District Management Plan

NORTH PLAINS
GROUNDWATER
Conservation District

2024 -2029 Management Plan

Approved January 16, 2024

603 East 1st Street
P.O. Box 795
Dumas, Texas 79029
www.northplainsgcd.org

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I. District Mission Statement

The mission of the North Plains Groundwater Conservation District (District) as adopted by the Board of Directors:

> Maintaining our way of life through conservation, protection, and preservation of our groundwater resources.

II. Purpose of Management Plan

The District's management plan satisfies the statutory requirements of Chapter 36 of the Texas Water Code (TWC), and the administrative requirements of the Texas Water Development Board (TWDB) Rules.

III. District Information

A. Creation

In 1949, the Texas Legislature authorized the creation of underground water conservation districts to perform certain prescribed duties and functions, and hold specific powers as outlined in Article 7880-3c, Texas Civil Statutes. The Legislature codified this portion of the Texas Civil Statutes into Chapter 52 of the Texas Water Code. Later, the Legislature amended the Texas Water Code and moved the statutes into Chapter 36. Ground Water Conservation District No. 2, North of the Canadian River was created after a petition to the Texas Board of Water Engineers on August 16, 1954. Then on January 21, 1955, voters created the District through a confirmation election. The North Plains Groundwater Conservation District No.2 (District) enabling legislation was passed in 1955 with HB 610 Section 1 Chapter 498 Acts of 54th Legislature R.S., the act was modified in 1983 by HB 399 68th Regular Session, and was later codified into TEX. SPEC. DIST. LAWS CODE §8887 during the 85th Regular Session with HB 2803 Ch. 869 Sec. 1.04 effective April 1, 2019.

B. Directors

The District is governed by an elected seven-member Board of Directors (Board). Each Director is elected from a defined area within the District for a four-year term. The elections are held in November of each even-numbered year in accordance with Chapter 36 and the Texas Election Code. The Board elects officers after each director election and these officers serve two-year terms. The Board of Directors holds regular meetings at the Richard S. Bowers Conservation Learning Center located at 6045 W Road E, Dumas, Texas 79029.

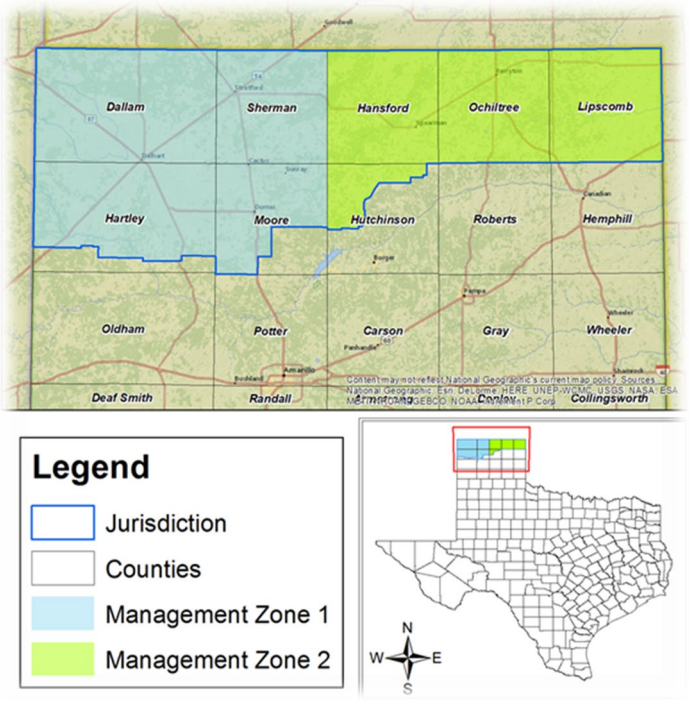
C. Authority

The District derives its authority to manage groundwater within the District by virtue of the powers granted and authorized pursuant to: Article XVI, Section 59, Texas Constitution; Chapter 36, Texas Water Code; and Chapter 8887, Special District Local Laws Code. The District, acting under such authority, assumes all the rights and responsibilities of a groundwater conservation district specified in Chapter 36, Texas Water Code.

D. Location and Extent

The District's area of management responsibility extends over 7,335 square miles in the northern Texas Panhandle encompassing all of Dallam, Hansford, Lipscomb, Ochiltree, and Sherman Counties, as well as parts of Hartley, Hutchinson, and Moore Counties. The District is located north of Amarillo and north of the Canadian River.

Figure 1: Map of the District Jurisdiction



E. General Geology and Hydrology

The Ogallala aquifer is the primary groundwater source within the District. Water-bearing areas of the Ogallala formation are hydraulically connected except where the Canadian River has partly or wholly eroded through the formation to separate the North and South Plains. The Rita Blanca aquifer in the western part of Dallam and Hartley Counties underlies the Ogallala aquifer. The Dockum aquifer in Dallam, Hartley, Moore and

Sherman Counties underlies the Ogallala and Rita Blanca aquifers where present. These aquifers are hydraulically connected.

F. Local Aquifers

Figure 2: The Ogallala Aquifer

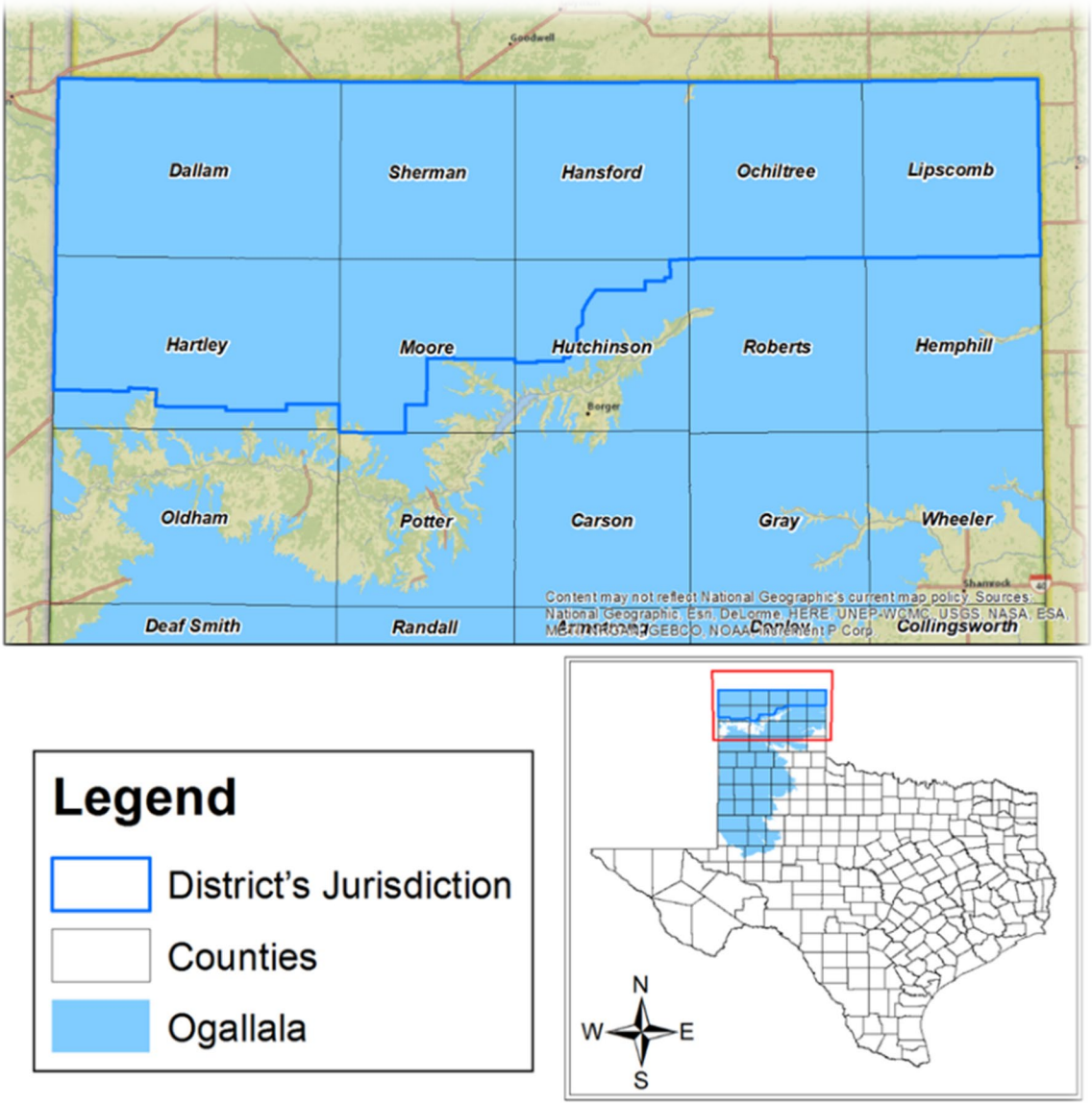


Figure 3: The Dockum Aquifer

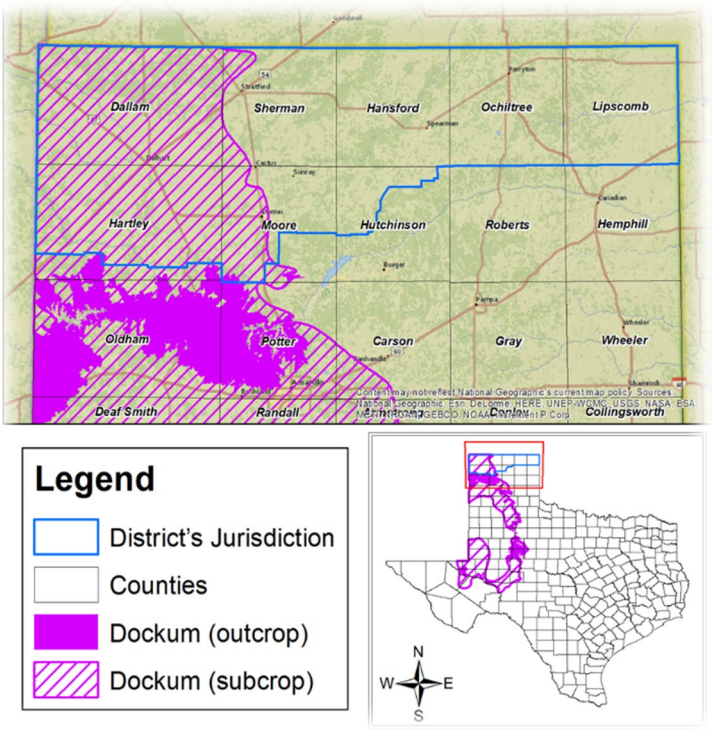
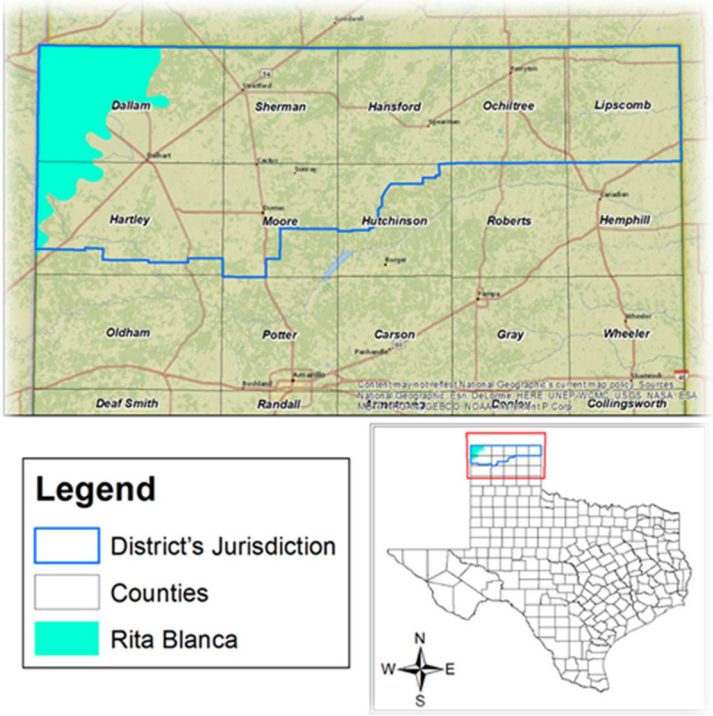


Figure 4: Rita Blanca Aquifer



IV. Statement of Guiding Principles

The District's goal is to provide sound management of groundwater resources and make every effort to ensure that an abundant supply of potable water will be available for many future generations.

The District's main office is located at 603 East 1st Street, Dumas, Texas 79029. The District's office hours are from 8:00 am to 12:00 pm and from 1:00 pm to 5:00 pm Monday through Friday, except holidays.

The Board develops and adopts the rules and programs, establishes practices, hires the general manager, sets the annual budget, and determines the tax rate necessary to carry out the operations of the District. The directors conduct themselves in a manner consistent with sound ethical and business practices; consider the public interest in conducting District business; avoid impropriety or the appearance of impropriety; ensure and maintain public confidence in the District; and control and manage the affairs of the District lawfully, fairly, impartially, without discrimination, and in accordance with the stated purposes of the District. In September 2005, the Board developed and adopted a document which sets forth the District's Director Policies which was last updated November 16, 2021.

The District employs a general manager to manage the administrative affairs of the District and who, in the absence of the Secretary of the Board, may act as secretary to the Board and may attest on behalf of the District. The general manager ensures all duties outlined in the rules, personnel policies, and the job description of the general manager are performed to the reasonable satisfaction of the Board of Directors. The general manager's duties specifically include the employment and supervision of personnel, oversight of financial matters, attendance of Board and Board committee meetings, and the submission of reports to the Board concerning all phases of the services and operations of the District. Further, the general manager's duties include the continued review, development, and enforcement of the rules. The general manager also performs any other duties which may be assigned by the Board from time to time.

The District maintains qualified staff to assist water users in protecting, preserving, and conserving the aquifers. The Board bases its decisions on the best data available and treats all water users equitably and equally. The Board determines the programs and activities that the District shall undertake to provide the best possible management of the area. The rules are enforced to protect the quality of the groundwater and to prevent the waste of this precious resource.

V. Criteria for Plan Certification

A. Planning Horizon

The planning period for this plan is five years from the date of approval by the executive administrator of TWDB or, if appealed, on approval by TWDB. This plan is being submitted as part of the five-year review and re-adoption process as required by §36.0172(e), Texas Water Code. This management plan will remain in effect until a revised plan is approved by the executive administrator or TWDB.

B. Board Resolution

The Board approved the adoption of the management plan on January 16, 2024, and a copy of the resolution is in Appendix A.

C. Plan Adoption

The District issued notice on December 20, 2023, of the 2024 Management Plan Hearing to be held on January 16, 2024 at 9:00 a.m., by posting the notice at the District office; on the District's website; by providing a copy of the notice to the county clerk of each county in the District; by publishing a copy of the Notice on the website of the Texas Secretary of State; and by publishing the notice in the Amarillo Globe-News on December 24, 2023.

Copies of the notice of hearing are in Appendix B and the transcripts of the hearings are in Appendix C.

D. Coordination with Surface Management Entities

Three surface water management entities, Palo Duro Water District, Red River Authority of Texas and the Canadian River Municipal Water Authority (CRMWA), have a portion of their jurisdiction located within the District. The District coordinated with CRMWA, the Red River Authority and the Palo Duro Water District. Copies of the correspondence transmitting this plan to the other entities are in Appendix D.

VI. Estimates Required by 21 Tex. Admin Code (TAC) § 356.52(a)(5)(A) Implementing TWC § 36.1071(e)(3)

A. Modeled Available Groundwater in The District Based on The Desired Future Conditions (DFCs)

Texas Water Code Chapter 36 requires joint planning among groundwater conservation districts (GCDs) that are in the same Groundwater Management Area (GMA). These GCDs must establish the DFCs of the aquifers within their respective GMA every five years. Through this process, the GCDs consider the varying uses and conditions of the aquifer

within the management area that differs substantially from one geographic area to another. The District is entirely in Groundwater Management Area 1 (GMA-1), which also includes Hemphill County Underground Water Conservation District, Panhandle Groundwater Conservation District, and part of High Plains Underground Water Conservation District. This management plan utilizes information from the GMA-1 joint planning cycle completed by the districts in 2021.

GMA-1 and the District adopted DFCs relative to the area during the joint planning process. Based on the specified DFCs, TWDB's executive administrator provides each district with the modeled available groundwater (MAG) in the management area. Modeled available groundwater is defined by Texas Water Code § 36.001(25) as "the amount of water that the executive administrator [of TWDB] determines may be produced on an average annual basis to achieve a desired future condition established under Section 36.108." Well owners within the District withdraw groundwater from three aquifers: Ogallala, Rita Blanca, and Dockum aquifers.

1. **Ogallala and Rita Blanca Aquifers**

   a. **Desired Future Conditions**

   GMA-1 included the Rita Blanca aquifer in the Ogallala aquifer DFC. In places, the Rita Blanca aquifer is hydraulically connected to the Ogallala aquifer and the underlying Dockum aquifer. Though the report goes on to say that irrigation accounts for most of the groundwater use from this aquifer, Texline is the only community that uses the Rita Blanca aquifer for municipal water supply. GMA-1 district representatives unanimously adopted DFCs for the Ogallala aquifer by resolution on August 26, 2021, and the District adopted Ogallala aquifer DFCs inclusive of the Rita Blanca aquifer within the District's jurisdiction as follows:

   - At least 40% of volume in storage remaining for each 50-year period between 2018 and 2080 in Dallam, Hartley, Sherman, and Moore Counties; and
   - At least 50 percent of volume in storage remaining for each 50-year period between 2018 and 2080 in Hansford, Hutchinson, Lipscomb, and Ochiltree Counties.

   b. **Modeled Available Groundwater**

   The modeled available groundwater value for the Ogallala and Rita Blanca aquifers provided for the DFC adopted on August 26, 2021, by GMA-1, was developed through TWDB GAM Run 21-007 MAG and is set forth in Appendix E.

