	0	0	0	0	69	69
2005	GW	504	0	0	0	71,037	159	71,700
	SW	0	0	0	0	0	18	18
2004	GW	701	0	0	0	137,669	65	138,435
	SW	0	0	0	0	0	86	86
2003	GW	809	0	0	0	148,266	65	149,140
	SW	0	0	0	0	0	86	86
2002	GW	825	0	0	0	121,509	36	122,370
	SW	0	0	0	0	0	47	47
2001	GW	766	0	0	0	115,261	215	116,242
	SW	0	0	0	0	0	280	280

CROSBY COUNTY

64.16% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	171	0	608	0	65,162	73	66,014
	SW	301	0	269	0	404	31	1,005
2015	GW	241	0	3	0	24,027	73	24,344
	SW	311	0	197	0	221	31	760
2014	GW	209	0	8	0	50,216	71	50,504
	SW	214	0	287	0	497	31	1,029
2013	GW	224	0	5	0	71,743	69	72,041
	SW	282	0	262	0	504	29	1,077
2012	GW	242	0	3	0	84,831	92	85,168
	SW	378	0	273	0	510	39	1,200
2011	GW	367	1	0	0	85,728	101	86,197
	SW	398	0	282	0	445	43	1,168
2010	GW	326	1	124	0	50,357	98	50,906
	SW	303	0	311	0	297	42	953
2009	GW	202	1	186	0	80,869	127	81,385
	SW	275	0	299	0	520	55	1,149
2008	GW	260	1	129	0	107,747	105	108,242
	SW	272	0	289	0	507	45	1,113
2007	GW	304	1	119	0	98,108	119	98,651
	SW	137	1	259	0	316	51	764
2006	GW	231	1	119	0	56,188	123	56,662
	SW	342	1	263	0	522	53	1,181
2005	GW	235	1	119	0	46,877	104	47,336
	SW	337	1	285	0	515	45	1,183
2004	GW	226	0	128	0	88,121	94	88,569
	SW	339	2	258	0	422	34	1,055
2003	GW	254	2	128	0	94,267	96	94,747
	SW	368	1	282	0	455	35	1,141
2002	GW	256	2	128	0	94,830	120	95,336
	SW	364	1	262	0	958	44	1,629
2001	GW	260	3	128	0	100,743	114	101,248
	SW	416	1	265	0	1,018	41	1,741

DEAF SMITH COUNTY

58.64% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	2,489	637	0	0	109,806	5,923	118,855
	SW	0	0	0	0	0	657	657
2015	GW	2,354	608	0	0	64,090	5,799	72,851
	SW	0	0	0	0	0	644	644
2014	GW	2,406	585	0	0	106,029	5,777	114,797
	SW	0	0	0	0	0	642	642
2013	GW	2,794	588	0	0	130,911	5,761	140,054
	SW	0	0	0	0	0	640	640
2012	GW	2,148	564	0	0	140,443	6,877	150,032
	SW	0	0	0	0	0	764	764
2011	GW	2,457	277	0	0	133,670	6,784	143,188
	SW	0	0	0	0	0	754	754
2010	GW	2,402	279	0	0	104,713	5,867	113,261
	SW	0	0	0	0	0	652	652
2009	GW	2,383	279	0	0	120,120	6,409	129,191
	SW	0	0	0	0	0	712	712
2008	GW	2,368	279	0	0	165,389	7,089	175,125
	SW	0	0	0	0	0	750	750
2007	GW	1,626	278	0	0	145,340	6,346	153,590
	SW	0	0	0	0	0	665	665
2006	GW	1,676	280	0	0	71,530	10,290	83,776
	SW	0	0	0	0	0	1,106	1,106
2005	GW	1,769	169	0	0	83,248	5,744	90,930
	SW	0	0	0	0	0	605	605
2004	GW	1,645	274	0	0	135,947	4,288	142,154
	SW	0	0	0	0	0	1,576	1,576
2003	GW	2,256	309	0	0	143,073	1,109	146,747
	SW	0	0	0	0	0	327	327
2002	GW	2,244	335	0	0	183,000	5,147	190,726
	SW	0	0	0	0	0	1,925	1,925
2001	GW	2,349	736	0	0	174,388	5,397	182,870
	SW	0	0	0	0	0	2,027	2,027

FLOYD COUNTY

93.14% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	527	0	0	0	114,266	1,045	115,838
	SW	91	0	0	0	0	185	276
2015	GW	462	0	0	0	76,579	1,030	78,071
	SW	100	0	0	0	0	182	282
2014	GW	592	0	0	0	106,688	1,004	108,284
	SW	78	0	0	0	0	178	256
2013	GW	737	0	0	0	131,097	1,015	132,849
	SW	104	0	0	0	0	179	283
2012	GW	745	0	0	0	110,134	1,047	111,926
	SW	156	0	0	0	0	186	342
2011	GW	711	0	0	0	156,644	1,060	158,415
	SW	225	0	0	0	0	187	412
2010	GW	386	0	170	0	95,430	915	96,901
	SW	221	0	176	0	0	162	559
2009	GW	652	0	155	0	159,455	1,164	161,426
	SW	258	0	159	0	0	205	622
2008	GW	649	0	139	0	176,513	1,051	178,352
	SW	269	0	143	0	0	186	598
2007	GW	645	0	0	0	154,796	904	156,345
	SW	193	0	0	0	0	160	353
2006	GW	730	0	0	0	117,448	1,647	119,825
	SW	177	0	0	0	0	291	468
2005	GW	726	0	0	0	108,279	1,011	110,016
	SW	182	0	0	0	0	179	361
2004	GW	579	0	0	0	159,885	581	161,045
	SW	312	0	0	0	0	704	1,016
2003	GW	518	0	0	0	180,370	534	181,422
	SW	366	0	0	0	0	646	1,012
2002	GW	522	0	0	0	175,278	574	176,374
	SW	296	0	0	0	0	696	992
2001	GW	575	0	0	0	163,349	498	164,422
	SW	392	0	0	0	0	604	996

HALE COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	3,988	643	0	5	289,742	3,817	298,195
	SW	378	105	0	0	79	424	986
2015	GW	4,215	622	0	0	204,294	3,749	212,880
	SW	0	97	0	0	120	417	634
2014	GW	4,581	618	1	0	248,628	3,695	257,523
	SW	0	97	0	0	240	411	748
2013	GW	4,210	2,270	0	0	330,365	3,454	340,299
	SW	0	97	0	0	198	384	679
2012	GW	5,911	1,048	0	0	364,360	2,999	374,318
	SW	0	97	0	0	107	333	537
2011	GW	6,327	973	0	0	389,019	3,063	399,382
	SW	275	1,444	0	0	154	340	2,213
2010	GW	2,727	1,125	215	0	219,525	2,792	226,384
	SW	859	1,424	56	0	118	310	2,767
2009	GW	3,350	2,463	151	0	368,617	3,190	377,771
	SW	2,154	105	39	0	37	354	2,689
2008	GW	4,824	2,372	87	0	530,510	3,180	540,973
	SW	734	129	22	0	50	353	1,288
2007	GW	4,451	2,365	0	0	491,650	2,244	500,710
	SW	329	139	0	0	117	249	834
2006	GW	4,687	2,300	0	0	277,885	3,747	288,619
	SW	1,091	176	0	0	246	416	1,929
2005	GW	4,431	2,269	0	0	242,795	2,277	251,772
	SW	1,069	354	0	0	244	253	1,920
2004	GW	4,414	2,423	0	0	354,210	1,767	362,814
	SW	1,054	0	0	0	1,399	450	2,903
2003	GW	4,685	3,123	0	0	393,087	2,425	403,320
	SW	2,783	173	0	0	1,422	617	4,995
2002	GW	2,777	3,084	0	0	385,812	2,078	393,751
	SW	759	148	0	0	0	529	1,436
2001	GW	4,249	2,676	0	0	337,770	2,031	346,726
	SW	1,437	0	0	0	0	517	1,954

HOCKLEY COUNTY

93.43% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	1,224	533	41	0	127,650	329	129,777
	SW	1,524	7	0	0	0	37	1,568
2015	GW	1,053	1,047	16	0	106,756	325	109,197
	SW	1,775	3	0	0	0	37	1,815
2014	GW	1,404	528	49	0	102,700	315	104,996
	SW	1,646	4	0	0	0	35	1,685
2013	GW	1,859	529	17	0	129,159	309	131,873
	SW	1,518	3	0	0	0	34	1,555
2012	GW	1,750	532	2	0	149,755	321	152,360
	SW	1,392	9	0	0	0	37	1,438
2011	GW	1,824	529	0	0	140,060	381	142,794
	SW	1,678	3	0	0	0	43	1,724
2010	GW	1,291	530	12	0	92,442	335	94,610
	SW	1,549	1	3	0	0	38	1,591
2009	GW	1,305	529	729	0	140,537	323	143,423
	SW	1,707	1	179	0	0	37	1,924
2008	GW	1,247	492	1,445	0	121,218	339	124,741
	SW	1,386	88	356	0	0	38	1,868
2007	GW	2,130	369	0	0	184,522	296	187,317
	SW	584	0	0	0	0	32	616
2006	GW	1,535	370	0	0	101,752	425	104,082
	SW	1,700	0	0	0	0	48	1,748
2005	GW	1,480	370	0	0	84,420	218	86,488
	SW	1,692	0	0	0	0	24	1,716
2004	GW	1,461	370	0	0	173,395	146	175,372
	SW	1,398	0	0	0	0	93	1,491
2003	GW	3,002	370	0	0	177,607	318	181,297
	SW	2	0	0	0	0	203	205
2002	GW	1,474	370	0	0	154,034	367	156,245
	SW	1,818	0	0	0	0	236	2,054
2001	GW	1,777	370	0	0	174,433	357	176,937
	SW	1,719	0	0	0	0	228	1,947

LAMB COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	1,716	0	0	9,834	224,511	5,329	241,390
	SW	0	0	0	0	0	280	280
2015	GW	1,532	363	0	11,351	169,494	5,225	187,965
	SW	0	0	0	0	0	275	275
2014	GW	1,899	363	0	11,760	207,750	5,178	226,950
	SW	0	0	0	0	0	273	273
2013	GW	2,056	415	0	15,666	271,563	4,571	294,271
	SW	0	0	0	0	0	241	241
2012	GW	2,404	404	0	14,748	325,693	3,980	347,229
	SW	0	0	0	0	0	209	209
2011	GW	2,551	414	0	13,448	308,578	3,902	328,893
	SW	0	0	0	0	0	205	205
2010	GW	1,843	388	108	13,945	182,763	3,554	202,601
	SW	0	0	28	0	0	187	215
2009	GW	1,734	361	59	13,750	323,337	4,265	343,506
	SW	0	0	15	0	0	224	239
2008	GW	2,464	513	10	14,557	404,946	3,928	426,418
	SW	0	0	3	0	0	207	210
2007	GW	2,377	512	0	14,527	470,827	3,352	491,595
	SW	0	0	0	0	0	177	177
2006	GW	2,569	459	0	11,964	249,209	4,657	268,858
	SW	0	0	0	0	0	245	245
2005	GW	2,523	459	0	14,197	241,431	3,478	262,088
	SW	0	0	0	0	0	183	183
2004	GW	2,572	459	0	18,295	372,046	2,631	396,003
	SW	0	0	0	0	0	657	657
2003	GW	2,950	422	0	15,432	388,042	2,597	409,443
	SW	0	0	0	0	0	649	649
2002	GW	3,362	418	0	14,237	422,375	1,937	442,329
	SW	0	0	0	0	0	484	484
2001	GW	3,117	330	0	14,879	421,483	1,768	441,577
	SW	0	0	0	0	0	442	442

