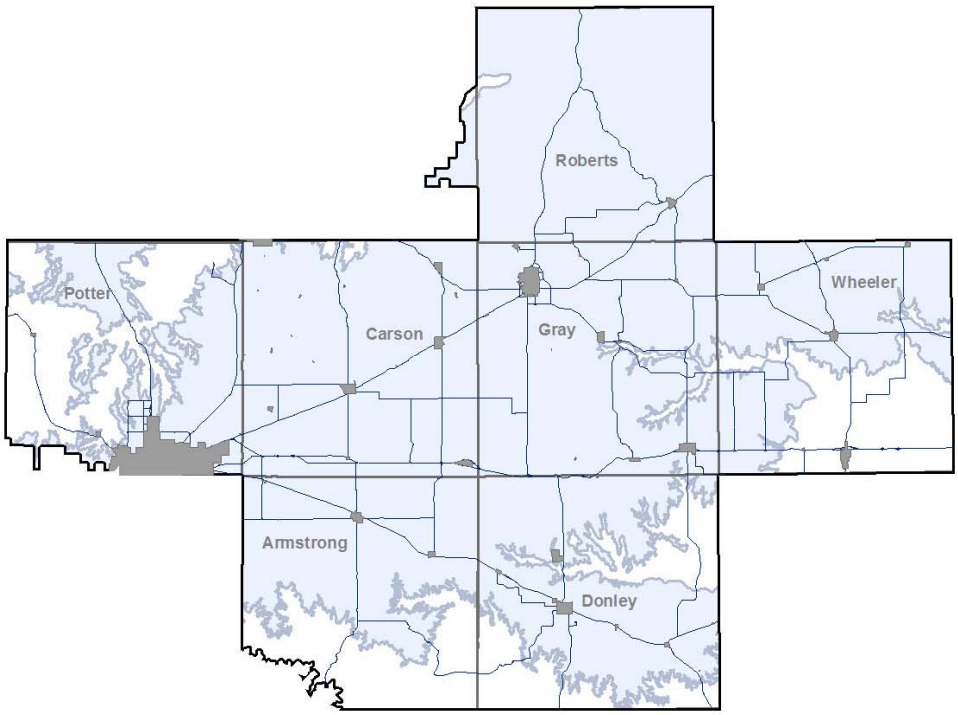
PANHANDLE GROUNDWATER

CONSERVATION DISTRICT

MANAGEMENT PLAN



Approved by the

Panhandle Groundwater Conservation District

Board of Directors

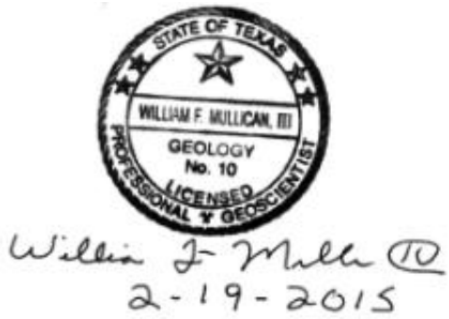
April 4, 2012

Amended March 13, 2015

The Panhandle Groundwater Conservation District Management Plan was adopted, after notice and hearing, on March 13, 2015.

Hydrologic data developed for this Management Plan were developed and reviewed by William F. Mullican III

Licensed Texas Professional Geoscientist No. 10



A review of the Management Plan by the Executive Administrator of the Texas Water Development Board has determined that the plan is administratively complete and in compliance with Texas Water Code §36.1071 and 31 Texas Administrative Code 356.

Approved May 1, 2015

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DISTRICT MISSION

The Panhandle Groundwater Conservation District (the District) will strive to develop, promote, and implement water conservation, preservation, recharging, augmentation through precipitation enhancement, prevention of waste, and management strategies to protect water resources for the benefit of the citizens, economy, and environment of the District.

The District seeks cooperation in the implementation of this plan and the management of groundwater supplies within the District. All activities of the District will be undertaken in cooperation and coordination with local owners and the appropriate state, regional or local water management entities.

The District will work to treat all citizens uniformly. The District will enforce the permit terms and conditions and the District rules by enjoining the permit holder in a court of competent jurisdiction, as provided for in TWC §36.102, if required, after exhausting all other remedies.

The District consists of all of Carson, Donley, Gray, Roberts and Wheeler counties, along with parts of Armstrong, Hutchinson, and Potter counties. The District was created by the Legislature in 1955, when it began operating in portions of Gray, Carson, Potter, and Armstrong counties. Elections were held in 1988, 1991, 1994, 1997 and 2000 to annex the remaining portions of the District within the present boundaries.

The District's areal extent is 6,309 square miles or approximately four million acres located in the Panhandle region of Texas, extending from west of Amarillo to the Oklahoma border. The Canadian River to the north and Salt Fork of the Red River to the south generally border it. The District's economy is dominated by agricultural production and petrochemical production. The agricultural income sources include beef cattle production, wheat, corn, milo, peanuts, soybeans,

sunflowers, hay crops and cotton. Petrochemical production also contributes significantly to the income of the District. There are also chemical, manufacturing, and nuclear weapons industries located in the District.

Within the District boundaries, there are over 4,400 irrigation wells capable of producing water to meet the needs of the agricultural community. The District has more than 470 municipal or public supply wells, and over 450 wells for industrial use and oil and gas secondary recovery (water flood) operations. The remaining wells are registered, non-permitted water supplies for household, livestock consumption, and oil and gas exploration.

Topography and Drainage

The area contains rolling plains that are used for cattle production, cultivation and oil and gas activities. There is a substantial area of flat plains that contain numerous playa basins. This area is used primarily for crop production. The altitude of the land surface ranges from 2,005 feet to 3,800 feet above mean sea level. The District lies within, and between, the drainage systems of both the Canadian River Basin and the Red River Basin.

GROUNDWATER MANAGEMENT IN TEXAS

The authority of groundwater conservation districts (GCDs) to conserve, preserve, and protect groundwater through necessary regulation dates back to the Underground Water Conservation Districts Act passed by the Texas Legislature in 1949 (Vernon's Civil Statutes, Article 7880-3c). Included in this landmark legislation, which for the most part, remains substantively unchanged today, GCDs receive the following legislative directive, *"Such Districts shall and are hereby authorized to exercise any one or more of the following:*

(8) develop comprehensive plans for the most efficient use of the underground water of the underground reservoir or subdivision thereof and for the control and prevention of waste of such underground water, which plans shall specify in such detail as may be practicable, the acts, procedure, performance and avoidance which are or may be necessary to effect such plans, including specifications therefore; to carry out research projects, develop information and determine limitations, if any, which should be made on the withdrawal of underground water from the underground reservoir or subdivision thereof; to collect and preserve information regarding the use of such underground water and the practicability of recharge of the underground water subdivision thereof; to publish such plans and information, bring them to the notice and attention of the users of such underground water within the District, and to encourage their adoption and execution;"

In 1997 the Texas Legislature approved one of the more significant amendments by expanding the groundwater planning process, requiring all GCDs to develop and adopt management plans. Once adopted, management plans are then to be reviewed by the Executive Administrator at the Texas Water Development Board (TWDB). This review and approval is designed to ensure that certain technical and administrative requirements are met.

Substantial changes in the planning and management of groundwater were put in place in 2005 with the passage of House Bill 1763, which requires GCDs in the same Groundwater Management Area (GMA) to conduct joint planning and establish Desired Future Conditions (DFCs) for all relevant aquifers in the GMA. The first round of joint planning concluded on September 1, 2010. Since the passage of House Bill 1763 in 2005, the District has been an active participant in the joint planning process for GMA #1. GMA #1 adopted DFCs for the Ogallala Aquifer on July 7, 2009, and DFCs for the Dockum and Blaine aquifers on June 3, 2010. No other aquifers were determined to be relevant during the first round of joint planning in the District. By law, GCDs are required to

meet at least annually to continue joint planning and to review and readopt (with amendments as necessary) DFCs at least every five years.

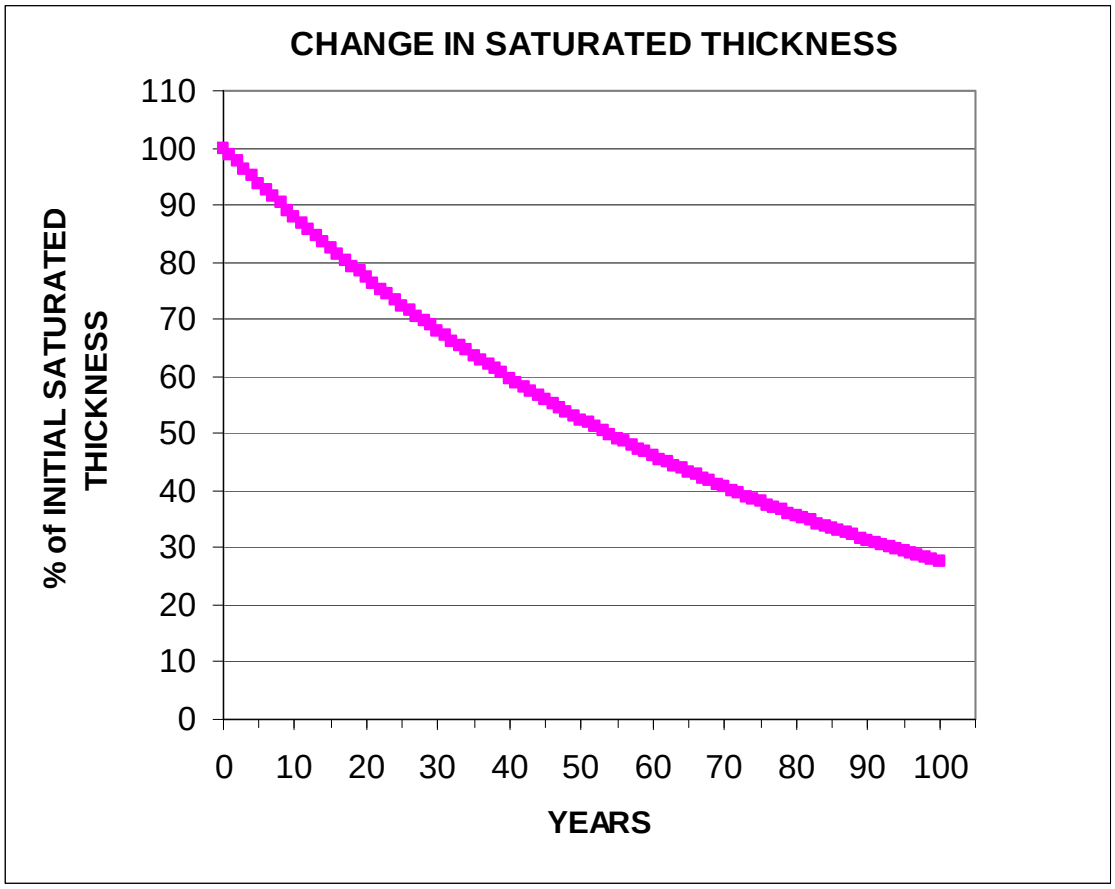
DESIRED FUTURE CONDITIONS AND THE PANHANDLE GROUNDWATER CONSERVATION DISTRICT

Long before the State of Texas first considered the concept of "Desired Future Conditions" or DFCs in the 2002 State Water Plan (Texas Water Development Board, 2002, P.5), or codified the concept in statute in House Bill 1763 in 2005 (Texas Water Code (TWC) §36.108(d)), the District Board of Directors spent countless hours deliberating approaches to better manage and balance current water demands with future water needs. The result of this deliberation that began in 1995 was the District's adoption of the 50/50 Management Standard in 1998. This landmark decision in 1998 to adopt the 50/50 Management Standard represents the first DFC adopted by a GCD anywhere in Texas.

The District's 50/50 Management Standard is the goal to have at least 50 percent of current supplies, as measured by saturated thickness, still available 50 years after the first certification of this plan (which occurred in 1998). This standard was subsequently adopted for the Ogallala Aquifer, in whole or in part, by three of the four districts in GMA #1. For the purposes of the DFC adopted for the District by the member districts in GMA #1, this Management Plan, and District rules, the 50/50 Management Standard, 50 percent of the current ***saturated thickness*** remaining in 50 years, is indistinguishable from 50 percent of the ***volume*** of groundwater remaining in the Ogallala Aquifer. The 50/50 Management Standard, originally adopted by the District for the planning period of 1998 – 2048, has now been extended to 2060 in order to fully represent the current planning horizon (Figure 1). An examination of Figure 1 illustrates that as more time passes

during the 50-year planning horizon, the reduction in saturated thickness of the Ogallala Aquifer each year becomes less and less. Therefore, by the end of the planning horizon, use of the Ogallala Aquifer strives to achieve virtual ***sustainability*** because of the 50/50 Management Standard.

Figure 1 – illustration of change in saturated thickness as a result of the 50/50 Management Standard.



Texas groundwater law is clear in establishing the sequence that a GCD is to follow in accomplishing statutory responsibilities related to the conservation and management of groundwater resources within a GCD. The three primary steps, which are to occur at least every five years, are to: (1) adopt DFCs (TWC §36.108(c), (2) develop and adopt a management plan that includes goals designed to achieve the DFCs (TWC 36.1071(a)(8), and (3) amend and adopt rules necessary to achieve goals included in the management plan goals (TWC §36.101(a)(5). This management plan

represents the second step of this three step process. This management plan is a revision of the management plan adopted by the Panhandle GCD Board of Directors on August 20, 2008. The Executive Administrator of the TWDB approved that plan as administratively complete on November 13, 2008. This revised plan will remain in effect until an amended plan is adopted and approved, or (May 14, 2017), whichever is earlier. The Board of Directors will review and adopt the management plan at least every five years, as required by Texas Water Code §36.1072(e). The District Management Plan and any amendments thereto, shall be forwarded to the Panhandle Water Planning Group for consideration in their planning process.

GOALS, MANAGEMENT OBJECTIVES, AND PERFORMANCE STANDARDS

For over fifty-nine years, the District has worked to manage and conserve the supply of groundwater within its' jurisdictional boundaries. With the adoption of the 50/50 Management Standard by the District Board of Directors in 1998, this all-encompassing goal for the District was established. All other goals, management objectives, and performance standards required for inclusion in this management plan by TWC §36.1071(a) have been developed and adopted so as to ensure that all District programs and activities work directly or indirectly in an integrated and comprehensive manner in order to achieve the 50/50 Management Standard. The 50/50 Management Standard is specifically designed so as to ensure the conservation and preservation of the limited water resources of the District while seeking to maintain the economic viability of all water resource user groups, both public and private.

Texas Water Code §36.1071(a)(1-9) requires that all management plans address the following management goals, as applicable:

- addressing the desired future conditions adopted by the District,

- providing the most efficient use of groundwater;
- controlling and preventing waste of groundwater;
- controlling and preventing subsidence;
- conjunctive surface water management issues;
- natural resource issues;
- drought conditions, and;
- conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective.

Goals, management objectives, and performance standards included in this management plan have been developed and adopted to ensure the management and conservation of groundwater resources within the District's jurisdiction.

Actions, Methodologies, Procedures, Performance, and Avoidance Necessary to Effectuate the Plan

In order to achieve the goals, management objectives, and performance standards adopted in this management plan, the District continually works to develop, maintain, review, and update rules and procedures for the various programs and activities contained in the management plan. As a means to monitor performance, (a) the General Manager routinely meets with staff to track progress on the various management objectives and performance standards adopted in this management plan and, (b) on an annual basis; the General Manager prepares and submits an annual report documenting progress made towards implementation of the management plan to the Board of Directors for their review and approval. In addition, staff reviews District rules to ensure that all provisions necessary to implement the management plan are contained in the rules. Reviews of the rules are conducted annually and on an as needed basis. The District Board of Directors will make

revisions to the rules as needed to manage and conserve groundwater resources within the District more effectively and to ensure that the duties prescribed in the Texas Water Code and other applicable laws are carried out. A copy of this management plan and the District's rules may be found on the District website at www.pgcd.us.

Goal 1 Achieve the Desired Future Conditions Adopted by the Panhandle GCD.

The main purpose of a management plan is to develop goals, management objectives, and performance standards that, when successfully implemented, will work together to achieve the adopted DFCs. Goals 2 through 13 directly and/or indirectly support Goal One. DFCs adopted for the Ogallala, Dockum, and Blaine aquifers by GMA #1 for the District are described below. A 50-year planning horizon was used in setting the DFCs. Throughout the joint planning process, the District actively worked with the other member districts and stakeholders within GMA #1 to determine the DFCs for each aquifer located within each district.

Ogallala Aquifer DFC

The primary water resource in the District is the Ogallala Aquifer, which is a finite resource and must be conserved and preserved for future generations. The DFC for the Ogallala Aquifer within the boundaries of the District is to have at least 50 percent of the volume in storage remaining in 50 years (50/50 DFC). As discussed above, for the District, the 50/50 DFC (goal) is synonymous and interchangeable with the 50/50 Management Standard. Successful attainment of the 50/50 DFC is accomplished using the District's integrated programs focused on conservation, education, regulation, and permitting which are designed to achieve this umbrella goal. Texas Water Code §36.1132(a) states that "*a district, to the extent possible, shall issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired*

future condition under Section 36.108." The District's permitting program has been designed in order to achieve the DFC.

Estimates of modeled available groundwater for the Ogallala Aquifer within the District are presented in Table 1 below. The requirement for inclusion of estimates of modeled available groundwater in the management plan is a new requirement resulting from the passage of Senate Bill 660 by the 82nd Texas Legislature in 2011. The term *"modeled available groundwater"* is defined in TWC §36.001(a)(25) as *"the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition…"* This change in terms is included to clarify that the estimates presented in Table 1 represent both exempt and non-exempt groundwater production. Estimates of modeled available groundwater for the Ogallala Aquifer in the District were provided by the executive administrator of the TWDB in GAM Run 09-026 MAG (Oliver, 2011a).

Table 1 Estimates of modeled available groundwater for the Ogallala Aquifer in the District (Oliver, 2011a).

Estimates of modeled available groundwater for Ogallala Aquifer in the Panhandle GCD (acre-feet per year)						
County	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Armstrong	46,315	42,978	39,881	37,008	34,342	32,447
Carson	186,010	172,608	160,171	148,631	137,922	130,888
Donley	86,072	79,870	74,115	68,775	63,820	60,565
Gray	176,598	163,874	152,066	141,110	130,816	124,046
Hutchinson	13,411	12,445	11,548	10,716	9,944	9,437
Potter	35,153	32,620	30,270	28,089	26,065	24,630
Roberts	358,946	333,084	309,085	286,815	266,149	252,576
Wheeler	114,217	105,987	98,351	91,264	84,585	80,272
Total	1,016,722	943,466	875,487	812,407	753,642	714,861

Management Objective 1.1

The cornerstone of the many programs and activities that have been developed and adopted in order to achieve the 50/50 DFC is the District's Rule 15, also referred to as the Depletion Rule, which contains the 50/50 Management Standard stating that 50 percent of the current saturated thickness will remain in 50 years. This 50/50 Management Standard is the tool by which the District will ensure that we meet or exceed the 50/50 DFC. Rule 15 states that the allowable rate of decline in the Ogallala Aquifer's saturated thickness annually is 1.25 percent. In order to ensure that the Management Objective of Rule 15 are being met, the District goes through an annual review process in order to identify and act upon areas that are exceeding the allowable decline rate of 1.25 percent of saturated thickness on an annual basis. Management Objective 1.1 is for the District to successfully undergo and complete the evaluation and review process required by Rule 15 no later than December 1 of each calendar year. The results of this process will be published in the District's Annual Report which, upon approval by the District Board of Directors, will be published on the District's web site.