2. Dockum Aquifer

a. Desired Future Conditions

GMA 1 district representatives unanimously adopted DFCs for the Dockum aquifer by resolution on August 26, 2021. The Dockum aquifer DFCs adopted by GMA 1 and the District are as follows:

- At least 40 percent of the average available drawdown remaining for each 50-year period between 2018 and 2080 for Dallam, Hartley, Moore, and Sherman Counties.

b. Modeled Available Groundwater

The modeled available groundwater value for the Dockum aquifer provided for the DFC adopted on August 26, 2021, by GMA 1, was developed through TWDB GAM Run 21-007 MAG and is set forth in Appendix E.

B. Amount Of Groundwater Being Used Within the District on an Annual Basis

The amount of groundwater used in Dallam, Hartley, Sherman, Moore, Hansford, Hutchinson, Ochiltree, and Lipscomb Counties as prepared by the Texas Water Development Board is shown in Appendix F Estimated Historical Water Use. All values are in acre-feet. TWDB data included in Appendix F does not differentiate between exempt and non-exempt use. The values presented in Appendix F are county based. In cases where the district only covers a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent conditions within the district boundaries. This multiplier is used only for the Estimated Historical Water Use TWDB Historical Water Use Survey (WUS) Data, Projected Surface Water Supplies and the Projected Water Demands. All other tables are county wide values.

C. Annual Amount of Recharge from Precipitation to the Groundwater Resources within the District

The estimates of the annual volume of recharge for the aquifers within the NPGCD are based on GAM Run 22-015 simulations provided by TWDB to the District for use in this plan, as set forth in Appendix G.

D. For Each Aquifer, The Annual Volume Of Water That Discharges From The Aquifer To Springs And Any Surface Water Bodies, Including Lakes, Streams, And Rivers

The estimates of the annual volume of water discharged from the Ogallala, Rita Blanca or Dockum aquifers in the District to surface water systems are based on GAM Run 22-015 simulations as provided by TWDB to the District for use in this plan and are set forth in Appendix G.

E. Annual Volume Of Flow Into And Out Of The District Within Each Aquifer And Between Aquifers In The District If A Groundwater Availability Model Is Available

The estimates of the volume of water flowing into and out of the District within each and between aquifers in the District are based on GAM Run 22-015 simulations provided by TWDB to the District for use in this plan are set forth in Appendix G.

F. Projected Surface Water Supply In The District, According To The Most Recently Adopted State Water Plan

The projected surface water supply within the District, according to the most recently adopted State Water Plan as provided by TWDB, are set forth in Appendix F Estimated Historical Water Use. All values are in acre-feet.

G. Projected Total Demand For Water In The District According To The Most Recently Adopted State Water Plan

The projected total demand for water in the District from the 2022 State Water Plan is set forth in Appendix F Estimated Historical Water Use and 2022 State Water Plan datasets.

VII. Consideration of the Water Supply Needs and Water Management Strategies Included in The Adopted State Water Plan – TWC §36.1071(e)(4)

A. Projected Water Supply Needs

The most recent State Water Plan is the 2022 State Water Plan. Water needs are identified when the projected water demand of a Water User Group (WUG) exceeds the projected water supplies of the WUG. See Appendix F Estimated Historical Water Use.

According to the 2022 State Water Plan data as provided in Appendix F, the estimated water supply needs in acre-feet are as follows:

Table 1: Estimated Water Supply Needs in Acre-Feet

County	2020	2030	2040	2050	2060	2070
Dallam	-29,965	-117,238	-109,256	-93,385	-76,444	-76,664
Hartley	-84,944	-193,146	-178,101	-160,175	-142,147	-142,163
Moore	-10,522	-51,384	-54,658	-52,778	-50,285	-51,003
Sherman	0	0	-29,567	-38,831	-38,207	-38,423
Hansford	0	-20	-98	-409	-751	-797
Hutchinson	0	-164	-291	-394	-615	-622
Lipscomb	0	0	-97	-241	-344	-372
Ochiltree	0	0	-1	-197	-563	-824
Total	-125,431	-361,952	-372,069	-346,410	-309,356	-310,868

Note: Negative numbers denote shortages the District is projected to experience unless groundwater strategies are implemented. For more information on this data, see Appendix F.

VIII. Projected Water Management Strategies

In consideration of the projected water supply needs of the District, it is noted that the 2022 State Water Plan recommends six water management strategies that are relevant in meeting those needs. Those management strategies and the county that they would be applicable to are as follows:

Table 2: Water Management Strategies.

Management Strategy	Dallam	Hansford	Hartley	Hutchinson	Lipscomb	Moore	Ochiltree	Sherman
Develop Groundwater Supply	✓	✓	✓	✓	✓	✓	✓	
Irrigation Conservation	✓	✓	✓	✓	✓	✓	✓	✓
Municipal Conservation	✓	✓	✓	✓	✓	✓	✓	✓
Expand Capacity CRMWA 2				✓				
Water Audit and Leak Repair					✓	✓		
Replace well capacity				✓				

According to the projected water supply needs highlighted in the estimated historical water use 2022 State Water Plan data packet (Appendix F), irrigation conservation is the management strategy with the most potential to meet future needs in the District. Irrigation conservation is recommended for all 8 counties in the District. To promote irrigation conservation, the District has worked with the TWDB to develop the Master Irrigator Program where a classroom setting provides educational guidance. Funding for conservation equipment is made available to the class attendees through a grant provided by the TWDB subject to availability. Water conservation is also recommended for all municipal water users, whether there is a defined need or not. Municipal conservation is applicable to all municipalities. Funding programs provided by TWDB are available to apply for assistance to help pay for water audits and leak repair. Educating about individual conservation practices such as rainwater conservation and waste prevention can also provide some reduction in demand. All but Sherman County plan to develop new groundwater supplies. Hutchinson County will pursue expanding capacity through CRMWA 2 and replacing well capacity. Lipscomb and Moore Counties will both pursue savings through water audits and leak repairs. If the strategies are implemented to their fullest potential, they are projected to meet all needs except irrigation in Dallam, Hartley, and Moore Counties.

IX. Methodology to Track District Progress in Achieving Management Goals

District staff will produce an Annual Report for the Board each year, providing information on the progress of District activities and programs no later than September 30 of the following fiscal year. The report will specifically contain status updates on the management goals, objectives and standards as presented in this management plan. This report will be submitted to the Board in a timely manner, taking into consideration seasonal workloads and events, such as legislative sessions. The District will continue to enforce its rules to conserve, preserve, protect, and prevent the waste of the groundwater resources under its jurisdiction. The Board periodically reviews the District's rules and makes revisions as needed to manage the groundwater resources within the District under Texas Water Code Chapter 36. The Board will consider all groundwater uses and needs and will develop rules which are fair and impartial to implement this management plan. A copy of the most current Annual Report is available for public review on the District website at http://northplainsgcd.org and at the District office.

X. Actions, Procedures, Performance, and Avoidance for District Implementation of Management Plan

A. District Rules and Management of Groundwater

With substantial input and feedback from stakeholders the District's Board of Directors established the District's rules in accordance with state law to successfully implement the

management plan. The rules are strictly and fairly enforced. The District may amend the rules as necessary to comply with changes to Texas law and to ensure the best management of the groundwater within the District. The rules govern the management strategies of the District, including, but not limited to, well permitting, well spacing, production reporting, annual allowable production, waste of groundwater, achieving DFCs, and establishing a groundwater conservation reserve. All District documents are made available to the public pursuant to the Texas Public Information Act. In addition to the District's management plan, the District's rules can be obtained online from the District's website: https://northplainsgcd.org/aquifer-management-rules/ and from the District's office.

B. Applications, Permits, and Registrations of Wells

The District requires all wells to be registered, have a test hole permit or well permit issued prior to the construction of a well. District rules require all newly permitted wells or permits to increase the capacity of a well, have a flow meter installed on the permitted well and all other wells located within the water rights owner's groundwater production unit (GPU). Each permitted well must be fitted with a check valve to prevent aquifer contamination.

C. Classification, Spacing, and Density of Wells

The District allows a groundwater rights owner one non-exempt well per sixty-four (64) acres in a GPU. All new non-exempt wells are required to be spaced at least fifty yards away from an existing exempt well. All non-exempt wells are subject to classification and spacing rules based on the rate of production.

D. Groundwater Production Units

An owner may join contiguous parcels of groundwater rights within the District's jurisdiction in one single unit of groundwater rights called a groundwater production unit (GPU). A GPU cannot contain more than 1,600 acres, and the most distant diagonal corners of the GPU cannot exceed 25,000 feet apart.

E. Allowable Annual Production and Reporting

A groundwater user may pump up to 1.5 acre-feet of groundwater per acre of the GPU per year, termed allowable annual production. An owner may accumulate any unused allowable annual production in a groundwater conservation reserve. Additional production may be added from the water right owner's groundwater conservation reserve, up to 0.5 acre-feet of groundwater per acre of the GPU per year. If the reserve is not utilized within a five-year period, any accumulated reserve for that year is terminated. Annually, an owner will file a production report on all the owner's GPUs by March 1st immediately following the end of the calendar year. The District's preferred method for measuring groundwater production is flow meters; however, the District allows six different methods to measure

groundwater production: flow meters, center pivot nozzle package, hour meter, CAFOs, natural gas consumption, and electric consumption.

F. Achieving Desired Future Conditions

To achieve the DFCs, the Board added Chapter 8 to the District's rules. The allowable annual production limit will be reviewed if the average annual production in a management zone exceeds the average MAG amount for the first three years after the beginning of a GMA joint planning cycle. If the mean annual production did exceed the average MAG amounts, the Board may choose to lower the allowable annual production limit for a management zone based on the MAG data.

G. Waste of Groundwater

Chapter 9 in the District's Rules outlines the District enforcement for the control and prevention of the waste of groundwater as defined by the Texas Water Code.

XI. Groundwater Management Goals

A. Providing for the Most Efficient use of Groundwater

1. Groundwater Reporting

***Management Objective*:** Monitor annual groundwater withdrawals through water use reporting by owners/operators that have a well capable of producing more than 25,000 gallons of groundwater a day.

***Performance Standards*:** Annually, the District will collect production reports on at least 75 percent of the properties containing non-exempt wells and from established GPU's, calculate annual groundwater withdrawals for the District and report this data to the Board of Directors.

2. Well Registrations and Permitting

***Management Objective*:** All exempt and non-exempt wells constructed within the jurisdiction of the District are required to be registered or permitted in accordance with the District's rules.

***Performance Standards*:** The District will provide a yearly report of the total number of permits and registrations to the board of directors on an annual basis.

3. Conservation Demonstration and Education

***Management Objective*:** Provide support through the District's North Plains Water Conservation Center, demonstrations, and other District education programs to promote groundwater conservation.

***Performance Standards*:** At least annually, conduct field days and/or other events to educate stakeholders regarding water use efficiency technologies and practices. The District will publish annually, in the newsletter, reports on the activities at the North Plains Water Conservation Center and other demonstrations and education programs. A summary of the associated activities will be included in the annual report.

4. Financial Assistance

***Management Objective*:** The District will encourage the adoption of technologies that promote efficient use of groundwater by educating producers of the various means available to the District to obtain financial assistance to implement these technologies.

***Performance Standards*:** At least annually, the District will report to the Board of Directors a report of any applications for financial assistance made by the District and updates on available funding available to qualifying producers.

5. Education Assistance

Management Objective: The District will educate stakeholders about practices and technologies that promote efficient use of groundwater.

Performance Standards: The District will provide educational assistance to stakeholders at least annually through information programs on the website and/or in the newsletter. A summary will be included in the annual report.

B. Controlling and Preventing the Waste of Groundwater

Management Objective: The District will address groundwater waste according to the defined conditions that constitute waste in its rules.

***Performance Standards*:** Annually, District staff will report to the Board any actionable violations of the District's rules concerning groundwater waste.

C. Controlling and Preventing Subsidence

The District has reviewed TWDB's subsidence risk report, Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping" – TWDB Contract Number 1648302062, by LRE Water, as the report applies to the District. This report presents the results of a qualitative study the TWDB requested to identify areas of vulnerability to subsidence due to groundwater pumping in the major and minor aquifers of Texas outside of the Houston-Galveston and Fort Bend Subsidence Districts. The report defines subsidence as the lowering of the ground surface and typically occurs in unconsolidated aquifers where compressible layers exist. Subsidence also occurs in areas where soluble aquifer layers experience accelerated

dissolution, erosion, and void growth. The report evaluated the vulnerability of the Ogallala aquifer, Dockum aquifer, and Rita Blanca aquifer within the District as follows:

Ogallala aquifer

Results of the assessment suggest that the northern part of the Ogallala aquifer has the greatest risk for future subsidence due to pumping. Table 4.12 on report page 4-54, summarizes the data sources and values for each subsidence risk factor. Figure 4.33 on report page 4-55 illustrates data from wells in the northern Ogallala aquifer tend to show a medium to high subsidence risk within the District.

Dockum aquifer

Results of the assessment suggest that the northern part of the Dockum aquifer has the greatest risk for future subsidence due to pumping. Table 4.30 on report page 4-125 summarizes the data sources and values for each subsidence risk factor. Figure 4.80 on report page 4-126, illustrates data from wells in the northern Dockum aquifer tend to show a medium to high subsidence risk in the western counties within the District.

Rita Blanca aquifer

The report suggests that the Rita Blanca aquifer has a low to medium risk for future subsidence due to pumping with the risk increasing from east to west. Table 4.53. on report page 4-198 summarizes the data sources and values for each Rita Blanca aquifer subsidence risk factor. Figure 4.127 on report page 4-199, illustrates the subsidence risk vulnerability at well locations throughout the aquifer. Figure 4-127 also shows substantial areas lacking data for the report.

Due to the depth of the water and the nature of the geology within the District, subsidence is unlikely, and this goal is not applicable to the District.

D. Addressing Conjunctive Surface Water Management Issues

***Management Objective*:** Address conjunctive water use issues with organizations that have relevant authority or jurisdiction.

***Performance Standard*:** Annually, District's representatives will attend at least 75% of Region A: Panhandle Regional Water Planning Group's meetings. To further address conjunctive water use issues, The District will submit a copy of its Management Plan to The Canadian River Municipal Water Authority, Palo Duro Water District, and Red River Authority for their consideration and review after each adoption.

E. Addressing Natural Resource Issues that Impact the Use and Availability of Groundwater and which are Impacted by the Use of Groundwater

1. Aquifer Monitoring

***Management Objective*:** Monitor aquifer characteristics that affect utilization and availability of groundwater, and which are affected by the use of groundwater through District programs by maintaining a network of monitor wells.

***Performance Standards*:**

a. Annually, District staff will collect and analyze water samples from a minimum of 10 wells.
b. Annually, District staff will summarize their water quality activities and make the information available to the Board and the public.
c. Annually, District staff will visit 90% of the District's monitor well network of over 300 wells and collect aquifer water level measurements from 70% percent of the designated monitor sites.
d. Annually, District staff will summarize groundwater level declines and average depth to water and make the information available to the Board and the public. A summary of all activities will be included in the annual report.

2. Deteriorated Wells

***Management Objective*:** Review District rules 4.1 and 4.9 to consider if any changes are necessary to protect the groundwater resources of the District due to deteriorated wells**.**

***Performance Standard*:** Annually, the District will review its rules regarding deteriorated wells and a summary of the review will be included in the annual report.

3. Aquifer Information

***Management Objective*:** The District will provide access to public information available about the aquifers and wells within the District's jurisdiction.

***Performance Standards*:** Annually, the District will produce a hydrologic report and present it to the Board of Directors. A summary of the report will be included in the Annual Report.

F. Addressing Drought Conditions

North Plains Groundwater Conservation District lies in an area of the State of Texas that has a year-round semi-arid climate. Semi-drought conditions are experienced year-

round, and the District works to educate the public about methods to conserve water all year, but particularly during dry periods.

1. Current Drought Conditions

***Management Objective*:** Provide information about the current drought conditions in the area at the following link: https://northplainsgcd.org/aquifer-data-maps/drought-monitor-map/ . Additional information is available at www.waterdatafortexas.org and https://northplainsgcd.org/conservationprograms/communityedu/.

***Performance Standards*:** Report the drought monitor information at least quarterly to the Board and to the public through the District's website, social media, and/or newsletter. A summary of the drought information will be included in the Annual Report.

2. Conservation Education

***Management Objective*:** Provide stakeholders with information and tools to conserve during dry and peak use periods.

***Performance Standards*:** Annually, the District will conduct a minimum of three (3) water conservation communications and education activities. A summary of these activities will be provided in the Annual Report.

G. Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, and Brush Control, Where Appropriate and Cost-Effective

1. Conservation

a. Groundwater Conservation Reserve Program

***Management Objective*:** Provide program allowing permitted well owners that timely report their groundwater production to retain any unused allowable annual production for future years, promoting the conservation of groundwater.

Performance Standards: Annually, District staff will report to permitted well owners the well owner's available conservation reserve on the annual production reporting form. A summary of the conservation reserve will be reported to the Board of Directors annually and a summary will be included in the Annual Report.

b. Conservation Education

***Management Objective*:** Conduct conservation education activities to encourage water conservation.

***Performance Standards*:** Annually, the District will disseminate groundwater conservation and waste prevention information through a variety of media, activities, and events. A summary of these activities will be included in the Annual Report.

2. Recharge Enhancement

The District has limited surface water resources to effectuate enhanced recharge through diversion or infiltration of surface water. The District explored recharge enhancement through its precipitation enhancement program, and the District discontinued funding for the program in 2006. The District could not quantify if, and to what extent, the program positively affected recharge or groundwater use in the District. The Board of Directors determined recharge enhancement through surface water diversion, infiltration, or precipitation enhancement is not currently viable or practical. For this management plan, this goal is not applicable to the District.

3. Rainwater Harvesting

***Management Objective*:** The District promotes rainwater harvesting by maintaining rainwater harvesting information at the District office and provides literature about its benefits at a public meeting held at least once annually.

***Performance Standards*:** Annually District staff will report to the Board of Directors the number of people who attended the annual rainwater harvesting meeting and provide a summary of the discussion.