LUBBOCK COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	31,431	387	0	165	135,927	603	168,513
	SW	12,603	575	0	163	263	12	13,616
2015	GW	32,087	298	2	258	168,005	590	201,240
	SW	9,199	546	0	164	106	12	10,027
2014	GW	35,412	265	5	396	104,666	569	141,313
	SW	9,308	216	0	151	156	12	9,843
2013	GW	41,122	344	5	1,221	156,414	561	199,667
	SW	7,406	238	0	139	196	11	7,990
2012	GW	48,406	423	0	950	171,326	794	221,899
	SW	1,544	212	0	129	0	16	1,901
2011	GW	52,448	475	0	1,260	158,755	821	213,759
	SW	4,361	246	0	118	0	17	4,742
2010	GW	30,753	619	982	452	106,030	716	139,552
	SW	13,361	267	970	537	0	15	15,150
2009	GW	26,886	452	717	0	178,181	683	206,919
	SW	14,939	253	708	723	0	14	16,637
2008	GW	27,735	677	451	18	241,393	708	270,982
	SW	12,265	382	446	884	0	14	13,991
2007	GW	24,140	388	0	17	219,928	825	245,298
	SW	13,527	270	0	740	6,000	17	20,554
2006	GW	30,627	396	0	12	123,243	1,532	155,810
	SW	16,928	1,241	0	885	6,500	31	25,585
2005	GW	26,642	423	0	4	109,686	922	137,677
	SW	19,647	301	0	836	6,000	19	26,803
2004	GW	29,149	342	0	5	199,872	605	229,973
	SW	14,501	277	0	148,487	5,650	151	169,066
2003	GW	35,771	527	0	8	193,309	680	230,295
	SW	13,984	123	0	562	8,000	170	22,839
2002	GW	25,459	423	0	11	223,230	801	249,924
	SW	20,701	108	0	781	6,904	200	28,694
2001	GW	12,976	558	0	12	220,296	777	234,619
	SW	35,320	80	0	815	6,813	194	43,222

LYNN COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	706	0	0	0	90,708	64	91,478
	SW	65	0	0	0	0	11	76
2015	GW	549	0	0	0	65,587	63	66,199
	SW	137	0	0	0	0	11	148
2014	GW	724	0	0	0	88,606	60	89,390
	SW	102	0	0	0	0	11	113
2013	GW	356	0	11	0	87,787	64	88,218
	SW	385	0	0	0	0	11	396
2012	GW	469	0	0	0	100,642	70	101,181
	SW	355	0	0	0	0	12	367
2011	GW	349	0	0	0	99,511	77	99,937
	SW	586	0	0	0	0	14	600
2010	GW	298	0	249	0	53,247	75	53,869
	SW	471	0	63	0	0	13	547
2009	GW	419	0	145	0	88,008	167	88,739
	SW	427	0	37	0	0	29	493
2008	GW	431	0	41	0	111,548	75	112,095
	SW	403	0	10	0	0	13	426
2007	GW	643	0	0	0	105,698	94	106,435
	SW	136	0	0	0	5,000	16	5,152
2006	GW	572	0	0	0	60,206	141	60,919
	SW	136	0	0	0	5,446	25	5,607
2005	GW	506	0	0	0	60,788	107	61,401
	SW	182	0	0	0	4,659	19	4,860
2004	GW	540	0	0	0	87,583	62	88,185
	SW	106	0	0	0	4,390	27	4,523
2003	GW	555	0	0	0	86,411	93	87,059
	SW	444	0	0	0	6,204	39	6,687
2002	GW	520	0	0	0	94,197	122	94,839
	SW	438	0	0	0	6,013	51	6,502
2001	GW	428	0	0	0	108,306	135	108,869
	SW	324	0	0	0	6,913	57	7,294

PARMER COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	1,321	1,830	0	0	173,774	8,933	185,858
	SW	0	0	0	0	0	992	992
2015	GW	1,140	1,643	0	0	145,520	8,858	157,161
	SW	0	0	0	0	0	984	984
2014	GW	1,456	1,624	0	0	210,719	8,821	222,620
	SW	0	0	0	0	0	980	980
2013	GW	1,576	1,666	0	0	222,847	8,703	234,792
	SW	0	0	0	0	0	967	967
2012	GW	1,803	1,404	0	0	260,143	9,709	273,059
	SW	0	0	0	0	0	1,079	1,079
2011	GW	2,137	1,467	0	0	245,279	9,195	258,078
	SW	0	0	0	0	0	1,021	1,021
2010	GW	1,596	1,560	0	0	256,507	7,748	267,411
	SW	0	0	0	0	0	861	861
2009	GW	1,594	1,738	0	0	299,329	8,781	311,442
	SW	0	0	0	0	0	976	976
2008	GW	1,556	1,873	0	0	405,765	9,949	419,143
	SW	0	0	0	0	0	992	992
2007	GW	1,559	1,819	0	0	405,687	7,247	416,312
	SW	0	0	0	0	0	689	689
2006	GW	1,811	1,861	0	0	264,001	12,026	279,699
	SW	0	0	0	0	0	1,211	1,211
2005	GW	1,497	1,917	0	0	291,445	6,613	301,472
	SW	0	0	0	0	0	618	618
2004	GW	2,028	1,961	0	0	467,218	3,531	474,738
	SW	0	0	0	0	0	3,176	3,176
2003	GW	2,210	2,125	0	0	425,739	3,539	433,613
	SW	0	0	0	0	492	3,366	3,858
2002	GW	1,930	1,983	0	0	456,427	3,603	463,943
	SW	0	0	0	0	0	3,099	3,099
2001	GW	1,810	2,017	0	0	363,640	4,063	371,530
	SW	0	0	0	0	0	3,433	3,433

POTTER COUNTY

5.87% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	1,241	385	5	51	90	24	1,796
	SW	166	4	2	0	0	5	177
2015	GW	1,195	349	9	64	31	23	1,671
	SW	0	4	3	0	0	4	11
2014	GW	1,424	334	9	66	153	23	2,009
	SW	0	3	3	0	0	4	10
2013	GW	1,488	274	6	76	241	26	2,111
	SW	0	5	2	0	0	5	12
2012	GW	1,631	241	7	46	210	33	2,168
	SW	0	4	2	0	0	6	12
2011	GW	1,656	324	8	82	140	42	2,252
	SW	95	5	0	0	0	7	107
2010	GW	1,104	358	26	31	70	38	1,627
	SW	380	17	29	0	0	7	433
2009	GW	1,037	310	25	42	206	37	1,657
	SW	390	24	27	0	0	6	447
2008	GW	1,224	342	24	78	182	35	1,885
	SW	292	13	25	0	0	6	336
2007	GW	1,012	341	8	83	345	37	1,826
	SW	392	22	0	11	0	7	432
2006	GW	1,219	331	9	56	247	32	1,894
	SW	509	27	0	108	0	5	649
2005	GW	1,052	286	9	95	323	32	1,797
	SW	564	15	0	221	0	5	805
2004	GW	1,121	314	9	79	290	3	1,816
	SW	441	19	0	275	0	28	763
2003	GW	687	318	8	85	299	5	1,402
	SW	1,018	19	0	236	0	49	1,322
2002	GW	808	288	8	97	512	6	1,719
	SW	803	20	0	188	301	61	1,373
2001	GW	800	295	16	79	310	3	1,503
	SW	794	25	0	193	181	29	1,222

RANDALL COUNTY

47.32% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	9,614	273	0	0	8,340	1,216	19,443
	SW	1,545	0	0	0	40	304	1,889
2015	GW	8,917	251	0	0	2,827	1,201	13,196
	SW	436	0	0	0	37	300	773
2014	GW	10,494	294	0	0	7,487	1,165	19,440
	SW	437	0	0	0	38	291	766
2013	GW	10,938	260	0	0	9,843	1,095	22,136
	SW	475	0	0	0	43	274	792
2012	GW	12,077	247	0	0	11,531	1,339	25,194
	SW	375	0	0	0	0	335	710
2011	GW	12,287	257	0	0	12,961	1,424	26,929
	SW	920	0	0	0	41	356	1,317
2010	GW	8,776	240	0	0	8,673	1,165	18,854
	SW	2,488	0	0	0	43	291	2,822
2009	GW	7,955	137	0	0	10,298	1,437	19,827
	SW	2,891	0	0	0	42	359	3,292
2008	GW	8,817	259	0	0	12,005	1,408	22,489
	SW	2,229	0	0	0	41	352	2,622
2007	GW	7,246	236	0	0	11,554	1,182	20,218
	SW	2,738	0	0	0	25	295	3,058
2006	GW	8,541	253	0	0	10,903	2,070	21,767
	SW	3,386	0	0	0	54	518	3,958
2005	GW	7,625	262	0	0	15,438	1,054	24,379
	SW	3,709	0	0	0	58	263	4,030
2004	GW	7,820	252	0	0	12,888	1,158	22,118
	SW	3,143	0	0	0	93	319	3,555
2003	GW	5,413	210	0	0	14,692	1,219	21,534
	SW	6,219	255	0	0	128	336	6,938
2002	GW	5,888	210	0	0	13,300	1,125	20,523
	SW	4,834	7	0	0	849	310	6,000
2001	GW	5,735	272	0	0	12,155	1,198	19,360
	SW	4,803	7	0	0	776	330	5,916

SWISHER COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	889	0	0	0	83,585	3,269	87,743
	SW	106	0	0	0	0	66	172
2015	GW	847	0	0	0	71,839	3,229	75,915
	SW	95	0	0	0	0	66	161
2014	GW	1,016	0	0	0	110,225	3,146	114,387
	SW	17	0	0	0	0	64	81
2013	GW	1,031	0	0	0	134,191	3,072	138,294
	SW	59	0	0	0	0	63	122
2012	GW	1,033	0	0	0	163,750	3,333	168,116
	SW	128	0	0	0	0	68	196
2011	GW	1,151	0	0	0	155,342	3,467	159,960
	SW	134	0	0	0	0	71	205
2010	GW	905	0	0	0	113,473	2,918	117,296
	SW	181	0	0	0	0	60	241
2009	GW	950	0	0	0	240,117	3,990	245,057
	SW	162	0	0	0	0	81	243
2008	GW	944	0	0	0	246,525	3,687	251,156
	SW	226	0	0	0	0	76	302
2007	GW	854	0	0	0	227,875	3,003	231,732
	SW	227	0	0	0	0	62	289
2006	GW	1,051	0	0	0	147,700	6,093	154,844
	SW	163	0	0	0	0	124	287
2005	GW	903	0	0	0	165,346	3,872	170,121
	SW	419	0	0	0	0	79	498
2004	GW	912	0	0	0	168,500	2,532	171,944
	SW	200	0	0	0	0	1,194	1,394
2003	GW	933	0	0	0	169,277	2,609	172,819
	SW	419	0	0	0	0	1,230	1,649
2002	GW	890	0	0	0	158,661	2,515	162,066
	SW	396	0	0	0	0	1,186	1,582
2001	GW	922	0	0	0	168,394	2,403	171,719
	SW	371	0	0	0	0	1,133	1,504