In order to complete Management Objective 1.1, the following Performance Standards will be met. Actions by the District Board of Directors that may result from this review include the adoption of production limits, drilling moratoriums, and installation of flow meters, as required.

Performance Standard

1.1a The first step in this process is to evaluate Ogallala Aquifer water level measurements collected during the District's annual winter water level monitoring program. These water level measurements will be evaluated to determine areas with declines greater than 1.25 percent of saturated thickness. This information will be provided to the District Board of Directors at a regularly scheduled meeting by August 31st of each year.

1.1b Evaluate the sum of all groundwater declines since 1998 for any area breaking the 50 percent of saturated thickness as recalculated every five years in the 50/50 depletion management trend line by September 30th annually.

1.1c Determine non-exempt water pumping volumes annually within each established Conservation Area and report results to the Board of Directors in the Annual Report.

Management Objective 1.2

The District will develop and maintain an integrated geodatabase system based on the District's Observation Well Network and computer mapping programs to annually track and evaluate current supplies by determining a baseline (1998) groundwater saturated thickness in the District. The baseline is utilized to track and review changes in water supplies.

Performance Standards

1.2a The baseline (1998) Ogallala Aquifer saturated thickness, for the District, will be updated on an annual basis using any new red bed stratigraphic information made available to the District over the past year. This updated baseline (1998) saturated thickness map will be presented to the Board of Directors during the annual review of depletion in the District.

1.2b Update and publish at least once every 5 years on the District's website the latest updated saturated thickness map.

Dockum Aquifer DFC

The Dockum Aquifer is a minor aquifer that is present primarily in the western portions of the District and is generally under confined (artesian) conditions. Based on our current understanding of water resources in the Dockum Aquifer, DFCs have been adopted for Armstrong, Carson, and Potter counties within the District. Due to the predominantly confined nature of the Dockum Aquifer, a

different approach was taken in adopting DFCs. The DFC adopted for the Dockum Aquifer in GMA #1 is that the average decline in water levels will decline no more than 30 feet aquifer wide over the next 50 years.

The estimates of modeled available groundwater for the Dockum Aquifer were extracted from GAM Run 10-019 MAG Version 2 (Oliver, 2011b) and are presented in Table 2.

Table 2 Estimates of modeled available groundwater for the Dockum Aquifer in the District (Oliver, 2011b).

Estimates of modeled available groundwater for Dockum Aquifer in the Panhandle GCD (acre-feet per year)						
County	2010	2020	2030	2040	2050	2060
Armstrong	500	500	500	500	500	500
Carson	283	283	283	283	283	283
Potter	1,454	1,454	1,454	1,454	1,454	1,454
Total	2,237	2,237	2,237	2,237	2,237	2,237

Management Objective 1.3

While there are tens of thousands of data points collected over time relative to the Ogallala Aquifer, the opposite is case for the Dockum Aquifer. This can primarily be attributed to dominance of the Ogallala Aquifer in the region and prevalence of poor water quality from the Dockum Aquifer. However, there are areas where the Dockum Aquifer is becoming a more important water resource, due to declining water levels in the Ogallala Aquifer, localized relatively good water quality in the Dockum Aquifer, and advances being made in the technology of brackish groundwater desalination.

Due to the scarcity of data regarding the Dockum Aquifer, the District is in the process of identifying data needs and establishing monitoring protocols necessary to manage the Dockum Aquifer in a manner that will achieve the adopted DFCs. The District also recognizes the need for developing a strategy that will ensure progress towards achieving the adopted DFCs for the Dockum Aquifer. As a first step, the District has partnered with the TWDB in the ongoing High Plains Aquifer

update, in part focused on obtaining, analyzing, and updating our understanding of the hydrogeology of the Dockum Aquifer.

Performance Standard

1.3a Within 90 days of final completion and release of the updated High Plains Aquifer GAM, a technical presentation on study results will be presented to the Board of Directors and summary results in cluded in the District's newsletter as soon as practicable.

Blaine Aquifer DFC

The Blaine Aquifer is generally under unconfined conditions in portions of Wheeler County. Its use is limited to irrigation of highly salt-tolerant crops and livestock watering purposes. The DFC for the Blaine Aquifer is for 50 percent of the volume in storage, based on saturated thickness in 2010, to be remaining in 50 years in Wheeler County.

Table 3 Estimates of modeled available groundwater for the Blaine Aquifer in Wheeler County in the District (GAM Run 10-020, Oliver, 2011c).

Estimates of modeled available groundwater for Blaine Aquifer in the Panhandle GCD (acre-feet per year)						
County	2010	2020	2030	2040	2050	2060
Wheeler	98,997	98,997	98,997	98,997	98,997	97,695
Total	98,997	98,997	98,997	98,997	98,997	97,695

Due to the lack of water quality and water quality data for the Blaine Aquifer in Wheeler County, little is known about changes in groundwater availability (quantity or quality) for this aquifer during the historical period. After review, the District has determined that during the ongoing round of joint planning, that it will request that the Blaine Aquifer be designated as non-relevant for the purposes of joint planning.

Management Objective 1.4

At the conclusion of the ongoing joint-planning process in Groundwater Management Area 1, request that the Blaine Aqufier be designated as non-relevant, as allowed under Texas Administrative Code Chapter 356.

Performance Standard

In the DFCs adopted by Groundwater Management Area 1 currently under consideration, the Blaine Aquifer is designated as non-relevant.

Goal 2 Providing for the most efficient use of groundwater.

Throughout our history, the District has operated on the core principle (or goal) that groundwater should be used as efficiently as possible for beneficial purposes. In order to achieve this goal, the District maintains a qualified staff to assist water users in protecting, preserving, and conserving groundwater resources. The Board of Directors has in the past and continues today to base its decisions on the best data available to treat all water users as equitably as possible. Once data is collected, the District utilizes a wide variety of forums to provide important information to water users throughout the District so that sound decisions regarding the efficient use of groundwater can be made. The observation well network will continuously be reviewed and maintained in order to monitor changing storage conditions of groundwater supplies within the District. The District will continue to undertake and cooperate with technical investigations of the groundwater resources within the District. The following management objectives and performance standards have been developed and adopted to collect needed information, disseminate information,

and provide opportunities through the District's Agricultural Water Conservation Equipment Loan Program to ensure the efficient use of groundwater.

Management Objective 2.1

An observation well network with approximately 850 water wells located throughout the District is continuously maintained and monitored. Wells in the observation network produce groundwater from the Ogallala Aquifer, as well as the Dockum and Blaine aquifers. Water levels are measured by District staff in as many wells as possible, with the management objective being to measure water levels in at least 90 percent of the wells in the network each year. This data is then processed for quality assurance/quality control, entered into the District's geodatabase, analyzed, mapped, and used to make decline calculations and update historic trend lines (hydrographs).

Water level measurements from wells in the District's Observation Well Network are used to generate annual depletion maps. The District will strive to install additional monitoring wells in locations when necessary in order to evaluate the effects of high-impact pumping operations as necessary. Furthermore, the District will install and maintain automatic data gathering equipment on wells as needed.

Performance Standard

2.1a Measure water levels in at least 90 percent of the operational water wells in the District's Observation Well Network annually by March 1st.

2.1b Using water level measurements collected at the beginning of each year from wells in the Observation Well Network, prepare an annual depletion map based on changes in water levels observed in the last 12 months by July 31st and publish in next available District newsletter, Panhandle Water News (PWN).

2.1c Using water level measurements collected at the beginning of each year from wells in the Observation Well Network and historical information from the District's geodatabase, prepare for review and approval by the Internal Revenue Service (IRS) the annual IRS depletion map utilized to quantify allowable depletion levels by December 30th annually. The District will provide individual participation letters to be sent by January 31st of each year.

Management Objective 2.2

The District encourages efficient groundwater use by continued promotion of Low Energy Precision Application (LEPA), low pressure and other efficient sprinkler systems, which will decrease the utilization of less efficient row irrigation techniques. This will be accomplished by increasing the use of the District's Agricultural Water Conservation Equipment Loan Program, as long as TWDB Agricultural Loan Program funds are available and economically competitive. The District will enhance awareness of the loan program by publicity releases in local newspapers and the PWN. The District website will have information on availability of funds and guidelines for applicants. The District will strive to provide timely responses to loan applicants.

Performance Standard

2.2a The District will include a reminder about the District's Agricultural Water Conservation Equipment Loan Program at least bi-annually in the *PWN*, as long as funds are available at competitive rates.

2.2b District staff strives to complete the District review process for all loan applications and prepare for Board of Director consideration within 60 days of receipt of administratively complete loan application.

Management Objective 2.3

The District encourages the efficient use of groundwater by disseminating educational information regarding current best management practices and trends in water conservation for agricultural, municipal, and industrial applications. The District publishes a newsletter quarterly that contains resources for water users interested in water conservation. In addition, the District also attends and participates in public events throughout the District including the annual Amarillo Farm and Ranch Show as often as possible.

Performance Standard

2.3a The District will publish *Panhandle Water News* (*PWN*) on a quarterly basis.

2.3b Each year the District will participate in the Amarillo Farm and Ranch Show.

Management Objective 2.4

In order to ensure that the Board of Directors and District constituents are aware of and informed on the most current information on water conservation, groundwater management, and emerging policy issues related to groundwater resources, District staff actively participate in a broad grouping of professional associations that focus on water resource issues. District staff will report at the next available regularly scheduled Board of Directors meeting in the General Manager's Report on any activities resulting from participation with the following active affiliations:

- Texas Alliance of Groundwater Districts (TAGD)
- Texas Water Conservation Association (TWCA),
- Groundwater Management Districts Association (GMDA), and
- Alliance for Water Efficiency.

Performance Standard

2.4a District staff will attend and participate in 80 percent of regularly scheduled TAGD, TWCA and GMDA general meetings and report on noteworthy presentations and issues from these meetings at

the next available regularly scheduled Board of Directors meeting in the General Manager's Report.

Management Objective 2.5

The District has adopted rules that require approved flow meters on all new and replacement wells. Flow meters are also required in certain instances for wells in designated study areas and for all non-exempt wells in designated conservation areas. The District believes that when a water user understands the volume of groundwater being used, they are better able to adopt best management practices that result in the efficient use of groundwater. Therefore the District is committed to continuing the program focused on requiring flow meters for certain wells, flow meter monitoring, and data collection and analysis of water use by crop and irrigation type. To achieve this objective the District will read and record flow meter data from 90 percent of the installed flow meters in the District annually. Study Area and Conservation Area meters will be read at least annually, however may be read on a monthly or quarterly basis as needed. The information from the District's metering program will be published in the District's Annual Report.

Performance Standard

2.5a Read and record flow meter data for 90 percent of installed flow meters at least annually.

2.5b Verify damaged, inoperative, or inaccurate flow meters within 14 days of reported errors, take appropriate action, as necessary, and record into meter repair spreadsheet (S:Field_Support/Meters/Meter Repair Spreadsheet)

2.5c Review and prepare revised estimates to TWDB annual draft agricultural water use estimates based on District meter data and other relevant information and submit to designated TWDB staff within timeframe requested.

Goal 3 Controlling and preventing waste of groundwater.

Another core principle adopted by the District since its inception in order to conserve groundwater resources of the region is by controlling and preventing the waste of groundwater. The following management objectives and performance standards have developed and adopted as an integral component of the District's umbrella goal to achieve the 50/50 Management Standard.

Management Objective 3.1

The District is continuously working to take positive and prompt action to identify and address all reported wasteful practices and instances of waste located by District staff within the District. This effort involves the following actions to be taken by the District.

- Report each complaint to the landowner and/or operator within two working days.
- Resolve the complaint and note the corrective action taken.
- Report resolution of each complaint to the landowner/operator and to the Board at the next regularly scheduled meeting during the General Manager's Report.

Performance Standards

3.1a All notices or complaints will be recorded, investigated and reported to the landowner/operator, within four working days.

3.1b Report each complaint and staff recommendation for resolution to the Board at the next regularly scheduled meeting.

Goal 4 Implement strategies to address drought conditions.

In order to address drought conditions, the District has implemented a number of programs that are designed to positively support constituents in the District when drought conditions exist. While three of these efforts are described below in Management Objectives 4.1 - 4.3, others are documented elsewhere in the management plan. For example the District operates a state-permitted precipitation

enhancement program. This program is described below in Goal 8.

Management Objective 4.1

Conduct drought contingency planning by ensuring that drought contingency plans required in all Multiple Well Permits issued by the District are included in the permit applications and that they are administratively complete.

Performance Standard

4.1a Upon submission for District consideration, ensure that all Multiple Well Permit applications meet drought contingency plan requirements prior to certification of administrative completeness.

Management Objective 4.2

In order to provide ongoing information regarding water conditions in the District, establish and maintain links to National Oceanic and Atmospheric Administration Drought Monitor indices are on the District website.

Performance Standard

4.2a Links to the National Oceanic and Atmospheric Administration Drought Monitor indices are available for use on the District's website.

Goal 5 Implement strategies to address conjunctive surface water management issues.

The Canadian River Municipal Water Authority (CRMWA) supplements member city allocations of groundwater with supplies from Lake Meredith. The CRMWA system is the largest conjunctive use water provider in the State of Texas, providing a combination of groundwater and surface water to 11 member cities. All current CRMWA groundwater supplies are produced within the boundaries of the District.

The Greenbelt Water Authority (GWA) is the second surface water user with supplies inside the boundaries of the District. At the time of the implementation of this plan, GWA has not utilized any groundwater supplies for distribution. In the event that GWA develops groundwater supplies to supplement the surface water, then the District will communicate with regards to rules and technical data as it applies to conjunctive use within the District.

Management Objective 5.1

In order to continually monitor the impact of declining surface-water availability on groundwater resources within the District, the General Manager participates in the Panhandle Water Planning Group (PWPG) with the two surface-water entities currently operating within the District. This activity helps facilitate regular communication and cooperation with regards to conjunctive use issues in the District.

Performance Standard

The District General Manger will participate in at least 75 percent of the regularly scheduled PWPG meetings and activities throughout the current regional water planning cycle (2011 – 2016).

Goal 6 Implement strategies that will address natural resource issues.

As part of the umbrella goal of achieving the adopted DFCs, the District recognizes that the protection of water quality is equally as important as working to ensure adequate water quantity. In order to protect the District's most important natural resource, the abundant, high quality groundwater resources, the District has for many years maintained and operated a water quality sampling program sampling different areas each summer which yields a complete set of data biennially.

In addition to the District's water quality program, another aspect of the District's efforts to protect natural resources is to monitor the possible impacts of groundwater pumping on White Deer Creek.

Management objective 6.1

In order to control and prevent the contamination of groundwater, the District maintains and works to expand the groundwater quality monitoring. As part of this effort, an annual sampling program will be conducted within the District's Water Quality Network. The objective will be to sample at least 40 percent of the wells in the District's Water Quality Network by September 1st of each year. Also, upon request the District will conduct analysis of water within current District sampling capabilities, including sites near oil and gas industry injection well sites.

Performance Standards

6.1a Sample 40 percent of the wells in the District's Water Quality Network by September 1st of each year.

6.1b Record all water quality measurement data in the District's water quality database within 30 days of sampling.

Management Objective 6.2

In order to monitor the possible impacts of groundwater pumping on White Deer Creek, the District will measure and record reports of flow from White Deer Creek, check annual decline maps for water level declines near White Deer Creek headwaters, and compare the flow reports to decline maps**.** An annual assessment statement will be prepared and presented with analysis of findings to the Board of Directors in the District's Annual Report each year.

Performance Standard

6.2a The District will record stream flow data measurements bimonthly.

6.2b. Prepare and include an assessment of impacts on White Deer Creek in the District's Annual Report.

Goal 7 Improve operating efficiency and customer service.

Management Objective 7.1

Customer service is of great importance to the Board and Staff of the District. As detailed in the corresponding performance standards, the District will continue to provide timely response to customer assistance requests in the following areas:

- Pump flow tests.
- Processing of well drilling permits.
-
- Review and revision of District Rules, as necessary, to incorporate revisions required by new legislation.
- Well camera recordings.

Performance Standard

7.1a Provide requested flow tests annually within two working days of the request or the landowners requested date and enter results into the database within 30 days.

7.1b Managers action on approved well drilling permits taken and permit returned to customer, within ten working days of approval.

7.1c Provide the well camera service within two working days of request or the landowners requested date and return the information to the well operator within two working days, and archive a copy of the DVD into the District library.

Goal 8 Addressing precipitation enhancement

Texas Water Code §36.1071(a)(7) requires groundwater conservation districts to include in the management plan a goal addressing precipitation enhancement. The District has one of the longest continuous precipitation enhancement programs in the State of Texas.

Management Objective 8.1

The District will continue to operate its Precipitation Enhancement Program throughout the planning horizon of this management plan. The program will operate within budget. A rain gauge network will be maintained and monitored to check results. Flight records and radar data will be collected and archived. The program will abide by Texas Department of Licensing and Regulation requirements for testing, monitoring, and reporting in order to ensure compliance with permit guidelines. Results of the District's Precipitation Enhancement Program will be presented to the Board of Directors and included in the Annual Report each year.

Performance Standard

8.1a Annually conduct the Precipitation Enhancement Program from April 1 to September 30.

8.1b Calculate the baseline costs for Precipitation Enhancement Program each year.

8.1c Collect and record rain gauge readings at least once a quarter, starting one month prior to seeding operations and continuing one month after the end of seeding operations.

8.1d Annually maintain all flight records and archived radar data on all precipitation enhancement operations and make available for review upon request.

8.1e. Provide precipitation enhancement annual report to Texas Department of Licensing and Regulation.

Management Objective 8.2

Educate the public with regards to the benefits of the District's Precipitation Enhancement Program through informational articles in the *PWN* and local newspapers, public presentations, and Program summaries in the District's Annual Report each year.

Performance Standard

8.2a Publish an article about precipitation enhancement in at least 2 of the quarterly issues of *PWN.*

8.2b Provide at least one article about the Precipitation Enhancement Program to all local newspapers annually.

8.2c District staff will give at least two presentations annually to a public or civic group regarding the Precipitation Enhancement Program.

8.2d Complete the Program Summary Report and include in District's Annual Report each year.

Goal 9 Addressing Conservation

Texas Water Code §36.0015 states, in part, that, "In order to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater….Groundwater conservation districts may be created…are the state's preferred method of groundwater management through rules developed, adopted, and promulgated by a district in accordance with the provisions of this chapter." It is noteworthy that in this overview section of Texas water law addressing groundwater management that "conservation" is the first action groundwater conservation districts are to pursue. The 50/50 Management Standard can only be achieved if our groundwater resources are conserved in a manner that ensures adequate water resources will be

available for future generations. While water conservation is a fundamental component of many of the District's programs, the following represent management objectives most focused on water conservation.