4. Precipitation Enhancement

The District discontinued its funding for the precipitation enhancement program in 2006. The District could not quantify if, and to what extent, the program positively affected recharge or groundwater use. The Board of Directors determined that precipitation enhancement is not currently viable or practical. For this management plan, this goal is not applicable to the District.

5. **Brush Control**

The District has a semi-arid climate, very little surface water, experiences low annual rainfall and has a depth to groundwater exceeding 300 feet. Considering the District's low rainfall, depth to groundwater and lack of surface water resources; brush control as a form of recharge enhancement or groundwater conservation is not practicable or effective. The District has determined that brush control is not a viable groundwater conservation goal for this area and is therefore not applicable.

H. Addressing the Desired Future Conditions

1. Compare DFCs to Aquifers' Conditions

***Management Objective*:** Monitor the condition of the aquifers and status of groundwater production compared to the adopted DFCs.

***Performance Standards*:** Annually review groundwater production information, GAMs, and water level measurements to characterize aquifer conditions compared to the DFCs. A summary of the evaluation will be included in the annual report.

2. Joint Planning

***Management Objective*:** The District will participate in the joint planning process of the Groundwater Management Area 1 with other groundwater conservation districts.

***Performance Standards*:** A District representative will participate in each GMA-1 joint planning meeting. A summary of the number of meetings and status of the joint planning process to adopt a Desired Future Condition will be included in the annual report.

3. Allowable Production Limitation

***Management Objective*:** Manage groundwater withdrawal amounts based on allowable production limits to achieve DFCs.

***Performance Standards*:** The Board of Directors will review groundwater withdrawal amounts annually, and may modify annual allowable groundwater production limits consistent with its rules to achieve the DFCs . A summary of the review will be included in the annual report.

Appendix A

BOARD RESOLUTION OF
NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT
ADOPTING 2024 GROUNDWATER MANAGEMENT PLAN

WHEREAS Texas Water Code, Chapter 36, Section 36.1071 requires the North Plains Groundwater Conservation District ("the District") to develop a comprehensive management plan to address specific management goals; and,

WHEREAS the Management Plan adopted by the District on March 13, 2018, expired on April 25, 2023;

WHEREAS the District issued Notice of the 2024 Groundwater Management Plan hearing to be held on January 16, 2024, at 9:00 a.m. on December 19, 2023, by posting the said Notice on the District's website on December 20, 2024, and by publishing the said Notice in the *Amarillo Globe News* on December 24, 2024, and,

WHEREAS the District also gave notice of the District's intent to propose the adoption of the 2024 Groundwater Management Plan on the Agenda for its January 16, 2024, regular Board Meeting; and

WHEREAS the District held the public hearing on January 16, 2024, to receive public comment regarding the proposed 2024 Management Plan that was transcribed by Court Reporter, Shelly Burnett; and,

WHEREAS no members of the public appeared on January 16, 2024, to offer public comment regarding the proposed 2024 Groundwater Management Plan and no oral, or written, public comment has been received by the District as of January 16, 2024; and,

WHEREAS Texas Water Code, Section 36.1071 also requires the District to identify the performance standards and management objectives under which the District will operate to achieve its management goals; and,

WHEREAS the Board of Directors of the North Plains Groundwater Conservation District believes that the 2024 proposed Management Plan of the District reflects the best management of the groundwater for the District and meets the requirements of Section 36.1071 as applicable; and,

WHEREAS the Board of Directors of the North Plains Groundwater Conservation District further believes that the description of activities, programs, and procedures of the District included in the proposed Management Plan provides performance standards and management goals and objectives necessary to affect the proposed Plan in accordance with Section 36.1071.

NOW, THEREFORE, BE IT RESOLVED, AND IT IS HEREBY RESOLVED, THAT the Board of Directors of the North Plains Groundwater Conservation District does hereby adopt the proposed 2024 North Plains Groundwater Conservation District Management Plan on this 16th day of January 2024.

Mark Howard, President

Bob B. Zimmer, Secretary

Daniel L. Krienke, Vice-President

Gene Born, Director

Harold Grall, Director

Justin Crownover, Director

Allan Frerich, Director

Appendix B

NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT'S NOTICE OF PUBLIC HEARING FOR THE PURPOSE OF PROPOSING TO ADOPT THE 2024 MANAGEMENT PLAN

TO: ALL INTERESTED PERSONS.

The North Plains Groundwater Conservation District ("District") will conduct a public hearing concerning the District's intent to adopt the 2024 Management Plan.

The public hearing is to provide interested members of the public the opportunity to appear and provide oral or written comments on the proposed amendments to the District's Management Plan.

Date, Time, and Place of Public Hearing.

The date, time, and place of the public hearing is as follows:

Date: **January 16, 2024**
Time: **9:00 a.m. CDT**
Location: North Plains Water Conservation Center Conference Room
6045 County Road E
Dumas, Texas 79029.

Procedures for Submitting Public Comments on the Proposed Amendments to the Management Plan.

A. **Oral Comments:**

Any person may appear in person, or by authorized representative, at the public hearing regarding the proposed amendments to the 2024 Management Plan. Any person making an appearance must indicate their desire to make oral comments on the registration form provided by the District at the public hearing. A person must disclose any affiliation on the registration form and if applicable, the legal authority to speak for a person represented. Any other person attending the public hearing will be considered by the District to be an observer not desiring to make comment on the proposed adoption of the amended Management Plan. The District will not consider any comments of an observer in its proceedings.

All persons must indicate on the registration form whether their comments are generally directed to the 2024 Management Plan, or whether they are directed at a specific item (or items) proposed to be amended in the 2024 Management Plan. If directed at a specific item (or items) in the 2024 Management Plan proposed to be adopted by the District, the number of the item (or items) in the 2024 Management Plan proposed to be adopted by the District must be identified on the registration form.

If it becomes apparent during the oral comments that what were indicated to be merely general comments are, in fact, specific comments, the presiding officer may ask the person to specifically identify the item(s) in the 2024 Management Plan proposed to be adopted by the District to which the oral comments are directed.

The presiding officer will establish the order of oral comments of persons at the hearing. As appropriate, the presiding officer may limit:

1. the number of times a person may speak;

2. the time period for oral comments;

3. cumulative, irrelevant, or unduly repetitious comments;

4. general comments that are so vague, undeveloped, or immaterial as to be impracticable for the District to ascertain the intent or purpose of the person making the general oral comments, and that are otherwise unhelpful to the District in analyzing the amendments to the Management Plan proposed to be adopted by the District;

5. the time period for asking or responding to questions; and,

6. other matters that come to the attention of the presiding officer as requiring limitation.

B. **Written Comments:**

1. Written comments on the proposed adoption of the 2024 Management Plan must be filed with the District by mail or hand-delivery at the District's office at 603 East First Street, P. O. Box 795, Dumas, Texas 79029-0795. All written comments must be filed with the District and date-stamped no later than **Monday, January 15, 2024, at 5:00 p.m. CDT**.

2. Written comments should be filed on 8½ x 11-inch paper and be typed or legibly written. Written comments must indicate whether the comments are general and directed at all of the amendments to the 2024 Management Plan proposed to be adopted by the District, or whether they are directed at a specific item (or items) in the amended 2024 Management Plan proposed to be adopted by the District. If directed at a specific item (or items) in the amended 2024 Management Plan proposed to be adopted by the District, the number of the proposed item(s) must be identified and followed by the comments on the specifically identified item(s) of the amended Management Plan proposed to be adopted by the District.

C. **Response to Comments:**

Please note that while the District Board and staff will consider both oral and written comments, the staff may not prepare written responses to these comments for review and consideration by the Board of Directors of the District when it deliberates on whether to adopt the 2024 Management Plan.

Procedure for Obtaining the 2024 Management Plan.

Copies of the 2024 Management Plan proposed to be adopted by the District may be obtained from the District by:

1. telephoning (806) 935-6401;

2. e-mailing a request to the District at jguthrie@northplainsgcd.org;

3 visiting the offices of the District at 603 East First Street, Dumas, Texas 79029-0795; or,

4. visiting the District's website at http://www.northplainsgcd.org.

Opportunity to Attend the Board Meeting at which the 2024 Management Plan May be adopted.

The meeting of the District's Board of Directors to consider the adoption of the 2024 Management Plan will be held immediately following the conclusion of the Management Plan Hearing on January 16, 2024, at the North Plains Water Conservation Center Conference Room, 6045 West County Road E, Dumas, Texas 79029.

SUMMARY OF THE DISTRICT'S AMENDED MANAGEMENT PLAN

---

(1) Providing the most efficient use of groundwater by calculating total annual groundwater withdrawals through water use reporting by all producing water right owners that have a well capable of producing more than 25,000 gallons of groundwater a day, and by providing support through the District's North Plains Water Conservation Center to promote research into drought tolerant crops, efficient water management strategies and other research promoting water use efficiencies;

(2) Controlling and preventing waste of groundwater by managing groundwater withdrawal amounts based on an allowable production limitation to encourage well owners to avoid groundwater waste and by controlling and preventing the

waste of groundwater as defined by the Texas Water Code through the enforcement of District "Waste" Rules;

(3) Controlling and preventing subsidence is not an issue for the District;

(4) Addressing conjunctive surface water management issues by participating with surface water management entities during the regional planning process;

(5) Addressing natural resource issues by monitoring aquifer characteristics that impact the use and availability of groundwater and which are impacted by the use of groundwater through District programs by maintaining a network of water quality and water level monitor wells;

(6) Addressing drought conditions by providing residential stakeholders with information and tools to conserve during dry and peak use periods;

(7) Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost effective through various District programs; and

(8) Addressing the desired future conditions (DFC) adopted by the District under Section 36.108 by identifying the DFCs, by providing the modeled available groundwater data, and setting a date to amend the District's rules after the adoption of the Management Plan.

Issued this 19th day of December 2023.

Janet Guthrie

Janet Guthrie, General Manager,
North Plains Groundwater Conservation District

Kristen Blackwell Log Off

Open Meeting Submission

TRD:	2023007197
Date Posted:	12/20/2023
Status:	Accepted
Agency Id:	0978
Date of Submission:	12/20/2023
Agency Name:	North Plains Groundwater Conservation District
Board:	North Plains Groundwater Conservation District
Date of Meeting:	01/16/2024
Time of Meeting:	09:00 AM **(##:## AM Local Time)**
Street Location:	6045 W County Road E
City:	Dumas
State:	TX
Liaison Name:	Kristen Blackwell
Liaison Id:	7
Additional Information Obtained From:	Kristen Blackwell
Agenda:	NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT'S NOTICE OF PUBLIC HEARING FOR THE PURPOSE OF PROPOSING TO ADOPT THE 2024 MANAGEMENT PLAN TO: ALL INTERESTED PERSONS. The North Plains Groundwater Conservation District ("District") will conduct a public hearing concerning the District's intent to adopt the 2024 Management Plan. The public hearing is to provide interested members of the public the opportunity to appear and provide oral or written comments on the proposed amendments to the District's Management Plan. Date, Time, and Place of Public Hearing.

with the District by mail or hand-delivery at the District's office at 603 East First Street, P. O. Box 795, Dumas, Texas 79029-0795. All written comments must be filed with the District and date-stamped no later than Monday, January 15, 2024, at 5:00 p.m. CDT.

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3 visiting the offices of the District at 603 East First Street, Dumas, Texas 79029-0795; or,

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at which the 2024 Management Plan May be adopted.

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(2) Controlling and preventing waste of groundwater by managing groundwater withdrawal amounts based on an allowable production limitation to encourage well owners to avoid groundwater waste and by controlling and preventing the waste of groundwater as defined by

Kristen Lane

From:	Krystal Donley
Sent:	Wednesday, December 20, 2023 3:52 PM
To:	blake@revelationoil-gas.com; chuck1113@hotmail.com; cullum.jefferies@ubs.com; dejongd@agrivisionfm.com; diamondmllc@gmail.com; editor@moorenews.com; editor@borgernewsherald.com; f.giesbrecht@yahoo.com; hberngen@hilmarcheese.com; johnneufeld84@gmail.com; marty.jones@sprouselaw.com; shackelford.jerry@gmail.com; wfarmsinc@gmail.com; Paige Glazner; Kyle Kleypas; Sabrina Leven; bvwoody@xit.net; kxitamfm@xit.net; rspielman@xit.net; stardm@xit.net; 'SR. Ragsdale@hotmail. com'; Kirk Welch; Baylee Barnes
Cc:	Kristen Lane
Subject:	Public Hearing
Attachments:	Notice of Public Hearing Management Plan.pdf

North Plains Groundwater Conservation District will be holding a public hearing for the purpose of proposing to adopt the 2024 Management Plan.

A copy of the notice is attached for your reference.

Thank you,

Sincerely,

Krystal Donley
Administrative Assistant
Office: 806-935-6401 **EXT. 200**

www.northplainsgcd.org

NORTH PLAINS
GROUNDWATER
Conservation District

Follow North Plains GCD on social media!

Click here to access the North Plains GCD Interactive Web Map.

Kristen Lane

From: TexReg@sos.texas.gov
Sent: Wednesday, December 20, 2023 3:32 PM
To: Kristen Lane
Subject: S.O.S. Acknowledgment of Receipt

Acknowledgment of Receipt

Agency: North Plains Groundwater Conservation District

Liaison: Kristen Blackwell

The Office of the Secretary of State has posted

notice of the following meeting:

Board: North Plains Groundwater Conservation District

Committee:

Date: 01/16/2024 09:00 AM "TRD# 2023007197"

Notice posted: 12/20/23 03:31 PM

Proofread your current open meeting notice at:

http://texreg.sos.state.tx.us/public/pub_om_lookup$.startup?Z_TRD=2023007197

Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:39 PM
To: Kristen Lane
Subject: Email-to-Fax status

Hello,

Your 4 page fax to 8069359004 has been successfully delivered.

Sincerely,

FaxToYourEmail

Notice:
The body of the message may also act as a cover page by adding 'cover page' to the end of the subject.

Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:38 PM
To: Kristen Lane
Subject: Email-to-Fax status

Hello,

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Sincerely,

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Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:38 PM
To: Kristen Lane
Subject: Email-to-Fax status

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Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:38 PM
To: Kristen Lane
Subject: Email-to-Fax status

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Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:38 PM
To: Kristen Lane
Subject: Email-to-Fax status

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Sincerely,

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Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:38 PM
To: Kristen Lane
Subject: Email-to-Fax status

Hello,

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Sincerely,

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Notice:
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Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:38 PM
To: Kristen Lane
Subject: Email-to-Fax status

Hello,

Your 4 page fax to 8068783497 has been successfully delivered.

Sincerely,

FaxToYourEmail

Notice:
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Kristen Lane

From: noreply@email-sent.net on behalf of Email to Fax <noreply@email-sent.net>
Sent: Wednesday, December 20, 2023 3:36 PM
To: Kristen Lane
Subject: Email-to-Fax status

Hello,

Your 4 page fax to 8062443751 has been successfully delivered.

Sincerely,

FaxToYourEmail

Notice:
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LOCALiQ

Austin American-Statesman
Amarillo Globe-News
Lubbock Avalanche-Journal

PO Box 631667 Cincinnati, OH 45263-1667

PROOF OF PUBLICATION

North Plains Groundwater Conserv
North Plains Groundwater Conservation District
Po Box 795
Dumas TX 79029

STATE OF WISCONSIN, COUNTY OF BROWN

The Amarillo Globe-News is a daily newspaper of general circulation, printed and published in Amarillo, Potter County, Texas; that the publication, a copy of which is attached hereto, was published in the said newspaper in the issues dated:

12/24/2023

Sworn to and subscribed before on 12/24/2023

Keegan Moran
Legal Clerk

Notary, State of WI, County of Brown 6.25.26

My commision expires

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Order No:	9655243	# of Copies:
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MARIAH VERHAGEN
Notary Public
State of Wisconsin

NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT'S NOTICE OF PUBLIC HEARING FOR THE PURPOSE OF PROPOSING TO ADOPT THE 2024 MANAGEMENT PLAN

TO: ALL INTERESTED PERSONS.

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2. the time period for oral comments;
3. cumulative, irrelevant, or unduly repetitious comments;
4. general comments that are so vague, undeveloped, or immaterial as to be impracticable for the District to ascertain the intent or purpose of the person making the general oral comments, and that are otherwise unhelpful to the District in analyzing the amendments to the Management Plan proposed to be adopted by the District;
5. the time period for asking or responding to questions; and,
6. other matters that come to the attention of the presiding officer as requiring limitation.

B. **Written Comments:**

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2. e-mailing a request to the District at jguthrie@northplainsgcd.org;
3 visiting the offices of the District at 603 East First Street, Dumas, Texas 79029-0795; or,
4. visiting the District's website at http://www.northplainsgcd.org.

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diately following the conclusion of the Management Plan Hearing on January 16, 2024, at the North Plains Water Conservation Center Conference Room, 6045 West County Road E, Dumas, Texas 79029.

SUMMARY OF THE DISTRICT'S AMENDED MANAGEMENT PLAN

(1) Providing the most efficient use of groundwater by calculating total annual groundwater withdrawals through water use reporting by all producing water right owners that have a well capable of producing more than 25,000 gallons of groundwater a day, and by providing support through the District's North Plains Water Conservation Center to promote research into drought tolerant crops, efficient water management strategies and other research promoting water use efficiencies;

(2) Controlling and preventing waste of groundwater by managing groundwater withdrawal amounts based on an allowable production limitation to encourage well owners to avoid groundwater waste and by controlling and preventing the waste of groundwater as defined by the Texas Water Code through the enforcement of District "Waste" Rules;

(3) Controlling and preventing subsidence is not an issue for the District;

(4) Addressing conjunctive surface water management issues by participating with surface water management entities during the regional planning process;

(5) Addressing natural resource issues by monitoring aquifer characteristics that impact the use and availability of groundwater and which are impacted by the use of groundwater through District programs by maintaining a network of water quality and water level monitor wells;

(6) Addressing drought conditions by providing residential stakeholders with information and tools to conserve during dry and peak use periods;

(7) Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost effective through various District programs; and

(8) Addressing the desired future conditions (DFC) adopted by the District under Section 36.108 by identifying the DFCs, by providing the modeled available groundwater data, and setting a date to amend the District's rules after the adoption of the Management Plan.