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

ARMSTRONG COUNTY

7.63% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	LIVESTOCK, ARMSTRONG	RED	RED LIVESTOCK LOCAL SUPPLY	9	9	9	9	9	9
	Sum of Projected Surface Water Supplies (acre-feet)			**9**	**9**	**9**	**9**	**9**	**9**

BAILEY COUNTY

100% (multiplier)

All values are in acre-feet

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

CASTRO COUNTY

96.33% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, CASTRO	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LIVESTOCK, CASTRO	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**

COCHRAN COUNTY

100% (multiplier)

All values are in acre-feet

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

CROSBY COUNTY

64.16% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, CROSBY	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, CROSBY	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**

DEAF SMITH COUNTY

58.64% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, DEAF SMITH	CANADIAN	CANADIAN LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LIVESTOCK, DEAF SMITH	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**

FLOYD COUNTY

93.14% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	FLOYDADA	BRAZOS	MACKENZIE LAKE/RESERVOIR	49	49	49	49	49	49
O	LIVESTOCK, FLOYD	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LIVESTOCK, FLOYD	RED	RED LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LOCKNEY	BRAZOS	MACKENZIE LAKE/RESERVOIR	35	35	35	35	35	35
		Sum of Projected Surface Water Supplies (acre-feet)		**84**	**84**	**84**	**84**	**84**	**84**

HALE COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, HALE	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LIVESTOCK, HALE	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 Surface Water Supplies
TWDB 2017 State Water Plan Data

HOCKLEY COUNTY

93.43% (multiplier)

All values are in acre-feet

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

LAMB COUNTY

100% (multiplier)

All values are in acre-feet

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

LUBBOCK COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, LUBBOCK	BRAZOS	ALAN HENRY LAKE/RESERVOIR	202	202	202	202	202	202
O	LIVESTOCK, LUBBOCK	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LUBBOCK	BRAZOS	ALAN HENRY LAKE/RESERVOIR	7,655	7,655	7,655	7,655	7,655	7,655
O	RANSOM CANYON	BRAZOS	ALAN HENRY LAKE/RESERVOIR	143	143	143	143	143	143
	Sum of Projected Surface Water Supplies (acre-feet)			**8,000**	**8,000**	**8,000**	**8,000**	**8,000**	**8,000**

LYNN COUNTY

100% (multiplier)

All values are in acre-feet

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

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

PARMER COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, PARMER	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LIVESTOCK, PARMER	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**

POTTER COUNTY

5.87% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	LIVESTOCK, POTTER	CANADIAN	CANADIAN LIVESTOCK LOCAL SUPPLY	29	29	29	29	29	29
A	LIVESTOCK, POTTER	RED	RED LIVESTOCK LOCAL SUPPLY	4	4	4	4	4	4
	Sum of Projected Surface Water Supplies (acre-feet)			**33**	**33**	**33**	**33**	**33**	**33**

RANDALL COUNTY

47.32% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	IRRIGATION, RANDALL	RED	RED RUN-OF-RIVER	103	103	103	103	103	103
A	LIVESTOCK, RANDALL	RED	RED LIVESTOCK LOCAL SUPPLY	621	621	621	621	621	621
	Sum of Projected Surface Water Supplies (acre-feet)			**724**	**724**	**724**	**724**	**724**	**724**

SWISHER COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, SWISHER	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	LIVESTOCK, SWISHER	RED	RED LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
O	TULIA	RED	MACKENZIE LAKE/RESERVOIR	61	61	61	61	61	61
	Sum of Projected Surface Water Supplies (acre-feet)			**61**	**61**	**61**	**61**	**61**	**61**

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.

ARMSTRONG COUNTY

7.63% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	CLAUDE	RED	358	353	348	346	345	345
A	COUNTY-OTHER, ARMSTRONG	RED	7	6	6	6	6	6
A	IRRIGATION, ARMSTRONG	RED	320	304	283	251	220	189
A	LIVESTOCK, ARMSTRONG	RED	49	50	50	50	50	51
		Sum of Projected Water Demands (acre-feet)	**734**	**713**	**687**	**653**	**621**	**591**

BAILEY COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, BAILEY	BRAZOS	277	296	321	351	381	411
O	IRRIGATION, BAILEY	BRAZOS	119,268	116,407	113,614	110,888	108,227	105,752
O	LIVESTOCK, BAILEY	BRAZOS	2,335	3,013	3,057	3,104	3,153	3,204
O	MANUFACTURING, BAILEY	BRAZOS	316	326	335	343	365	388
O	MULESHOE	BRAZOS	1,174	1,284	1,397	1,523	1,656	1,787
		Sum of Projected Water Demands (acre-feet)	**123,370**	**121,326**	**118,724**	**116,209**	**113,782**	**111,542**

CASTRO COUNTY

96.33% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, CASTRO	BRAZOS	189	197	205	215	223	228
O	COUNTY-OTHER, CASTRO	RED	207	217	224	235	243	249
O	DIMMITT	BRAZOS	1,096	1,164	1,210	1,260	1,304	1,341
O	HART	BRAZOS	180	189	194	203	210	216
O	IRRIGATION, CASTRO	BRAZOS	242,929	233,616	224,658	216,045	207,763	200,385
O	IRRIGATION, CASTRO	RED	130,808	125,793	120,970	116,332	111,872	107,899
O	LIVESTOCK, CASTRO	BRAZOS	4,169	5,076	5,197	5,323	5,457	5,597
O	LIVESTOCK, CASTRO	RED	1,464	1,783	1,825	1,871	1,917	1,966
O	MANUFACTURING, CASTRO	BRAZOS	802	853	901	942	1,009	1,080
O	MANUFACTURING, CASTRO	RED	142	150	159	167	178	191
		Sum of Projected Water Demands (acre-feet)	**381,986**	**369,038**	**355,543**	**342,593**	**330,176**	**319,152**

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.

COCHRAN COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, COCHRAN	BRAZOS	376	415	427	428	444	451
O	COUNTY-OTHER, COCHRAN	COLORADO	124	129	129	128	131	132
O	IRRIGATION, COCHRAN	BRAZOS	69,516	66,833	64,253	61,772	59,387	57,266
O	IRRIGATION, COCHRAN	COLORADO	32,713	31,451	30,236	29,069	27,947	26,948
O	LIVESTOCK, COCHRAN	BRAZOS	370	388	407	428	449	472
O	LIVESTOCK, COCHRAN	COLORADO	166	174	183	192	202	212
O	MINING, COCHRAN	BRAZOS	8	10	10	8	6	4
O	MINING, COCHRAN	COLORADO	146	198	200	155	109	77
O	MORTON	BRAZOS	473	474	467	456	466	469
		Sum of Projected Water Demands (acre-feet)	**103,892**	**100,072**	**96,312**	**92,636**	**89,141**	**86,031**

CROSBY COUNTY

64.16% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, CROSBY	BRAZOS	99	101	107	111	116	123
O	COUNTY-OTHER, CROSBY	RED	1	1	1	1	1	1
O	CROSBYTON	BRAZOS	294	306	316	332	351	367
O	IRRIGATION, CROSBY	BRAZOS	72,303	69,390	66,594	63,912	61,338	59,059
O	IRRIGATION, CROSBY	RED	2,996	2,876	2,760	2,649	2,542	2,448
O	LIVESTOCK, CROSBY	BRAZOS	164	168	172	176	180	185
O	LIVESTOCK, CROSBY	RED	4	4	4	4	4	4
O	LORENZO	BRAZOS	231	246	258	275	295	310
O	MANUFACTURING, CROSBY	BRAZOS	2	2	2	2	2	2
O	MINING, CROSBY	BRAZOS	402	396	352	306	265	230
O	MINING, CROSBY	RED	236	233	207	180	156	135
O	RALLS	BRAZOS	313	324	333	347	364	381
		Sum of Projected Water Demands (acre-feet)	**77,045**	**74,047**	**71,106**	**68,295**	**65,614**	**63,245**

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.

DEAF SMITH COUNTY

58.64% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, DEAF SMITH	CANADIAN	1	1	1	1	1	1
O	COUNTY-OTHER, DEAF SMITH	RED	317	349	388	439	482	529
O	HEREFORD	RED	3,953	4,463	5,040	5,728	6,288	6,907
O	IRRIGATION, DEAF SMITH	CANADIAN	1,134	1,098	1,063	1,030	997	968
O	IRRIGATION, DEAF SMITH	RED	112,282	108,724	105,280	101,944	98,715	95,780
O	LIVESTOCK, DEAF SMITH	CANADIAN	74	84	87	90	93	97
O	LIVESTOCK, DEAF SMITH	RED	7,288	8,304	8,596	8,903	9,224	9,562
O	MANUFACTURING, DEAF SMITH	RED	2,248	2,316	2,381	2,438	2,519	2,602
		Sum of Projected Water Demands (acre-feet)	**127,297**	**125,339**	**122,836**	**120,573**	**118,319**	**116,446**

FLOYD COUNTY

93.14% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, FLOYD	BRAZOS	127	128	131	135	139	142
O	COUNTY-OTHER, FLOYD	RED	60	60	61	64	65	67
O	FLOYDADA	BRAZOS	572	589	603	625	643	658
O	IRRIGATION, FLOYD	BRAZOS	49,533	47,560	45,666	43,847	42,100	40,552
O	IRRIGATION, FLOYD	RED	88,058	84,551	81,183	77,950	74,845	72,092
O	LIVESTOCK, FLOYD	BRAZOS	526	552	580	608	639	672
O	LIVESTOCK, FLOYD	RED	161	170	178	187	197	206
O	LOCKNEY	BRAZOS	268	274	276	286	294	300
O	MINING, FLOYD	BRAZOS	199	201	200	199	198	198
O	MINING, FLOYD	RED	253	257	255	253	252	253
		Sum of Projected Water Demands (acre-feet)	**139,757**	**134,342**	**129,133**	**124,154**	**119,372**	**115,140**

HALE COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	ABERNATHY	BRAZOS	528	539	540	532	545	550
O	COUNTY-OTHER, HALE	BRAZOS	1,171	1,177	1,162	1,135	1,161	1,173
O	HALE CENTER	BRAZOS	298	299	296	289	296	299

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.