Management Objective 9.1

Continue and expand, when possible, the District's Groundwater Conservation Education Program. District staff will make presentations on the importance of water conservation to at least 10 civic organizations and in at least 35 elementary schools. Annually, the District will award at least three college scholarships to students in the District based on participation in a water conservation essay competition. The District will maintain an Internet information page and launch an aggressive conservation education initiative called "Water Warriors", as well as work with other entities to present an ongoing Panhandle area water conservation symposium.

Performance Standards

9.1a Annually make a minimum of 10 civic educational presentations.

9.1b Annually make 35 elementary school presentations.

9.1c Annually provide at least three scholarships to students residing within the District that have participated in the District's water conservation essay competition.

9.1d Continue Water Warrior Program as part of aggressive public relations and education campaign encouraging all users to make water conservation a high priority in at least three public presentations outside of school settings.

Goal 10 Rainwater Harvesting

Rainwater harvesting is becoming an increasingly important strategy for meeting water supply needs, especially in the more rural areas of Texas. While rainwater harvesting is one of the many topics included in the District's water conservation education programs, the following management objective and performance standards are specifically focused on rainwater harvesting.

Management Objective 10.1

The District has established and maintains a rainwater harvesting system and provides educational tours to the public regarding the many benefits of the system. Tours of the District office rainwater harvesting system are provided upon request. A link to an informational page highlighting the rainwater harvesting system will be maintained and updated as necessary on the District's website. In addition, a link to the TWDB website on rainwater harvesting will also be maintained on the District's website.

Performance Standard

10.1a Webpage highlighting the District's rainwater harvesting system along with information regarding availability of tours to the public is maintained and updated as necessary.

10.1b Link to the TWDB Rainwater Harvesting webpage is maintained on the District's webpage.

Goal 11 Recharge Enhancement

The District has conducted or helped facilitate several recharge projects in recent years, one of which is an ongoing TWDB effort regarding the recharge characteristics of playa lakes. The District will continue to work with the TWDB on recharge projects as long as the Legislature continues to fund their activities. Since TWDB funding for this recharge effort of playa basins is beyond the control of the District, management objectives and performance standards specific to that project are not included.

Management Objective 11.1

Surface water collected in the thousands of playa lakes on the High Plains is the primary source of recharge to the Ogallala Aquifer. Ongoing research will be monitored and all research results directly applicable to enhancing recharge to the Ogallala Aquifer in the District will be reported to the Board of Directors and summarized in the Annual Report.

Performance Standards

11.1a Document any ongoing research results directly applicable to enhancing recharge to the Ogallala Aquifer in the District will be reported to the Board of Directors and summarized in the Annual Report

GOALS DETERMINED NOT-APPLICABLE

Goal 12 Control and Prevention of Subsidence

The geologic framework and unconfined nature of the Ogallala Aquifer in the region precludes significant subsidence from occurring due to groundwater pumping.

Goal 13 Brush Control

The Canadian River Municipal Water Authority has a large brush control project along the Canadian River in the District, and the District encourages that action, but the District has determined that a program addressing brush control by the District is not feasible at this time.

POPULATION, WATER USE, AND WATER DEMANDS

Primary activities involved in the development of a water resources management plan include the analysis and development of projections of population, historical and current water use, and projections of water demands in the future (for a defined period of time). In order to develop

projections for how much water supply we will need in the future, three questions must be answered: (1) how many people are there now and how much water has been used in the recent past, (2) how many people will there be in the future (population projections), and (3) how much water will be required to meet the needs of the projected population and other water use sectors in the future. These analyses to develop water demand projections are primarily conducted in Texas as part of the regional water supply planning process (created by the 75th Texas Legislature through the passage of Senate Bill 1 in 1997). Water demand projections are developed for the following water user categories; municipal, rural (county-other), irrigation, livestock, manufacturing, mining, and steam-electric power generation. These three tasks are then followed by the evaluation of current water supplies, comparison of water demands to water supplies in order to determine needs for additional water supplies, and finally the identification, evaluation, and selection of water management strategies to meet any water supply needs that identified. This section addresses population projections, water use, and water demands.

Based on information developed for the 2012 Texas State Water Plan, population projections for the District range from 160,963 in 2010 to 227,021 in 2060. This represents a 41 percent increase in population over the 50-year planning horizon. (Table 4, Figure 2).

Table 4 Population projections from the 2012 Texas State Water Plan.

County	Population Projections					
	2010	2020	2030	2040	2050	2060
Armstrong - Total	2,171	2,240	2,163	2,074	2,053	1,994
Armstrong - District[1]	2,004	2,068	1,996	1,914	1,895	1,840
Carson	5,871	5,933	5,886	5,696	5,177	4,701
Donley	3,764	3,694	3,536	3,375	3,238	3,026
Gray	22,163	21,988	21,371	20,542	19,286	18,064
Hutchinson - Total	24,320	24,655	24,311	23,513	22,209	21,087
Hutchinson - District[2]	1,046	1,060	1,045	1,011	955	907

Potter - Total	127,580	142,703	156,846	172,950	190,526	204,933
Potter - District[3]	120,053	134,284	147,592	162,746	179,285	192,842
Roberts	930	955	857	719	622	561
Wheeler	5,132	5,133	5,112	5,149	5,139	5,080
District Total[4]	160,963	175,115	187,395	201,152	215,597	227,021

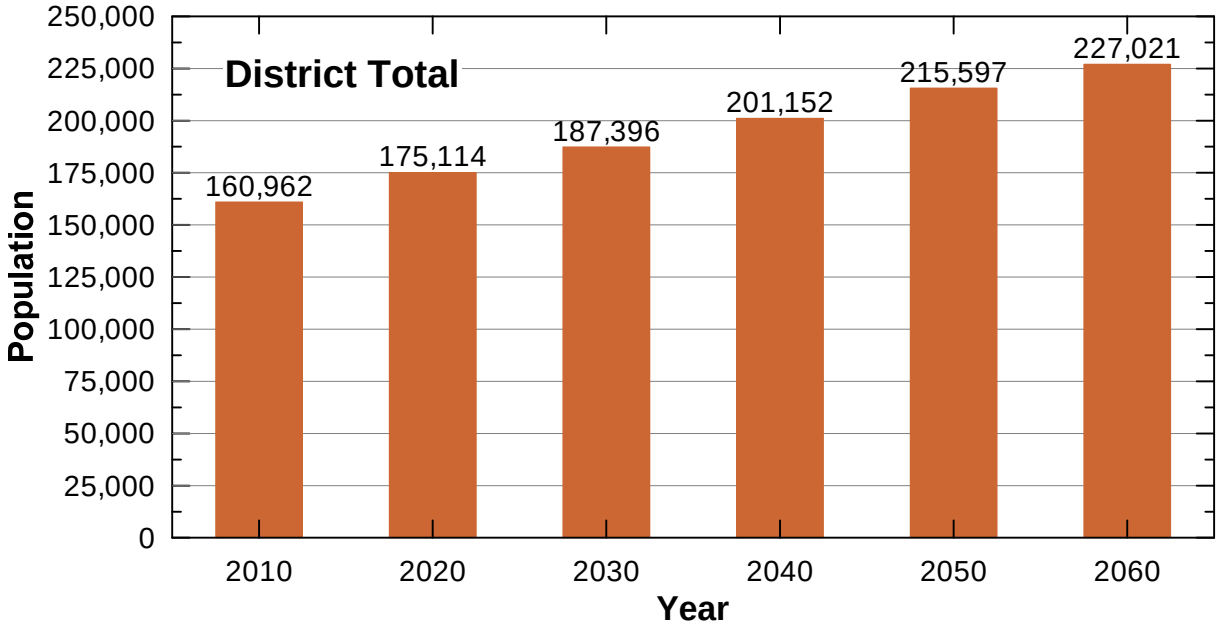
[1] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.923

[2] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.043

[3] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.941

District total represents the sum of population projections for Carson, Donley, Gray, Roberts, and Wheeler counties and the proportional population estimate based on the proportional amount of area in the county that is within the boundaries for counties partially within the jurisdictional boundaries of the District.

Figure 2 – Population projections for District (from 2012 Texas State Water Plan)



The next important component in planning for and management of water resources is an understanding of water use. The methods used to estimate groundwater use in the District have changed and improved over time, so that flow meters are now available and being used throughout the District to improve estimates of groundwater use. Figure 3, Table 5, and Appendix B provide the comprehensive dataset of groundwater use estimates for the District since the beginning of data collection in 1980. Throughout the period of record, groundwater for irrigated agriculture in the District has been the largest use of groundwater from the Ogallala Aquifer. District totals for all water use sectors range from 325,206 acre-feet in 1980 to 246,810 acre-feet in 2008. A summary table for the District for the most recent five years for which data is available in the TWDB Water Use Database is provided in Table 6.

Figure 3 – Historical estimates of water use for the District (from Allen, 2011)

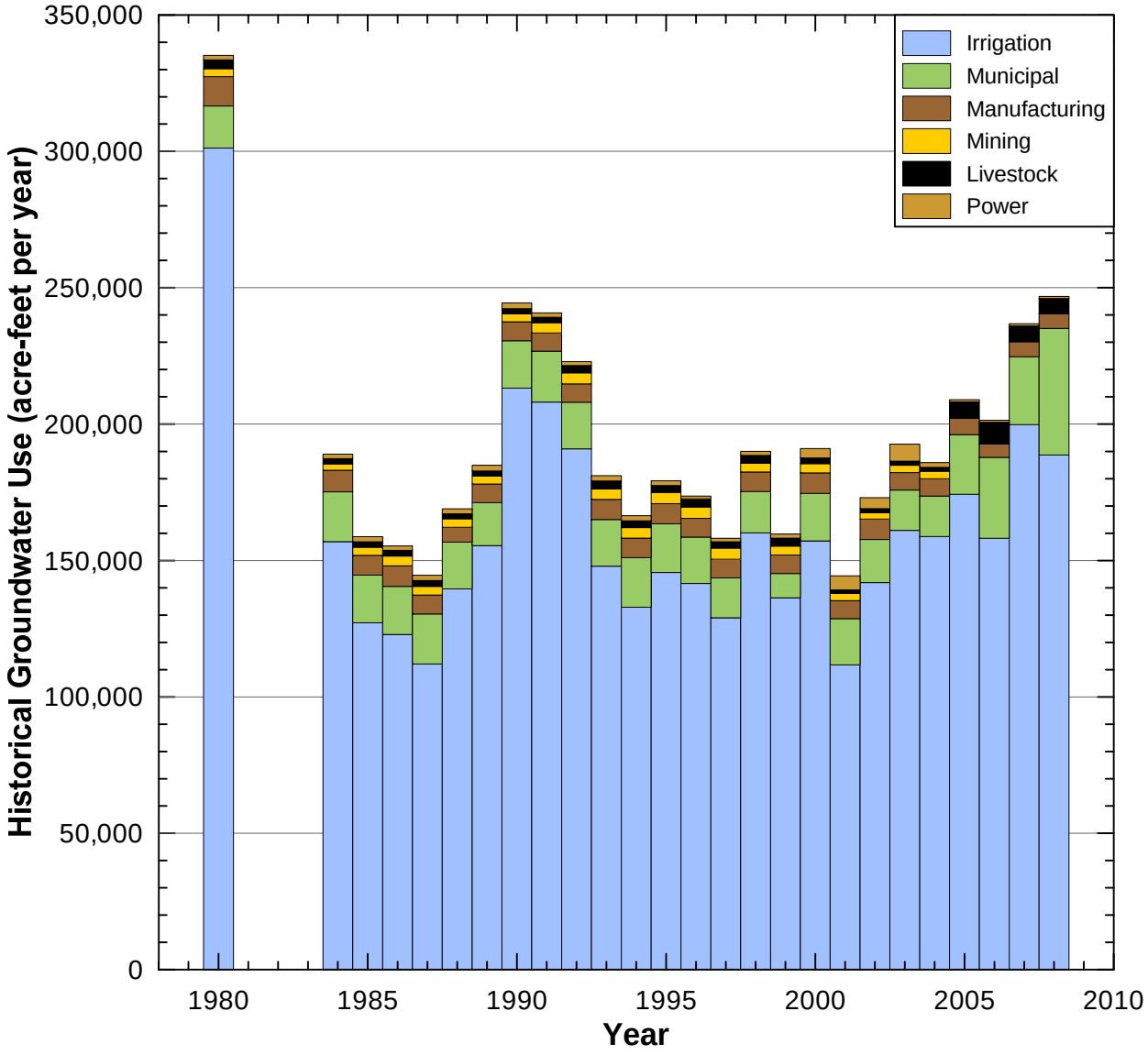


Table 5 Estimated historical groundwater use for the District (from Allen, 2011).

Year	County[1]	Estimated Historical Groundwater Use (acre-feet per year)						
		Municipal	Manufacturing	Power	Irrigation	Mining	Livestock	Total
1980	Armstrong	245	0	0	17,687	0	623	18,555
	Carson	1,471	1,059	0	186,145	927	886	190,488
	Donley	134	21	0	13,158	0	71	13,384
	Gray	1,115	4,194	0	40,007	1,256	989	47,561
	Hutchison	119	665	30	3,189	83	5	4,091
	Potter	10,647	4,598	1,662	18,341	503	36	35,787
	Roberts	232	0	0	14,911	0	51	15,194
	Wheeler	1,475	218	0	7,790	95	568	10,146
	Total	**15,438**	**10,755**	**1,691**	**301,228**	**2,864**	**3,229**	**335,206**
1984	Armstrong	309	0	0	6,551	22	413	7,294
	Carson	1,523	825	0	105,923	895	904	110,070
	Donley	143	21	0	6,715	24	67	6,970
	Gray	3,234	3,160	0	16,293	726	210	23,623
	Hutchison	174	1,030	0	2,586	35	2	3,827
	Potter	11,342	2,902	1,631	9,576	529	51	26,030
	Roberts	233	0	0	5,204	3	67	5,507
	Wheeler	1,282	0	0	4,078	89	209	5,658
	Total	**18,240**	**7,938**	**1,631**	**156,925**	**2,323**	**1,923**	**188,979**
1985	Armstrong	294	0	0	4,269	22	432	5,017
	Carson	1,245	730	0	77,682	815	909	81,381
	Donley	95	21	0	4,917	24	84	5,141
	Gray	3,322	3,259	0	21,500	1,349	246	29,676
	Hutchison	187	594	0	2,761	44	3	3,588
	Potter	10,967	2,681	1,899	8,754	530	56	24,888
	Roberts	219	0	0	4,050	4	55	4,328
	Wheeler	1,117	0	0	3,250	171	197	4,735
	Total	**17,446**	**7,285**	**1,899**	**127,183**	**2,959**	**1,982**	**158,754**
1986	Armstrong	333	0	0	4,492	23	454	5,303
	Carson	1,323	843	0	67,100	1,481	995	71,742
	Donley	64	21	0	4,716	25	62	4,888
	Gray	2,316	3,384	0	27,317	1,355	243	34,615
	Hutchison	170	561	0	2,104	36	2	2,874
	Potter	12,253	2,671	1,646	9,206	552	56	26,385
	Roberts	200	0	0	4,267	10	59	4,536
	Wheeler	987	0	0	3,683	153	192	5,015
	Total	**17,646**	**7,480**	**1,646**	**122,885**	**3,636**	**2,064**	**155,357**
1987	Armstrong	282	0	0	4,030	18	477	4,808
	Carson	1,221	837	0	66,050	1,392	1,121	70,621
	Donley	89	0	0	3,775	20	62	3,946
	Gray	2,522	2,910	0	21,767	1,052	210	28,461
	Hutchison	140	630	0	2,574	33	2	3,379
	Potter	12,852	2,602	1,929	8,574	465	64	26,486
	Roberts	188	0	0	2,783	9	50	3,030
	Wheeler	997	0	0	2,533	144	191	3,865
	Total	**18,291**	**6,979**	**1,929**	**112,086**	**3,133**	**2,178**	**144,596**

Table 5, continued

Year	County[1]	Estimated Historical Groundwater Use (acre-feet per year)						
		Municipal	Manufacturing	Power	Irrigation	Mining	Livestock	Total
1988	Armstrong	270	0	0	9,513	19	459	10,261
	Carson	1,337	926	0	66,970	1,444	907	71,584
	Donley	59	0	0	6,000	21	66	6,146
	Gray	2,448	1,576	0	26,512	990	122	31,648
	Hutchison	123	648	0	2,210	30	2	3,012
	Potter	11,711	2,271	1,813	19,259	475	68	35,596
	Roberts	208	0	0	5,517	10	52	5,787
	Wheeler	1,002	0	0	3,600	157	144	4,903
	Total	**17,157**	**5,420**	**1,813**	**139,581**	**3,146**	**1,820**	**168,938**
1989	Armstrong	279	0	0	9,737	17	477	10,509
	Carson	1,333	641	0	93,553	1,375	907	97,809
	Donley	79	0	0	17,516	0	66	17,661
	Gray	2,510	3,402	0	19,905	952	123	26,892
	Hutchison	117	682	0	1,924	28	3	2,753
	Potter	10,327	2,098	2,102	6,329	446	68	21,371
	Roberts	212	0	0	4,243	6	54	4,515
	Wheeler	887	0	0	2,237	145	143	3,412
	Total	**15,744**	**6,823**	**2,102**	**155,444**	**2,968**	**1,841**	**184,922**
1990	Armstrong	326	0	0	15,313	17	478	16,134
	Carson	1,361	683	0	146,350	1,375	943	150,712
	Donley	87	0	0	12,425	0	65	12,577
	Gray	2,885	3,644	0	25,000	952	141	32,622
	Hutchison	92	692	0	2,489	28	3	3,303
	Potter	11,523	1,887	2,096	4,665	446	67	20,682
	Roberts	235	0	0	4,275	6	54	4,570
	Wheeler	901	0	0	2,659	145	153	3,858
	Total	**17,409**	**6,906**	**2,096**	**213,176**	**2,968**	**1,904**	**244,458**
1991	Armstrong	308	0	0	10,791	18	488	11,605
	Carson	1,317	688	0	138,159	1,804	964	142,932
	Donley	85	0	0	10,184	22	67	10,358
	Gray	3,759	3,200	0	31,707	1,392	145	40,203
	Hutchison	105	655	0	2,646	21	3	3,430
	Potter	11,935	2,116	1,611	6,635	394	69	22,760
	Roberts	247	0	0	4,900	13	56	5,216
	Wheeler	906	0	0	3,084	114	157	4,261
	Total	**18,662**	**6,660**	**1,611**	**208,105**	**3,778**	**1,949**	**240,765**
1992	Armstrong	282	0	0	12,380	18	787	13,467
	Carson	1,186	616	0	126,217	1,754	1,171	130,944
	Donley	88	0	0	10,317	22	79	10,506
	Gray	3,411	3,682	0	25,341	1,379	309	34,122
	Hutchison	103	596	0	2,881	20	3	3,604
	Potter	10,909	1,826	1,432	6,740	722	70	21,699
	Roberts	233	0	0	3,992	12	56	4,293
	Wheeler	877	0	0	3,091	114	212	4,294
	Total	**17,089**	**6,721**	**1,432**	**190,960**	**4,041**	**2,687**	**222,930**