Issued this 19th day of December 2023.

Janet Guthrie

Janet Guthrie, General Manager,
North Plains Groundwater Conservation District

12/24/2023

Appendix C

APPENDIX C

NORTH PLAINS GROUNDWATER

CONSERVATION DISTRICT

PUBLIC HEARING

ADOPTION OF 2024 MANAGEMENT PLAN

NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT

SECTION 36.108

TUESDAY, JANUARY 16, 2024

RICHARD S. BOWERS WATER CONSERVATION LEARNING CENTER

NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT CENTER BARN

6045 County Road E

Etter, Moore County, Texas

APPEARANCES

NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT
BOARD OF DIRECTORS:

Danny L. Krienke, Vice-President
Bob Zimmer
Justin Crownover
Harold Grall
Allan Frerich

Janet Guthrie, General Manager

GENERAL COUNSEL FOR NPGCD:

F. Keith Good SBOT No. 08139000
keith@lemon-lawfirm.com
Ellen Orr, Paralegal
ellen@lemon-lawfirm.com
LEMON, SHEARER, PHILLIPS & GOOD, PC
315 South Main
Post Office Box 1066
Perryton, Texas 79070-1066
806.435-6544 - telephone
806.323.2613 - facsimile
www.lemon-lawfirm.com

VICE-PRESIDENT KREINKE: **The time is 9:35. No formal action was taken by the Board in Closed Session. Any action which needs to be taken by the Board on matters discussed in Closed Session will be acted upon in Open Session.**

We have a hearing on the management plan. Coy, can you wait a few more minutes?

COY BARTON: You bet. I can do that. You go ahead.

VICE-PRESIDENT KREINKE: We have a court reporter here, and we have announced it to be at 9:00, but we had to get matters done in Closed Session so we're running a little late. I guess at this time we will move forward with the hearing.

For the record, my name is Daniel L. Kreinke. I serve as Vice-President of the Board of Directors of the North Plains Groundwater Conservation District. It is my pleasure to serve in that capacity this morning and serve as a presiding officer for this hearing.

This is a formal hearing required under Chapter 36.1071 of the Water Code. The District has developed and proposed a management plan. It has submitted that management plan to the Texas Water Development Board for full review and comments. Those comments have been received. The proposed management plan has been modified accordingly. If you wish to comment, if you would, please stand and state your

name and make your comments. The comments will be reported by Shelly Burnett who is the court reporter present here today. The District staff will make a brief presentation regarding the proposed management plan. Thereafter, the hearing is open for public comment on the proposed management plan.

At this time is there anyone that wants to speak on the management plan, any public comment? We will leave this open for a short period of time, but at this time I'll call Janet Guthrie, Manager, to have a brief description of the management plan.

JANET GUTHRIE: Thank you. Thank you, Danny, for the opportunity. My name is Janet Guthrie. I'm General Manager of the North Plains Groundwater Conservation District.

The Texas Water Code in Chapter 36.1072 requires each groundwater district to adopt a management plan no less than every five years. This plan must be submitted to the Texas Water Development Board for approval. The last management plan was adopted and approved by the Water Development Board on April 25th, 2018.

We have been working with the Texas Water Development Board to obtain the required content, to address the required and recommended changes. In the development of this plan, we coordinated with the department heads to obtain their feedback and understanding of their various goals and objectives outlined in the plan. The statutes require that we

develop goals and strategies based on specific topics. These goals and objectives must be time based and quantifiable. The management plan must also contain the most recent desired future conditions managed available groundwater number and the latest state water plan production data which are both provided to us by the Texas Water Development Board.

Proper notice of the hearing and the Board meeting to adopt this plan were properly provided to the public and interested parties. To date, there has been no public oral or written comments at this time. Following Board adoption, correspondence will take place with the three water supply authorities within the District, the appendices will be completed in field with the appropriate documents attached, and the plan will then be submitted to the Texas Water Development Board for final review.

Are there any questions or comments for me at this time? If none, the General Manager recommends approval.

VICE-PRESIDENT KREINKE: Thank you, Janet. Even though there's no one present, it's been our policy to go ahead and leave the hearing open for a little -- for some time after just in case somebody is late. Due to the lateness of it and no one is here to speak, we'll leave it open for five minutes if you want to take a short break, then we'll close the hearing.

(Recess 9:40 am - 9:46 am.)

VICE-PRESIDENT KREINKE: I have 9:46. At this time, we'll close the public hearing. I don't see anybody -- but I -- before we close, I'll ask one more time: Does anyone want to speak about the management plan? Okay.

We'll consider the hearing closed. Thank you.

(Public hearing concluded.)

THE STATE OF TEXAS §

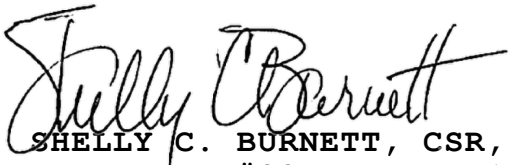
COUNTY OF MOORE §

I, Shelly C. Burnett, Certified Shorthand Reporter in and for the State of Texas and Registered Professional Reporter, do hereby certify that the above and foregoing contains a true and correct transcription of all portions of the proceedings requested in writing to be included in this volume of the Reporter's Record, in the above-referenced matter, all of which were reported by me.

I further certify that this Reporter's Record of the proceedings truly and correctly reflects the exhibits, if any, admitted by the respective parties.

I further certify that the total cost for the preparation of this Reporter's Record is $56.00 and will be paid by North Plains Groundwater Conservation District.

WITNESS MY OFFICIAL HAND this the 17th day of January, 2024.



SHELLY C. BURNETT, CSR, RPR
Texas CSR #2244 (Exp. 10/31/25)
Post Office Box 796
Dumas, Texas 79029
(806) 935-2700
shellycburnett@gmail.com

Appendix D

NORTH PLAINS
GROUNDWATER
Conservation District

On March 14, 2024, the North Plains Groundwater Conservation District sent a copy of the 2024 Amended Management Plan to the following surface water entities in accordance with statute and TWDB rule requirements.

Canadian River Municipal Water Authority – Drew Satterwhite drew@crmwa.com and DSchick@crmwa.com

Pala Duro River Authority – Robert Howell – prdahowell@outlook.com

Red River Authority cs@rra.texas.gov

Janet Guthrie

General Manager

From:	Janet Guthrie
To:	drew@crmwa.com; DSchick@crmwa.com; prdahowell@outlook.com; cs@rra.texas.gov
Subject:	adoption of amended 2024 Management Plan
Date:	Thursday, March 14, 2024 6:59:00 PM
Attachments:	image002.png image003.png image004.png image005.png image006.png NPGCD 2024 Mgmt Plan merged.pdf

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Ladies and Gentlemen:

The North Plains Groundwater Conservation District recently proposed to the public for comment and the adoption of the District's amended 2024 Management Plan. A copy of the 2024 amended management as submitted to Texas Water Development Board is being provided to you as evidence of the coordination with surface water entities.

If you have any questions, please feel free to contact me.

Thanks so much,

Janet Guthrie

General Manager
jguthrie@northplainsgcd.org
Office: 806-935-6401; Ext. 207
Cell: 806-323-2526

www.northplainsgcd.org

NORTH PLAINS GROUNDWATER Conservation District

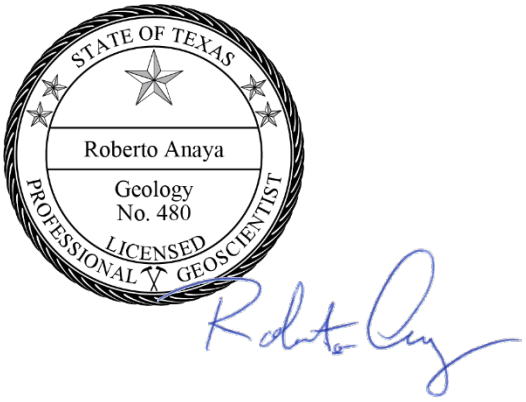
Follow North Plains GCD on social media!

Click here to access the North Plains GCD Interactive Web Map.

Appendix E

GAM RUN 21-007 MAG: MODELED AVAILABLE GROUNDWATER FOR THE HIGH PLAINS AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 1

Roberto Anaya, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-463-6115
February 28, 2023



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GAM RUN 21-007 MAG: MODELED AVAILABLE GROUNDWATER FOR THE HIGH PLAINS AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 1

Roberto Anaya, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-463-6115
February 28, 2023

EXECUTIVE SUMMARY:

The modeled available groundwater for the High Plains Aquifer System within Groundwater Management Area 1 is summarized by decade for the groundwater conservation districts (Tables 1 and 2) and for use in the regional water planning process (Tables 3 and 4). The modeled available groundwater values for the Ogallala Aquifer (inclusive of the Rita Blanca Aquifer) range from 3,192,963 acre-feet per year in 2020 to 1,991,106 acre-feet per year in 2080 (Table 1). The modeled available groundwater values for the Dockum Aquifer range from 288,052 acre-feet per year in 2020 to 241,087 acre-feet per year in 2080 (Table 2).

The modeled available groundwater values for the Ogallala (inclusive of the Rita Blanca Aquifer) and Dockum aquifers were extracted from results of a model simulation using the groundwater availability model for the High Plains Aquifer System (version 1.01). District representatives in Groundwater Management Area 1 declared the Blaine and Seymour aquifers to be non-relevant for the purposes of joint groundwater planning. The explanatory report and other materials submitted to the TWDB were determined to be administratively complete on December 16, 2022.

REQUESTOR:

Mr. Dustin Meyer, Groundwater Management Area 1 coordinator at the time of the request.

DESCRIPTION OF REQUEST:

District representatives in Groundwater Management Area 1 adopted desired future conditions by resolution for the aquifers in the area on August 26, 2021:

Ogallala (inclusive of the Rita Blanca) Aquifer:

- *"At least 40 percent of volume in storage remaining for each 50-year period between 2018 and 2080 in Dallam, Hartley, Moore, and Sherman Counties"*
- *"At least 50 percent of volume in storage remaining for each 50-year period between 2018 and 2080 in Hansford, Hutchison, Lipscomb, Ochiltree, Carson, Donley, Gray, Roberts, Wheeler, and Oldham Counties; and within the Panhandle District portions of Armstrong and Potter Counties"*
- *"At least 80 percent of volume in storage remaining for each 50-year period between 2018 and 2080 in Hemphill County"*
- *"Approximately 20 feet of total average drawdown for each 50-year period between 2012 and 2080 in Randall County and within High Plains District in Armstrong and Potter Counties".*

Dockum Aquifer:

- *"At least 40 percent of the average available drawdown remaining for each 50-year period between 2018 and 2080 in Dallam, Hartley, Moore, and Sherman Counties"*
- *"No more than 30 feet average decline in water levels for each 50-year period between 2018 and 2080 in Oldham and Carson Counties and the Panhandle District portions of Potter and Armstrong Counties"*
- *"Approximately 40 feet average decline in water levels for each 50-year period between 2012 and 2080 in Randall County and within High Plains District in Armstrong and Potter Counties".*

District representatives in Groundwater Management Area 1 determined the Blaine and Seymour aquifers were not relevant for purposes of joint planning.

On January 4, 2022, Mr. Wade Oliver, on behalf of Groundwater Management Area 1, submitted the Desired Future Conditions Explanatory Report and accompanying files to the TWDB. Groundwater Management Area 1 adopted four geographically defined desired future conditions for the Ogallala (inclusive of the Rita Blanca) Aquifer, and three

geographically defined desired future conditions for the Dockum Aquifer, as presented above. TWDB staff reviewed the model files associated with the desired future conditions and some of the desired future conditions were initially not mutually compatible with the groundwater availability model results for the High Plains Aquifer System.

The technical coordinator and consultant for Groundwater Management Area 1 confirmed that the intended desired future conditions required clarification for the assumption of "averaging the 50-year periods," as defined in the resolution adopting desired future conditions. Additionally, the technical coordinator and consultant for the Groundwater Management Area 1 confirmed that a 1 percent tolerance was acceptable for the desired future conditions of both the Ogallala (inclusive of the Rita Blanca) Aquifer and the Dockum Aquifer.

The TWDB received clarifications on procedures and assumptions from the Groundwater Management Area 1 technical coordinator on November 10, 2022, and on November 17, 2022, and a letter of administrative completeness was then provided by the TWDB to Groundwater Management Area 1 on December 16, 2022. All clarifications are included in Appendix A of this report.

METHODS:

The groundwater availability model for the High Plains Aquifer System version 1.01 was run using model files submitted with the explanatory report (Groundwater Management Area 1 and Oliver, 2021) for both the Ogallala (inclusive of the Rita Blanca) Aquifer and the Dockum Aquifer (Figures 1 and 2). Model-simulated water levels were extracted for the years 2019 (stress period 1) through 2080 (stress period 62).

Average percent volumes in storage remaining, total average drawdowns, percent of average drawdowns remaining, and average decline in water levels were calculated according to the Desired Future Conditions Explanatory Report provided by Groundwater Management Area 1 (Groundwater Management Area 1, and Oliver, W., INTERA Inc., 2021). The calculated average percent volumes in storage remaining, total average drawdowns, percent of average drawdowns remaining, and average decline in water level values were then analyzed to verify that the annual pumping scenarios characterized in the submitted model files achieved the desired future conditions within a tolerance of one percent.

The modeled available groundwater values were determined by extracting pumping rates at the end of each decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates by aquifer are summarized by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed for Groundwater Management Area 1 (Tables 1 and 2). Annual pumping rates by aquifer are summarized by county, river basin, and regional water planning area

within Groundwater Management Area 1 (Tables 3 and 4) to be consistent with the format used in the regional water planning process.

Modeled Available Groundwater and Permitting

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

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the modeled available groundwater values are described below:

Ogallala (inclusive of the Rita Blanca Aquifer) and Dockum aquifers

- We used Version 1.01 of the groundwater availability model for the High Plains Aquifer System. See Deeds and Jigmond (2015) for assumptions and limitations of the groundwater availability model for the Ogallala, Rita Blanca, and Dockum aquifers.
- This groundwater availability model includes four layers, which generally represent the Ogallala Aquifer (Layer 1), the Rita Blanca Aquifer (Layer 2), the Upper Unit of the Dockum Aquifer (Layer 3), and the Lower Unit of the Dockum Aquifer (Layer 4). Since active model cells extend beyond the official TWDB aquifer extents, please note that only active model cells within the official TWDB aquifer extents and within Groundwater Management Area 1 were considered for analysis of the desired future conditions and modeled available groundwater values.
- The model was run with MODFLOW-NWT (Niswonger and others, 2011).
- Although the original groundwater availability model was calibrated only to 2012, an analysis during the current round of joint planning (Groundwater Management Area 1 and Oliver, 2021) verified that the model satisfactorily matched measured water levels for the period from 2012 to 2018. For this reason, the TWDB considers it acceptable to use the end of 2018 as the reference year for initial starting water levels for the predictive model simulation from 2019 to 2080.

- Average percent volumes in storage remaining, total average drawdowns, percent of average drawdowns remaining, and average decline in water levels, as well as modeled available groundwater values were based on the active model cells spatially coincident within the official TWDB defined aquifer boundaries.
- Model cells that became dry (when the water level in a model cell drops below the base of the aquifer) at the start of a simulated 50-year duration cycle were excluded from the desired future conditions analysis. Pumping in dry cells were excluded from the modeled available groundwater values for the decades after the cell went dry.
- A tolerance value of one percent was assumed when comparing desired future conditions to modeled results of average percent volumes in storage remaining, total average drawdowns, percent of average drawdowns remaining, and average decline in water levels. This one percent tolerance was specified by the Groundwater Management Area 1 in clarification statements for their desired future conditions resolution (Appendix A).
- Calculations of modeled available groundwater from the model simulation were rounded to the nearest whole number in units of acre-feet per year.
- The verification calculation for the desired future conditions of average percent volume in storage remaining for each 50-year period between 2018 and 2080 in the Ogallala (inclusive of the Rita Blanca) Aquifer for Dallam, Sherman, Hartley, and Moore counties is based on model layer 1 where the Rita Blanca Aquifer does not exist and on an average of model layers 1 and 2 for the area where the extent of the Rita Blanca Aquifer is spatially coincident with the Ogallala Aquifer within Dallam and Hartley counties.

RESULTS:

The modeled available groundwater values for the Ogallala (inclusive of the Rita Blanca Aquifer) Aquifer range from 3,192,963 acre-feet per year in 2020 to 1,991,106 acre-feet per year in 2080 (Table 1). The modeled available groundwater values for the Dockum Aquifer range from approximately 288,052 acre-feet per year in 2020 to 241,087 acre-feet per year in 2080 (Table 2). The modeled available groundwater is summarized by groundwater conservation district and county for the Ogallala (inclusive of the Rita Blanca Aquifer) and Dockum aquifers (Tables 1 and 2). The modeled available groundwater has also been summarized by county, river basin, and regional water planning area for use in the regional water planning process for the Ogallala (inclusive of the Rita Blanca Aquifer) and Dockum aquifers (Tables 3 and 4).

FIGURE 1. GROUNDWATER MANAGEMENT AREA (GMA) 1 BOUNDARY, RIVER BASINS, COUNTIES, REGIONAL WATER PLANNING AREAS (RWPAS), AND GROUNDWATER CONSERVATION DISTRICTS (GCDS) OVERLAIN ON THE MODEL EXTENT OF THE OGALLALA (INCLUSIVE OF THE RITA BLANCA) AQUIFER.