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	IRRIGATION, HALE	BRAZOS	366,115	353,986	342,257	330,917	319,952	310,031
O	IRRIGATION, HALE	RED	3,697	3,574	3,456	3,341	3,231	3,130
O	LIVESTOCK, HALE	BRAZOS	2,027	2,636	2,673	2,711	2,753	2,796
O	LIVESTOCK, HALE	RED	18	24	24	25	25	25
O	MANUFACTURING, HALE	BRAZOS	2,830	2,944	3,052	3,144	3,322	3,510
O	MINING, HALE	BRAZOS	1,168	1,152	1,022	886	766	662
O	PETERSBURG	BRAZOS	326	334	335	330	338	342
O	PLAINVIEW	BRAZOS	4,368	4,441	4,427	4,344	4,449	4,496
O	STEAM ELECTRIC POWER, HALE	BRAZOS	60	71	83	98	117	139
		Sum of Projected Water Demands (acre-feet)	**382,606**	**371,177**	**359,327**	**347,752**	**336,955**	**327,153**

HOCKLEY COUNTY

93.43% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	ANTON	BRAZOS	161	164	165	165	172	176
O	COUNTY-OTHER, HOCKLEY	BRAZOS	832	854	862	855	890	915
O	COUNTY-OTHER, HOCKLEY	COLORADO	29	30	30	30	31	32
O	IRRIGATION, HOCKLEY	BRAZOS	114,006	109,549	105,264	101,147	97,193	93,679
O	IRRIGATION, HOCKLEY	COLORADO	8,581	8,245	7,923	7,614	7,316	7,051
O	LEVELLAND	BRAZOS	2,442	2,521	2,554	2,547	2,655	2,727
O	LIVESTOCK, HOCKLEY	BRAZOS	190	199	208	220	230	242
O	LIVESTOCK, HOCKLEY	COLORADO	33	35	36	38	40	42
O	MANUFACTURING, HOCKLEY	BRAZOS	1,107	1,110	1,113	1,115	1,119	1,124
O	MINING, HOCKLEY	BRAZOS	15	15	14	14	13	12
O	MINING, HOCKLEY	COLORADO	2	2	2	2	2	2
O	SUNDOWN	COLORADO	416	434	446	448	467	480
		Sum of Projected Water Demands (acre-feet)	**127,814**	**123,158**	**118,617**	**114,195**	**110,128**	**106,482**

LAMB COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	AMHERST	BRAZOS	102	107	110	113	119	124

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.

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, LAMB	BRAZOS	435	471	505	530	567	596
O	EARTH	BRAZOS	192	190	187	184	186	187
O	IRRIGATION, LAMB	BRAZOS	325,356	312,802	300,732	289,129	277,974	268,045
O	LITTLEFIELD	BRAZOS	953	917	873	833	824	809
O	LIVESTOCK, LAMB	BRAZOS	2,969	3,136	3,204	3,275	3,349	3,427
O	MANUFACTURING, LAMB	BRAZOS	616	642	667	688	733	781
O	MINING, LAMB	BRAZOS	586	579	513	445	385	333
O	OLTON	BRAZOS	469	463	453	440	441	438
O	STEAM ELECTRIC POWER, LAMB	BRAZOS	17,663	20,651	24,292	28,731	34,142	40,391
O	SUDAN	BRAZOS	250	265	274	279	292	302
		Sum of Projected Water Demands (acre-feet)	**349,591**	**340,223**	**331,810**	**324,647**	**319,012**	**315,433**

LUBBOCK COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	ABERNATHY	BRAZOS	184	200	217	236	255	274
O	COUNTY-OTHER, LUBBOCK	BRAZOS	4,647	5,010	5,402	5,869	6,354	6,847
O	IDALOU	BRAZOS	419	426	436	452	469	486
O	IRRIGATION, LUBBOCK	BRAZOS	169,242	159,740	150,773	142,310	134,322	127,582
O	LIVESTOCK, LUBBOCK	BRAZOS	780	887	918	951	985	1,021
O	LUBBOCK	BRAZOS	45,623	49,424	53,437	58,113	62,886	67,703
O	MANUFACTURING, LUBBOCK	BRAZOS	2,161	2,354	2,540	2,697	2,914	3,148
O	MINING, LUBBOCK	BRAZOS	6,354	6,425	5,913	5,302	4,763	4,314
O	NEW DEAL	BRAZOS	114	121	128	138	148	158
O	RANSOM CANYON	BRAZOS	337	356	377	401	424	448
O	SHALLOWATER	BRAZOS	422	464	507	558	610	662
O	SLATON	BRAZOS	746	726	712	711	718	726
O	STEAM ELECTRIC POWER, LUBBOCK	BRAZOS	4,540	5,308	6,244	7,385	8,776	9,906
O	WOLFFORTH	BRAZOS	765	912	1,062	1,223	1,385	1,547
		Sum of Projected Water Demands (acre-feet)	**236,334**	**232,353**	**228,666**	**226,346**	**225,009**	**224,822**

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.

LYNN COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, LYNN	BRAZOS	301	304	296	289	303	309
O	COUNTY-OTHER, LYNN	COLORADO	10	10	10	10	10	10
O	IRRIGATION, LYNN	BRAZOS	78,646	74,418	70,411	66,626	63,045	59,999
O	IRRIGATION, LYNN	COLORADO	5,920	5,601	5,300	5,015	4,745	4,516
O	LIVESTOCK, LYNN	BRAZOS	131	136	139	144	149	153
O	LIVESTOCK, LYNN	COLORADO	10	10	11	11	11	12
O	MINING, LYNN	BRAZOS	1,084	1,234	1,167	961	768	614
O	MINING, LYNN	COLORADO	82	93	88	72	58	46
O	O'DONNELL	BRAZOS	105	106	105	104	109	111
O	TAHOKA	BRAZOS	478	488	478	472	494	505
		Sum of Projected Water Demands (acre-feet)	**86,767**	**82,400**	**78,005**	**73,704**	**69,692**	**66,275**

PARMER COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	BOVINA	BRAZOS	373	402	429	458	496	531
O	COUNTY-OTHER, PARMER	BRAZOS	384	414	442	474	512	549
O	COUNTY-OTHER, PARMER	RED	247	266	284	304	330	353
O	FARWELL	BRAZOS	396	430	461	494	535	573
O	FRIONA	RED	829	894	953	1,018	1,103	1,182
O	IRRIGATION, PARMER	BRAZOS	263,845	261,044	258,272	255,530	252,817	250,189
O	IRRIGATION, PARMER	RED	65,961	65,261	64,568	63,883	63,204	62,547
O	LIVESTOCK, PARMER	BRAZOS	4,507	5,526	5,654	5,787	5,927	6,074
O	LIVESTOCK, PARMER	RED	1,127	1,382	1,413	1,447	1,482	1,519
O	MANUFACTURING, PARMER	RED	2,233	2,365	2,492	2,603	2,782	2,973
		Sum of Projected Water Demands (acre-feet)	**339,902**	**337,984**	**334,968**	**331,998**	**329,188**	**326,490**

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.

POTTER COUNTY

5.87% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	AMARILLO	CANADIAN	15,884	17,294	18,856	20,510	22,424	24,462
A	AMARILLO	RED	10,458	11,386	12,414	13,504	14,764	16,106
A	COUNTY-OTHER, POTTER	CANADIAN	116	126	137	150	163	178
A	COUNTY-OTHER, POTTER	RED	65	71	77	84	92	100
A	IRRIGATION, POTTER	CANADIAN	99	95	89	79	69	59
A	IRRIGATION, POTTER	RED	103	99	93	82	72	62
A	LIVESTOCK, POTTER	CANADIAN	23	23	24	24	24	24
A	LIVESTOCK, POTTER	RED	5	5	5	5	5	5
A	MANUFACTURING, POTTER	CANADIAN	86	92	99	104	112	120
A	MANUFACTURING, POTTER	RED	485	522	558	590	633	680
A	MINING, POTTER	CANADIAN	38	46	54	58	65	73
A	MINING, POTTER	RED	18	22	25	27	31	34
A	STEAM ELECTRIC POWER, POTTER	CANADIAN	1,490	1,573	1,668	1,762	2,003	2,211
		Sum of Projected Water Demands (acre-feet)	**28,870**	**31,354**	**34,099**	**36,979**	**40,457**	**44,114**

RANDALL COUNTY

47.32% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	AMARILLO	RED	21,389	23,430	25,540	27,846	30,443	33,171
A	CANYON	RED	3,633	3,982	4,343	4,736	5,179	5,643
A	COUNTY-OTHER, RANDALL	RED	1,734	1,894	2,063	2,247	2,454	2,674
A	HAPPY	RED	11	12	13	14	15	16
A	IRRIGATION, RANDALL	RED	8,518	8,118	7,560	6,720	5,880	5,040
A	LAKE TANGLEWOOD	RED	319	315	312	311	310	310
A	LIVESTOCK, RANDALL	RED	1,256	1,261	1,267	1,273	1,280	1,287
A	MANUFACTURING, RANDALL	RED	279	302	324	342	371	403
		Sum of Projected Water Demands (acre-feet)	**37,139**	**39,314**	**41,422**	**43,489**	**45,932**	**48,544**

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.

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

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, SWISHER	BRAZOS	29	29	29	28	30	30
O	COUNTY-OTHER, SWISHER	RED	185	187	184	184	191	196
O	HAPPY	RED	99	101	100	98	103	105
O	IRRIGATION, SWISHER	BRAZOS	35,441	36,571	36,362	36,154	35,948	35,745
O	IRRIGATION, SWISHER	RED	161,454	166,600	165,649	164,703	163,761	162,836
O	KRESS	BRAZOS	18	18	17	16	18	18
O	KRESS	RED	61	61	60	59	61	62
O	LIVESTOCK, SWISHER	BRAZOS	118	124	130	137	144	151
O	LIVESTOCK, SWISHER	RED	2,244	2,357	2,475	2,598	2,728	2,864
O	TULIA	RED	926	945	938	924	967	989
		Sum of Projected Water Demands (acre-feet)	**200,575**	**206,993**	**205,944**	**204,901**	**203,951**	**202,996**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

ARMSTRONG COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	CLAUDE	RED	105	52	6	-35	-72	-110
A	COUNTY-OTHER, ARMSTRONG	RED	11	15	16	17	17	17
A	IRRIGATION, ARMSTRONG	RED	0	0	0	0	0	0
A	LIVESTOCK, ARMSTRONG	RED	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**0**	**-35**	**-72**	**-110**

BAILEY COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, BAILEY	BRAZOS	3	4	-121	-126	-131	-146
O	IRRIGATION, BAILEY	BRAZOS	-82,342	-85,313	-87,094	-90,083	-89,878	-93,037
O	LIVESTOCK, BAILEY	BRAZOS	-1,049	-1,797	-1,879	-2,045	-2,089	-2,451
O	MANUFACTURING, BAILEY	BRAZOS	-183	-206	-225	-250	-274	-324
O	MULESHOE	BRAZOS	-49	-334	-347	-373	-556	-587
	Sum of Projected Water Supply Needs (acre-feet)		**-83,623**	**-87,650**	**-89,666**	**-92,877**	**-92,928**	**-96,545**

CASTRO COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, CASTRO	BRAZOS	4	5	7	7	9	13
O	COUNTY-OTHER, CASTRO	RED	5	5	7	6	8	11
O	DIMMITT	BRAZOS	-43	-54	-198	-248	-292	-329
O	HART	BRAZOS	11	2	-3	-12	-19	-25
O	IRRIGATION, CASTRO	BRAZOS	-161,561	-151,969	-173,104	-179,331	-177,409	-181,989
O	IRRIGATION, CASTRO	RED	-101,363	-97,001	-102,188	-99,597	-97,881	-104,521
O	LIVESTOCK, CASTRO	BRAZOS	-2,897	-3,829	-4,855	-5,209	-5,321	-5,606
O	LIVESTOCK, CASTRO	RED	705	374	330	283	235	184
O	MANUFACTURING, CASTRO	BRAZOS	67	15	-35	-78	-147	-221
O	MANUFACTURING, CASTRO	RED	-85	-54	-29	-31	-33	-39
	Sum of Projected Water Supply Needs (acre-feet)		**-265,949**	**-252,907**	**-280,412**	**-284,506**	**-281,102**	**-292,730**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