Table 5, continued

Year	County[1]	Estimated Historical Groundwater Use (acre-feet per year)						
		Municipal	Manufacturing	Power	Irrigation	Mining	Livestock	Total
1993	Armstrong	305	0	0	11,181	18	855	12,358
	Carson	1,210	554	0	65,924	1,650	1,339	70,677
	Donley	83	0	0	10,397	22	79	10,581
	Gray	3,540	3,868	0	21,397	1,127	323	30,255
	Hutchison	125	879	0	2,075	18	3	3,101
	Potter	10,760	2,038	1,903	30,661	875	83	46,320
	Roberts	214	0	0	4,095	12	61	4,382
	Wheeler	863	0	0	2,197	114	236	3,410
	Total	**17,100**	**7,339**	**1,903**	**147,927**	**3,836**	**2,979**	**181,084**
1994	Armstrong	338	0	0	9,821	18	617	10,794
	Carson	1,348	571	0	69,137	1,651	1,218	73,925
	Donley	55	0	0	12,638	22	72	12,787
	Gray	3,672	3,868	0	16,444	1,136	280	25,400
	Hutchison	158	583	0	2,696	16	5	3,457
	Potter	11,408	2,126	1,908	13,379	881	61	29,763
	Roberts	207	0	0	5,650	11	40	5,908
	Wheeler	972	0	0	3,124	114	195	4,405
	Total	**18,158**	**7,147**	**1,908**	**132,889**	**3,848**	**2,488**	**166,439**
1995	Armstrong	351	0	0	10,989	18	465	11,823
	Carson	1,471	510	0	83,495	1,703	1,352	88,531
	Donley	95	0	0	10,352	22	99	10,568
	Gray	3,192	3,928	0	16,577	1,366	296	25,359
	Hutchison	166	622	0	2,739	18	4	3,548
	Potter	11,507	2,274	1,692	14,615	897	64	31,048
	Roberts	207	0	0	4,424	11	37	4,679
	Wheeler	853	0	0	2,448	113	222	3,636
	Total	**17,842**	**7,334**	**1,692**	**145,638**	**4,147**	**2,539**	**179,192**
1996	Armstrong	434	0	0	8,911	18	455	9,817
	Carson	1,434	536	0	76,190	1,703	1,723	81,586
	Donley	94	0	0	9,338	22	171	9,625
	Gray	2,503	3,872	0	17,863	1,366	309	25,913
	Hutchison	176	579	0	2,151	18	2	2,927
	Potter	11,295	1,907	1,012	17,110	901	64	32,289
	Roberts	169	0	0	7,057	11	35	7,272
	Wheeler	865	0	0	2,956	113	260	4,194
	Total	**16,970**	**6,895**	**1,012**	**141,576**	**4,151**	**3,019**	**173,622**
1997	Armstrong	330	0	0	10,076	18	473	10,898
	Carson	1,040	499	0	53,704	1,687	1,156	58,086
	Donley	88	0	0	8,845	22	74	9,029
	Gray	2,192	3,812	0	24,229	1,396	285	31,914
	Hutchison	153	625	0	1,871	18	2	2,669
	Potter	9,486	1,906	1,286	23,624	853	64	37,218
	Roberts	183	0	0	3,634	9	32	3,858
	Wheeler	1,147	0	0	2,997	113	223	4,480
	Total	**14,620**	**6,841**	**1,286**	**128,980**	**4,115**	**2,310**	**158,153**

Table 5, continued

Year	County[1]	Estimated Historical Groundwater Use (acre-feet per year)						
		Municipal	Manufacturing	Power	Irrigation	Mining	Livestock	Total
1998	Armstrong	390	0	0	8,242	18	505	9,155
	Carson	1,205	429	0	85,640	1,632	1,586	90,492
	Donley	131	0	0	14,746	22	118	15,017
	Gray	1,147	4,082	0	25,472	1,092	275	32,068
	Hutchison	234	631	0	1,979	13	3	2,860
	Potter	10,631	2,039	1,500	7,517	384	50	22,121
	Roberts	214	0	0	11,112	9	56	11,391
	Wheeler	1,193	0	0	5,419	113	213	6,938
	Total	**15,146**	**7,181**	**1,500**	**160,128**	**3,283**	**2,805**	**190,042**
1999	Armstrong	354	0	0	11,624	18	495	12,491
	Carson	993	423	0	73,077	1,632	1,574	77,699
	Donley	91	0	0	10,268	22	151	10,532
	Gray	1,063	3,878	0	23,079	1,092	299	29,411
	Hutchison	172	657	0	2,364	13	3	3,209
	Potter	5,096	1,823	1,540	4,399	384	48	13,291
	Roberts	182	0	0	7,945	9	55	8,191
	Wheeler	969	0	0	3,557	113	253	4,892
	Total	**8,921**	**6,780**	**1,540**	**136,314**	**3,283**	**2,878**	**159,716**
2000	Armstrong	382	0	0	10,908	18	446	11,753
	Carson	1,433	491	0	79,045	1,632	1,135	83,736
	Donley	137	0	0	23,873	22	136	24,168
	Gray	1,151	4,083	0	20,525	1,092	140	26,991
	Hutchison	125	611	0	2,527	264	2	3,530
	Potter	13,044	2,327	3,400	3,517	245	54	22,586
	Roberts	180	0	0	8,838	9	54	9,081
	Wheeler	961	0	0	7,939	113	173	9,186
	Total	**17,413**	**7,512**	**3,400**	**157,171**	**3,394**	**2,140**	**191,031**
2001	Armstrong	360	0	0	7,143	18	416	7,937
	Carson	1,382	402	0	51,012	832	387	54,015
	Donley	85	0	0	18,739	22	135	18,981
	Gray	1,521	4,036	0	15,733	1,297	91	22,678
	Hutchison	212	758	0	1,721	258	2	2,952
	Potter	12,206	1,428	5,160	4,958	119	44	23,915
	Roberts	160	0	0	7,045	5	45	7,255
	Wheeler	985	0	0	5,396	113	173	6,667
	Total	**16,911**	**6,625**	**5,160**	**111,747**	**2,663**	**1,293**	**144,399**
2002	Armstrong	344	0	0	9,483	18	488	10,333
	Carson	1,282	448	0	53,621	832	377	56,560
	Donley	87	0	0	26,256	22	125	26,490
	Gray	956	3,634	0	20,494	1,297	106	26,487
	Hutchison	211	693	0	2,073	54	2	3,033
	Potter	11,943	2,678	4,013	8,209	99	92	27,035
	Roberts	166	0	0	12,642	5	50	12,863
	Wheeler	863	0	0	9,104	113	147	10,227
	Total	**15,853**	**7,453**	**4,013**	**141,882**	**2,439**	**1,388**	**173,028**

Table 5, continued

Year	County[1]	Estimated Historical Groundwater Use (acre-feet per year)						
		Municipal	Manufacturing	Power	Irrigation	Mining	Livestock	Total
2003	Armstrong	403	0	0	7,046	18	727	8,194
	Carson	1,266	444	0	55,663	832	277	58,482
	Donley	91	0	0	28,484	22	100	28,697
	Gray	1,530	3,765	0	37,451	1,297	109	44,152
	Hutchison	143	647	0	1,564	15	2	2,371
	Potter	10,358	1,544	6,277	4,791	379	74	23,423
	Roberts	164	0	0	12,866	5	46	13,081
	Wheeler	824	0	0	13,169	113	168	14,274
	Total	**14,779**	**6,400**	**6,277**	**161,034**	**2,681**	**1,504**	**192,675**
2004	Armstrong	350	0	0	6,643	18	719	7,729
	Carson	1,217	440	0	56,545	842	261	59,305
	Donley	97	0	0	29,097	22	110	29,326
	Gray	1,423	3,843	0	35,394	1,288	118	42,066
	Hutchison	167	595	0	1,648	53	3	2,466
	Potter	10,438	1,477	1,726	4,638	382	42	18,703
	Roberts	241	0	0	14,394	5	48	14,688
	Wheeler	893	0	0	10,441	113	168	11,615
	Total	**14,826**	**6,356**	**1,726**	**158,800**	**2,722**	**1,469**	**185,899**
2005	Armstrong	357	0	0	7,072	0	758	8,187
	Carson	1,347	1,432	0	70,249	58	586	73,672
	Donley	238	0	0	30,969	0	943	32,150
	Gray	2,253	3,655	0	33,406	0	1,169	40,483
	Hutchison	1,591	931	0	1,779	0	21	4,322
	Potter	14,971	10	758	4,324	135	515	20,713
	Roberts	203	0	0	13,601	1	460	14,265
	Wheeler	891	0	0	12,886	0	1,359	15,136
	Total	**21,852**	**6,028**	**758**	**174,286**	**194**	**5,810**	**208,928**
2006	Armstrong	435	0	0	6,076	0	845	7,356
	Carson	1,432	307	0	64,707	43	1,007	67,496
	Donley	259	0	0	26,299	0	862	27,420
	Gray	2,228	3,694	0	27,181	0	1,998	35,101
	Hutchison	1,752	971	0	1,760	0	24	4,507
	Potter	22,513	6	757	3,956	137	507	27,876
	Roberts	106	0	0	14,639	0	350	15,095
	Wheeler	923	0	0	13,528	0	2,112	16,563
	Total	**29,648**	**4,978**	**757**	**158,146**	**180**	**7,706**	**201,414**
2007	Armstrong	366	0	0	5,335	0	467	6,167
	Carson	1,778	307	0	84,896	53	571	87,605
	Donley	576	0	0	38,543	0	943	40,062
	Gray	2,182	3,921	0	32,103	0	1,450	39,656
	Hutchison	996	960	0	1,483	0	17	3,457
	Potter	17,980	320	757	5,540	126	596	25,318
	Roberts	156	0	0	16,522	0	387	17,065
	Wheeler	857	0	0	15,370	0	1,221	17,448
	Total	**24,891**	**5,508**	**757**	**199,792**	**179**	**5,651**	**236,778**

Table 5, continued

Year	County[1]	Estimated Historical Groundwater Use (acre-feet per year)						
		Municipal	Manufacturing	Power	Irrigation	Mining	Livestock	Total
2008	Armstrong	377	0	0	6,520	0	490	7,387
	Carson	1,779	358	0	88,034	39	558	90,768
	Donley	600	0	0	32,265	0	835	33,700
	Gray	2,231	3,947	0	33,218	0	1,547	40,943
	Hutchison	463	995	0	2,168	0	21	3,648
	Potter	39,539	39	757	2,921	126	564	43,945
	Roberts	147	0	0	8,412	0	287	8,846
	Wheeler	1,261	0	0	15,142	0	1,170	17,573
	Total	**46,397**	**5,339**	**757**	**188,680**	**165**	**5,472**	**246,810**

[1] county total multiplied by apportioning factor (land area of District in county/land area of county) of 0.923 for Armstrong County, 0.043 for Hutchinson County, and 0.941 for Potter County; see Appendix B for Armstrong, Hutchinson, and Potter county totals.

Table 6, Summary estimates of groundwater use in District for most recent five years (in acre-feet)

Year	District Total[1] Groundwater Use (acre-feet per year)
2004	185,899
2005	208,928
2006	201,414
2007	236,778
2008	246,810

[1] county total multiplied by apportioning factor (land area of District in county/land area of county) of 0.923 for Armstrong County, 0.043 for Hutchinson County, and 0.941 for Potter County; see Appendix B for Armstrong, Hutchinson, and Potter county totals.

The next step in the planning process is the development of water demand projections for the various water use sectors and water user groups over the course of the 50-year planning horizon. Water demand projections are updated for the regional water planning process every five years and are based on changes in population trends including information from the most recent U.S. Census, water use patterns, and changes in technology (for example, anticipated savings from drought tolerant crops in the future). Appendix B provides water demand projections for the six water use categories throughout the 50-year planning horizon and Figure 4 and Table 7 provides summary information on water demands by county in the District. Water demands decrease from 224,353 acre-feet per year in 2010 to 195,605 acre-feet per year in 2060, representing a 15 percent decrease in water demands over the 50-year planning horizon.

Figure 4 – Water demand projections for the District from the 2012 State Water Plan (from Allen, 2012)

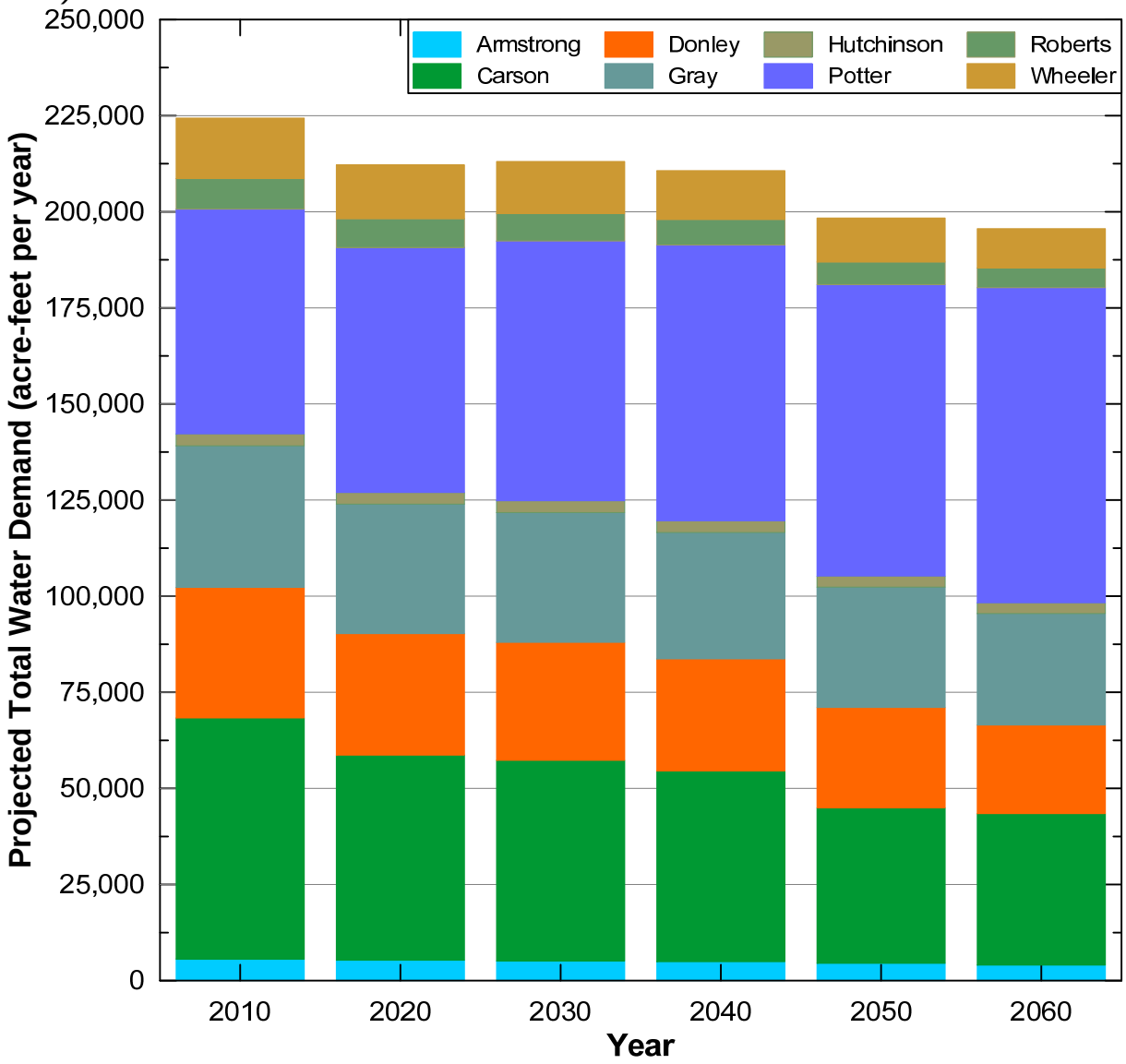


Table 7 Water demand projections for the District from the 2012 Texas State Water Plan (in acre-feet per year).

County	Projected Total Water Demands (acre-feet per year)					
	2010	2020	2030	2040	2050	2060
Armstrong - Total	6,068	5,752	5,598	5,348	4,870	4,386
Armstrong - District[1]	5,601	5,309	5,167	4,936	4,495	4,048
Carson	62,731	53,330	52,126	49,607	40,445	39,382
Donley	33,941	31,608	30,686	29,153	26,109	23,057
Gray	36,835	33,700	33,786	32,877	31,289	29,001
Hutchinson - Total	71,970	70,715	70,931	70,198	67,152	64,963
Hutchinson - District[2]	3,095	3,041	3,050	3,019	2,888	2,793
Potter - Total	62,142	67,696	71,794	76,261	80,594	87,101
Potter - District[3]	58,476	63,702	67,558	71,762	75,839	81,962
Roberts	7,928	7,488	7,175	6,634	5,849	5,123
Wheeler	15,746	14,027	13,546	12,702	11,439	10,239
District Total[4]	224,353	212,205	213,094	210,690	198,353	195,605

[1] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.923

[2] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.043

[3] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.941

[4] District total represents the sum of water demand projections for Carson, Donley, Gray, Roberts, and Wheeler counties and the proportional water demand estimate based on the proportional amount of area in the county that is within the boundaries for counties partially within the jurisdictional boundaries of the District.

The water demands for Hutchinson County in the District were based on the proportional area of that county in the District, which is 4.3 percent. However, District data documents only domestic and livestock water in that area and the District anticipates the water demands to be steady at approximately 20 acre-feet annually.

GROUNDWATER RESOURCES

The Ogallala Aquifer is the primary aquifer within the District and located in sediments of the Ogallala Formation of Neggene (Pliocene) age. The Ogallala Aquifer yields water from the mostly unconsolidated gravels, sands, silts, and clays of the Ogallala Formation. Groundwater movement is generally to the northeast, away from groundwater and topographic highs and towards the surface

drainage system of the Canadian River basin. There are areas where flow is toward groundwater lows that have developed as a result of production in large well fields. Areas where irrigation wells are co-located with municipal well fields have experienced significant water table declines. Other irrigated areas have demonstrated varying water level declines.

In addition to the Ogallala Aquifer, there are three minor aquifers within the District. The Blaine Aquifer is a minor aquifer located in the southern portion of Wheeler County. The aquifer is contained in the Permian age Blaine Formation. The water is found in solution channels formed by dissolving deposits of anhydrite and halite within the formation. The dissolving salts raise the total dissolved solids to levels above drinking water standards, so the Blaine Aquifer is used mainly for agricultural purposes.

The Dockum Aquifer furnishes limited amounts of household, livestock and irrigation water within the District. The Dockum Aquifer is present in Triassic age shales, sandstones and siltstones where it is found within the District. Water production from the Dockum Aquifer occurs in Armstrong, Potter and southwest Carson counties.