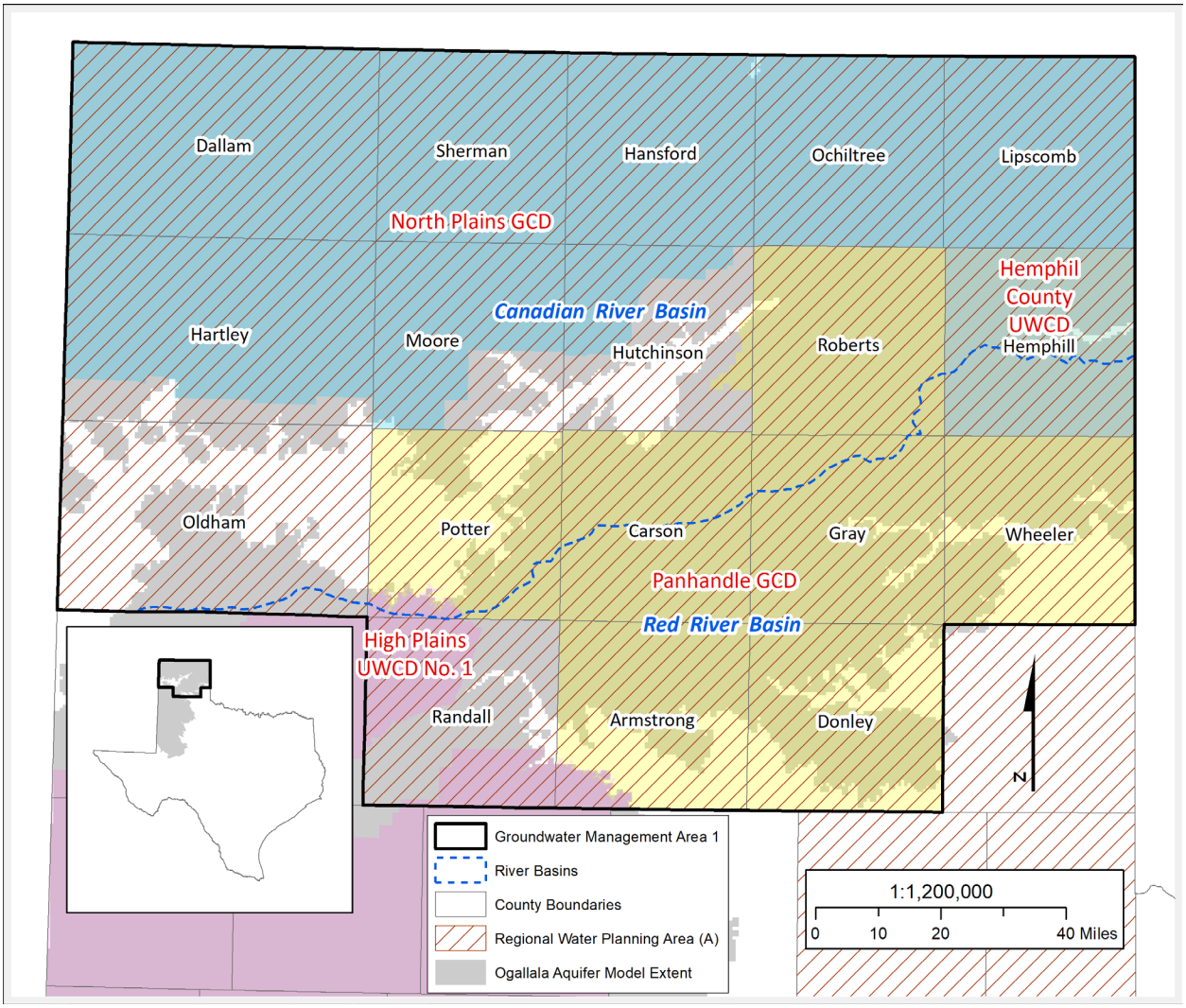


FIGURE 2. GROUNDWATER MANAGEMENT AREA (GMA) 1 BOUNDARY, RIVER BASINS, COUNTIES, REGIONAL WATER PLANNING AREAS (RWPAS), AND GROUNDWATER CONSERVATION DISTRICTS (GCDS) OVERLAIN ON THE MODEL EXTENT OF THE DOCKUM AQUIFER.

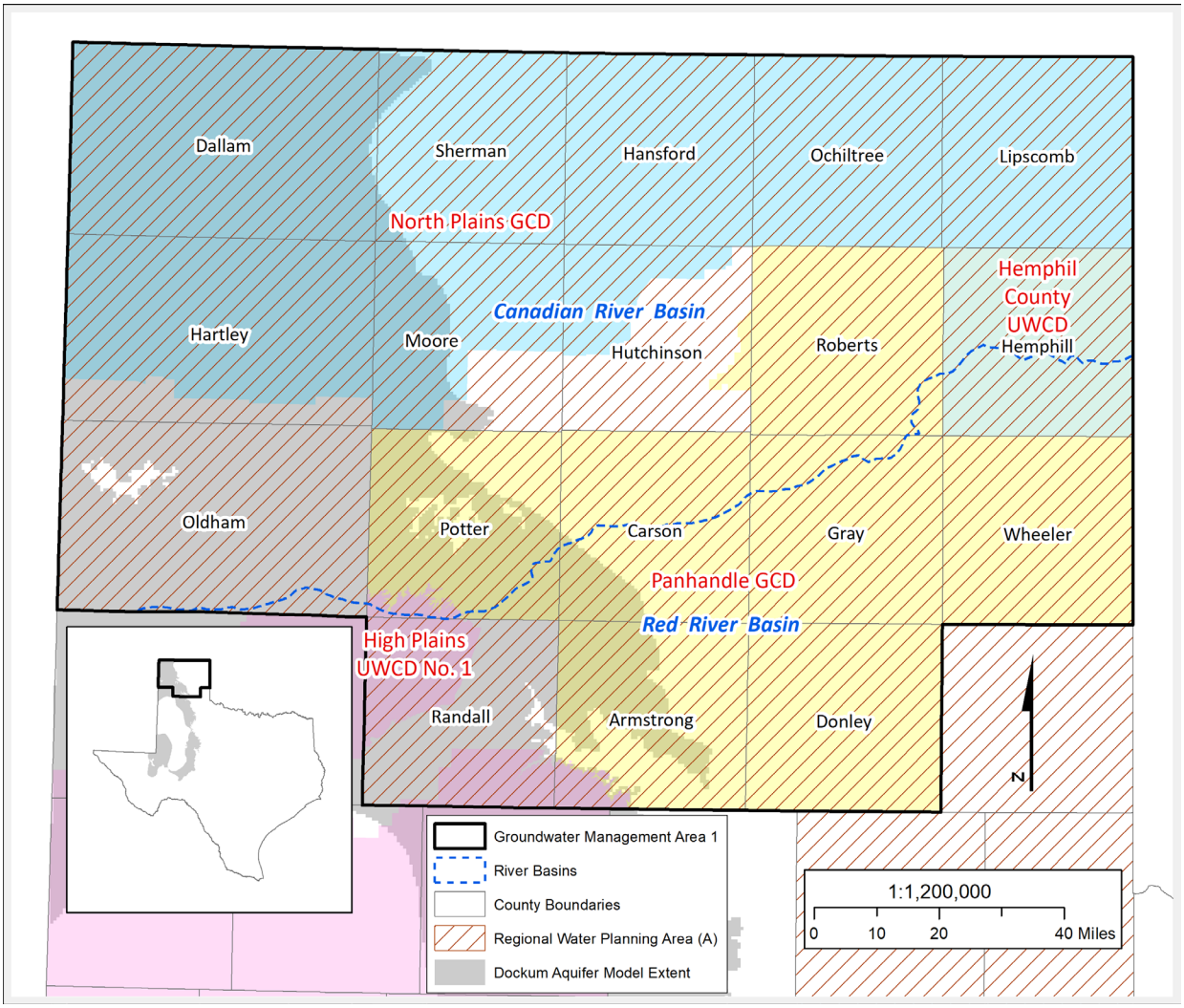


TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA (INCLUSIVE OF THE RITA BLANCA AQUIFER) AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Hemphill County UWCD	Hemphill	Ogallala	37,259	45,816	52,208	55,621	58,039	59,257	60,177
Hemphill County UWCD Total		**Ogallala**	**37,259**	**45,816**	**52,208**	**55,621**	**58,039**	**59,257**	**60,177**
High Plains UWCD No.1	Armstrong	Ogallala	5,679	4,713	3,007	1,877	1,181	968	786
High Plains UWCD No.1	Potter	Ogallala	2,348	2,538	2,362	2,049	1,634	1,075	802
High Plains UWCD No.1	Randall	Ogallala	36,992	34,674	29,709	24,585	20,385	17,088	14,559
High Plains UWCD No.1 Total		**Ogallala**	**45,019**	**41,925**	**35,078**	**28,511**	**23,200**	**19,131**	**16,147**
North Plains GCD	Dallam	Ogallala*	319,988	269,575	228,726	194,888	165,787	144,360	128,259
North Plains GCD	Hansford	Ogallala	297,486	295,700	281,612	264,290	247,744	229,800	211,464
North Plains GCD	Hartley	Ogallala†	355,646	270,230	207,754	169,890	144,564	124,366	108,352
North Plains GCD	Hutchinson	Ogallala	77,920	80,189	77,835	74,461	70,609	67,496	64,083
North Plains GCD	Lipscomb	Ogallala	251,489	270,819	263,478	249,968	235,561	218,975	201,984

* Ogallala Aquifer also includes the Rita Blanca Aquifer where they are both spatially coincident within the Dallam County portion of North Plains GCD.
† Ogallala Aquifer also includes the Rita Blanca Aquifer where they are both spatially coincident within the Hartley County portion of North Plains GCD.

TABLE 1 (CONTINUED). MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA (INCLUSIVE OF THE RITA BLANCA AQUIFER) AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
North Plains GCD	Moore	Ogallala	140,408	139,745	132,737	121,616	106,134	88,165	73,128
North Plains GCD	Ochiltree	Ogallala	259,676	259,973	247,274	231,502	215,617	199,324	181,295
North Plains GCD	Sherman	Ogallala	290,148	287,657	261,521	226,142	198,338	166,675	145,399
North Plains GCD Total		**Ogallala**	**1,992,761**	**1,873,888**	**1,700,937**	**1,532,757**	**1,384,354**	**1,239,161**	**1,113,964**
Panhandle GCD	Armstrong	Ogallala	56,940	51,726	45,757	40,241	35,089	30,685	27,137
Panhandle GCD	Carson	Ogallala	163,315	166,024	159,756	149,768	141,251	134,365	121,774
Panhandle GCD	Donley	Ogallala	72,747	78,267	77,157	72,601	67,032	60,915	53,337
Panhandle GCD	Gray	Ogallala	177,633	181,648	173,602	160,382	147,045	133,802	121,936
Panhandle GCD	Hutchinson	Ogallala	8,524	10,589	11,798	11,784	11,427	10,775	9,606
Panhandle GCD	Potter	Ogallala	24,022	22,245	19,590	16,477	13,607	10,990	8,821
Panhandle GCD	Roberts	Ogallala	358,704	409,300	394,930	369,335	344,109	317,529	286,594
Panhandle GCD	Wheeler	Ogallala	119,602	132,615	132,787	128,472	121,852	114,269	106,929
Panhandle GCD Total		**Ogallala**	**981,487**	**1,052,414**	**1,015,377**	**949,060**	**881,412**	**813,330**	**736,134**
All Districts Total		**Ogallala**	**3,056,526**	**3,014,043**	**2,803,600**	**2,565,949**	**2,347,005**	**2,130,879**	**1,926,422**

TABLE 1 (CONTINUED). MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA (INCLUSIVE OF THE RITA BLANCA AQUIFER) AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
No District-County	Hartley	Ogallala‡	15,555	16,380	15,634	14,309	12,989	11,646	10,434
No District-County	Hutchinson	Ogallala	33,955	32,967	28,372	24,059	20,978	18,576	17,204
No District-County	Moore	Ogallala	8,703	9,681	9,415	8,245	7,122	6,198	5,517
No District-County	Oldham	Ogallala	40,496	39,067	36,192	31,219	26,044	21,393	18,041
No District-County	Randall	Ogallala	37,728	35,877	30,800	25,725	20,992	17,103	13,488
No District Total		**Ogallala**	**136,437**	**133,972**	**120,413**	**103,557**	**88,125**	**74,916**	**64,684**
GMA 1 Total		**Ogallala**	**3,192,963**	**3,148,015**	**2,924,013**	**2,669,506**	**2,435,130**	**2,205,795**	**1,991,106**

‡ Ogallala Aquifer also includes the Rita Blanca Aquifer where they are both spatially coincident within Hartley County and outside of any groundwater district.

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
High Plains UWCD No.1	Armstrong	Dockum	1,853	835	221	221	221	221	221
High Plains UWCD No.1	Potter	Dockum	2,663	2,657	2,406	2,315	2,281	2,248	2,172
High Plains UWCD No.1	Randall	Dockum	6,997	8,736	9,703	8,428	7,698	7,610	7,782
High Plains UWCD No.1 Total		**Dockum**	**11,513**	**12,228**	**12,330**	**10,964**	**10,200**	**10,079**	**10,175**
North Plains GCD	Dallam	Dockum	15,969	15,522	14,700	14,019	13,513	12,895	12,415
North Plains GCD	Hartley	Dockum	12,402	11,792	11,051	10,334	9,755	9,234	8,831
North Plains GCD	Moore	Dockum	4,496	5,399	5,409	5,064	4,782	4,474	4,213
North Plains GCD	Sherman	Dockum	445	416	310	288	293	288	291
North Plains GCD Total		**Dockum**	**33,312**	**33,129**	**31,470**	**29,705**	**28,343**	**26,891**	**25,750**
Panhandle GCD	Armstrong	Dockum	5,313	7,102	8,122	8,601	8,849	8,904	8,914
Panhandle GCD	Carson	Dockum	6	6	6	6	6	6	6
Panhandle GCD	Potter	Dockum	30,160	37,699	37,853	36,963	35,881	34,685	33,571
Panhandle GCD Total		**Dockum**	**35,479**	**44,807**	**45,981**	**45,570**	**44,736**	**43,595**	**42,491**
All Districts Total		**Dockum**	**80,304**	**90,164**	**89,781**	**86,239**	**83,279**	**80,565**	**78,416**

TABLE 2 (CONTINUED). MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
No District-County	Hartley	Dockum	44,260	52,799	53,096	50,432	46,907	42,974	39,311
No District-County	Moore	Dockum	241	560	594	616	643	645	625
No District-County	Oldham	Dockum	144,234	153,787	145,925	135,393	124,861	114,569	105,341
No District-County	Randall	Dockum	19,013	29,231	32,057	31,502	28,550	21,149	17,394
No District Total		**Dockum**	**207,748**	**236,377**	**231,672**	**217,943**	**200,961**	**179,337**	**162,671**
GMA 1 Total		**Dockum**	**288,052**	**326,541**	**321,453**	**304,182**	**284,240**	**259,902**	**241,087**

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA (INCLUSIVE OF THE RITA BLANCA AQUIFER) AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER FOR EACH DECADE BETWEEN 2030 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River basin	Aquifer	2030	2040	2050	2060	2070	2080
Armstrong	A	RED	Ogallala	56,439	48,764	42,118	36,270	31,653	27,923
Carson	A	CANADIAN	Ogallala	68,193	66,220	62,132	57,975	54,708	49,565
Carson	A	RED	Ogallala	97,831	93,536	87,636	83,276	79,657	72,209
Dallam	A	CANADIAN	Ogallala§	269,575	228,726	194,888	165,787	144,360	128,259
Donley	A	RED	Ogallala	78,267	77,157	72,601	67,032	60,915	53,337
Gray	A	CANADIAN	Ogallala	46,240	43,480	39,643	36,480	33,394	30,628
Gray	A	RED	Ogallala	135,408	130,122	120,739	110,565	100,408	91,308
Hansford	A	CANADIAN	Ogallala	295,700	281,612	264,290	247,744	229,800	211,464
Hartley	A	CANADIAN	Ogallala**	286,610	223,388	184,199	157,553	136,012	118,786
Hemphill	A	CANADIAN	Ogallala	24,975	29,168	32,388	34,729	36,110	37,074
Hemphill	A	RED	Ogallala	20,841	23,040	23,233	23,310	23,147	23,103
Hutchinson	A	CANADIAN	Ogallala	123,745	118,005	110,304	103,014	96,847	90,893
Lipscomb	A	CANADIAN	Ogallala	270,819	263,478	249,968	235,561	218,975	201,984
Moore	A	CANADIAN	Ogallala	149,426	142,152	129,861	113,256	94,363	78,645
Ochiltree	A	CANADIAN	Ogallala	259,973	247,274	231,502	215,617	199,324	181,295
Oldham	A	CANADIAN	Ogallala	34,871	32,845	28,578	23,948	19,789	16,869
Oldham	A	RED	Ogallala	4,196	3,347	2,641	2,096	1,604	1,172
Potter	A	CANADIAN	Ogallala	14,672	13,137	11,036	9,214	7,648	6,337
Potter	A	RED	Ogallala	10,111	8,815	7,490	6,027	4,417	3,286
Randall	A	RED	Ogallala	70,551	60,509	50,310	41,377	34,191	28,047
Roberts	A	CANADIAN	Ogallala	386,950	372,064	346,908	322,461	297,068	267,425
Roberts	A	RED	Ogallala	22,350	22,866	22,427	21,648	20,461	19,169

§ Ogallala Aquifer also includes the Rita Blanca Aquifer where they are both spatially coincident within Dallam County and the Canadian River basin.
** Ogallala Aquifer also includes the Rita Blanca Aquifer where they are both spatially coincident within Hartley County and the Canadian River basin.