COCHRAN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, COCHRAN	BRAZOS	-16	-15	-17	-18	-19	-21
O	COUNTY-OTHER, COCHRAN	COLORADO	1	1	1	2	-1	-2
O	IRRIGATION, COCHRAN	BRAZOS	-62,403	-60,920	-60,109	-58,226	-56,083	-55,257
O	IRRIGATION, COCHRAN	COLORADO	-4,460	-4,669	-4,613	-5,658	-6,968	-7,264
O	LIVESTOCK, COCHRAN	BRAZOS	-221	-229	-275	-59	-83	-230
O	LIVESTOCK, COCHRAN	COLORADO	-166	-174	-183	-192	-202	-212
O	MINING, COCHRAN	BRAZOS	-6	-9	-9	-6	-5	-4
O	MINING, COCHRAN	COLORADO	4	2	0	5	1	3
O	MORTON	BRAZOS	-123	-124	-117	-106	-116	-119
		Sum of Projected Water Supply Needs (acre-feet)	**-67,395**	**-66,140**	**-65,323**	**-64,265**	**-63,477**	**-63,109**

CROSBY COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, CROSBY	BRAZOS	82	78	70	68	60	55
O	COUNTY-OTHER, CROSBY	RED	1	1	1	1	1	1
O	CROSBYTON	BRAZOS	50	50	50	50	50	50
O	IRRIGATION, CROSBY	BRAZOS	-4,009	-3,969	-3,611	-3,931	-3,919	-3,866
O	IRRIGATION, CROSBY	RED	-3,073	-2,876	-2,689	-2,511	-2,345	-2,198
O	LIVESTOCK, CROSBY	BRAZOS	-106	-112	-118	-125	-131	-138
O	LIVESTOCK, CROSBY	RED	-1	-1	-1	-1	-1	-1
O	LORENZO	BRAZOS	39	24	12	-5	-25	-40
O	MANUFACTURING, CROSBY	BRAZOS	3	3	3	3	3	3
O	MINING, CROSBY	BRAZOS	4	3	1	3	2	2
O	MINING, CROSBY	RED	-348	-352	-317	-280	-243	-210
O	RALLS	BRAZOS	25	25	25	25	25	25
		Sum of Projected Water Supply Needs (acre-feet)	**-7,537**	**-7,310**	**-6,736**	**-6,853**	**-6,664**	**-6,453**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

DEAF SMITH COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, DEAF SMITH	CANADIAN	15	15	15	14	14	14
O	COUNTY-OTHER, DEAF SMITH	RED	47	30	38	26	3	23
O	HEREFORD	RED	47	-33	64	87	19	-151
O	IRRIGATION, DEAF SMITH	CANADIAN	-917	-856	-796	-739	-683	-633
O	IRRIGATION, DEAF SMITH	RED	-83,217	-90,424	-98,488	-108,500	-115,901	-127,805
O	LIVESTOCK, DEAF SMITH	CANADIAN	-76	-93	-98	-103	-109	-115
O	LIVESTOCK, DEAF SMITH	RED	-4,399	-3,973	-1,444	-2,698	-4,181	-683
O	MANUFACTURING, DEAF SMITH	RED	-2,234	-2,600	-2,061	-2,057	-3,295	-2,638
	Sum of Projected Water Supply Needs (acre-feet)		**-90,843**	**-97,979**	**-102,887**	**-114,097**	**-124,169**	**-132,025**

FLOYD COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, FLOYD	BRAZOS	49	46	39	27	14	8
O	COUNTY-OTHER, FLOYD	RED	43	42	38	31	25	21
O	FLOYDADA	BRAZOS	173	153	131	81	29	7
O	IRRIGATION, FLOYD	BRAZOS	1,268	1,386	1,420	1,373	1,248	910
O	IRRIGATION, FLOYD	RED	-26,565	-25,099	-27,346	-27,971	-27,922	-29,390
O	LIVESTOCK, FLOYD	BRAZOS	35	7	27	47	14	29
O	LIVESTOCK, FLOYD	RED	25	16	7	-3	-13	-23
O	LOCKNEY	BRAZOS	-35	-41	-43	-53	-61	-67
O	MINING, FLOYD	BRAZOS	0	0	0	0	0	0
O	MINING, FLOYD	RED	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-26,600**	**-25,140**	**-27,389**	**-28,027**	**-27,996**	**-29,480**

HALE COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	ABERNATHY	BRAZOS	-76	-48	-51	-44	-51	-49
O	COUNTY-OTHER, HALE	BRAZOS	19	23	38	65	39	27
O	HALE CENTER	BRAZOS	2	1	4	11	4	1
O	IRRIGATION, HALE	BRAZOS	-236,525	-228,045	-220,587	-214,196	-211,256	-203,418

Projected Water Supply Needs

TWDB 2017 State Water Plan Data

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

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	IRRIGATION, HALE	RED	-1,966	-1,880	-1,805	-1,741	-1,710	-1,630
O	LIVESTOCK, HALE	BRAZOS	-924	-1,148	-328	-1,304	-1,454	-1,784
O	LIVESTOCK, HALE	RED	-14	-20	-20	-21	-21	-21
O	MANUFACTURING, HALE	BRAZOS	-1,227	-341	48	56	78	90
O	MINING, HALE	BRAZOS	-1,154	-1,139	-1,022	-886	-766	-662
O	PETERSBURG	BRAZOS	-4	-10	-5	0	2	-2
O	PLAINVIEW	BRAZOS	1,302	756	683	641	394	205
O	STEAM ELECTRIC POWER, HALE	BRAZOS	-34	-24	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-241,924**	**-232,655**	**-223,818**	**-218,192**	**-215,258**	**-207,566**

HOCKLEY COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	ANTON	BRAZOS	92	89	88	88	81	77
O	COUNTY-OTHER, HOCKLEY	BRAZOS	125	102	93	101	63	37
O	COUNTY-OTHER, HOCKLEY	COLORADO	1	8	8	7	2	2
O	IRRIGATION, HOCKLEY	BRAZOS	-45,997	-52,877	-58,977	-56,085	-55,322	-53,726
O	IRRIGATION, HOCKLEY	COLORADO	-1,645	-1,220	-1,307	-1,106	-1,092	-1,401
O	LEVELLAND	BRAZOS	264	-407	-558	-691	-873	-1,029
O	LIVESTOCK, HOCKLEY	BRAZOS	265	284	305	326	349	366
O	LIVESTOCK, HOCKLEY	COLORADO	-35	-37	-39	-41	-43	-45
O	MANUFACTURING, HOCKLEY	BRAZOS	0	0	0	0	0	-3
O	MINING, HOCKLEY	BRAZOS	1,494	965	363	4	-14	-13
O	MINING, HOCKLEY	COLORADO	195	121	120	4	-2	-2
O	SUNDOWN	COLORADO	-18	-36	-48	-50	-69	-82
	Sum of Projected Water Supply Needs (acre-feet)		**-47,695**	**-54,577**	**-60,929**	**-57,973**	**-57,415**	**-56,301**

LAMB COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	AMHERST	BRAZOS	0	-5	-8	-11	-17	-22
O	COUNTY-OTHER, LAMB	BRAZOS	15	4	5	10	3	4
O	EARTH	BRAZOS	8	10	13	16	14	13
O	IRRIGATION, LAMB	BRAZOS	-199,252	-204,875	-216,428	-227,103	-230,194	-239,866

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

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	LITTLEFIELD	BRAZOS	73	59	53	43	52	17
O	LIVESTOCK, LAMB	BRAZOS	-889	-680	-1,070	-1,567	-1,972	-2,639
O	MANUFACTURING, LAMB	BRAZOS	-280	-213	-105	-108	-115	-146
O	MINING, LAMB	BRAZOS	-570	-567	-507	-445	-385	-333
O	OLTON	BRAZOS	31	37	47	60	59	62
O	STEAM ELECTRIC POWER, LAMB	BRAZOS	-6,227	-4,267	0	0	0	-2,984
O	SUDAN	BRAZOS	50	35	26	21	8	-2
	Sum of Projected Water Supply Needs (acre-feet)		**-207,218**	**-210,607**	**-218,118**	**-229,234**	**-232,683**	**-245,992**

LUBBOCK COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	ABERNATHY	BRAZOS	-26	-18	-21	-19	-24	-25
O	COUNTY-OTHER, LUBBOCK	BRAZOS	9	46	4	37	52	59
O	IDALOU	BRAZOS	-19	-26	-36	-52	-69	-86
O	IRRIGATION, LUBBOCK	BRAZOS	-55,020	-57,036	-69,663	-64,611	-61,390	-73,945
O	LIVESTOCK, LUBBOCK	BRAZOS	20	13	32	49	15	29
O	LUBBOCK	BRAZOS	-10,352	-18,100	-22,615	-29,226	-36,019	-43,148
O	MANUFACTURING, LUBBOCK	BRAZOS	-232	-63	-68	-72	-78	-143
O	MINING, LUBBOCK	BRAZOS	-6,261	-6,366	-5,888	-5,302	-4,763	-4,314
O	NEW DEAL	BRAZOS	79	72	65	55	45	35
O	RANSOM CANYON	BRAZOS	232	213	192	168	145	121
O	SHALLOWATER	BRAZOS	-35	-77	-120	-171	-223	-275
O	SLATON	BRAZOS	-118	-390	-463	-555	-623	-691
O	STEAM ELECTRIC POWER, LUBBOCK	BRAZOS	11,142	10,374	9,438	8,297	3,546	-945
O	WOLFFORTH	BRAZOS	-15	-162	-312	-473	-635	-797
	Sum of Projected Water Supply Needs (acre-feet)		**-72,078**	**-82,238**	**-99,186**	**-100,481**	**-103,824**	**-124,369**

LYNN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, LYNN	BRAZOS	0	-12	-14	-22	-54	-69

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, LYNN	COLORADO	5	5	5	5	5	5
O	IRRIGATION, LYNN	BRAZOS	21	49	56	41	22	68
O	IRRIGATION, LYNN	COLORADO	5	4	0	0	5	4
O	LIVESTOCK, LYNN	BRAZOS	19	14	11	6	1	-3
O	LIVESTOCK, LYNN	COLORADO	-1	-1	-2	-2	-2	-3
O	MINING, LYNN	BRAZOS	-634	-784	-717	-511	-318	-164
O	MINING, LYNN	COLORADO	-49	-60	-55	-39	-25	-13
O	O'DONNELL	BRAZOS	59	-40	-47	-52	-62	-68
O	TAHOKA	BRAZOS	5	-57	-77	-100	-138	-166
		Sum of Projected Water Supply Needs (acre-feet)	**-684**	**-954**	**-912**	**-726**	**-599**	**-486**