The Whitehorse Aquifer furnishes very small amounts of water where no other sources are available. The Whitehorse Aquifer is located with Permian age shales and clays in isolated areas of the District. The total dissolved solids and mineral concentrations render it usable for livestock watering purposes only in most instances. During the initial round of joint planning from 2005 - 2010, due to the very remote and limited amount and poor quality of groundwater available from the Whitehorse Aquifer, it was determined that for the purposes of adopted desired future conditions, the Whitehorse Aquifer was not relevant.

Based on District calculations, in 2010 the portion of the Ogallala Aquifer within the District had an estimated 74,000,000 acre-feet of water in storage, the Dockum Aquifer had an estimated

4,870,900 acre-feet of water in storage, and the Blaine Aquifer had 2,600,000 acre-feet of water in storage. No estimates of water in storage for the Whitehorse Aquifer are currently available. Total estimated groundwater resources within the District are summarized in Table 8.

Table 8 – Groundwater in storage in the District based on District calculations.

Aquifer	Groundwater in storage in the District
Ogallala	74,000,000
Dockum	4,870,900
Blaine	2,600,000
District Total	81,470,900

Texas Water Code §36.1071(e)(3)(C-E) requires that estimates for recharge discharge, inflows, and outflows, as quantified in the applicable groundwater availability model, be provided in the management plan for each relevant aquifer. Tables 9 and 10 include this required information, based on information from Jones (2012).

Table 9 Groundwater budget information for the Ogallala, Dockum, and Blaine aquifers from GAM Run 11-021 (Jones, 2012).

Information from Groundwater Availability Models	Volume (acre-feet per year)[1]		
	Ogallala Aquifer	Dockum Aquifer	Blaine Aquifer
Annual Recharge from Precipitation	98,167	2,643	4,132
Annual Discharge into Springs and other Surface Water Bodies	101,759	3,105	5,911
Annual Flow into the District	23,433	1,471	8,636
Annual Flow out of the District	21,182	1,047	7,505

[1] from GAM Run 11-021 (Jones, 2021); these flows may include fresh and brackish waters

Table 10 Groundwater flow between aquifers in the District from GAM Run 11-021 (Jones, 2012).

Unit Groundwater is Flowing From	Aquifer Groundwater is Flowing To	Volume of Flow[1] (acre-feet per year)
Underlying units	Overlying Ogallala Aquifer (single model layer)	0[2]
Overlying Ogallala Aquifer (model layer 1)	Underlying Dockum Aquifer model layers 2 and 3)	424
Overlying units	Blaine Aquifer	0[3]

[1] from GAM Run 11-021 (Jones, 2012); these flows may include fresh and brackish waters

[2] the model consists of a single layer and, thus, assumes no flow with underlying units

[3] the model reports net annual flow into the Blaine Aquifer of 367 acre-feet per year from nonexistent overlying units; this numerical modeling issue is currently under investigation.

Over the past century, there have been many hydrogeologic investigations focused on the Ogallala Aquifer and to a much lesser extent, the Dockum Aquifer. A detailed discussion of the hydrogeology of the District based on the published scientific literature is clearly beyond the scope of this management plan. For those interested in additional information, the following technical publications are recommended; Johnson (1901), White and others (1946), Seni (1980), Knowles and others (1984), Gutentag and others (1984), Bradley and Kalaswad (2003), Dutton and Simpkins, (1986), Dutton and others, (2001), Dutton (2004); Gustavson and others (1995), Nativ (1988), Wood and Osterkamp, (1987); Wood and Sanford, (1995); Mullican and others, (1997); Scanlon and others, (1997 a.b)., and McMahon and others, (2006)

Primary sources of recharge to the Ogallala Aquifer are infiltration of water from playa lakes and infiltration of precipitation. Localized infiltration of water from playa lakes is the main recharge mechanism in the part of the District located “above the Caprock.”

The District has determined that the most feasible method of increasing natural recharge is to increase rainfall by initiating a rainfall enhancement program. The objective of this program is to decrease irrigation demand and increase recharge in those areas where recharge takes place. Cloud seeding operations began in May 2000. The purpose of the cloud seeding program is to add

additional rainfall over an extended period. One additional inch of rainfall could provide 2300 acre-feet of additional recharge within the District each year (PGCD, 2001).

SURFACE WATER RESOURCES

While groundwater clearly provides the vast majority of water supplies within the District, it is still important to consider surface water resources during the development of this management plan. Also, Texas Water Code §36.1071(e)(3)(F) requires the inclusion of estimates of projected surface water supplies in the District based on the most recently adopted Texas State Water Plan. These estimates are presented below in Figure 5 and Table 11 and increase from 18,406 acre-feet per year in 2010 to 22,070 in 2020, then decrease to 21,570 in 2060. (Readers note – estimates of groundwater resources, determined based on the adopted desired future conditions, are included in Tables 1 – 3).

Figure 5 - Projected surface water supplies from the 2012 Texas State Water Plan (from Allen, 2011)

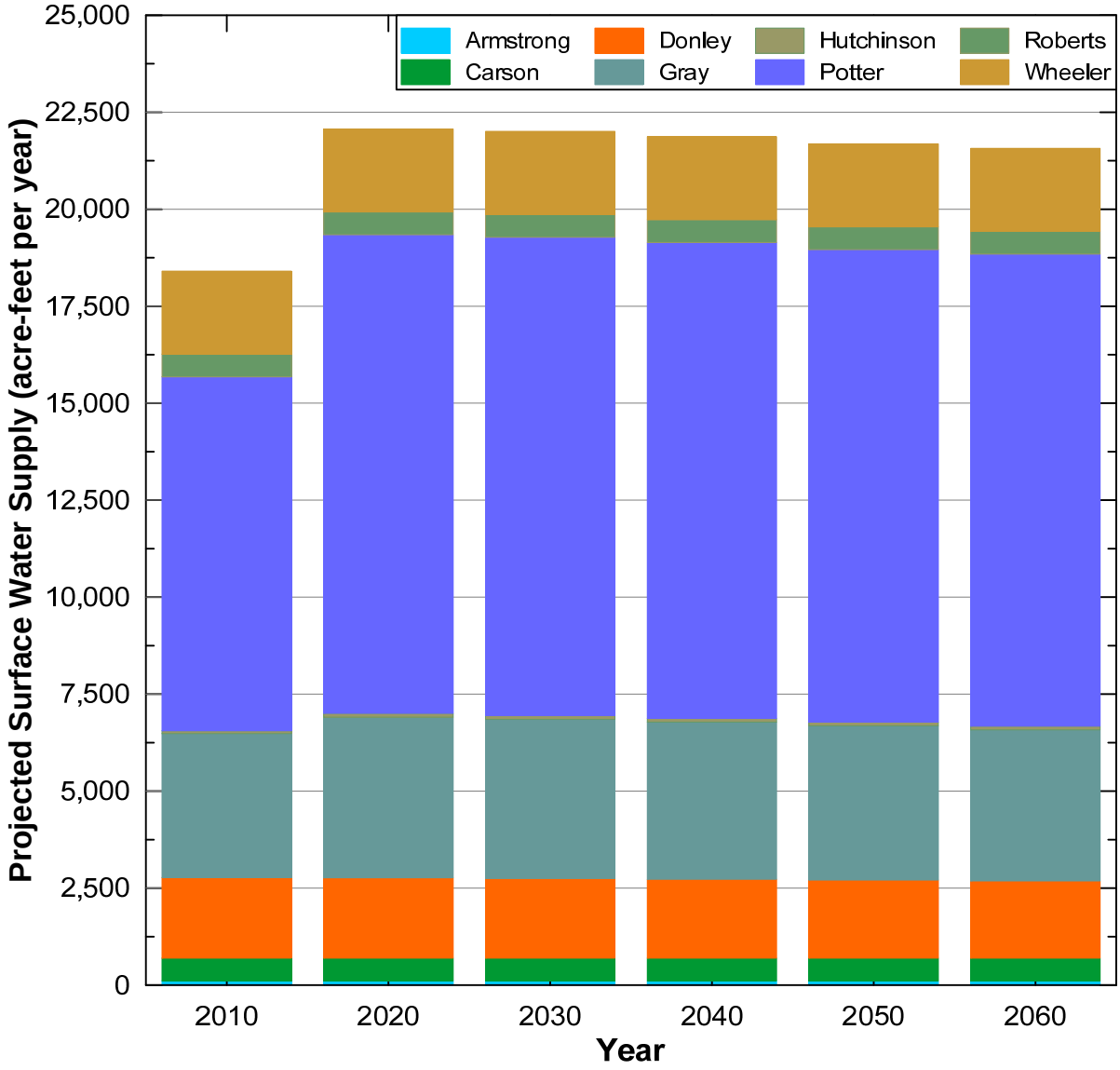


Table 11 Projected surface water supplies from the 2012 Texas State Water Plan (from Allen, 2011).

County	Projected Surface Water Supplies (acre-feet per year)					
	2010	2020	2030	2040	2050	2060
Armstrong - Total	121	121	121	121	121	121
Armstrong - District[1]	112	112	112	112	112	112
Carson	584	584	584	584	584	584
Donley	2,079	2,070	2,051	2,031	2,014	1,988
Gray	3,707	4,141	4,103	4,051	3,972	3,896
Hutchinson - Total	1,733	2,270	2,270	2,270	2,270	2,270

Hutchinson - District[2]	75	98	98	98	98	98
Potter - Total	9,693	13,110	13,103	13,036	12,941	12,927
Potter - District[3]	9,121	12,337	12,330	12,267	12,177	12,164
Roberts	587	587	587	587	587	587
Wheeler	2,141	2,141	2,141	2,141	2,141	2,141
District Total	18,406	22,070	22,006	21,871	21,685	21,570

[1]1county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.923
[2] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.043
[3] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.941

Lake Meredith and Lake Greenbelt are the two major surface impoundments used to supply water to cities inside and outside the District. There are also numerous other small reservoirs used for agricultural purposes and environmental needs. Lake Meredith is located in parts of Hutchinson, Moore, and Potter counties, and is operated by the Canadian River Municipal Water Authority (CRMWA) as a municipal and industrial water supply for 11 member cities of the Authority. The lake is owned by the United States Bureau of Reclamation and is operated as a National Recreation Area by the National Park Service. Water rights to impound water in the lake (up to 500,000 acre-feet may be held in conservation storage), and to divert water from it for municipal and industrial uses, are held by the Authority under certificates of adjudication issued by the State of Texas. The Ogallala Aquifer provides most of the water that CRMWA delivers to its member cities. Supplemental water is obtained from Lake Meredith to fulfill the annual CRMWA allocations, however, for the first time since opening, there are no projected deliveries of surface water to member cities from Lake Meredith in 2012. Water from the lake is blended with local groundwater from individual municipality well fields by several cities. Member cities use the water from CRMWA to supply their base demand, and rely upon their localized groundwater supplies to meet their peak demands. Pampa and Amarillo, which are within the boundaries of the District, follow the latter

procedure. Calculated annual firm yield of Lake Meredith is 69,750 acre-feet, although permits originally granted to the Authority were for greater amounts. However, for planning calculations, it is assumed to supply an average of 30,000 acre-feet per year (PRWP, 2011), including during drought conditions, throughout the planning period to the year 2050. The Authority has a contract to provide 7.163 percent of the normal water supply from Lake Meredith to Pampa and 37 percent to Amarillo. CRMWA allocated 358 and 1,850 acre-feet of the Lake Meredith supply to Pampa and Amarillo respectively, for calendar year 2011.(CRMWA, 2010).

The second surface impoundment is Greenbelt Lake, located in Donley County. Greenbelt Municipal & Industrial Water Authority (Greenbelt) is the proprietor and operator. The possible annual supply from this impoundment is 8,297 acre-feet; however, during the 2007 fiscal year for Greenbelt (July 2006 – June 2007), the yield was 2,891 acre-feet (PRWP, 2011). Therefore, it will be assumed to supply an average of 2,891 acre-feet per year, including during drought conditions, throughout the planning period to the year 2050.

WATER SUPPLY PLAN

A water supply need exists if the projected demands exceed the supply. During the regional water planning process, needs are quantified on an individual water user group basis, then summarized at the county, groundwater conservation district, regional water planning area, and statewide basis. If no water user group is determined to have a need for additional water supply during drought conditions, then the need for additional supply will be recorded as 0. A review of summary data for counties in the District documents that five of the eight counties in the District do not have a need for additional water supply throughout the 50-year planning horizon; Armstrong, Carson, Donley, Roberts, and Wheeler County. Gray County has a need for 36 acre-feet of

additional water supply in 2060; the portion of Hutchinson County that is in the District has a need for a maximum of 645 acre-feet in 2010; and the portion of Potter County that is in the District has a need for 13,982 acre-feet of additional water supply in 2060 (Figure 6 and Table 12). The portion of Hutchinson County that is in the District shows needs based on a proportional amount of the needs in Hutchinson County as a whole. As discussed above in the water demand projections section, that area has only domestic and livestock use, and therefore the District does not anticipate that the portion of Hutchinson County in the District will realize any needs for additional water supply.

Figure 6 Total projected needs from the 2012 Texas State Water Plan (from Allen, 2011).

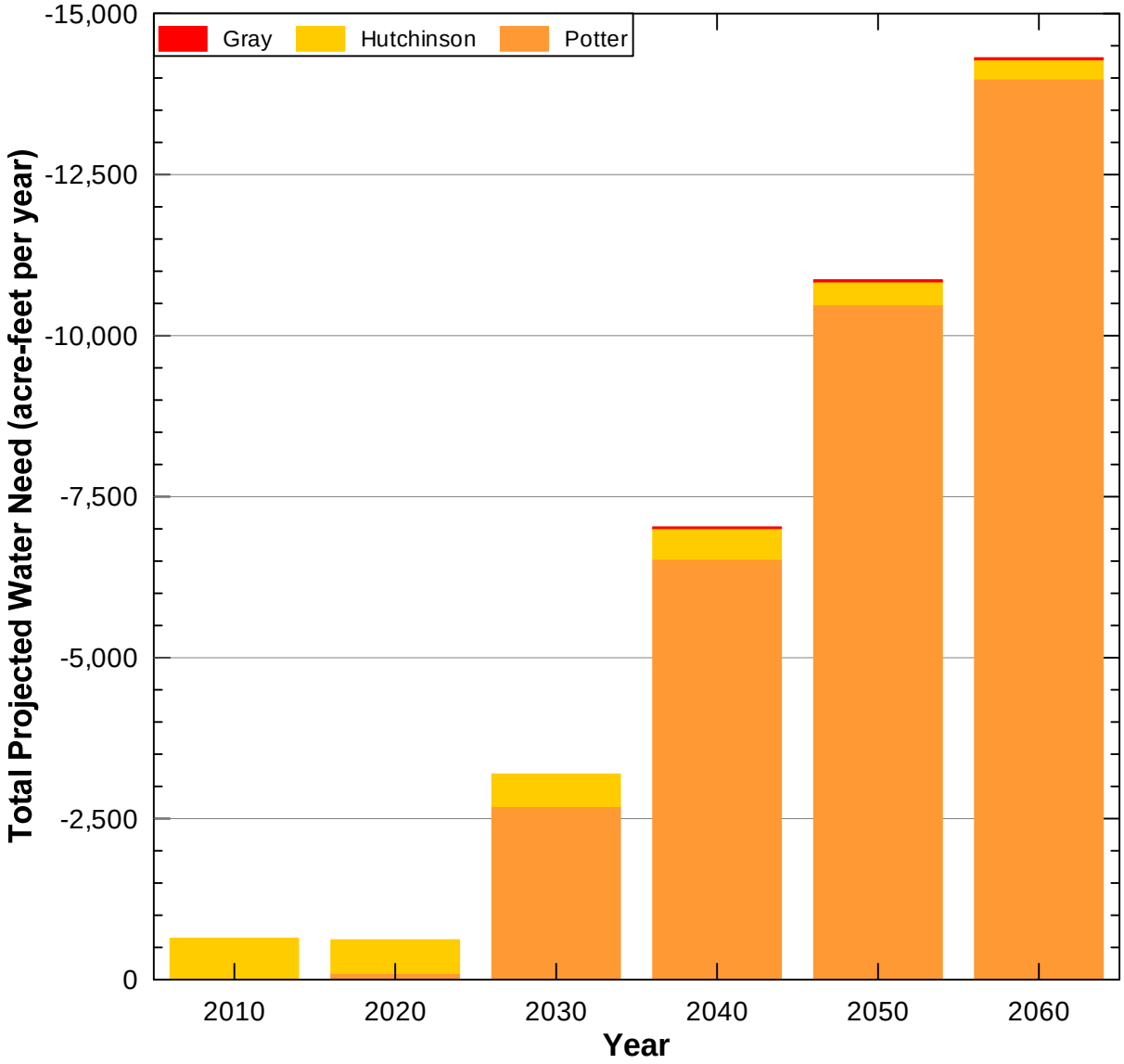


Table 12 Total projected needs from the 2012 Texas State Water Plan (from Allen, 2011).

County	Total Projected Water Needs (acre-feet per year)					
	2010	2020	2030	2040	2050	2060
Armstrong	0	0	0	0	0	0
Carson	0	0	0	0	0	0
Donley	0	0	0	0	0	0
Gray	0	0	0	-29	-35	-36
Hutchinson - Total	-15,008	-12,175	-11,716	-11,081	-8,318	-6,921
Hutchinson - District[1]	-645	-524	-504	-476	-358	-298
Potter - Total	0	-103	-2,859	-6,936	-11,132	-14,859

Potter - District[2]	0	-97	-2,690	-6,527	-10,475	-13,982
Roberts	0	0	0	0	0	0
Wheeler	0	0	0	0	0	0

[1] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.043
[2] county total multiplied by apportioning factor (land area of district in county/land area of county) of 0.941

The final step in the regional water planning process is to identify, evaluate, and then recommend or select water management strategies to meet all identified needs for additional water supply. Basically, any water user group, whether it is a city or irrigated agriculture or mining (at a county aggregate level) for example, that is determined to have a need for additional water supply for any decade during the 50-year planning horizon will go through a deliberate process of identifying all potentially feasible water management strategies to meet the identified need, evaluate the cost, reliability, yield, impact to the environment and water quality, and the recommend the most appropriate strategy or combination of water management strategies to meet the identified needs. Table 13 includes the water management strategies recommended in the 2012 Texas State Water Plan to meet the identified needs for additional water supply.

Table 13 Projected water management strategies from the 2012 Texas State Water Plan (from Allen, 2011).