TABLE 3 (CONTINUED). MODELED AVAILABLE GROUNDWATER FOR THE OGALLALA (INCLUSIVE OF THE RITA BLANCA AQUIFER) AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER FOR EACH DECADE BETWEEN 2030 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River basin	Aquifer	2030	2040	2050	2060	2070	2080
Sherman	A	CANADIAN	Ogallala	287,657	261,521	226,142	198,338	166,675	145,399
Wheeler	A	RED	Ogallala	132,615	132,787	128,472	121,852	114,269	106,929
GMA 1 Total			**Ogallala**	**3,148,015**	**2,924,013**	**2,669,506**	**2,435,130**	**2,205,795**	**1,991,106**

TABLE 4. MODELED AVAILABLE GROUNDWATER FOR THE DOCKUM AQUIFER IN GROUNDWATER MANAGEMENT AREA 1 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER FOR EACH DECADE BETWEEN 2030 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River basin	Aquifer	2030	2040	2050	2060	2070	2080
Armstrong	A	RED	Dockum	7,937	8,343	8,822	9,070	9,125	9,135
Carson	A	CANADIAN	Dockum	0	0	0	0	0	0
Carson	A	RED	Dockum	6	6	6	6	6	6
Dallam	A	CANADIAN	Dockum	15,522	14,700	14,019	13,513	12,895	12,415
Hartley	A	CANADIAN	Dockum	64,591	64,147	60,766	56,662	52,208	48,142
Moore	A	CANADIAN	Dockum	5,959	6,003	5,680	5,425	5,119	4,838
Oldham	A	CANADIAN	Dockum	153,694	145,814	135,269	124,727	114,427	105,188
Oldham	A	RED	Dockum	93	111	124	134	142	153
Potter	A	CANADIAN	Dockum	38,004	38,158	37,268	36,186	34,990	33,815
Potter	A	RED	Dockum	2,352	2,101	2,010	1,976	1,943	1,928
Randall	A	RED	Dockum	37,967	41,760	39,930	36,248	28,759	25,176
Sherman	A	CANADIAN	Dockum	416	310	288	293	288	291
GMA 1 Total			**Dockum**	**326,541**	**321,453**	**304,182**	**284,240**	**259,902**	**241,087**

LIMITATIONS:

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

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

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

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

REFERENCES:

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

Groundwater Management Area 1, and Oliver, W., INTERA Inc., 2021, Desired Future Conditions Explanatory Report (Groundwater Management Area 1), December 2021, 595 p.

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

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

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

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

APPENDIX A

Critical Clarifications requested by the TWDB *(need additional files or potential update to legal DFC Resolutions)***:**

1. Based on TWDB analysis of the High Plains Aquifer System model files provided by the GMA 1 consultant (INTERA, Inc.), some DFCs are unachievable with respect to the current legal phrasing of the DFC Resolution. The TWDB is requesting the following tolerances:
    - A tolerance of 1% for GMA 1 DFCs defined by percent volume in storage remaining in the Ogallala Aquifer (inclusive of Rita Blanca Aquifer).
    - A tolerance of 1% for GMA 1 DFCs defined by percent available drawdown remaining in the Dockum Aquifer.

    Please confirm that the GMA is willing to accept the tolerance clarifications requested above. Alternatively, the GMA or GMA consultant may provide revised High Plains Aquifer System model files for TWDB to review or may revise the DFC Resolution so that the DFCs are achievable without requiring a tolerance.

Other Clarifications requested by the TWDB (*need acknowledgement*)**:**
Note that the tolerances in Clarification #1 were derived from calculations using the following assumptions. If the GMA disagrees with the following assumptions, the requested tolerances may no longer be sufficient for TWDB to declare the DFCs achievable and further action may be required.

Ogallala (inclusive of Rita Blanca) Aquifer:

2. Please confirm that the phrase "percent of volume in storage remaining for each 50-year period between 2018 and 2080" in the DFC Resolution means "the percent of volume remaining in storage averaged over all thirteen 50-year time periods starting from 2018 to 2068 through 2030 to 2080." This interpretation produces calculated storage values consistent with the DFC values provided in the Explanatory Report and supplemental documents provided by the GMA 1 consultant.
3. Please confirm that the phrase "total average drawdown for each 50-year period between 2012 and 2080" in the DFC Resolution means "the total average drawdown averaged over all nineteen 50-year time periods starting from 2012 to 2062 through 2030 to 2080. This interpretation produces calculated drawdown values consistent with the DFC values provided in the Explanatory Report and supplemental documents provided by the GMA 1 consultant.
4. Please confirm that the GMA accepts the following assumptions for calculating modeled drawdown: 1) modeled dry cells are excluded from the calculations, 2) only active model cells within official TWDB aquifer boundaries are included in calculations, and 3) averages are calculated over the entire multi-county area defined

within the resolutions rather than by individual county within those areas. This method produces drawdown values consistent with the DFC values provided in the Explanatory Report and supplemental documents provided by the GMA 1 consultant.

Dockum Aquifer:

5. Please confirm that the phrase "percent of the average available drawdown remaining for each 50-year period between 2018 and 2080" in the DFC Resolution means "the percent of the average available drawdown remaining averaged over all thirteen 50-year time periods starting from 2018 to 2068 through 2030 to 2080." This method produces calculated storage values consistent with the DFC values provided in the Explanatory Report and supplemental documents provided by the GMA 1 consultant.
6. Please confirm that the phrase "average decline in water levels for each 50-year period between 2018 and 2080" in the DFC Resolution means "the average decline in water levels averaged over all thirteen 50-year time periods starting from 2018 to 2068 through 2030 to 2080". This method produces calculated storage values consistent with the DFC values provided in the Explanatory Report and supplemental documents provided by the GMA 1 consultant.
7. Please confirm that the phrase "average decline in water levels for each 50-year period between 2012 and 2080" in the DFC Resolution means "the average decline in water levels averaged over all nineteen 50-year time periods starting from 2012 to 2062 through 2030 to 2080. This method produces calculated storage values consistent with the DFC values provided in the Explanatory Report and supplemental documents provided by the GMA 1 consultant.
8. Please confirm that the GMA accepts the following assumptions for calculating modeled drawdowns: 1) modeled dry cells are excluded from the calculations, 2) only active model cells within official TWDB aquifer boundaries are included in calculations, and 3) averages are calculated over the entire multi-county area defined within the resolutions rather than by individual county within those areas. This method produces drawdown values consistent with the DFC values provided in the Explanatory Report and supplemental documents provided by the GMA 1 consultant.

Optional Clarifications requested by the TWDB *(Typos in Explanatory Report)*[6]:

None

[6] Since the TWDB considers the legal DFC Resolution documents, rather than the Explanatory Report, as the official definition of DFCs, the TWDB does not officially require corrections to the Explanatory Report. However, because the Explanatory Report is often used as a simplified, more-readable summary of the legal DFC Resolution documents, we recommend correcting the Explanatory Report to match the DFC Resolutions in order to avoid confusion.

Informational

For reference, the tables below show the averaged results of DFC analysis calculations provided by the GMA 1 consultant and verified by TWDB for the currently unachievable DFCs:

Bulleted Resolutions	***Percent of volume in storage remaining for each 50-year period between 2018 and 2080***	
	DFC	**Calculated from model**
Ogallala Bullet #2*	>= 50%	49%
Ogallala Bullet #3**	>= 80%	79%

** Refers to Hansford, Hutchinson, Lipscomb, Ochiltree, Carson, Donley, Gray, Roberts, Wheeler, and Oldham counties; and within the Panhandle District portions of Armstrong and Potter counties*
*** refers to Hemphill County*

Resolution Section	***Percent of average available drawdown remaining for each 50-year period between 2018 and 2080***	
	DFC	**Calculated from model**
Dockum Bullet #1*	>= 40%	39%

** Refers to Dallam, Hartley, Moore, and Sherman counties.*

FIGURE A1. LETTER OF AGREEMENT FROM THE GROUNDWATER MANAGEMENT AREA 1 TECHNICAL COORDINATOR FOR CLARIFICATIONS ON PROCEDURES AND ASSUMPTIONS OF THEIR DESIRED FUTURE CONDITIONS RESOLUTION STATEMENTS.

NORTH PLAINS GROUNDWATER Conservation District

November 10, 2022

Robert G. Bradley, PG, CTCM
Groundwater Technical Assistance
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711

Dear Mr. Bradley,

Thank you for reaching out to clarify the Desired Future Conditions adopted by the groundwater conservation districts in Groundwater Management Area 1 (GMA 1). The GMA 1 technical consultant and the managers from Hemphill County Underground Water Conservation District, High Plains Underground Water Conservation District, and Panhandle Groundwater Conservation District reviewed the clarifications document attached to this correspondence.

The Districts in GMA 1 agree that the approach presented by the TWDB staff including the tolerances below are consistent with our intent when adopting DFCs:

- A tolerance of 1% for GMA 1 DFCs defined by percent volume in storage remaining in the Ogallala Aquifer (inclusive of Rita Blanca Aquifer).
- A tolerance of 1% for GMA 1 DFCs defined by percent available drawdown remaining in the Dockum Aquifer.

We agree with the TWDB staff assumptions presented in the "Other Clarifications" section of your note on November 9, 2022, relating to Ogallala, Rita Blanca and Dockum aquifers.

We look forward to TWDB's determination of administrative completeness and estimation of modeled available groundwater. If there is anything else we can do to help in this process, please let me know.

Sincerely,

Steven D. Walthour, PG
General Manager

CC. Janet Guthrie – Hemphill County Underground Water Conservation District
Britney Britten – Panhandle Groundwater Conservation District
Jason Coleman– High Plains Underground Water Conservation District
Wade Oliver - Intera

Attachment

603 East 1st Street PO Box 795 Dumas, TX 79029 (806) 935-6401 Phone (806) 935-6633 Fax www.northplainsgcd.org

Appendix F

Estimated Historical Groundwater Use And 2022 State Water Plan Datasets:

North Plains Groundwater Conservation District

Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
December 11, 2022

GROUNDWATER MANAGEMENT PLAN DATA:

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

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

The five reports included in this part are:

1. Estimated Historical Groundwater Use (checklist item 2)
   from the TWDB Historical Water Use Survey (WUS)
2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)
   from the 2022 Texas State Water Plan (SWP)

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

DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2022 SWP data available as of 12/11/2022. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2022 SWP. District personnel must review these datasets and correct any discrepancies to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

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

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

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

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

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

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

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

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

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

DALLAM COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	1,585	42	0	0	304,196	4,232	310,055
	SW	0	0	0	0	0	1,058	1,058
2018	GW	1,849	42	0	0	334,818	4,217	340,926
	SW	0	0	0	0	0	1,054	1,054
2017	GW	1,986	45	0	0	282,807	4,076	288,914
	SW	0	0	0	0	0	1,019	1,019
2016	GW	1,881	45	0	0	338,797	4,760	345,483
	SW	0	0	0	0	0	1,190	1,190
2015	GW	1,592	50	0	0	290,509	4,464	296,615
	SW	0	0	0	0	185	1,116	1,301
2014	GW	1,571	60	0	0	381,546	5,952	389,129
	SW	0	0	0	0	185	1,488	1,673
2013	GW	1,725	60	0	0	391,795	5,605	399,185
	SW	0	0	0	0	185	1,401	1,586
2012	GW	1,865	60	0	0	495,720	5,800	503,445
	SW	0	0	0	0	185	1,450	1,635
2011	GW	1,929	60	0	0	492,524	2,807	497,320
	SW	0	0	0	0	185	702	887
2010	GW	1,641	60	0	0	363,654	2,410	367,765
	SW	0	0	0	0	185	603	788
2009	GW	1,597	6	0	0	419,927	5,590	427,120
	SW	0	0	0	0	185	1,398	1,583
2008	GW	1,817	6	0	0	407,938	7,382	417,143
	SW	0	0	0	0	185	1,707	1,892
2007	GW	1,649	9	0	0	366,071	8,908	376,637
	SW	0	0	0	0	191	2,074	2,265
2006	GW	1,572	9	0	0	346,414	8,538	356,533
	SW	0	0	0	0	191	1,974	2,165
2005	GW	1,461	9	0	0	405,495	6,923	413,888
	SW	0	0	0	0	191	1,599	1,790
2004	GW	1,434	9	0	0	402,698	7,147	411,288
	SW	0	0	0	0	191	1,660	1,851

HANSFORD COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	687	71	8	0	170,748	3,760	175,274
	SW	0	0	2	0	0	1,612	1,614
2018	GW	791	207	40	0	190,628	3,787	195,453
	SW	0	0	10	0	0	1,623	1,633
2017	GW	774	217	25	0	177,426	3,658	182,100
	SW	0	0	6	0	0	1,568	1,574
2016	GW	1,136	261	13	0	168,461	3,289	173,160
	SW	0	0	3	0	0	1,410	1,413
2015	GW	1,127	328	3	0	146,249	3,229	150,936
	SW	0	0	1	0	0	1,384	1,385
2014	GW	1,156	285	11	0	211,451	3,314	216,217
	SW	0	0	3	0	0	1,420	1,423
2013	GW	1,257	204	8	0	198,601	3,241	203,311
	SW	0	0	2	0	132	1,389	1,523
2012	GW	1,230	232	5	0	218,645	3,630	223,742
	SW	0	0	1	0	134	1,556	1,691
2011	GW	1,092	231	2	0	233,576	3,270	238,171
	SW	0	0	1	0	129	1,402	1,532
2010	GW	1,090	144	113	0	128,462	2,631	132,440
	SW	0	0	19	0	170	1,128	1,317
2009	GW	1,006	232	67	0	152,554	3,043	156,902
	SW	0	0	11	0	132	1,304	1,447
2008	GW	1,084	369	21	0	140,900	4,835	147,209
	SW	0	0	4	0	1,940	1,376	3,320
2007	GW	990	387	0	0	106,015	4,249	111,641
	SW	0	0	0	0	62	1,456	1,518
2006	GW	1,372	438	0	0	134,030	5,759	141,599
	SW	0	0	0	0	143	2,181	2,324
2005	GW	1,171	454	0	0	214,532	4,241	220,398
	SW	0	0	0	0	127	1,547	1,674
2004	GW	1,162	413	0	0	231,027	2,214	234,816
	SW	0	0	0	0	0	2,709	2,709

HARTLEY COUNTY

83.56% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	867	0	0	0	293,613	5,527	300,007
	SW	0	0	0	0	0	2,368	2,368
2018	GW	1,024	0	18	0	345,150	5,448	351,640
	SW	0	0	4	0	0	2,335	2,339
2017	GW	1,068	0	0	0	299,835	5,270	306,173
	SW	0	0	0	0	0	2,259	2,259
2016	GW	1,029	0	0	0	328,282	4,172	333,483
	SW	0	0	0	0	0	1,788	1,788
2015	GW	957	0	1	0	276,676	4,106	281,740
	SW	0	0	0	0	0	1,760	1,760
2014	GW	1,012	0	30	0	341,427	4,518	346,987
	SW	0	0	8	0	0	1,936	1,944
2013	GW	1,100	0	0	0	379,326	4,192	384,618
	SW	0	0	0	0	0	1,797	1,797
2012	GW	1,186	0	0	0	383,596	4,257	389,039
	SW	0	0	0	0	0	1,824	1,824
2011	GW	1,272	0	0	0	405,919	3,926	411,117
	SW	0	0	0	0	0	1,682	1,682
2010	GW	958	0	2	0	284,567	3,380	288,907
	SW	0	0	0	0	0	1,448	1,448
2009	GW	903	0	2	0	320,110	3,870	324,885
	SW	0	0	0	0	0	1,659	1,659
2008	GW	1,034	0	2	0	304,726	4,928	310,690
	SW	0	0	1	0	0	1,747	1,748
2007	GW	999	0	0	0	270,322	4,242	275,563
	SW	0	0	0	0	0	1,453	1,453
2006	GW	1,028	0	0	0	256,746	6,040	263,814
	SW	0	0	0	0	0	2,224	2,224
2005	GW	983	0	0	0	318,898	3,963	323,844
	SW	0	0	0	0	0	1,334	1,334
2004	GW	1,012	0	0	0	338,582	3,108	342,702
	SW	0	0	0	0	0	1,975	1,975

HUTCHINSON COUNTY

30.53% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	1,474	3,210	26	0	20,950	109	25,769
	SW	48	201	0	0	588	36	873
2018	GW	1,626	3,166	28	0	20,084	108	25,012
	SW	60	200	1	0	84	36	381
2017	GW	1,414	3,338	34	0	17,953	104	22,843
	SW	38	205	2	0	84	35	364
2016	GW	1,856	2,987	26	0	19,601	85	24,555
	SW	68	0	0	0	84	28	180
2015	GW	1,550	4,692	27	0	15,121	83	21,473
	SW	30	0	0	0	588	27	645
2014	GW	2,078	4,848	26	0	19,670	82	26,704
	SW	426	0	0	0	0	27	453
2013	GW	922	4,595	27	0	21,115	82	26,741
	SW	345	0	0	0	84	27	456
2012	GW	1,052	4,923	27	0	21,925	102	28,029
	SW	282	0	0	0	84	34	400
2011	GW	1,737	5,184	26	0	22,517	126	29,590
	SW	37	104	0	0	0	42	183
2010	GW	1,345	8,353	40	0	12,242	112	22,092
	SW	365	278	6	0	84	38	771
2009	GW	1,100	8,929	41	0	16,236	149	26,455
	SW	63	0	6	0	0	49	118
2008	GW	1,353	7,953	42	0	15,395	151	24,894
	SW	99	588	33	0	588	50	1,358
2007	GW	990	7,702	26	0	10,531	118	19,367
	SW	79	822	26	0	84	39	1,050
2006	GW	994	7,973	26	0	12,493	173	21,659
	SW	95	167	26	0	84	58	430
2005	GW	728	7,401	26	0	12,681	146	20,982
	SW	92	1,088	0	0	84	49	1,313
2004	GW	905	7,952	26	0	11,700	22	20,605
	SW	136	790	26	0	84	198	1,234