PARMER COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	BOVINA	BRAZOS	3	-2	-29	-58	-96	-131
O	COUNTY-OTHER, PARMER	BRAZOS	6	1	8	1	-37	-74
O	COUNTY-OTHER, PARMER	RED	-12	-11	-14	-14	-15	-18
O	FARWELL	BRAZOS	-16	-50	-61	-94	-135	-173
O	FRIONA	RED	-29	-44	-43	-18	-48	-127
O	IRRIGATION, PARMER	BRAZOS	-222,943	-233,884	-247,501	-246,354	-241,077	-246,788
O	IRRIGATION, PARMER	RED	-49,777	-49,880	-49,747	-50,055	-51,859	-51,497
O	LIVESTOCK, PARMER	BRAZOS	-582	-1,601	-1,729	-1,862	-2,002	-2,149
O	LIVESTOCK, PARMER	RED	73	18	37	3	18	31
O	MANUFACTURING, PARMER	RED	-673	-805	-932	-1,043	-1,222	-1,413
		Sum of Projected Water Supply Needs (acre-feet)	**-274,032**	**-286,277**	**-300,056**	**-299,498**	**-296,491**	**-302,370**

POTTER COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	AMARILLO	CANADIAN	-1,501	-4,129	-7,241	-10,389	-13,215	-16,315
A	AMARILLO	RED	-987	-2,719	-4,767	-6,840	-8,703	-10,742
A	COUNTY-OTHER, POTTER	CANADIAN	-271	-446	-642	-847	-1,084	-1,336
A	COUNTY-OTHER, POTTER	RED	-412	-510	-620	-736	-869	-1,212
A	IRRIGATION, POTTER	CANADIAN	181	37	0	0	0	7

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	IRRIGATION, POTTER	RED	0	0	1	121	323	519
A	LIVESTOCK, POTTER	CANADIAN	164	163	161	160	158	155
A	LIVESTOCK, POTTER	RED	30	30	30	29	29	29
A	MANUFACTURING, POTTER	CANADIAN	-314	-542	-786	-1,007	-1,220	-1,445
A	MANUFACTURING, POTTER	RED	-1,785	-3,069	-4,453	-5,707	-6,910	-8,188
A	MINING, POTTER	CANADIAN	0	0	0	0	0	0
A	MINING, POTTER	RED	0	0	0	0	0	0
A	STEAM ELECTRIC POWER, POTTER	CANADIAN	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-5,270**	**-11,415**	**-18,509**	**-25,526**	**-32,001**	**-39,238**

RANDALL COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	AMARILLO	RED	-2,020	-5,593	-9,807	-14,105	-17,944	-22,125
A	CANYON	RED	-1,009	-1,589	-2,176	-2,770	-3,779	-4,313
A	COUNTY-OTHER, RANDALL	RED	-637	-978	-1,339	-1,731	-2,172	-2,638
A	HAPPY	RED	4	5	5	5	3	1
A	IRRIGATION, RANDALL	RED	762	814	868	927	994	1,063
A	LAKE TANGLEWOOD	RED	-172	-200	-225	-248	-266	-284
A	LIVESTOCK, RANDALL	RED	0	0	0	0	0	0
A	MANUFACTURING, RANDALL	RED	-41	-169	-295	-401	-508	-619
	Sum of Projected Water Supply Needs (acre-feet)		**-3,879**	**-8,529**	**-13,842**	**-19,255**	**-24,669**	**-29,979**

SWISHER COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	COUNTY-OTHER, SWISHER	BRAZOS	1	1	1	2	0	0
O	COUNTY-OTHER, SWISHER	RED	5	3	6	6	4	4
O	HAPPY	RED	40	42	40	34	20	7
O	IRRIGATION, SWISHER	BRAZOS	-12,193	-34,404	-35,573	-35,925	-35,712	-35,727
O	IRRIGATION, SWISHER	RED	-85,240	-95,261	-103,893	-108,230	-111,183	-117,820
O	KRESS	BRAZOS	84	64	51	39	26	9
O	KRESS	RED	21	22	21	20	15	13
O	LIVESTOCK, SWISHER	BRAZOS	2	1	0	3	1	4

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
O	LIVESTOCK, SWISHER	RED	6	3	0	2	2	1
O	TULIA	RED	-172	-191	-184	-170	-213	-235
		Sum of Projected Water Supply Needs (acre-feet)	**-97,605**	**-129,856**	**-139,650**	**-144,325**	**-147,108**	**-153,782**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

ARMSTRONG COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
CLAUDE, RED (A)							
DEVELOP OGALLALA AQUIFER SUPPLIES - CLAUDE	OGALLALA AQUIFER [ARMSTRONG]	0	0	400	400	400	400
MUNICIPAL CONSERVATION - CLAUDE	DEMAND REDUCTION [ARMSTRONG]	11	11	10	10	10	10
WATER AUDITS AND LEAK REPAIR - CLAUDE	DEMAND REDUCTION [ARMSTRONG]	18	18	18	18	18	18
		29	**29**	**428**	**428**	**428**	**428**
IRRIGATION, ARMSTRONG, RED (A)							
IRRIGATION CONSERVATION - ARMSTRONG COUNTY	DEMAND REDUCTION [ARMSTRONG]	206	425	721	800	869	900
WEATHER MODIFICATION (PRECIPITATION ENHANCEMENT)	WEATHER MODIFICATION [ATMOSPHERE]	402	402	402	402	402	402
		608	**827**	**1,123**	**1,202**	**1,271**	**1,302**
Sum of Projected Water Management Strategies (acre-feet)		**637**	**856**	**1,551**	**1,630**	**1,699**	**1,730**

BAILEY COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, BAILEY, BRAZOS (O)							
BAILEY COUNTY-OTHER LOCAL GROUNDWATER DEVELOPMENT	EDWARDS-TRINITY-HIGH PLAINS AQUIFER [BAILEY]	0	0	150	150	150	150
		0	**0**	**150**	**150**	**150**	**150**
IRRIGATION, BAILEY, BRAZOS (O)							
BAILEY COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [BAILEY]	1,846	1,846	2,652	2,652	2,752	2,752
		1,846	**1,846**	**2,652**	**2,652**	**2,752**	**2,752**
MULESHOE, BRAZOS (O)							
BAILEY COUNTY - MULESHOE LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [BAILEY]	0	300	300	300	500	500
BAILEY COUNTY - MULESHOE MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [BAILEY]	59	64	70	76	83	89
		59	**364**	**370**	**376**	**583**	**589**
Sum of Projected Water Management Strategies (acre-feet)		**1,905**	**2,210**	**3,172**	**3,178**	**3,485**	**3,491**

CASTRO COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
DIMMITT, BRAZOS (O)							
CASTRO COUNTY - DIMMITT LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [CASTRO]	0	0	300	300	300	300
CASTRO COUNTY - DIMMITT MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [CASTRO]	55	58	60	63	65	67
		55	**58**	**360**	**363**	**365**	**367**
HART, BRAZOS (O)							
CASTRO COUNTY - HART LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [CASTRO]	0	0	100	100	100	100
		0	**0**	**100**	**100**	**100**	**100**
IRRIGATION, CASTRO, BRAZOS (O)							
CASTRO COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [CASTRO]	4,064	4,064	5,427	5,428	5,511	5,511
		4,064	**4,064**	**5,427**	**5,428**	**5,511**	**5,511**
IRRIGATION, CASTRO, RED (O)							
CASTRO COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [CASTRO]	2,189	2,189	2,923	2,922	2,967	2,967
		2,189	**2,189**	**2,923**	**2,922**	**2,967**	**2,967**
Sum of Projected Water Management Strategies (acre-feet)		**6,308**	**6,311**	**8,810**	**8,813**	**8,943**	**8,945**

COCHRAN COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, COCHRAN, BRAZOS (O)							
COCHRAN COUNTY-OTHER MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [COCHRAN]	19	21	22	22	22	22
		19	**21**	**22**	**22**	**22**	**22**
COUNTY-OTHER, COCHRAN, COLORADO (O)							
COCHRAN COUNTY-OTHER MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [COCHRAN]	6	6	6	6	7	7
		6	**6**	**6**	**6**	**7**	**7**
IRRIGATION, COCHRAN, BRAZOS (O)							
COCHRAN COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [COCHRAN]	1,202	1,202	2,024	2,024	2,477	2,477
		1,202	**1,202**	**2,024**	**2,024**	**2,477**	**2,477**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION, COCHRAN, COLORADO (O)							
COCHRAN COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [COCHRAN]	566	566	953	953	1,165	1,165
		566	**566**	**953**	**953**	**1,165**	**1,165**
MORTON, BRAZOS (O)							
COCHRAN COUNTY - MORTON MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [COCHRAN]	24	24	23	23	23	23
COCHRAN COUNTY - MORTON WATER LOSS REDUCTION	DEMAND REDUCTION [COCHRAN]	141	141	232	226	231	233
		165	**165**	**255**	**249**	**254**	**256**
Sum of Projected Water Management Strategies (acre-feet)		**1,958**	**1,960**	**3,260**	**3,254**	**3,925**	**3,927**

CROSBY COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION, CROSBY, BRAZOS (O)							
CROSBY COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [CROSBY]	5,295	5,295	9,775	9,775	13,438	13,438
		5,295	**5,295**	**9,775**	**9,775**	**13,438**	**13,438**
IRRIGATION, CROSBY, RED (O)							
CROSBY COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [CROSBY]	219	219	405	405	557	557
		219	**219**	**405**	**405**	**557**	**557**
LORENZO, BRAZOS (O)							
CROSBY COUNTY - LORENZO MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [CROSBY]	12	12	13	14	15	15
CROSBY COUNTY - LORENZO WATER LOSS REDUCTION	DEMAND REDUCTION [CROSBY]	29	31	54	57	61	64
		41	**43**	**67**	**71**	**76**	**79**
Sum of Projected Water Management Strategies (acre-feet)		**5,555**	**5,557**	**10,247**	**10,251**	**14,071**	**14,074**

DEAF SMITH COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
HEREFORD, RED (O)							
DEAF SMITH COUNTY - HEREFORD MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [DEAF SMITH]	198	223	251	286	315	346
		198	**223**	**251**	**286**	**315**	**346**
IRRIGATION, DEAF SMITH, CANADIAN (O)							
DEAF SMITH COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [DEAF SMITH]	55	55	82	82	80	80
		55	**55**	**82**	**82**	**80**	**80**
IRRIGATION, DEAF SMITH, RED (O)							
DEAF SMITH COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [DEAF SMITH]	5,409	5,409	8,125	8,125	7,939	7,939
		5,409	**5,409**	**8,125**	**8,125**	**7,939**	**7,939**
Sum of Projected Water Management Strategies (acre-feet)		**5,662**	**5,687**	**8,458**	**8,493**	**8,334**	**8,365**

FLOYD COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
FLOYDADA, BRAZOS (O)							
FLOYD COUNTY - FLOYDADA MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [FLOYD]	29	30	30	31	32	33
		29	**30**	**30**	**31**	**32**	**33**
IRRIGATION, FLOYD, BRAZOS (O)							
FLOYD COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [FLOYD]	2,204	2,204	3,970	3,970	5,340	5,340
		2,204	**2,204**	**3,970**	**3,970**	**5,340**	**5,340**
IRRIGATION, FLOYD, RED (O)							
FLOYD COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [FLOYD]	3,917	3,917	7,057	7,057	9,493	9,493
		3,917	**3,917**	**7,057**	**7,057**	**9,493**	**9,493**
LOCKNEY, BRAZOS (O)							
FLOYD COUNTY - LOCKNEY LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [FLOYD]	240	240	240	240	240	240
		240	**240**	**240**	**240**	**240**	**240**
Sum of Projected Water Management Strategies (acre-feet)		**6,390**	**6,391**	**11,297**	**11,298**	**15,105**	**15,106**