Water User Group (WUG)[1]	WUG Basin	Water Management Strategy	Source Name	Source County
Armstrong County - RWPG A				
Irrigation	Red	Irrigation Conservation	Conservation	Armstrong
	Red	Precipitation Enhancement	Weather Modification	Armstrong
Carson County - RWPG A				
Irrigation	Canadian	Irrigation Conservation	Conservation	Carson
	Red	Irrigation Conservation	Conservation	Carson
	Canadian	Precipitation Enhancement	Weather Modification	Carson
	Red	Precipitation Enhancement	Weather Modification	Carson
Municipal	Red	Drill Additional Groundwater Well	Ogallala Aquifer	Carson
	Red	Municipal Conservation	Conservation	Carson
Donley County - RWPG A				
Irrigation	Red	Irrigation Conservation	Conservation	Donley
	Red	Precipitation Enhancement	Weather Modification	Donley
Gray County - RWPG A				
Irrigation	Canadian	Irrigation Conservation	Conservation	Gray
	Red	Irrigation Conservation	Conservation	Gray
	Canadian	Precipitation Enhancement	Weather Modification	Gray
	Red	Precipitation Enhancement	Weather Modification	Gray
Municipal	Red	Drill Additional Groundwater Well	Ogallala Aquifer	Gray
	Red	Municipal Conservation	Conservation	Gray
	Canadian	Drill Additional Groundwater Well	Ogallala Aquifer	Gray
	Canadian	Municipal Conservation	Conservation	Gray
	Canadian	Voluntary Transfer From Other Users	Ogallala Aquifer	Roberts
Hutchinson County - RWPG A[2]				
Irrigation	Canadian	Irrigation Conservation	Conservation	Hutchinson
	Canadian	Precipitation Enhancement	Weather Modification	Hutchinson
Manufacturing	Canadian	Voluntary Transfer From Other Users	Ogallala Aquifer	Hutchinson
Potter County - RWPG A				
County-Other	Canadian	Drill Additional Groundwater Well	Ogallala Aquifer	Potter
	Red	Drill Additional Groundwater Well	Ogallala Aquifer	Potter
	Canadian	Municipal Conservation	Conservation	Potter
	Red	Municipal Conservation	Conservation	Potter
Irrigation	Canadian	Irrigation Conservation	Conservation	Potter
	Red	Irrigation Conservation	Conservation	Potter
	Canadian	Precipitation Enhancement	Weather Modification	Potter
	Red	Precipitation Enhancement	Weather Modification	Potter
Manufacturing	Canadian	Voluntary Transfer From Other Users	Ogallala Aquifer	Potter
	Red	Voluntary Transfer From Other Users	Ogallala Aquifer	Potter
Municipal	Canadian	Municipal Conservation	Conservation	Potter
	Red	Municipal Conservation	Conservation	Potter
	Canadian	Potter County Well Field	Ogallala Aquifer	Potter
	Red	Potter County Well Field	Ogallala Aquifer	Potter
	Red	Potter County Well Field	Ogallala Aquifer	Potter
	Canadian	Roberts County Well Field - Amarillo	Ogallala Aquifer	Roberts
	Red	Roberts County Well Field - Amarillo	Ogallala Aquifer	Roberts

Table 13, continued

Water User Group (WUG)[1]	WUG Basin	Water Management Strategy	Source Name	Source County
Roberts County - RWPG A				
Irrigation	Canadian	Irrigation Conservation	Conservation	Roberts
	Red	Irrigation Conservation	Conservation	Roberts
	Canadian	Precipitation Enhancement	Weather Modification	Roberts
	Red	Precipitation Enhancement	Weather Modification	Roberts
Wheeler County - RWPG A				
Irrigation	Red	Irrigation Conservation	Conservation	Wheeler
	Red	Precipitation Enhancement	Weather Modification	Wheeler
Municipal	Red	Drill Additional Groundwater Well	Ogallala Aquifer	Wheeler
	Red	Municipal Conservation	Conservation	Wheeler

[1] all municipal WUGs combined and referred to as MUNICIPAL

[2] county municipal strategies removed because all municipalities with a water management strategy are located outside of the District

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Appendix A Statutorily Required Elements Checklist

As required by Texas Water Code Chapter 36.1071, the Panhandle Groundwater Conservation District submits this groundwater management plan to the Executive Administrator of the Texas Water Development Board for review and approval. The following table contains a checklist that is included to facilitate the administrative review of the management plan.

Requirement	Rule	Comments on Information Submitted	Location
Paper Copy of Plan	31 TAC §356.6 (a)(1)	NA	Enclosed herein
Electronic Copy of Plan	31 TAC §356.6 (a)(1)	NA	Submitted Separately
1. Estimate the modeled available groundwater in the district based on the desired future condition of the aquifers	31 TAC §356.5 (a)(5)(A) TWC §36.1071 (e)(3)(A)	Full text included in plan.	Pages 13, 16 and 17 Tables 1, 2 and 3
2. Estimate the amount of groundwater being used within the district on an annual basis for at least the most recent five years.	31 TAC §356.5 (a)(5)(B) 31 TAC §356.2(2) TWC §36.1071(e)(3)(B)	Full text included in plan.	Page 43 Table 6
3. Estimate the annual amount of recharge, from precipitation, to the groundwater resources within the district.	31 TAC §356.5 (a)(5)(C) TWC §36.1071(e)(3)(C)	Full text included in plan.	Page 47 Table 9
4. For each aquifer, estimate the annual volume of water that discharges from the aquifer to springs and	31 TAC §356.5 (a)(5)(D) TWC §36.1071(e)(3)(D)	Full text included in plan.	Page 47 Table 9

surface water bodies.			
5. For each aquifer, estimate the annual volume of flow into, out of, and between aquifers in the district.	31 TAC §356.5 (a)(5)(E) TWC §36.1071(e)(3)(E)	Full text included in plan.	Page 48 Table 10
Requirement	**Rule**	**Comments on Information Submitted**	**Location**
6. Estimate the projected surface water supply within the district according to the most recently adopted state water plan.	31 TAC §356.5 (a)(5)(F) TWC §36.1071(e)(3)(F)	Full text included in plan	Page 50 Table 11
7. Estimate the projected total demand for water within the district according to the most recently adopted state water plan.	31 TAC §356.5 (a)(5)(G) TWC §36.1071(e)(3)(G)	Full text included in plan	Page 45 Table 7
8. Consider the water supply needs that are included in the state water plan.	31 TAC §356.5 (a)(7) TWC §36.1071(e)(4)	Full text included in plan	Page 54 Table 12
9. Consider the water management strategies that are included in the state water plan.	31 TAC §356.5 (a)(7); TWC §36.1071(e)(4)	Full text included in plan.	Page 55 Table 13
10. Develop actions, procedures, performance, and avoidance necessary to effectuate the plan, including specifications and proposed rules.	31 TAC §356.5 (a)(4); §356.6(a)(3); TWC §36.1071(e)(2)	Full text included in plan	Page 11

11. Include a certified copy of the district's resolution adopting the plan.	31 TAC §356.6 (a)(2)		Appendix C
12. Provide evidence that the plan was adopted after notice and hearing.	31 TAC §356.6 (a)(5); TWC §36.1071(a)		Appendix D
Requirement	**Rule**	**Comments on Information Submitted**	**Location**
13. Provide evidence that the district coordinated the development of the plan with all surface water management entities.	31 TAC §356.6 (a)(4); TWC §36.1071(a)	A copy of the district's plan was sent to all surface water management entities.	Appendix E
14. Provide any site-specific information used in developing the plan	31 TAC §356.5 (b); TWC §36.1071(h)	All hydrologic and planning data included in this plan was provided by the TWDB.	Not Applicable
Management goals required to be addressed:			
Provide the most efficient use of groundwater	31 TAC §356.5(a)(1)(A); TWC §36.1071(a)(1)	Full text included in plan.	Page 18
Control and prevent waste of groundwater	31 TAC §356.5(a)(1)(B); TWC §36.1071(a)(2)	Full text included in plan.	Page 23
Control and prevent subsidence	31 TAC §356.5(a)(1)(C); TWC §36.1071(a)(3)	NA - Full text included in plan.	Page 34
Address conjunctive surface water management issues	31 TAC §356.5(a)(1)(D); TWC §36.1071(a)(4)	Full text included in plan.	Page 25
Address natural resource issues that impact or are impacted	31 TAC §356.5(a)(1)(E); TWC §36.1071(a)(5)	Full text included in plan.	Page 26

by the use and availability of groundwater			
Address drought conditions	31 TAC §356.5(a)(1)(F); TWC §36.1071(a)(6)	Full text included in plan.	Page 24
Address conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, and brush control	31 TAC §356.5(a)(1)(G); TWC §36.1071(a)(7)	Full text included in plan.	Pages 29 – 34
Address the desired future conditions of the groundwater resources in the district	31 TAC §356.5(a)(1)(H); TWC §36.1071(a)(8)	Full text included in plan.	Page 12
Identify the performance standards and management objectives for effecting the plan	31 TAC §356.5(a)(2)&(3); TWC §36.1071(e)(1)	Full text included in plan.	In each goal pages 12-33

Appendix B Estimated historical groundwater use and 2011 regional water plan datasets: Panhandle Groundwater Conservation District, by Stephen Allen

ESTIMATED HISTORICAL GROUNDWATER USE AND 2011 REGIONAL WATER PLAN DATASETS:
Panhandle Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Resources Division
Groundwater Technical Assistance Section
(512) 463-7317
October 13, 2011

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.state.tx.us/GwRD/GCD/pdf/GMPchecklist0911.pdf

The five reports included in part 1 are:

1. **Estimated Historical Groundwater Use** (checklist Item 2)
   from the TWDB Historical Water Use Survey (WUS)
2. **Projected Surface Water Supply** (checklist Item 6)
3. **Projected Net Water Demand** (checklist Item 7)
4. **Projected Water Supply Needs** (checklist Item 8)
5. **Projected Water Management Strategies** (checklist Item 9)
   reports 2-5 are from the 2012 State Water Plan (SWP)

DISCLAIMER:

No claims are made as to the accuracy or completeness of the data presented herein nor to its suitability for a particular use. District personnel must review these data and correct any discrepancies in order to ensure approval of their groundwater management plan.

The Historical Water Use data values can be verified at this web address:

http://www.twdb.state.tx.us/wrpi/wus/summary.asp

The TWDB 2012 State Water Plan data values can be verified at this web address. On that page click on Download > Download files > Download Excel 97 XLS file:

https://www.twdb.state.tx.us/apps/db12/defaultReadOnly.asp

For questions concerning these data please contact Stephen Allen (stephen.allen@twdb.state.tx.us or 512-463-7317) or Rima Petrossian (rima.petrossian@twdb.state.tx.us or 512-936-2420).

CONVERSION OF COUNTY-SPECIFIC VALUES TO DISTRICT-SPECIFIC VALUES: Data provided in this report is county-based. Because some groundwater conservation districts cover only a portion of one or more counties, those districts may wish to apportion the partial county data to generate values that more accurately represent district conditions in those counties. A potential apportioning formula to use which apportions values by land area is:

[county data values * [land area of district in county/land area of county]].

If a district chooses to use this formula it is recommended that only the generic county-wide data (county other, manufacturing, steam electric power, irrigation, and livestock) be adjusted. Specific municipalities, water supply corporations, and utility districts should be included or excluded depending on whether they are located in the district or not. Their locations can be determined by examining maps of surface water entities such as the interactive map viewer provided by the Texas Commission on Environmental Quality at this web address:

http://www.tceq.texas.gov/gis/iwudview.html

Using the formula above for the Panhandle Groundwater Conservation District, the apportioning factor to use [land area of district in county/land area of county] in multiplying each county value is:

Armstrong	.923
Carson	1.000
Donley	1.000
Gray	1.000
Hutchinson	.043
Potter	.941
Roberts	1.000

Wheeler 1.000

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

Note on data values: The WUS table is periodically updated by the TWDB Water Resources Planning and Information Office if and when more accurate data become available. The data presented in this table is up-to-date as of April 20, 2011. It is unlikely but possible that some of the values presented here have changed since April 20.

ARMSTRONG COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	**331**	**1**	**0**	**30,308**	**0**	**610**	**31,250**
1980	265	0	0	19,163	0	675	20,103
1984	**335**	**0**	**0**	**7,097**	**24**	**447**	**7,903**
1985	318	0	0	4,625	24	468	5,435
1986	**361**	**0**	**0**	**4,867**	**25**	**492**	**5,745**
1987	306	0	0	4,366	20	517	5,209
1988	**292**	**0**	**0**	**10,307**	**21**	**497**	**11,117**
1989	302	0	0	10,549	18	517	11,386
1990	**353**	**0**	**0**	**16,591**	**18**	**518**	**17,480**
1991	334	0	0	11,691	19	529	12,573
1992	**306**	**0**	**0**	**13,413**	**19**	**853**	**14,591**
1993	330	0	0	12,114	19	926	13,389
1994	**366**	**0**	**0**	**10,640**	**19**	**669**	**11,694**
1995	380	0	0	11,906	19	504	12,809
1996	**470**	**0**	**0**	**9,654**	**19**	**493**	**10,636**
1997	358	0	0	10,917	19	513	11,807
1998	**423**	**0**	**0**	**8,930**	**19**	**547**	**9,919**
1999	384	0	0	12,594	19	536	13,533
2000	**414**	**0**	**0**	**11,818**	**19**	**483**	**12,734**
2001	390	0	0	7,739	19	451	8,599
2002	**373**	**0**	**0**	**10,274**	**19**	**529**	**11,195**
2003	437	0	0	7,634	19	788	8,878
2004	**379**	**0**	**0**	**7,197**	**19**	**779**	**8,374**
2005	387	0	0	7,662	0	821	8,870
2006	**471**	**0**	**0**	**6,583**	**0**	**916**	**7,970**
2007	396	0	0	5,780	0	506	6,682
2008	**408**	**0**	**0**	**7,064**	**0**	**531**	**8,003**

CARSON COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total

1974	861	1,354	0	184,354	588	753	187,910
1980	**1,471**	**1,059**	**0**	**186,145**	**927**	**886**	**190,488**
1984	1,523	825	0	105,923	895	904	110,070
1985	**1,245**	**730**	**0**	**77,682**	**815**	**909**	**81,381**
1986	1,323	843	0	67,100	1,481	995	71,742
1987	**1,221**	**837**	**0**	**66,050**	**1,392**	**1,121**	**70,621**
1988	1,337	926	0	66,970	1,444	907	71,584
1989	**1,333**	**641**	**0**	**93,553**	**1,375**	**907**	**97,809**
1990	1,361	683	0	146,350	1,375	943	150,712
1991	**1,317**	**688**	**0**	**138,159**	**1,804**	**964**	**142,932**
1992	1,186	616	0	126,217	1,754	1,171	130,944
1993	**1,210**	**554**	**0**	**65,924**	**1,650**	**1,339**	**70,677**
1994	1,348	571	0	69,137	1,651	1,218	73,925
1995	**1,471**	**510**	**0**	**83,495**	**1,703**	**1,352**	**88,531**
1996	1,434	536	0	76,190	1,703	1,723	81,586
1997	**1,040**	**499**	**0**	**53,704**	**1,687**	**1,156**	**58,086**
1998	1,205	429	0	85,640	1,632	1,586	90,492
1999	**993**	**423**	**0**	**73,077**	**1,632**	**1,574**	**77,699**
2000	1,433	491	0	79,045	1,632	1,135	83,736
2001	**1,382**	**402**	**0**	**51,012**	**832**	**387**	**54,015**
2002	1,282	448	0	53,621	832	377	56,560
2003	**1,266**	**444**	**0**	**55,663**	**832**	**277**	**58,482**
2004	1,217	440	0	56,545	842	261	59,305
2005	**1,347**	**1,432**	**0**	**70,249**	**58**	**586**	**73,672**
2006	1,432	307	0	64,707	43	1,007	67,496
2007	**1,778**	**307**	**0**	**84,896**	**53**	**571**	**87,605**
2008	1,779	358	0	88,034	39	558	90,768

DONLEY COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	**267**	**0**	**0**	**26,020**	**3**	**187**	**26,477**
1980	134	21	0	13,158	0	71	13,384
1984	**143**	**21**	**0**	**6,715**	**24**	**67**	**6,970**
1985	95	21	0	4,917	24	84	5,141
1986	**64**	**21**	**0**	**4,716**	**25**	**62**	**4,888**
1987	89	0	0	3,775	20	62	3,946
1988	**59**	**0**	**0**	**6,000**	**21**	**66**	**6,146**
1989	79	0	0	17,516	0	66	17,661
1990	**87**	**0**	**0**	**12,425**	**0**	**65**	**12,577**
1991	85	0	0	10,184	22	67	10,358
1992	**88**	**0**	**0**	**10,317**	**22**	**79**	**10,506**
1993	83	0	0	10,397	22	79	10,581
1994	**55**	**0**	**0**	**12,638**	**22**	**72**	**12,787**

1995	95	0	0	10,352	22	99	10,568
1996	**94**	**0**	**0**	**9,338**	**22**	**171**	**9,625**
1997	88	0	0	8,845	22	74	9,029
1998	**131**	**0**	**0**	**14,746**	**22**	**118**	**15,017**
1999	91	0	0	10,268	22	151	10,532
2000	**137**	**0**	**0**	**23,873**	**22**	**136**	**24,168**
2001	85	0	0	18,739	22	135	18,981
2002	**87**	**0**	**0**	**26,256**	**22**	**125**	**26,490**
2003	91	0	0	28,484	22	100	28,697
2004	**97**	**0**	**0**	**29,097**	**22**	**110**	**29,326**
2005	238	0	0	30,969	0	943	32,150
2006	**259**	**0**	**0**	**26,299**	**0**	**862**	**27,420**
2007	576	0	0	38,543	0	943	40,062
2008	**600**	**0**	**0**	**32,265**	**0**	**835**	**33,700**

GRAY COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	1,102	4,548	0	45,719	2,799	787	54,955
1980	**1,115**	**4,194**	**0**	**40,007**	**1,256**	**989**	**47,561**
1984	3,234	3,160	0	16,293	726	210	23,623
1985	**3,322**	**3,259**	**0**	**21,500**	**1,349**	**246**	**29,676**
1986	2,316	3,384	0	27,317	1,355	243	34,615
1987	**2,522**	**2,910**	**0**	**21,767**	**1,052**	**210**	**28,461**
1988	2,448	1,576	0	26,512	990	122	31,648
1989	**2,510**	**3,402**	**0**	**19,905**	**952**	**123**	**26,892**
1990	2,885	3,644	0	25,000	952	141	32,622
1991	**3,759**	**3,200**	**0**	**31,707**	**1,392**	**145**	**40,203**
1992	3,411	3,682	0	25,341	1,379	309	34,122
1993	**3,540**	**3,868**	**0**	**21,397**	**1,127**	**323**	**30,255**
1994	3,672	3,868	0	16,444	1,136	280	25,400
1995	**3,192**	**3,928**	**0**	**16,577**	**1,366**	**296**	**25,359**
1996	2,503	3,872	0	17,863	1,366	309	25,913
1997	**2,192**	**3,812**	**0**	**24,229**	**1,396**	**285**	**31,914**
1998	1,147	4,082	0	25,472	1,092	275	32,068
1999	**1,063**	**3,878**	**0**	**23,079**	**1,092**	**299**	**29,411**
2000	1,151	4,083	0	20,525	1,092	140	26,991
2001	**1,521**	**4,036**	**0**	**15,733**	**1,297**	**91**	**22,678**
2002	956	3,634	0	20,494	1,297	106	26,487
2003	**1,530**	**3,765**	**0**	**37,451**	**1,297**	**109**	**44,152**
2004	1,423	3,843	0	35,394	1,288	118	42,066
2005	**2,253**	**3,655**	**0**	**33,406**	**0**	**1,169**	**40,483**
2006	2,228	3,694	0	27,181	0	1,998	35,101
2007	**2,182**	**3,921**	**0**	**32,103**	**0**	**1,450**	**39,656**