LIPSCOMB COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	583	325	42	0	44,244	1,245	46,439
	SW	0	0	11	0	0	138	149
2018	GW	598	349	136	0	44,005	1,263	46,351
	SW	0	0	34	0	0	140	174
2017	GW	574	310	110	0	44,391	1,200	46,585
	SW	0	0	27	0	0	133	160
2016	GW	655	314	86	0	42,592	596	44,243
	SW	0	0	22	0	0	66	88
2015	GW	642	292	107	0	35,113	581	36,735
	SW	0	0	27	0	0	65	92
2014	GW	683	258	269	0	43,894	576	45,680
	SW	0	0	67	0	0	64	131
2013	GW	721	244	190	0	41,723	575	43,453
	SW	0	0	47	0	0	64	111
2012	GW	1,010	244	212	0	55,287	717	57,470
	SW	0	0	53	0	0	80	133
2011	GW	926	242	13	0	51,358	826	53,365
	SW	0	0	3	0	0	92	95
2010	GW	671	193	130	0	31,415	716	33,125
	SW	0	0	53	0	0	80	133
2009	GW	528	171	144	0	29,915	774	31,532
	SW	0	0	59	0	0	86	145
2008	GW	626	187	159	0	30,974	782	32,728
	SW	0	0	65	0	0	87	152
2007	GW	663	143	0	0	32,319	719	33,844
	SW	0	0	0	0	20	80	100
2006	GW	678	102	0	0	28,020	647	29,447
	SW	0	0	0	0	0	72	72
2005	GW	625	102	0	0	27,263	780	28,770
	SW	0	0	0	0	0	87	87
2004	GW	651	159	0	0	23,440	90	24,340
	SW	0	0	0	0	0	809	809

MOORE COUNTY

76.51% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	2,335	6,806	4	0	132,130	2,832	144,107
	SW	0	0	0	0	0	500	500
2018	GW	2,712	6,047	2	0	141,685	2,763	153,209
	SW	0	0	0	0	0	487	487
2017	GW	2,709	5,923	2	0	121,355	2,703	132,692
	SW	0	0	0	0	0	477	477
2016	GW	3,212	6,783	1	0	141,661	2,102	153,759
	SW	0	0	0	0	0	371	371
2015	GW	2,778	6,692	6	0	114,822	1,999	126,297
	SW	0	0	2	0	0	353	355
2014	GW	3,065	6,731	6	0	158,960	2,182	170,944
	SW	0	0	2	0	0	385	387
2013	GW	3,404	6,623	0	85	170,581	2,098	182,791
	SW	0	0	0	0	0	370	370
2012	GW	3,477	6,842	0	128	179,790	2,376	192,613
	SW	0	0	0	0	0	419	419
2011	GW	3,919	6,135	0	254	204,633	1,815	216,756
	SW	0	0	0	0	0	320	320
2010	GW	2,805	5,544	10	33	124,401	1,550	134,343
	SW	0	0	2	0	0	274	276
2009	GW	3,314	5,704	12	93	150,351	2,178	161,652
	SW	0	0	2	0	0	384	386
2008	GW	3,122	5,623	39	83	143,173	2,401	154,441
	SW	0	0	2	0	620	424	1,046
2007	GW	3,185	5,532	18	83	191,572	1,969	202,359
	SW	0	0	0	0	0	347	347
2006	GW	3,706	6,489	19	83	139,103	3,611	153,011
	SW	0	0	0	0	0	637	637
2005	GW	3,368	6,563	9	109	222,704	2,005	234,758
	SW	0	0	0	0	0	353	353
2004	GW	3,266	5,240	7	83	224,076	1,924	234,596
	SW	0	0	0	0	0	480	480

OCHILTREE COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	1,655	3	132	0	84,939	3,236	89,965
	SW	0	0	33	0	0	360	393
2018	GW	1,991	28	177	0	89,102	3,318	94,616
	SW	0	0	44	0	0	369	413
2017	GW	2,145	30	96	0	74,156	3,144	79,571
	SW	0	0	24	0	0	349	373
2016	GW	2,108	31	49	0	79,668	1,983	83,839
	SW	0	0	12	0	0	220	232
2015	GW	2,176	30	155	0	75,302	1,868	79,531
	SW	0	0	39	0	0	208	247
2014	GW	2,550	30	326	0	92,205	2,306	97,417
	SW	0	0	81	0	0	256	337
2013	GW	2,638	7	305	0	92,597	2,183	97,730
	SW	0	0	76	0	0	243	319
2012	GW	2,972	35	23	0	109,415	2,472	114,917
	SW	0	0	6	0	0	275	281
2011	GW	2,991	36	69	0	109,671	1,481	114,248
	SW	0	0	17	0	0	165	182
2010	GW	2,262	28	96	0	60,484	1,300	64,170
	SW	0	0	38	0	0	144	182
2009	GW	2,090	5	130	0	66,859	2,102	71,186
	SW	0	0	36	0	0	234	270
2008	GW	1,826	3	97	0	75,402	2,450	79,778
	SW	0	0	34	0	0	272	306
2007	GW	2,018	0	48	0	51,134	2,365	55,565
	SW	0	0	0	0	0	263	263
2006	GW	2,204	0	49	0	66,539	3,158	71,950
	SW	0	0	0	0	0	351	351
2005	GW	2,185	0	52	0	88,256	2,450	92,943
	SW	0	0	0	0	0	272	272
2004	GW	2,089	0	54	0	74,436	305	76,884
	SW	0	0	0	0	0	2,736	2,736

SHERMAN COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	3,267	1	0	0	268,513	4,614	276,395
	SW	0	0	0	0	0	513	513
2018	GW	4,457	2	1	0	309,867	4,648	318,975
	SW	0	0	0	0	0	516	516
2017	GW	4,397	2	1	0	311,847	4,491	320,738
	SW	0	0	0	0	0	499	499
2016	GW	514	2	0	0	285,432	3,850	289,798
	SW	0	0	0	0	0	428	428
2015	GW	537	1	2	0	246,920	3,542	251,002
	SW	0	0	1	0	0	394	395
2014	GW	622	2	0	0	336,265	4,712	341,601
	SW	0	0	0	0	0	524	524
2013	GW	524	2	3	0	344,067	4,410	349,006
	SW	0	0	1	0	0	490	491
2012	GW	658	2	0	0	347,939	4,840	353,439
	SW	0	0	0	0	0	538	538
2011	GW	687	2	0	0	396,637	2,274	399,600
	SW	0	0	0	0	0	253	253
2010	GW	630	2	32	0	236,631	1,947	239,242
	SW	0	0	4	0	0	216	220
2009	GW	638	3	34	0	282,660	4,853	288,188
	SW	0	0	4	0	0	539	543
2008	GW	581	2	37	0	274,019	6,488	281,127
	SW	0	0	4	0	0	721	725
2007	GW	699	2	0	0	222,185	7,217	230,103
	SW	0	0	0	0	0	802	802
2006	GW	651	2	0	0	259,255	7,896	267,804
	SW	0	0	0	0	0	877	877
2005	GW	641	2	0	0	358,343	6,507	365,493
	SW	0	0	0	0	0	723	723
2004	GW	742	2	0	0	386,966	5,980	393,690
	SW	0	0	0	0	0	1,496	1,496

Projected Surface Water Supplies
TWDB 2022 State Water Plan Data

DALLAM COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Livestock, Dallam	Canadian	Canadian Livestock Local Supply	2,488	2,488	2,488	2,488	2,488	2,488
	Sum of Projected Surface Water Supplies (acre-feet)			**2,488**	**2,488**	**2,488**	**2,488**	**2,488**	**2,488**

HANSFORD COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Irrigation, Hansford	Canadian	Canadian Run-of-River	22	22	22	22	22	22
A	Livestock, Hansford	Canadian	Canadian Livestock Local Supply	2,617	2,617	2,617	2,617	2,617	2,617
	Sum of Projected Surface Water Supplies (acre-feet)			**2,639**	**2,639**	**2,639**	**2,639**	**2,639**	**2,639**

HARTLEY COUNTY

83.56% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Livestock, Hartley	Canadian	Canadian Livestock Local Supply	2,668	2,668	2,668	2,668	2,668	2,668
	Sum of Projected Surface Water Supplies (acre-feet)			**2,668**	**2,668**	**2,668**	**2,668**	**2,668**	**2,668**

HUTCHINSON COUNTY

30.53% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Irrigation, Hutchinson	Canadian	Canadian Run-of-River	29	29	29	29	29	29
A	Livestock, Hutchinson	Canadian	Canadian Livestock Local Supply	86	86	86	86	86	86
A	Manufacturing, Hutchinson	Canadian	Canadian Run-of-River	1	1	1	1	1	1
A	Manufacturing, Hutchinson	Canadian	Meredith Lake/Reservoir	528	487	460	439	436	434
	Sum of Projected Surface Water Supplies (acre-feet)			**644**	**603**	**576**	**555**	**552**	**550**

LIPSCOMB COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Irrigation, Lipscomb	Canadian	Canadian Run-of-River	66	66	66	66	66	66
A	Livestock, Lipscomb	Canadian	Canadian Livestock Local Supply	110	110	110	110	110	110

	Sum of Projected Surface Water Supplies (acre-feet)			**176**	**176**	**176**	**176**	**176**	**176**

MOORE COUNTY

76.51% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Irrigation, Moore	Canadian	Canadian Run-of-River	5	5	5	5	5	5
A	Livestock, Moore	Canadian	Canadian Livestock Local Supply	765	765	765	765	765	765
	Sum of Projected Surface Water Supplies (acre-feet)			**770**	**770**	**770**	**770**	**770**	**770**

OCHILTREE COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Livestock, Ochiltree	Canadian	Canadian Livestock Local Supply	421	421	421	421	421	421
	Sum of Projected Surface Water Supplies (acre-feet)			**421**	**421**	**421**	**421**	**421**	**421**

SHERMAN COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
A	Irrigation, Sherman	Canadian	Canadian Run-of-River	32	32	32	32	32	32
A	Livestock, Sherman	Canadian	Canadian Livestock Local Supply	1,052	1,052	1,052	1,052	1,052	1,052
	Sum of Projected Surface Water Supplies (acre-feet)			**1,084**	**1,084**	**1,084**	**1,084**	**1,084**	**1,084**

Projected Water Demands
TWDB 2022 State Water Plan Data

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

DALLAM COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Dallam	Canadian	140	150	165	181	197	213
A	Dalhart	Canadian	1,814	2,014	2,228	2,447	2,665	2,877
A	Irrigation, Dallam	Canadian	343,830	343,830	286,928	228,243	174,217	174,217
A	Livestock, Dallam	Canadian	4,521	4,860	5,115	5,390	5,686	6,006
A	Manufacturing, Dallam	Canadian	6	6	6	6	6	6
A	Texline	Canadian	219	235	252	269	286	302
	Sum of Projected Water Demands (acre-feet)		**350,530**	**351,095**	**294,694**	**236,536**	**183,057**	**183,621**

HANSFORD COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Hansford	Canadian	117	123	133	141	150	158
A	Gruver	Canadian	350	380	407	431	457	481
A	Irrigation, Hansford	Canadian	171,900	171,900	171,900	171,900	171,900	171,900
A	Livestock, Hansford	Canadian	4,030	4,204	4,388	4,580	4,783	4,995
A	Manufacturing, Hansford	Canadian	285	321	321	321	321	321
A	Mining, Hansford	Canadian	577	904	602	309	16	1
A	Spearman Municipal Water System	Canadian	670	681	689	703	723	745
	Sum of Projected Water Demands (acre-feet)		**177,929**	**178,513**	**178,440**	**178,385**	**178,350**	**178,601**

HARTLEY COUNTY

83.56% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Hartley	Canadian	444	465	475	482	491	500
A	Dalhart	Canadian	853	873	881	889	899	907
A	Hartley WSC	Canadian	227	239	246	251	255	260
A	Irrigation, Hartley	Canadian	340,081	340,081	288,447	237,198	189,415	189,415
A	Livestock, Hartley	Canadian	5,506	6,163	6,621	7,118	7,658	8,244
A	Mining, Hartley	Canadian	6	6	5	4	3	3
	Sum of Projected Water Demands (acre-feet)		**347,117**	**347,827**	**296,675**	**245,942**	**198,721**	**199,329**

HUTCHINSON COUNTY

30.53% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	Borger	Canadian	3,163	3,201	3,182	3,177	3,172	3,172
A	County-Other, Hutchinson	Canadian	80	82	82	82	82	82
A	Fritch	Canadian	592	598	591	589	588	588
A	Irrigation, Hutchinson	Canadian	18,291	18,291	18,291	18,291	18,291	18,291
A	Livestock, Hutchinson	Canadian	183	194	203	213	224	235
A	Manufacturing, Hutchinson	Canadian	8,965	9,567	9,567	9,567	9,567	9,567
A	Mining, Hutchinson	Canadian	56	71	52	34	17	10
A	Stinnett	Canadian	454	460	456	455	454	454
A	TCW Supply	Canadian	690	705	705	701	700	700
	Sum of Projected Water Demands (acre-feet)		**32,474**	**33,169**	**33,129**	**33,109**	**33,095**	**33,099**

LIPSCOMB COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	Booker	Canadian	496	547	576	618	648	673
A	County-Other, Lipscomb	Canadian	137	124	117	109	103	99
A	Darrouzett	Canadian	124	131	135	141	145	149
A	Follett	Canadian	129	137	141	147	152	156
A	Higgins Municipal Water System	Canadian	127	134	138	144	149	153
A	Irrigation, Lipscomb	Canadian	40,870	40,870	40,870	40,870	40,870	40,870
A	Livestock, Lipscomb	Canadian	605	631	658	688	718	750
A	Manufacturing, Lipscomb	Canadian	362	400	400	400	400	400
A	Mining, Lipscomb	Canadian	1,098	758	446	142	21	3
	Sum of Projected Water Demands (acre-feet)		**43,948**	**43,732**	**43,481**	**43,259**	**43,206**	**43,253**

MOORE COUNTY

76.51% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	Cactus Municipal Water System	Canadian	985	1,107	1,242	1,382	1,532	1,685
A	County-Other, Moore	Canadian	224	247	272	301	333	366
A	Dumas	Canadian	3,584	3,993	4,446	4,930	5,461	6,011
A	Fritch	Canadian	3	3	3	4	4	4
A	Irrigation, Moore	Canadian	153,441	153,441	131,515	104,119	78,743	78,743
A	Livestock, Moore	Canadian	4,142	4,737	5,125	5,548	6,010	6,515
A	Manufacturing, Moore	Canadian	7,098	7,367	7,367	7,367	7,367	7,367
A	Mining, Moore	Canadian	12	12	12	11	11	11
A	Sunray	Canadian	450	454	461	471	484	499
	Sum of Projected Water Demands (acre-feet)		**169,939**	**171,361**	**150,443**	**124,133**	**99,945**	**101,201**

OCHILTREE COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	Booker	Canadian	6	9	13	16	20	25

A	County-Other, Ochiltree	Canadian	310	322	337	360	386	415
A	Irrigation, Ochiltree	Canadian	84,460	84,460	84,460	84,460	84,460	84,460
A	Livestock, Ochiltree	Canadian	2,801	2,962	3,120	3,286	3,462	3,647
A	Manufacturing, Ochiltree	Canadian	36	41	41	41	41	41
A	Mining, Ochiltree	Canadian	824	853	503	161	23	3
A	Perryton Municipal Water System	Canadian	2,693	2,851	3,030	3,238	3,475	3,734
	Sum of Projected Water Demands (acre-feet)		**91,130**	**91,498**	**91,504**	**91,562**	**91,867**	**92,325**

SHERMAN COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Sherman	Canadian	105	110	112	116	118	121
A	Irrigation, Sherman	Canadian	304,360	304,360	304,360	246,760	182,536	182,536
A	Livestock, Sherman	Canadian	3,576	3,813	4,006	4,212	4,432	4,669
A	Manufacturing, Sherman	Canadian	2	2	2	2	2	2
A	Mining, Sherman	Canadian	35	207	151	98	44	20
A	Stratford	Canadian	496	526	539	554	567	577
A	Texhoma	Canadian	122	131	135	139	143	145
	Sum of Projected Water Demands (acre-feet)		**308,696**	**309,149**	**309,305**	**251,881**	**187,842**	**188,070**

Projected Water Supply Needs
TWDB 2022 State Water Plan Data

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

DALLAM COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Dallam	Canadian	0	0	0	0	0	0
A	Dalhart	Canadian	-379	-880	-1,300	-1,741	-2,181	-2,385
A	Irrigation, Dallam	Canadian	-29,586	-116,358	-107,956	-91,644	-74,251	-74,251
A	Livestock, Dallam	Canadian	0	0	0	0	0	0
A	Manufacturing, Dallam	Canadian	0	0	0	0	0	0
A	Texline	Canadian	55	39	22	5	-12	-28
	Sum of Projected Water Supply Needs (acre-feet)		**-29,965**	**-117,238**	**-109,256**	**-93,385**	**-76,444**	**-76,664**

HANSFORD COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Hansford	Canadian	53	47	37	29	20	12
A	Gruver	Canadian	60	-20	-98	-180	-256	-280
A	Irrigation, Hansford	Canadian	22	22	22	22	22	22
A	Livestock, Hansford	Canadian	0	0	0	0	0	0
A	Manufacturing, Hansford	Canadian	0	0	0	0	0	0
A	Mining, Hansford	Canadian	0	0	0	0	0	0
A	Spearman Municipal Water System	Canadian	134	136	13	-229	-495	-517
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**-20**	**-98**	**-409**	**-751**	**-797**

HARTLEY COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Hartley	Canadian	0	0	0	0	0	0
A	Dalhart	Canadian	-178	-381	-514	-633	-736	-752
A	Hartley WSC	Canadian	23	21	24	29	25	30
A	Irrigation, Hartley	Canadian	-84,766	-192,765	-177,587	-159,542	-141,411	-141,411
A	Livestock, Hartley	Canadian	0	0	0	0	0	0
A	Mining, Hartley	Canadian	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-84,944**	**-193,146**	**-178,101**	**-160,175**	**-142,147**	**-142,163**

HUTCHINSON COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070

A	Borger	Canadian	3,436	2,032	1,416	542	-34	-36
A	County-Other, Hutchinson	Canadian	53	46	44	44	42	42
A	Fritch	Canadian	0	0	0	0	0	0
A	Irrigation, Hutchinson	Canadian	96	96	96	96	96	96
A	Livestock, Hutchinson	Canadian	0	0	0	0	0	0
A	Manufacturing, Hutchinson	Canadian	3	-32	-58	-79	-167	-172
A	Mining, Hutchinson	Canadian	0	0	0	0	0	0
A	Stinnett	Canadian	127	78	39	2	-31	-31
A	TCW Supply	Canadian	1	-132	-233	-315	-383	-383
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**-164**	**-291**	**-394**	**-615**	**-622**