HALE COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
ABERNATHY, BRAZOS (O)							
HALE COUNTY - ABERNATHY GROUNDWATER DESALINATION	DOCKUM AQUIFER [HALE]	111	109	107	104	102	100
HALE COUNTY - ABERNATHY MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [HALE]	26	27	27	26	27	27
		137	**136**	**134**	**130**	**129**	**127**
IRRIGATION, HALE, BRAZOS (O)							
HALE COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [HALE]	6,500	6,500	12,209	12,209	16,368	16,368
		6,500	**6,500**	**12,209**	**12,209**	**16,368**	**16,368**
IRRIGATION, HALE, RED (O)							
HALE COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [HALE]	66	66	123	123	165	165
		66	**66**	**123**	**123**	**165**	**165**
PETERSBURG, BRAZOS (O)							
HALE COUNTY - PETERSBURG MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [HALE]	16	17	17	16	17	17
		16	**17**	**17**	**16**	**17**	**17**
PLAINVIEW, BRAZOS (O)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	275	276	285	288	288	288
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	1,323	1,367	1,383	1,382	1,381
HALE COUNTY - PLAINVIEW MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [HALE]	218	222	221	217	223	225
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	248	370	548	662	806
		493	**2,069**	**2,243**	**2,436**	**2,555**	**2,700**
Sum of Projected Water Management Strategies (acre-feet)		**7,212**	**8,788**	**14,726**	**14,914**	**19,234**	**19,377**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

HOCKLEY COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
ANTON, BRAZOS (O)							
HOCKLEY COUNTY - ANTON MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [HOCKLEY]	8	8	8	8	9	9
		8	**8**	**8**	**8**	**9**	**9**
COUNTY-OTHER, HOCKLEY, BRAZOS (O)							
HOCKLEY COUNTY-OTHER LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [HOCKLEY]	150	150	150	150	150	150
		150	**150**	**150**	**150**	**150**	**150**
IRRIGATION, HOCKLEY, BRAZOS (O)							
HOCKLEY COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [HOCKLEY]	3,886	3,886	5,660	5,660	7,735	7,735
		3,886	**3,886**	**5,660**	**5,660**	**7,735**	**7,735**
IRRIGATION, HOCKLEY, COLORADO (O)							
HOCKLEY COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [HOCKLEY]	292	292	426	426	582	582
		292	**292**	**426**	**426**	**582**	**582**
LEVELLAND, BRAZOS (O)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	229	220	219	213	220	225
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	1,059	1,051	1,023	1,055	1,082
HOCKLEY COUNTY - LEVELLAND MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [HOCKLEY]	116	53	0	0	0	0
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	199	285	405	505	631
		345	**1,531**	**1,555**	**1,641**	**1,780**	**1,938**
SUNDOWN, COLORADO (O)							
HOCKLEY COUNTY - SUNDOWN LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [HOCKLEY]	0	0	0	0	0	100
HOCKLEY COUNTY - SUNDOWN MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [HOCKLEY]	21	22	22	22	23	24
HOCKLEY COUNTY - SUNDOWN WATER LOSS REDUCTION	DEMAND REDUCTION [HOCKLEY]	27	28	48	48	50	52
		48	**50**	**70**	**70**	**73**	**176**
Sum of Projected Water Management Strategies (acre-feet)		**4,729**	**5,917**	**7,869**	**7,955**	**10,329**	**10,590**

LAMB COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
AMHERST, BRAZOS (O)							
LAMB COUNTY - AMHERST LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [LAMB]	50	50	50	50	50	50
LAMB COUNTY - AMHERST MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LAMB]	5	5	5	6	6	6
		55	**55**	**55**	**56**	**56**	**56**
EARTH, BRAZOS (O)							
LAMB COUNTY - EARTH MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LAMB]	10	10	9	9	8	8
		10	**10**	**9**	**9**	**8**	**8**
IRRIGATION, LAMB, BRAZOS (O)							
LAMB COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [LAMB]	6,305	6,305	8,430	8,430	7,167	7,167
		6,305	**6,305**	**8,430**	**8,430**	**7,167**	**7,167**
LITTLEFIELD, BRAZOS (O)							
LAMB COUNTY - LITTLEFIELD MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LAMB]	48	46	44	42	41	40
		48	**46**	**44**	**42**	**41**	**40**
OLTON, BRAZOS (O)							
LAMB COUNTY - OLTON MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LAMB]	23	23	23	22	22	22
		23	**23**	**23**	**22**	**22**	**22**
SUDAN, BRAZOS (O)							
LAMB COUNTY - SUDAN MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LAMB]	12	13	14	14	15	15
		12	**13**	**14**	**14**	**15**	**15**
Sum of Projected Water Management Strategies (acre-feet)		**6,453**	**6,452**	**8,575**	**8,573**	**7,309**	**7,308**

LUBBOCK COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
ABERNATHY, BRAZOS (O)							
HALE COUNTY - ABERNATHY GROUNDWATER DESALINATION	DOCKUM AQUIFER [HALE]	39	41	43	46	48	50

Projected Water Management Strategies

TWDB 2017 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
HALE COUNTY - ABERNATHY MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LUBBOCK]	9	10	11	12	13	14
		48	**51**	**54**	**58**	**61**	**64**
IDALOU, BRAZOS (O)							
LUBBOCK COUNTY - IDALOU LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [LUBBOCK]	0	100	100	100	100	100
LUBBOCK COUNTY - IDALOU MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LUBBOCK]	21	21	22	23	23	24
		21	**121**	**122**	**123**	**123**	**124**
IRRIGATION, LUBBOCK, BRAZOS (O)							
LUBBOCK COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [LUBBOCK]	5,711	5,711	8,111	8,111	10,940	10,940
		5,711	**5,711**	**8,111**	**8,111**	**10,940**	**10,940**
LUBBOCK, BRAZOS (O)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	3,544	3,584	3,811	3,870	3,867	3,864
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	17,204	18,294	18,574	18,560	18,548
LUBBOCK COUNTY - LUBBOCK BAILEY COUNTY WELL FIELD CAPACITY MAINTENANCE	OGALLALA AQUIFER [LAMB]	997	1,443	2,822	3,120	3,120	3,120
LUBBOCK COUNTY - LUBBOCK BRACKISH WELL FIELD AT THE SOUTH WATER TREATMENT PLANT	DOCKUM AQUIFER [LUBBOCK]	1,120	1,120	1,120	1,120	1,120	1,120
LUBBOCK COUNTY - LUBBOCK CRMWA AQUIFER STORAGE AND RECOVERY	OGALLALA AQUIFER ASR [LUBBOCK]	0	6,090	6,090	6,090	6,090	6,090
LUBBOCK COUNTY - LUBBOCK JIM BERTRAM LAKE 7	LAKE 7 (JIM BERTRAM LAKE/RESERVOIR SYSTEM) [RESERVOIR]	13,800	13,800	13,800	13,800	13,800	13,800
LUBBOCK COUNTY - LUBBOCK LAKE ALAN HENRY PHASE 2	ALAN HENRY LAKE/RESERVOIR [RESERVOIR]	8,000	8,000	8,000	8,000	8,000	8,000
LUBBOCK COUNTY - LUBBOCK MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LUBBOCK]	2,287	2,478	2,674	2,915	3,139	3,382
LUBBOCK COUNTY - LUBBOCK NORTH FORK SCALPING OPERATION	ALAN HENRY LAKE/RESERVOIR [RESERVOIR]	10,390	9,790	9,220	8,660	8,110	7,890
LUBBOCK COUNTY - LUBBOCK SOUTH LUBBOCK WELL FIELD	OGALLALA AQUIFER [LUBBOCK]	0	2,613	2,613	2,613	2,613	2,613
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	3,226	4,955	7,352	8,894	10,819
		40,138	**69,348**	**73,399**	**76,114**	**77,313**	**79,246**

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
RANSOM CANYON, BRAZOS (O)							
LUBBOCK COUNTY - RANSOM CANYON MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LUBBOCK]	17	18	19	20	21	22
		17	**18**	**19**	**20**	**21**	**22**
SHALLOWATER, BRAZOS (O)							
LUBBOCK COUNTY - SHALLOWATER LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [LUBBOCK]	0	400	400	400	400	400
LUBBOCK COUNTY - SHALLOWATER WATER LOSS REDUCTION	DEMAND REDUCTION [LUBBOCK]	68	74	136	150	163	177
		68	**474**	**536**	**550**	**563**	**577**
SLATON, BRAZOS (O)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	140	131	127	122	121	121
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	631	612	585	583	583
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	118	166	231	279	340
		140	**880**	**905**	**938**	**983**	**1,044**
WOLFFORTH, BRAZOS (O)							
LUBBOCK COUNTY - WOLFFORTH LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [LUBBOCK]	0	726	726	726	726	726
LUBBOCK COUNTY - WOLFFORTH MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LUBBOCK]	38	37	29	26	29	32
LUBBOCK COUNTY - WOLFFORTH POTABLE REUSE	DIRECT REUSE [LUBBOCK]	0	560	560	560	560	560
		38	**1,323**	**1,315**	**1,312**	**1,315**	**1,318**
Sum of Projected Water Management Strategies (acre-feet)		**46,181**	**77,926**	**84,461**	**87,226**	**91,319**	**93,335**

LYNN COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, LYNN, BRAZOS (O)							
LYNN COUNTY-OTHER LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [LYNN]	100	100	100	100	100	100
		100	**100**	**100**	**100**	**100**	**100**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION, LYNN, BRAZOS (O)							
LYNN COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [LYNN]	3,934	3,934	7,047	7,047	9,461	9,461
		3,934	**3,934**	**7,047**	**7,047**	**9,461**	**9,461**
IRRIGATION, LYNN, COLORADO (O)							
LYNN COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [LYNN]	296	296	530	530	712	712
		296	**296**	**530**	**530**	**712**	**712**
O'DONNELL, BRAZOS (O)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	12	11	10	10	10	11
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	52	51	49	50	51
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	9	14	19	24	30
		12	**72**	**75**	**78**	**84**	**92**
TAHOKA, BRAZOS (O)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	46	44	42	41	42	42
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	210	203	196	200	204
LYNN COUNTY - TAHOKA MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [LYNN]	24	20	7	3	4	4
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	39	55	78	96	119
		70	**313**	**307**	**318**	**342**	**369**
Sum of Projected Water Management Strategies (acre-feet)		**4,412**	**4,715**	**8,059**	**8,073**	**10,699**	**10,734**

PARMER COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
BOVINA, BRAZOS (O)							
PARMER COUNTY - BOVINA LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [PARMER]	0	0	120	120	120	120
PARMER COUNTY - BOVINA MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [PARMER]	19	20	21	23	25	27