2008	2,231	3,947	0	33,218	0	1,547	40,943

HUTCHINSON COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	**2,362**	**15,512**	**383**	**87,558**	**1,899**	**138**	**107,852**
1980	2,764	15,465	690	74,160	1,929	122	95,130
1984	**4,043**	**23,946**	**0**	**60,142**	**812**	**52**	**88,995**
1985	4,342	13,822	0	64,199	1,019	70	83,452
1986	**3,959**	**13,043**	**0**	**48,933**	**843**	**56**	**66,834**
1987	3,252	14,645	0	59,867	762	54	78,580
1988	**2,852**	**15,060**	**0**	**51,403**	**690**	**51**	**70,056**
1989	2,716	15,858	0	44,746	642	65	64,027
1990	**2,132**	**16,093**	**0**	**57,880**	**642**	**66**	**76,813**
1991	2,447	15,243	0	61,525	482	67	79,764
1992	**2,389**	**13,868**	**0**	**67,001**	**475**	**73**	**83,806**
1993	2,917	20,437	0	48,261	415	81	72,111
1994	**3,680**	**13,551**	**0**	**62,701**	**361**	**110**	**80,403**
1995	3,870	14,454	0	63,687	407	99	82,517
1996	**4,104**	**13,472**	**0**	**50,023**	**407**	**54**	**68,060**
1997	3,568	14,532	0	43,516	407	52	62,075
1998	**5,447**	**14,665**	**0**	**46,034**	**309**	**61**	**66,516**
1999	4,008	15,271	0	54,981	309	67	74,636
2000	**2,908**	**14,210**	**0**	**58,766**	**6,143**	**55**	**82,082**
2001	4,941	17,631	0	40,020	6,004	45	68,641
2002	**4,912**	**16,120**	**0**	**48,203**	**1,247**	**53**	**70,535**
2003	3,321	15,045	0	36,377	353	54	55,150
2004	**3,888**	**13,847**	**0**	**38,323**	**1,221**	**72**	**57,351**
2005	37,007	21,644	0	41,381	0	478	100,510
2006	**40,742**	**22,582**	**0**	**40,919**	**0**	**567**	**104,810**
2007	23,174	22,331	0	34,495	0	386	80,386
2008	**10,777**	**23,148**	**0**	**50,427**	**0**	**495**	**84,847**

POTTER COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	7,525	2,063	4,888	24,327	129	75	39,007
1980	**11,315**	**4,886**	**1,766**	**19,491**	**535**	**38**	**38,031**
1984	12,053	3,084	1,733	10,176	562	54	27,662
1985	**11,655**	**2,849**	**2,018**	**9,303**	**563**	**60**	**26,448**
1986	13,021	2,839	1,749	9,783	587	60	28,039
1987	**13,658**	**2,765**	**2,050**	**9,112**	**494**	**68**	**28,147**
1988	12,445	2,413	1,927	20,466	505	72	37,828
1989	**10,975**	**2,230**	**2,234**	**6,726**	**474**	**72**	**22,711**

1990	12,245	2,005	2,227	4,957	474	71	21,979
1991	**12,683**	**2,249**	**1,712**	**7,051**	**419**	**73**	**24,187**
1992	11,593	1,941	1,522	7,163	767	74	23,060
1993	**11,435**	**2,166**	**2,022**	**32,583**	**930**	**88**	**49,224**
1994	12,123	2,259	2,028	14,218	936	65	31,629
1995	**12,228**	**2,417**	**1,798**	**15,531**	**953**	**68**	**32,995**
1996	12,003	2,027	1,075	18,183	957	68	34,313
1997	**10,081**	**2,025**	**1,367**	**25,105**	**906**	**68**	**39,552**
1998	11,298	2,167	1,594	7,988	408	53	23,508
1999	**5,416**	**1,937**	**1,637**	**4,675**	**408**	**51**	**14,124**
2000	13,862	2,473	3,613	3,737	260	57	24,002
2001	**12,971**	**1,518**	**5,483**	**5,269**	**126**	**47**	**25,414**
2002	12,692	2,846	4,265	8,724	105	98	28,730
2003	**11,007**	**1,641**	**6,671**	**5,091**	**403**	**79**	**24,892**
2004	11,092	1,570	1,834	4,929	406	45	19,876
2005	**15,910**	**11**	**806**	**4,595**	**143**	**547**	**22,012**
2006	23,925	6	804	4,204	146	539	29,624
2007	**19,107**	**340**	**804**	**5,887**	**134**	**633**	**26,905**
2008	42,018	41	804	3,104	134	599	46,700

ROBERTS COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	**210**	**0**	**0**	**13,518**	**1**	**120**	**13,849**
1980	232	0	0	14,911	0	51	15,194
1984	**233**	**0**	**0**	**5,204**	**3**	**67**	**5,507**
1985	219	0	0	4,050	4	55	4,328
1986	**200**	**0**	**0**	**4,267**	**10**	**59**	**4,536**
1987	188	0	0	2,783	9	50	3,030
1988	**208**	**0**	**0**	**5,517**	**10**	**52**	**5,787**
1989	212	0	0	4,243	6	54	4,515
1990	**235**	**0**	**0**	**4,275**	**6**	**54**	**4,570**
1991	247	0	0	4,900	13	56	5,216
1992	**233**	**0**	**0**	**3,992**	**12**	**56**	**4,293**
1993	214	0	0	4,095	12	61	4,382
1994	**207**	**0**	**0**	**5,650**	**11**	**40**	**5,908**
1995	207	0	0	4,424	11	37	4,679
1996	**169**	**0**	**0**	**7,057**	**11**	**35**	**7,272**
1997	183	0	0	3,634	9	32	3,858
1998	**214**	**0**	**0**	**11,112**	**9**	**56**	**11,391**
1999	182	0	0	7,945	9	55	8,191
2000	**180**	**0**	**0**	**8,838**	**9**	**54**	**9,081**
2001	160	0	0	7,045	5	45	7,255
2002	**166**	**0**	**0**	**12,642**	**5**	**50**	**12,863**

2003	164	0	0	12,866	5	46	13,081
2004	**241**	**0**	**0**	**14,394**	**5**	**48**	**14,688**
2005	203	0	0	13,601	1	460	14,265
2006	**106**	**0**	**0**	**14,639**	**0**	**350**	**15,095**
2007	156	0	0	16,522	0	387	17,065
2008	**147**	**0**	**0**	**8,412**	**0**	**287**	**8,846**

WHEELER COUNTY

All values are in acre-feet/year

Year	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	1,112	326	0	10,065	199	595	12,297
1980	**1,475**	**218**	**0**	**7,790**	**95**	**568**	**10,146**
1984	1,282	0	0	4,078	89	209	5,658
1985	**1,117**	**0**	**0**	**3,250**	**171**	**197**	**4,735**
1986	987	0	0	3,683	153	192	5,015
1987	**997**	**0**	**0**	**2,533**	**144**	**191**	**3,865**
1988	1,002	0	0	3,600	157	144	4,903
1989	**887**	**0**	**0**	**2,237**	**145**	**143**	**3,412**
1990	901	0	0	2,659	145	153	3,858
1991	**906**	**0**	**0**	**3,084**	**114**	**157**	**4,261**
1992	877	0	0	3,091	114	212	4,294
1993	**863**	**0**	**0**	**2,197**	**114**	**236**	**3,410**
1994	972	0	0	3,124	114	195	4,405
1995	**853**	**0**	**0**	**2,448**	**113**	**222**	**3,636**
1996	865	0	0	2,956	113	260	4,194
1997	**1,147**	**0**	**0**	**2,997**	**113**	**223**	**4,480**
1998	1,193	0	0	5,419	113	213	6,938
1999	**969**	**0**	**0**	**3,557**	**113**	**253**	**4,892**
2000	961	0	0	7,939	113	173	9,186
2001	**985**	**0**	**0**	**5,396**	**113**	**173**	**6,667**
2002	863	0	0	9,104	113	147	10,227
2003	**824**	**0**	**0**	**13,169**	**113**	**168**	**14,274**
2004	893	0	0	10,441	113	168	11,615
2005	**891**	**0**	**0**	**12,886**	**0**	**1,359**	**15,136**
2006	923	0	0	13,528	0	2,112	16,563
2007	**857**	**0**	**0**	**15,370**	**0**	**1,221**	**17,448**
2008	1,261	0	0	15,142	0	1,170	17,573

Source: TWDB Historical Water Use Survey (WUS) data:
http://www.twdb.state.tx.us/wrpi/wus/summary.asp

Projected Surface Water Supply
TWDB 2011 Regional Water Plan Data

ARMSTRONG COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	LIVESTOCK	RED	LIVESTOCK LOCAL SUPPLY	121	121	121	121	121	121
	Total Projected Surface Water Supplies (acre-feet per year) =			**121**	**121**	**121**	**121**	**121**	**121**

CARSON COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	IRRIGATION	RED	RED RIVER COMBINED RUN-OF-RIVER IRRIGATION	300	300	300	300	300	300
A	LIVESTOCK	CANADIAN	LIVESTOCK LOCAL SUPPLY	125	125	125	125	125	125
A	LIVESTOCK	RED	LIVESTOCK LOCAL SUPPLY	159	159	159	159	159	159
	Total Projected Surface Water Supplies (acre-feet per year) =			**584**	**584**	**584**	**584**	**584**	**584**

DONLEY COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	CLARENDON	RED	GREENBELT LAKE/RESERVOIR	440	440	440	440	440	440
A	COUNTY-OTHER	RED	GREENBELT LAKE/RESERVOIR	219	210	191	171	154	128
A	IRRIGATION	RED	RED RIVER COMBINED RUN-OF-RIVER IRRIGATION	195	195	195	195	195	195
A	LIVESTOCK	RED	LIVESTOCK LOCAL SUPPLY	1,225	1,225	1,225	1,225	1,225	1,225
	Total Projected Surface Water Supplies (acre-feet per year) =			**2,079**	**2,070**	**2,051**	**2,031**	**2,014**	**1,988**

GRAY COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	IRRIGATION	CANADIAN	CANADIAN RIVER RUN-OF-RIVER IRRIGATION	1	1	1	1	1	1
A	IRRIGATION	RED	RED RIVER COMBINED RUN-OF-RIVER IRRIGATION	33	33	33	33	33	33
A	LIVESTOCK	CANADIAN	LIVESTOCK LOCAL SUPPLY	732	732	732	732	732	732
A	LIVESTOCK	RED	LIVESTOCK LOCAL SUPPLY	2,000	2,000	2,000	2,000	2,000	2,000
A	PAMPA	CANADIAN	MEREDITH LAKE/RESERVOIR	941	1,375	1,337	1,285	1,206	1,130
	Total Projected Surface Water Supplies (acre-feet per year) =			**3,707**	**4,141**	**4,103**	**4,051**	**3,972**	**3,896**

HUTCHINSON COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	IRRIGATION	CANADIAN	CANADIAN RIVER COMBINED RUN-OF-RIVER IRRIGATION	96	96	96	96	96	96
A	LIVESTOCK	CANADIAN	LIVESTOCK LOCAL SUPPLY	493	493	493	493	493	493

A	MANUFACTURING	CANADIAN	MEREDITH LAKE/RESERVOIR	1,144	1,681	1,681	1,681	1,681	1,681
	Total Projected Surface Water Supplies (acre-feet per year) =			**1,733**	**2,270**	**2,270**	**2,270**	**2,270**	**2,270**

POTTER COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	AMARILLO	CANADIAN	MEREDITH LAKE/RESERVOIR	1,402	3,167	3,217	3,313	3,420	3,449
A	AMARILLO	RED	MEREDITH LAKE/RESERVOIR	1,000	2,258	2,293	2,362	2,438	2,458
A	IRRIGATION	CANADIAN	CANADIAN RIVER COMBINED RUN-OF-RIVER	0	0	0	0	0	0
A	LIVESTOCK	CANADIAN	LIVESTOCK LOCAL SUPPLY	480	480	480	480	480	480
A	LIVESTOCK	RED	LIVESTOCK LOCAL SUPPLY	36	36	36	36	36	36
A	MANUFACTURING	CANADIAN	MEREDITH LAKE/RESERVOIR	514	622	632	669	740	906
A	MANUFACTURING	RED	MEREDITH LAKE/RESERVOIR	6,002	6,547	6,445	6,176	5,827	5,598
A	STEAM ELECTRIC POWER	CANADIAN	MEREDITH LAKE/RESERVOIR	259	0	0	0	0	0
	Total Projected Surface Water Supplies (acre-feet per year) =			**9,693**	**13,110**	**13,103**	**13,036**	**12,941**	**12,927**

ROBERTS COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	IRRIGATION	CANADIAN	CANADIAN RIVER RUN-OF-RIVER IRRIGATION	72	72	72	72	72	72
A	LIVESTOCK	CANADIAN	LIVESTOCK LOCAL SUPPLY	500	500	500	500	500	500
A	LIVESTOCK	RED	LIVESTOCK LOCAL SUPPLY	15	15	15	15	15	15
	Total Projected Surface Water Supplies (acre-feet per year) =			**587**	**587**	**587**	**587**	**587**	**587**

WHEELER COUNTY

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
A	IRRIGATION	RED	RED RIVER COMBINED RUN-OF-RIVER IRRIGATION	580	580	580	580	580	580
A	LIVESTOCK	RED	LIVESTOCK LOCAL SUPPLY	1,561	1,561	1,561	1,561	1,561	1,561
	Total Projected Surface Water Supplies (acre-feet per year) =			**2,141**	**2,141**	**2,141**	**2,141**	**2,141**	**2,141**

Source: TWDB 2012 State Water Plan data:
https://www.twdb.state.tx.us/apps/db12/defaultReadOnly.asp

Projected Net Water Demand
TWDB 2011 Regional Water Plan Data

ARMSTRONG COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	CLAUDE	RED	262	270	261	250	247	240
A	COUNTY-OTHER	RED	109	112	108	104	103	100
A	IRRIGATION	RED	5,118	4,688	4,544	4,305	3,827	3,349
A	LIVESTOCK	RED	566	670	673	677	681	685
A	MINING	RED	13	12	12	12	12	12
Total Projected Water Demands (acre-feet per year) =			**6,068**	**5,752**	**5,598**	**5,348**	**4,870**	**4,386**

CARSON COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	CANADIAN	73	74	74	71	65	59
A	COUNTY-OTHER	RED	183	185	184	178	162	147
A	GROOM	RED	142	143	142	138	125	114
A	HI TEXAS WATER COMPANY	CANADIAN	55	55	55	53	48	44
A	IRRIGATION	CANADIAN	13,960	11,693	11,397	10,797	8,638	8,397
A	IRRIGATION	RED	44,815	37,537	36,585	34,660	27,730	26,958
A	LIVESTOCK	CANADIAN	295	346	348	350	353	355
A	LIVESTOCK	RED	312	365	368	370	372	375
A	MANUFACTURING	RED	591	669	735	797	849	920
A	MINING	CANADIAN	975	942	929	918	907	893
A	MINING	RED	486	470	464	458	453	446
A	PANHANDLE	RED	574	579	575	556	506	459
A	SKELLYTOWN	CANADIAN	106	107	106	102	93	85
A	WHITE DEER	CANADIAN	61	61	61	59	53	48
A	WHITE DEER	RED	103	104	103	100	91	82
Total Projected Water Demands (acre-feet per year) =			**62,731**	**53,330**	**52,126**	**49,607**	**40,445**	**39,382**

DONLEY COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	CLARENDON	RED	440	440	440	440	440	440
A	COUNTY-OTHER	RED	219	210	191	171	154	128
A	IRRIGATION	RED	32,000	29,676	28,771	27,257	24,228	21,200
A	LIVESTOCK	RED	1,267	1,268	1,270	1,271	1,273	1,275

A	MINING	RED	15	14	14	14	14	14
Total Projected Water Demands (acre-feet per year) =			**33,941**	**31,608**	**30,686**	**29,153**	**26,109**	**23,057**

GRAY COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	CANADIAN	351	348	339	325	305	286
A	COUNTY-OTHER	RED	160	159	154	148	139	131
A	IRRIGATION	CANADIAN	5,635	5,065	4,910	4,652	4,135	3,618
A	IRRIGATION	RED	17,070	15,345	14,875	14,092	12,526	10,960
A	LEFORS	RED	86	85	83	80	75	70
A	LIVESTOCK	CANADIAN	211	227	231	235	239	244
A	LIVESTOCK	RED	1,137	1,224	1,243	1,264	1,288	1,313
A	MANUFACTURING	CANADIAN	4,264	4,383	4,451	4,497	4,515	4,334
A	MCLEAN	RED	185	183	178	171	161	151
A	MINING	CANADIAN	85	88	89	90	91	93
A	MINING	RED	1,844	1,911	1,939	1,966	1,992	2,025
A	PAMPA	CANADIAN	3,300	3,273	3,182	3,058	2,871	2,689
A	STEAM ELECTRIC POWER	CANADIAN	2,507	1,409	2,112	2,299	2,952	3,087
Total Projected Water Demands (acre-feet per year) =			**36,835**	**33,700**	**33,786**	**32,877**	**31,289**	**29,001**

HUTCHINSON COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	BORGER	CANADIAN	2,352	2,384	2,351	2,274	2,148	2,039
A	COUNTY-OTHER	CANADIAN	56	57	57	55	52	49
A	FRITCH	CANADIAN	407	412	406	393	371	353
A	HI TEXAS WATER COMPANY	CANADIAN	341	346	341	330	312	296
A	IRRIGATION	CANADIAN	43,104	39,971	38,748	36,708	32,630	28,551
A	LIVESTOCK	CANADIAN	685	689	698	708	720	732
A	MANUFACTURING	CANADIAN	23,659	25,482	26,969	28,399	29,640	31,708
A	MINING	CANADIAN	398	393	394	395	396	396
A	STINNETT	CANADIAN	365	370	365	353	333	316
A	TCW SUPPLY INC	CANADIAN	603	611	602	583	550	523
Total Projected Water Demands (acre-feet per year) =			**71,970**	**70,715**	**70,931**	**70,198**	**67,152**	**64,963**

POTTER COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	AMARILLO	CANADIAN	14,107	15,167	16,158	17,287	18,519	19,529
A	AMARILLO	RED	10,055	10,811	11,517	12,322	13,200	13,920
A	COUNTY-OTHER	CANADIAN	1,010	1,361	1,690	2,065	2,474	2,809

A	COUNTY-OTHER	RED	693	934	1,160	1,417	1,697	1,927
A	IRRIGATION	CANADIAN	2,966	2,714	2,632	2,494	2,216	1,940
A	IRRIGATION	RED	3,260	2,983	2,893	2,740	2,436	2,131
A	LIVESTOCK	CANADIAN	455	457	458	460	462	464
A	LIVESTOCK	RED	47	47	47	47	47	47
A	MANUFACTURING	CANADIAN	1,058	1,164	1,254	1,341	1,417	1,521
A	MANUFACTURING	RED	5,730	6,304	6,789	7,263	7,673	8,236
A	MINING	CANADIAN	212	236	252	268	285	297
A	MINING	RED	117	131	140	149	157	165
A	STEAM ELECTRIC POWER	CANADIAN	22,432	25,387	26,804	28,408	30,011	34,115
Total Projected Water Demands (acre-feet per year) =			**62,142**	**67,696**	**71,794**	**76,261**	**80,594**	**87,101**