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
		19	**20**	**141**	**143**	**145**	**147**
COUNTY-OTHER, PARMER, BRAZOS (O)							
PARMER COUNTY-OTHER LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [PARMER]	0	0	0	0	50	50
PARMER COUNTY-OTHER MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [PARMER]	19	21	22	24	26	27
		19	**21**	**22**	**24**	**76**	**77**
COUNTY-OTHER, PARMER, RED (O)							
PARMER COUNTY-OTHER MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [PARMER]	13	13	14	15	16	18
		13	**13**	**14**	**15**	**16**	**18**
FARWELL, BRAZOS (O)							
PARMER COUNTY - FARWELL LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [PARMER]	0	0	0	125	125	125
PARMER COUNTY - FARWELL MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [PARMER]	20	21	23	25	27	29
PARMER COUNTY - FARWELL POTABLE REUSE	DIRECT REUSE [PARMER]	64	64	64	64	64	64
		84	**85**	**87**	**214**	**216**	**218**
FRIONA, RED (O)							
PARMER COUNTY - FRIONA LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [PARMER]	0	0	0	80	80	80
PARMER COUNTY - FRIONA MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [PARMER]	41	45	48	51	55	59
		41	**45**	**48**	**131**	**135**	**139**
IRRIGATION, PARMER, BRAZOS (O)							
PARMER COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [PARMER]	2,283	2,283	2,047	2,047	2,770	2,770
		2,283	**2,283**	**2,047**	**2,047**	**2,770**	**2,770**
IRRIGATION, PARMER, RED (O)							
PARMER COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [PARMER]	571	571	512	512	693	693
		571	**571**	**512**	**512**	**693**	**693**
Sum of Projected Water Management Strategies (acre-feet)		**3,030**	**3,038**	**2,871**	**3,086**	**4,051**	**4,062**

POTTER COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
AMARILLO, CANADIAN (A)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	1,524	1,525	1,454	1,365	1,364	1,364
DEVELOP CARSON COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [CARSON]	0	0	3,718	1,700	1,700	1,700
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	510	300	200	500	567	0
DEVELOP ROBERTS COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [ROBERTS]	0	0	0	0	0	3,715
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	7,320	6,979	6,552	6,547	6,546
MUNICIPAL CONSERVATION - AMARILLO	DEMAND REDUCTION [POTTER]	577	642	704	768	840	916
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	1,372	1,890	2,593	3,137	3,818
		2,611	**11,159**	**14,945**	**13,478**	**14,155**	**18,059**
AMARILLO, RED (A)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	1,003	1,004	957	899	898	898
DEVELOP CARSON COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [CARSON]	0	0	2,448	1,000	1,325	1,000
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	900	575	387	750	233	0
DEVELOP ROBERTS COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [ROBERTS]	0	0	0	0	0	2,446
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	4,819	4,595	4,314	4,310	4,310
MUNICIPAL CONSERVATION - AMARILLO	DEMAND REDUCTION [POTTER]	380	423	464	506	553	603
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	903	944	1,708	2,065	2,514
		2,283	**7,724**	**9,795**	**9,177**	**9,384**	**11,771**
COUNTY-OTHER, POTTER, CANADIAN (A)							
DEVELOP DOCKUM AQUIFER SUPPLIES - POTTER COUNTY OTHER	DOCKUM AQUIFER [POTTER]	560	560	560	560	560	560

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
DEVELOP OGALLALA AQUIFER SUPPLIES (IRRIGATION CONSERVATION) - POTTER COUNTY OTHER	OGALLALA AQUIFER [POTTER]	0	0	0	0	0	44
DEVELOP OGALLALA AQUIFER SUPPLIES - POTTER COUNTY OTHER	OGALLALA AQUIFER [POTTER]	575	576	535	429	308	0
MUNICIPAL CONSERVATION - POTTER COUNTY OTHER	DEMAND REDUCTION [POTTER]	72	79	86	95	103	113
WATER AUDITS AND LEAK REPAIR - POTTER COUNTY OTHER	DEMAND REDUCTION [POTTER]	98	107	117	127	139	152
		1,305	**1,322**	**1,298**	**1,211**	**1,110**	**869**

COUNTY-OTHER, POTTER, RED (A)

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
DEVELOP DOCKUM AQUIFER SUPPLIES - POTTER COUNTY OTHER	DOCKUM AQUIFER [POTTER]	140	140	140	140	140	140
DEVELOP OGALLALA AQUIFER SUPPLIES - POTTER COUNTY OTHER	OGALLALA AQUIFER [POTTER]	325	324	365	471	592	856
MUNICIPAL CONSERVATION - POTTER COUNTY OTHER	DEMAND REDUCTION [POTTER]	40	44	49	53	58	63
WATER AUDITS AND LEAK REPAIR - POTTER COUNTY OTHER	DEMAND REDUCTION [POTTER]	56	61	66	72	79	85
		561	**569**	**620**	**736**	**869**	**1,144**

IRRIGATION, POTTER, CANADIAN (A)

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION CONSERVATION - POTTER COUNTY	DEMAND REDUCTION [POTTER]	47	102	231	276	337	311
WEATHER MODIFICATION (PRECIPITATION ENHANCEMENT)	WEATHER MODIFICATION [ATMOSPHERE]	106	106	106	106	106	106
		153	**208**	**337**	**382**	**443**	**417**

IRRIGATION, POTTER, RED (A)

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION CONSERVATION - POTTER COUNTY	DEMAND REDUCTION [POTTER]	48	107	88	83	76	130
WEATHER MODIFICATION (PRECIPITATION ENHANCEMENT)	WEATHER MODIFICATION [ATMOSPHERE]	110	110	110	110	110	110
		158	**217**	**198**	**193**	**186**	**240**

MANUFACTURING, POTTER, CANADIAN (A)

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
DEVELOP CARSON COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [CARSON]	0	0	0	579	635	479
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	396	562	526	500	600	1,000
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	0	300	0	0	0
		396	**562**	**826**	**1,079**	**1,235**	**1,479**

WUG, Basin (RWPG)							All values are in acre-feet
Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
MANUFACTURING, POTTER, RED (A)							
DEVELOP CARSON COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [CARSON]	0	0	0	5,112	4,540	5,798
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	2,246	3,187	2,982	1,001	2,461	2,583
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	0	1,700	0	0	0
		2,246	**3,187**	**4,682**	**6,113**	**7,001**	**8,381**
Sum of Projected Water Management Strategies (acre-feet)		**9,713**	**24,948**	**32,701**	**32,369**	**34,383**	**42,360**

RANDALL COUNTY

WUG, Basin (RWPG)							All values are in acre-feet
Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
AMARILLO, RED (A)							
CONJUNCTIVE USE - CRMWA	MEREDITH LAKE/RESERVOIR [RESERVOIR]	2,052	2,066	1,970	1,853	1,852	1,849
DEVELOP CARSON COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [CARSON]	0	0	5,034	2,809	3,000	2,224
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	1,800	600	500	1,250	200	0
DEVELOP ROBERTS COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [ROBERTS]	0	0	0	0	0	5,039
EXPAND CAPACITY CRMWA II	OGALLALA AQUIFER [ROBERTS]	0	9,917	9,453	8,894	8,888	8,875
MUNICIPAL CONSERVATION - AMARILLO	DEMAND REDUCTION [RANDALL]	777	870	954	1,042	1,141	1,243
REPLACE WELL CAPACITY FOR CRMWA I	OGALLALA AQUIFER [ROBERTS]	0	1,860	861	3,521	4,259	5,178
		4,629	**15,313**	**18,772**	**19,369**	**19,340**	**24,408**
CANYON, RED (A)							
DEVELOP DOCKUM/OGALLALA AQUIFER SUPPLIES - CANYON	DOCKUM AQUIFER [RANDALL]	932	943	953	963	972	981
DEVELOP DOCKUM/OGALLALA AQUIFER SUPPLIES - CANYON	OGALLALA AQUIFER [RANDALL]	468	1,157	1,847	1,837	2,828	3,319

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	94	239	384	507	0	0
MUNICIPAL CONSERVATION - CANYON	DEMAND REDUCTION [RANDALL]	127	142	156	171	187	203
		1,621	**2,481**	**3,340**	**3,478**	**3,987**	**4,503**
COUNTY-OTHER, RANDALL, RED (A)							
DEVELOP OGALLALA AQUIFER SUPPLIES - RANDALL COUNTY OTHER	OGALLALA AQUIFER [RANDALL]	500	1,000	1,200	2,600	2,600	2,800
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	2	6	10	13	15	17
MUNICIPAL CONSERVATION - RANDALL COUNTY OTHER	DEMAND REDUCTION [RANDALL]	143	158	173	189	207	225
		645	**1,164**	**1,383**	**2,802**	**2,822**	**3,042**
IRRIGATION, RANDALL, RED (A)							
IRRIGATION CONSERVATION - RANDALL COUNTY	DEMAND REDUCTION [RANDALL]	647	1,641	2,637	2,890	3,221	3,356
		647	**1,641**	**2,637**	**2,890**	**3,221**	**3,356**
LAKE TANGLEWOOD, RED (A)							
DEVELOP OGALLALA AQUIFER SUPPLIES - LAKE TANGLEWOOD	OGALLALA AQUIFER [RANDALL]	300	300	300	300	300	300
MUNICIPAL CONSERVATION - LAKE TANGLEWOOD	DEMAND REDUCTION [RANDALL]	9	8	8	8	8	8
WATER AUDITS AND LEAK REPAIR - LAKE TANGLEWOOD	DEMAND REDUCTION [RANDALL]	16	16	16	16	16	16
		325	**324**	**324**	**324**	**324**	**324**
MANUFACTURING, RANDALL, RED (A)							
DEVELOP OGALLALA AQUIFER SUPPLIES - RANDALL COUNTY MANUFACTURING	OGALLALA AQUIFER [RANDALL]	0	300	300	300	300	300
DEVELOP POTTER COUNTY WELL FIELD (OGALLALA AQUIFER) - AMARILLO	OGALLALA AQUIFER [POTTER]	52	131	211	279	324	367
		52	**431**	**511**	**579**	**624**	**667**
Sum of Projected Water Management Strategies (acre-feet)		**7,919**	**21,354**	**26,967**	**29,442**	**30,318**	**36,300**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

SWISHER COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
IRRIGATION, SWISHER, BRAZOS (O)							
SWISHER COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [SWISHER]	895	895	1,126	1,126	1,426	1,426
		895	**895**	**1,126**	**1,126**	**1,426**	**1,426**
IRRIGATION, SWISHER, RED (O)							
SWISHER COUNTY IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [SWISHER]	4,078	4,078	5,129	5,129	6,496	6,496
		4,078	**4,078**	**5,129**	**5,129**	**6,496**	**6,496**
TULIA, RED (O)							
SWISHER COUNTY - TULIA LOCAL GROUNDWATER DEVELOPMENT	OGALLALA AQUIFER [SWISHER]	200	200	200	200	200	200
SWISHER COUNTY - TULIA MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [SWISHER]	46	47	47	46	48	50
		246	**247**	**247**	**246**	**248**	**250**
Sum of Projected Water Management Strategies (acre-feet)		**5,219**	**5,220**	**6,502**	**6,501**	**8,170**	**8,172**