ROBERTS COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	CANADIAN	41	42	38	32	28	25
A	COUNTY-OTHER	RED	3	3	3	2	2	2
A	IRRIGATION	CANADIAN	5,803	5,379	5,214	4,940	4,390	3,842
A	IRRIGATION	RED	281	260	252	239	213	186
A	LIVESTOCK	CANADIAN	375	375	376	377	378	378
A	LIVESTOCK	RED	10	10	10	10	10	10
A	MIAMI	CANADIAN	145	149	134	112	97	88
A	MINING	CANADIAN	1,232	1,232	1,114	894	709	574
A	MINING	RED	38	38	34	28	22	18
Total Projected Water Demands (acre-feet per year) =			**7,928**	**7,488**	**7,175**	**6,634**	**5,849**	**5,123**

WHEELER COUNTY

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	RED	277	278	276	279	278	273
A	IRRIGATION	RED	11,311	9,488	9,198	8,713	7,745	6,777
A	LIVESTOCK	RED	1,554	1,657	1,660	1,662	1,664	1,667
A	MINING	RED	2,001	2,001	1,810	1,444	1,148	922
A	SHAMROCK	RED	312	312	311	313	313	309
A	WHEELER	RED	291	291	291	291	291	291
Total Projected Water Demands (acre-feet per year) =			**15,746**	**14,027**	**13,546**	**12,702**	**11,439**	**10,239**

Source: TWDB 2012 State Water Plan data:
https://www.twdb.state.tx.us/apps/db12/defaultReadOnly.asp

Projected Water Supply Needs
TWDB 2011 Regional Water Plan Data

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

ARMSTRONG COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	CLAUDE	RED	270	209	170	137	100	70
A	COUNTY-OTHER	RED	291	288	292	296	297	300
A	IRRIGATION	RED	0	0	0	0	0	0
A	LIVESTOCK	RED	204	100	97	93	89	85
A	MINING	RED	69	44	40	41	46	52
Sum of Projected Water Needs (acre-feet per year) =			**0**	**0**	**0**	**0**	**0**	**0**

CARSON COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	CANADIAN	176	163	154	154	143	126
A	COUNTY-OTHER	RED	32	20	13	16	18	13
A	GROOM	RED	24	15	10	12	14	10
A	HI TEXAS WATER COMPANY	CANADIAN	45	45	45	47	52	56
A	IRRIGATION	CANADIAN	0	0	0	0	0	0
A	IRRIGATION	RED	367	364	362	361	356	350
A	LIVESTOCK	CANADIAN	380	329	327	325	322	320
A	LIVESTOCK	RED	497	444	441	439	437	434
A	MANUFACTURING	RED	115	87	67	92	114	104
A	MINING	CANADIAN	198	129	92	113	129	108
A	MINING	RED	14	30	36	42	47	54
A	PANHANDLE	RED	98	62	40	52	56	42
A	SKELLYTOWN	CANADIAN	251	234	221	221	206	181
A	WHITE DEER	CANADIAN	189	189	189	191	197	202
A	WHITE DEER	RED	17	16	17	20	29	38
Sum of Projected Water Needs (acre-feet per year) =			**0**	**0**	**0**	**0**	**0**	**0**

DONLEY COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	CLARENDON	RED	0	0	0	0	0	0
A	COUNTY-OTHER	RED	180	180	180	180	180	180
A	IRRIGATION	RED	195	195	195	195	195	195

A	LIVESTOCK	RED	179	178	176	175	173	171
A	MINING	RED	35	31	30	29	28	28
Sum of Projected Water Needs (acre-feet per year) =			**0**	**0**	**0**	**0**	**0**	**0**

GRAY COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	CANADIAN	81	84	93	107	127	146
A	COUNTY-OTHER	RED	37	38	43	49	58	66
A	IRRIGATION	CANADIAN	247	247	247	247	247	247
A	IRRIGATION	RED	33	33	33	33	33	33
A	LEFORS	RED	64	52	4	-29	-35	-36
A	LIVESTOCK	CANADIAN	621	605	601	597	593	588
A	LIVESTOCK	RED	1,063	976	957	936	912	887
A	MANUFACTURING	CANADIAN	504	411	424	696	1,040	1,198
A	MCLEAN	RED	277	279	284	276	264	249
A	MINING	CANADIAN	40	37	36	35	34	32
A	MINING	RED	656	589	561	534	508	475
A	PAMPA	CANADIAN	529	750	563	422	317	238
A	STEAM ELECTRIC POWER	CANADIAN	0	0	0	0	0	0
Sum of Projected Water Needs (acre-feet per year) =			**0**	**0**	**0**	**-29**	**-35**	**-36**

HUTCHINSON COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	BORGER	CANADIAN	650	1,396	722	359	78	-196
A	COUNTY-OTHER	CANADIAN	0	0	0	0	0	0
A	FRITCH	CANADIAN	180	133	100	89	87	66
A	HI TEXAS WATER COMPANY	CANADIAN	59	54	59	70	88	104
A	IRRIGATION	CANADIAN	-15,008	-12,175	-11,652	-10,612	-7,534	-5,455
A	LIVESTOCK	CANADIAN	0	0	0	0	0	0
A	MANUFACTURING	CANADIAN	0	173	-64	-469	-784	-1,270
A	MINING	CANADIAN	195	143	112	106	109	91
A	STINNETT	CANADIAN	229	182	147	135	130	109
A	TCW SUPPLY INC	CANADIAN	184	119	76	63	63	39
Sum of Projected Water Needs (acre-feet per year) =			**-15,008**	**-12,175**	**-11,716**	**-11,081**	**-8,318**	**-6,921**

POTTER COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	AMARILLO	CANADIAN	9	300	-1,349	-2,961	-4,582	-5,950
A	AMARILLO	RED	7	171	-961	-2,110	-3,266	-4,241
A	COUNTY-OTHER	CANADIAN	756	405	76	-299	-708	-1,043

A	COUNTY-OTHER	RED	138	-103	-329	-586	-866	-1,096
A	IRRIGATION	CANADIAN	1,016	735	379	221	292	391
A	IRRIGATION	RED	66	70	73	76	79	79
A	LIVESTOCK	CANADIAN	88	86	85	83	81	79
A	LIVESTOCK	RED	39	39	39	39	39	39
A	MANUFACTURING	CANADIAN	0	0	-33	-57	-35	-43
A	MANUFACTURING	RED	417	387	-187	-923	-1,675	-2,486
A	MINING	CANADIAN	88	64	48	32	15	3
A	MINING	RED	33	19	10	1	3	0
A	STEAM ELECTRIC POWER	CANADIAN	0	126	372	663	1,127	0
Sum of Projected Water Needs (acre-feet per year) =			**0**	**-103**	**-2,859**	**-6,936**	**-11,132**	**-14,859**

ROBERTS COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	CANADIAN	19	18	22	28	32	35
A	COUNTY-OTHER	RED	2	2	2	3	3	3
A	IRRIGATION	CANADIAN	72	72	72	72	72	72
A	IRRIGATION	RED	0	0	0	0	0	0
A	LIVESTOCK	CANADIAN	225	225	224	223	222	222
A	LIVESTOCK	RED	15	15	15	15	15	15
A	MIAMI	CANADIAN	396	392	407	429	444	453
A	MINING	CANADIAN	0	0	0	0	0	0
A	MINING	RED	0	0	0	0	0	0
Sum of Projected Water Needs (acre-feet per year) =			**0**	**0**	**0**	**0**	**0**	**0**

WHEELER COUNTY

RWPG	WUG	WUG BASIN	2010	2020	2030	2040	2050	2060
A	COUNTY-OTHER	RED	108	107	109	106	107	112
A	IRRIGATION	RED	970	970	970	970	970	970
A	LIVESTOCK	RED	305	202	199	197	195	192
A	MINING	RED	0	0	0	0	0	0
A	SHAMROCK	RED	936	936	937	935	935	939
A	WHEELER	RED	27	27	27	27	27	27
Sum of Projected Water Needs (acre-feet per year) =			**0**	**0**	**0**	**0**	**0**	**0**

Source: TWDB 2012 State Water Plan data:
https://www.twdb.state.tx.us/apps/db12/defaultReadOnly.asp

Projected Water Management Strategies
TWDB 2011 Regional Water Plan Data

ARMSTRONG COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	-2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	RED	IRRIGATION CONSERVATION	0	2,170	2,251	2,397	2,478	2,558
IRRIGATION		**CONSERVATION**	**ARMSTRONG**					
A	RED	PRECIPITATION ENHANCEMENT	0	785	785	785	785	785
IRRIGATION		**WEATHER MODIFICATION**	**ARMSTRONG**					
		Total Projected Water Strategies (acre-feet per year) =	**0**	**2,955**	**3,036**	**3,182**	**3,263**	**3,343**

CARSON COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	RED	DRILL ADDITIONAL GROUNDWATER WELL	0	0	600	600	600	600
PANHANDLE		**OGALLALA AQUIFER**	**CARSON**					
A	CANADIAN	IRRIGATION CONSERVATION	0	4,096	4,247	4,520	4,672	4,824
IRRIGATION		**CONSERVATION**	**CARSON**					
A	RED	IRRIGATION CONSERVATION	0	13,220	13,710	14,592	15,082	15,571
IRRIGATION		**CONSERVATION**	**CARSON**					
A	RED	MUNICIPAL CONSERVATION	0	17	29	28	25	23
PANHANDLE		**CONSERVATION**	**CARSON**					
A	CANADIAN	PRECIPITATION ENHANCEMENT	0	1,471	1,471	1,471	1,471	1,471
IRRIGATION		**WEATHER MODIFICATION**	**CARSON**					
A	RED	PRECIPITATION ENHANCEMENT	0	4,750	4,750	4,750	4,750	4,750
IRRIGATION		**WEATHER MODIFICATION**	**CARSON**					
		Total Projected Water Strategies (acre-feet per year) =	**0**	**23,554**	**24,807**	**25,961**	**26,600**	**27,239**

DONLEY COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	-2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	RED	IRRIGATION CONSERVATION	0	2,910	3,031	3,249	3,370	3,490
IRRIGATION		**CONSERVATION**	**DONLEY**					
A	RED	PRECIPITATION ENHANCEMENT	0	1,179	1,179	1,179	1,179	1,179
IRRIGATION		**WEATHER MODIFICATION**	**DONLEY**					
		Total Projected Water Strategies (acre-feet per year) =	**0**	**4,089**	**4,210**	**4,428**	**4,549**	**4,669**

GRAY COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	-2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	RED	DRILL ADDITIONAL GROUNDWATER WELL	0	0	0	100	100	100
LEFORS		**OGALLALA AQUIFER**	**GRAY**					
A	CANADIAN	DRILL ADDITIONAL GROUNDWATER WELL	968	2,581	0	0	0	0
PAMPA		**OGALLALA AQUIFER**	**GRAY**					
A	CANADIAN	IRRIGATION CONSERVATION	0	1,310	1,359	1,446	1,494	1,542
IRRIGATION		**CONSERVATION**	**GRAY**					
A	RED	IRRIGATION CONSERVATION	0	3,969	4,116	4,379	4,525	4,672
IRRIGATION		**CONSERVATION**	**GRAY**					
A	RED	MUNICIPAL CONSERVATION	0	3	4	4	4	4
LEFORS		**CONSERVATION**	**GRAY**					
A	CANADIAN	MUNICIPAL CONSERVATION	0	15	65	65	65	65
PAMPA		**CONSERVATION**	**GRAY**					
A	CANADIAN	PRECIPITATION ENHANCEMENT	0	468	468	468	468	468
IRRIGATION		**WEATHER MODIFICATION**	**GRAY**					
A	RED	PRECIPITATION ENHANCEMENT	0	1,418	1,418	1,418	1,418	1,418
IRRIGATION		**WEATHER MODIFICATION**	**GRAY**					
A	CANADIAN	VOLUNTARY TRANSFER FROM OTHER USERS	0	0	0	0	1,000	1,000
PAMPA		**OGALLALA AQUIFER**	**ROBERTS**					
		Total Projected Water Strategies (acre-feet per year) =	**968**	**9,764**	**7,430**	**7,880**	**9,074**	**9,269**

HUTCHINSON COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	-2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	CANADIAN	DRILL ADDITIONAL GROUNDWATER WELL	0	0	336	336	748	500
BORGER		**OGALLALA AQUIFER**	**HUTCHINSON**					
A	CANADIAN	DRILL ADDITIONAL GROUNDWATER WELL	0	200	200	200	200	200
FRITCH		**OGALLALA AQUIFER**	**HUTCHINSON**					
A	CANADIAN	DRILL ADDITIONAL GROUNDWATER WELL	200	200	200	200	200	200
FRITCH		**OGALLALA AQUIFER**	**CARSON**					
A	CANADIAN	IRRIGATION CONSERVATION	0	7,514	14,044	15,905	16,128	16,128
IRRIGATION		**CONSERVATION**	**HUTCHINSON**					
A	CANADIAN	MUNICIPAL CONSERVATION	0	24	71	114	107	102
BORGER		**CONSERVATION**	**HUTCHINSON**					
A	CANADIAN	PRECIPITATION ENHANCEMENT	0	2,965	2,965	2,965	2,965	2,965
IRRIGATION		**WEATHER MODIFICATION**	**HUTCHINSON**					
A	CANADIAN	VOLUNTARY TRANSFER FROM OTHER USERS	0	0	664	664	1,252	1,500
MANUFACTURING		**OGALLALA AQUIFER**	**HUTCHINSON**					

Total Projected Water Strategies (acre-feet per year) =			**200**	**10,903**	**18,480**	**20,384**	**21,600**	**21,595**

POTTER COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	-2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	CANADIAN	DRILL ADDITIONAL GROUNDWATER WELL	0	0	0	1,000	1,000	1,000
COUNTY-OTHER		**OGALLALA AQUIFER**	**POTTER**					
A	RED	DRILL ADDITIONAL GROUNDWATER WELL	0	600	600	600	1,200	1,200
COUNTY-OTHER		**OGALLALA AQUIFER**	**POTTER**					
A	CANADIAN	IRRIGATION CONSERVATION	0	446	464	496	513	531
IRRIGATION		**CONSERVATION**	**POTTER**					
A	RED	IRRIGATION CONSERVATION	0	490	510	545	564	583
IRRIGATION		**CONSERVATION**	**POTTER**					
A	CANADIAN	MUNICIPAL CONSERVATION	0	455	808	865	925	975
AMARILLO		**CONSERVATION**	**POTTER**					
A	RED	MUNICIPAL CONSERVATION	0	325	575	615	660	700
AMARILLO		**CONSERVATION**	**POTTER**					
A	CANADIAN	MUNICIPAL CONSERVATION	0	41	85	103	124	140
COUNTY-OTHER		**CONSERVATION**	**POTTER**					
A	RED	MUNICIPAL CONSERVATION	0	28	58	71	85	96
COUNTY-OTHER		**CONSERVATION**	**POTTER**					
A	CANADIAN	POTTER COUNTY WELL FIELD	0	2,500	2,500	2,500	2,500	2,500
AMARILLO		**OGALLALA AQUIFER**	**POTTER**					
A	RED	POTTER COUNTY WELL FIELD	0	2,500	2,500	2,500	2,500	2,500
AMARILLO		**OGALLALA AQUIFER**	**POTTER**					
A	RED	POTTER COUNTY WELL FIELD	0	800	800	800	800	800
AMARILLO		**OGALLALA AQUIFER**	**POTTER**					
A	CANADIAN	PRECIPITATION ENHANCEMENT	0	172	172	172	172	172
IRRIGATION		**WEATHER MODIFICATION**	**POTTER**					
A	RED	PRECIPITATION ENHANCEMENT	0	189	189	189	189	189
IRRIGATION		**WEATHER MODIFICATION**	**POTTER**					
A	CANADIAN	ROBERTS COUNTY WELL FIELD - AMARILLO	0	0	0	0	1,200	2,600
AMARILLO		**OGALLALA AQUIFER**	**ROBERTS**					
A	RED	ROBERTS COUNTY WELL FIELD - AMARILLO	0	0	0	0	0	741
AMARILLO		**OGALLALA AQUIFER**	**ROBERTS**					
A	CANADIAN	VOLUNTARY TRANSFER FROM OTHER USERS	0	0	200	328	313	225
MANUFACTURING		**OGALLALA AQUIFER**	**POTTER**					
A	RED	VOLUNTARY TRANSFER FROM OTHER USERS	0	0	444	1,087	1,846	2,638
MANUFACTURING		**OGALLALA AQUIFER**	**POTTER**					
Total Projected Water Strategies (acre-feet per year) =			**0**	**8,546**	**9,905**	**11,871**	**14,591**	**17,590**

ROBERTS COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	-2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	CANADIAN	IRRIGATION CONSERVATION	0	2,642	2,758	2,968	3,084	3,200
IRRIGATION		**CONSERVATION**	**ROBERTS**					
A	RED	IRRIGATION CONSERVATION	0	130	135	146	152	157
IRRIGATION		**CONSERVATION**	**ROBERTS**					
A	CANADIAN	PRECIPITATION ENHANCEMENT	0	1,138	1,138	1,138	1,138	1,138
IRRIGATION		**WEATHER MODIFICATION**	**ROBERTS**					
A	RED	PRECIPITATION ENHANCEMENT	0	56	56	56	56	56
IRRIGATION		**WEATHER MODIFICATION**	**ROBERTS**					
		Total Projected Water Strategies (acre-feet per year) =	**0**	**3,966**	**4,087**	**4,308**	**4,430**	**4,551**

WHEELER COUNTY

-RWPG-	-RIVER BASIN-	-WATER MANAGEMENT STRATEGY-	-2010-	-2020-	2030-	-2040-	-2050-	-2060-
-WUG-		**-SOURCE NAME-**	**-SOURCE COUNTY-**					
A	RED	DRILL ADDITIONAL GROUNDWATER WELL	0	0	0	0	200	200
WHEELER		**OGALLALA AQUIFER**	**WHEELER**					
A	RED	IRRIGATION CONSERVATION	0	1,676	1,740	1,854	1,917	1,980
IRRIGATION		**CONSERVATION**	**WHEELER**					
A	RED	MUNICIPAL CONSERVATION	0	9	15	15	15	15
WHEELER		**CONSERVATION**	**WHEELER**					
A	RED	PRECIPITATION ENHANCEMENT	0	615	615	615	615	615
IRRIGATION		**WEATHER MODIFICATION**	**WHEELER**					
		Total Projected Water Strategies (acre-feet per year) =	**0**	**2,300**	**2,370**	**2,484**	**2,747**	**2,810**

Appendix C
District's Resolution Adopting the Plan

Appendix D
Evidence that the plan was adopted after notice and hearing

Appendix E
Surface Water Letters