LIPSCOMB COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	Booker	Canadian	231	30	-57	-146	-213	-233
A	County-Other, Lipscomb	Canadian	0	0	0	0	0	0
A	Darrouzett	Canadian	26	19	15	19	15	11
A	Follett	Canadian	11	13	19	13	18	14
A	Higgins Municipal Water System	Canadian	13	16	12	16	11	17
A	Irrigation, Lipscomb	Canadian	66	66	66	66	66	66
A	Livestock, Lipscomb	Canadian	0	0	0	0	0	0
A	Manufacturing, Lipscomb	Canadian	0	0	-40	-95	-131	-139
A	Mining, Lipscomb	Canadian	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**-97**	**-241**	**-344**	**-372**

MOORE COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	Cactus Municipal Water System	Canadian	-306	-582	-819	-1,071	-1,292	-1,429
A	County-Other, Moore	Canadian	0	-12	-23	-33	-41	-41
A	Dumas	Canadian	597	-931	-2,008	-3,267	-4,432	-4,982
A	Fritch	Canadian	2	2	2	1	1	1
A	Irrigation, Moore	Canadian	-9,208	-47,976	-49,251	-43,861	-38,281	-38,281
A	Livestock, Moore	Canadian	0	0	0	0	0	0
A	Manufacturing, Moore	Canadian	-1,008	-1,773	-2,221	-4,131	-5,769	-5,785
A	Mining, Moore	Canadian	0	0	0	0	0	0
A	Sunray	Canadian	155	-110	-336	-415	-470	-485
	Sum of Projected Water Supply Needs (acre-feet)		**-10,522**	**-51,384**	**-54,658**	**-52,778**	**-50,285**	**-51,003**

OCHILTREE COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	Booker	Canadian	3	0	-1	-4	-7	-9
A	County-Other, Ochiltree	Canadian	31	32	34	36	39	42

A	Irrigation, Ochiltree	Canadian	0	0	0	0	0	0
A	Livestock, Ochiltree	Canadian	0	0	0	0	0	0
A	Manufacturing, Ochiltree	Canadian	0	0	0	0	0	0
A	Mining, Ochiltree	Canadian	0	0	0	0	0	0
A	Perryton Municipal Water System	Canadian	795	458	106	-193	-556	-815
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**-1**	**-197**	**-563**	**-824**

SHERMAN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
A	County-Other, Sherman	Canadian	0	0	0	0	0	0
A	Irrigation, Sherman	Canadian	159	159	-29,567	-38,831	-38,207	-38,423
A	Livestock, Sherman	Canadian	0	0	0	0	0	0
A	Manufacturing, Sherman	Canadian	0	0	0	0	0	0
A	Mining, Sherman	Canadian	0	0	0	0	0	0
A	Stratford	Canadian	325	295	282	267	66	56
A	Texhoma	Canadian	8	9	15	11	17	15
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**0**	**-29,567**	**-38,831**	**-38,207**	**-38,423**

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

DALLAM COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Dalhart, Canadian (A)							
Develop Ogallala Aquifer Supplies - Dalhart	Ogallala and Rita Blanca Aquifers [Hartley]	2,136	2,190	2,250	2,303	2,348	2,387
Municipal Conservation - Dalhart	DEMAND REDUCTION [Dallam]	18	21	23	26	28	30
		2,154	**2,211**	**2,273**	**2,329**	**2,376**	**2,417**
Irrigation, Dallam, Canadian (A)							
Irrigation Conservation - Dallam County	DEMAND REDUCTION [Dallam]	24,329	43,270	80,019	87,678	80,502	83,654
		24,329	**43,270**	**80,019**	**87,678**	**80,502**	**83,654**
Texline, Canadian (A)							
Develop Ogallala Aquifer Supplies - Texline	Ogallala and Rita Blanca Aquifers [Dallam]	0	0	0	100	100	100
Municipal Conservation - Texline	DEMAND REDUCTION [Dallam]	2	2	2	2	2	2
		2	**2**	**2**	**102**	**102**	**102**
Sum of Projected Water Management Strategies (acre-feet)		**26,485**	**45,483**	**82,294**	**90,109**	**82,980**	**86,173**

HANSFORD COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Gruver, Canadian (A)							
Develop Ogallala Aquifer Supplies - Gruver	Ogallala Aquifer [Hansford]	0	280	280	280	280	280
Municipal Conservation - Gruver	DEMAND REDUCTION [Hansford]	5	5	5	6	6	7
		5	**285**	**285**	**286**	**286**	**287**
Irrigation, Hansford, Canadian (A)							
Irrigation Conservation - Hansford County	DEMAND REDUCTION [Hansford]	14,572	25,101	49,532	57,670	61,580	65,189
		14,572	**25,101**	**49,532**	**57,670**	**61,580**	**65,189**
Spearman Municipal Water System, Canadian (A)							
Develop Ogallala Aquifer Supplies - Spearman	Ogallala Aquifer [Hansford]	0	0	0	520	520	520
Municipal Conservation - Spearman	DEMAND REDUCTION [Hansford]	11	11	12	12	12	13
		11	**11**	**12**	**532**	**532**	**533**
Sum of Projected Water Management Strategies (acre-feet)		**14,588**	**25,397**	**49,829**	**58,488**	**62,398**	**66,009**

HARTLEY COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Dalhart, Canadian (A)							
Develop Ogallala Aquifer Supplies - Dalhart	Ogallala and Rita Blanca Aquifers [Hartley]	1,004	950	890	837	792	753
Municipal Conservation - Dalhart	DEMAND REDUCTION [Hartley]	9	9	9	9	9	10
		1,013	**959**	**899**	**846**	**801**	**763**
Hartley WSC, Canadian (A)							
Municipal Conservation - Hartley	DEMAND REDUCTION [Hartley]	2	2	2	2	2	2
		2	**2**	**2**	**2**	**2**	**2**
Irrigation, Hartley, Canadian (A)							
Irrigation Conservation - Hartley County	DEMAND REDUCTION [Hartley]	27,160	48,052	89,129	99,463	94,245	99,380
		27,160	**48,052**	**89,129**	**99,463**	**94,245**	**99,380**
Sum of Projected Water Management Strategies (acre-feet)		**28,175**	**49,013**	**90,030**	**100,311**	**95,048**	**100,145**

HUTCHINSON COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Borger, Canadian (A)							
Expand Capacity CRMWA 2	Ogallala Aquifer [Roberts]	0	1,636	1,678	1,999	1,906	1,728
Municipal Conservation - Borger	DEMAND REDUCTION [Hutchinson]	41	43	43	43	43	43
Replace Well Capacity	Ogallala Aquifer [Roberts]	0	0	116	304	666	846
		41	**1,679**	**1,837**	**2,346**	**2,615**	**2,617**
Fritch, Canadian (A)							
Municipal Conservation - Fritch	DEMAND REDUCTION [Hutchinson]	9	9	10	10	10	10
		9	**9**	**10**	**10**	**10**	**10**
Irrigation, Hutchinson, Canadian (A)							
Irrigation Conservation - Hutchinson County	DEMAND REDUCTION [Hutchinson]	4,432	7,624	15,285	17,656	18,663	19,562
		4,432	**7,624**	**15,285**	**17,656**	**18,663**	**19,562**
Manufacturing, Hutchinson, Canadian (A)							
Expand Capacity CRMWA 2	Ogallala Aquifer [Roberts]	0	32	58	79	167	172
		0	**32**	**58**	**79**	**167**	**172**
Stinnett, Canadian (A)							
Develop Ogallala Aquifer Supplies - Stinnett	Ogallala Aquifer [Hutchinson]	0	0	0	50	50	50
Municipal Conservation - Stinnett	DEMAND REDUCTION [Hutchinson]	6	6	6	6	6	6

		6	**6**	**6**	**56**	**56**	**56**
TCW Supply, Canadian (A)							
Develop Ogallala Aquifer Supplies - TCW Supply	Ogallala Aquifer [Hutchinson]	0	400	400	400	400	400
Municipal Conservation - TCW Supply	DEMAND REDUCTION [Hutchinson]	6	6	6	6	6	6
		6	**406**	**406**	**406**	**406**	**406**
Sum of Projected Water Management Strategies (acre-feet)		**4,494**	**9,756**	**17,602**	**20,553**	**21,917**	**22,823**

LIPSCOMB COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Booker, Canadian (A)							
Develop Ogalalla Aquifer Supplies - Booker	Ogallala Aquifer [Lipscomb]	0	0	352	297	261	252
Municipal Conservation - Booker	DEMAND REDUCTION [Lipscomb]	5	6	6	7	7	8
		5	**6**	**358**	**304**	**268**	**260**
Darrouzett, Canadian (A)							
Municipal Conservation - Darrouzett	DEMAND REDUCTION [Lipscomb]	1	1	1	2	2	2
		1	**1**	**1**	**2**	**2**	**2**
Follett, Canadian (A)							
Municipal Conservation - Follett	DEMAND REDUCTION [Lipscomb]	1	1	1	2	2	2
		1	**1**	**1**	**2**	**2**	**2**
Higgins Municipal Water System, Canadian (A)							
Municipal Conservation - Higgins	DEMAND REDUCTION [Lipscomb]	1	1	1	2	2	2
Water Audit And Leak Repair - Higgins	DEMAND REDUCTION [Lipscomb]	8	9	9	10	10	10
		9	**10**	**10**	**12**	**12**	**12**
Irrigation, Lipscomb, Canadian (A)							
Irrigation Conservation - Lipscomb County	DEMAND REDUCTION [Lipscomb]	2,167	3,768	7,135	8,478	9,291	10,074
		2,167	**3,768**	**7,135**	**8,478**	**9,291**	**10,074**
Manufacturing, Lipscomb, Canadian (A)							
Develop Ogalalla Aquifer Supplies - Booker	Ogallala Aquifer [Lipscomb]	0	0	40	95	131	139
		0	**0**	**40**	**95**	**131**	**139**
Sum of Projected Water Management Strategies (acre-feet)		**2,183**	**3,786**	**7,545**	**8,893**	**9,706**	**10,489**

MOORE COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Cactus Municipal Water System, Canadian (A)							

Develop New Well Field (Ogallala Aquifer) - Cactus	Ogallala Aquifer [Moore]	3,992	3,227	2,779	2,390	2,159	2,143
Municipal Conservation - Cactus	DEMAND REDUCTION [Moore]	13	15	17	19	21	23
		4,005	**3,242**	**2,796**	**2,409**	**2,180**	**2,166**
County-Other, Moore, Canadian (A)							
Develop Ogallala Aquifer Supplies - Dumas	Ogallala and Rita Blanca Aquifers [Hartley]	0	12	23	33	41	41
Municipal Conservation - Moore County Other	DEMAND REDUCTION [Moore]	7	8	9	10	11	12
		7	**20**	**32**	**43**	**52**	**53**
Dumas, Canadian (A)							
Develop Ogallala Aquifer Supplies - Dumas	Ogallala and Rita Blanca Aquifers [Hartley]	0	4,988	4,977	4,967	4,959	4,959
Municipal Conservation - Dumas	DEMAND REDUCTION [Moore]	53	60	98	110	122	134
Water Audit And Leak Repair - Dumas	DEMAND REDUCTION [Moore]	115	128	142	158	175	192
		168	**5,176**	**5,217**	**5,235**	**5,256**	**5,285**
Fritch, Canadian (A)							
Municipal Conservation - Fritch	DEMAND REDUCTION [Moore]	0	0	0	0	0	0
		0	**0**	**0**	**0**	**0**	**0**
Irrigation, Moore, Canadian (A)							
Irrigation Conservation - Moore County	DEMAND REDUCTION [Moore]	16,630	29,092	57,177	64,138	59,240	60,841
		16,630	**29,092**	**57,177**	**64,138**	**59,240**	**60,841**
Manufacturing, Moore, Canadian (A)							
Develop Dockum/Ogallala Supplies - Moore County Manufacturing	Dockum Aquifer [Moore]	0	0	0	2,000	2,000	2,000
Develop Dockum/Ogallala Supplies - Moore County Manufacturing	Ogallala Aquifer [Moore]	0	0	0	1,000	1,000	1,000
Develop New Well Field (Ogallala Aquifer) - Cactus	Ogallala Aquifer [Moore]	1,008	1,773	2,221	2,610	2,841	2,857
		1,008	**1,773**	**2,221**	**5,610**	**5,841**	**5,857**
Sunray, Canadian (A)							
Develop Ogallala Aquifer Supplies - Sunray	Ogallala Aquifer [Moore]	0	500	500	500	500	500
Municipal Conservation - Sunray	DEMAND REDUCTION [Moore]	6	6	6	7	7	7
		6	**506**	**506**	**507**	**507**	**507**
Sum of Projected Water Management Strategies (acre-feet)		**21,824**	**39,809**	**67,949**	**77,942**	**73,076**	**74,709**

OCHILTREE COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Booker, Canadian (A)							
Develop Ogalalla Aquifer Supplies - Booker	Ogallala Aquifer [Lipscomb]	0	0	8	8	8	9

Municipal Conservation - Booker	DEMAND REDUCTION [Ochiltree]	0	0	0	0	0	0
		0	**0**	**8**	**8**	**8**	**9**
Irrigation, Ochiltree, Canadian (A)							
Irrigation Conservation - Ochiltree County	DEMAND REDUCTION [Ochiltree]	7,080	12,160	23,955	27,927	29,865	31,668
		7,080	**12,160**	**23,955**	**27,927**	**29,865**	**31,668**
Perryton Municipal Water System, Canadian (A)							
Develop Ogallala Aquifer Supplies - Perryton	Ogallala Aquifer [Ochiltree]	0	0	0	820	820	820
Municipal Conservation - Perryton	DEMAND REDUCTION [Ochiltree]	28	31	33	35	38	41
		28	**31**	**33**	**855**	**858**	**861**
Sum of Projected Water Management Strategies (acre-feet)		**7,108**	**12,191**	**23,996**	**28,790**	**30,731**	**32,538**

SHERMAN COUNTY

WUG, Basin (RWPG)

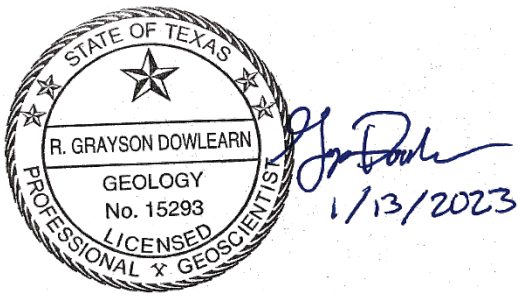
All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Irrigation, Sherman, Canadian (A)							
Irrigation Conservation - Sherman County	DEMAND REDUCTION [Sherman]	25,895	45,383	88,429	103,368	104,313	111,300
		25,895	**45,383**	**88,429**	**103,368**	**104,313**	**111,300**
Stratford, Canadian (A)							
Municipal Conservation - Stratford	DEMAND REDUCTION [Sherman]	7	8	8	8	9	9
		7	**8**	**8**	**8**	**9**	**9**
Texhoma, Canadian (A)							
Municipal Conservation - Texhoma	DEMAND REDUCTION [Sherman]	1	1	1	1	1	1
		1	**1**	**1**	**1**	**1**	**1**
Sum of Projected Water Management Strategies (acre-feet)		**25,903**	**45,392**	**88,438**	**103,377**	**104,323**	**111,310**

Appendix G

GAM RUN 22-015: NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-475-1552
January 13, 2023



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GAM RUN 22-015: NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
512-475-1552
January 13, 2023

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2011), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

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

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

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

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

The groundwater management plan for the North Plains Groundwater Conservation District should be adopted by the district on or before January 25, 2023 and submitted to the executive administrator of the TWDB on or before February 24, 2023. The current management plan for the North Plains Groundwater Conservation District expires on April 25, 2023.

We used the groundwater availability model for the High Plains Aquifer System groundwater availability model (Deeds and others, 2015; Deeds and Jigmond, 2015) to estimate the management plan information for the Dockum, Rita Blanca, and Ogallala aquifers within the North Plains Groundwater Conservation District.

This report replaces the results of GAM Run 17-008 (Goswami, 2017). Values may differ from the previous report as a result of routine updates to the spatial grid file used to define county, groundwater conservation district, and aquifer boundaries, which can impact the calculated water budget values. Additionally, the approach used for analyzing model results is reviewed during each update and may have been refined to better delineate groundwater flows. Tables 1, 2, and 3 summarize the groundwater availability model data required by statute. Figures 1, 3, and 5 shows the area of the model from which the values in Tables 1, 2, and 3 were extracted. Figures 2, 4, and 6 provide a generalized diagram of the groundwater flow components provided in Tables 1, 2, and 3. Full water budgets for each aquifer within the district are provided in Appendix A. These budgets are included to assist North Plains Groundwater Conservation District in analyzing the effects of pumping and recharge on the aquifers within the district. If, after review of the figures, the North Plains Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability model mentioned above was used to estimate information for the North Plains Groundwater Conservation District management plan. Water budgets were extracted for the historical model period for the Dockum, Rita Blanca, and Ogallala aquifers (1980-2012) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, surface-water outflow, inflow to the district, outflow from the district, and the flow between aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Dockum, Rita Blanca, and Ogallala aquifers

- We used version 1.01 of the groundwater availability model for the High Plains Aquifer System to analyze the Dockum, Rita Blanca, and Ogallala aquifers. See Deeds and others (2015) and Deeds and Jigmond (2015) for assumptions and limitations of the model.

- The groundwater availability model for the High Plains Aquifer System contains four layers. In the model, Layer 1 represents the Ogallala Aquifer, Layer 2 represents the Rita Blanca, Edwards-Trinity (High Plains), and Edwards-Trinity (Plateau) aquifers where present, Layer 3 represents the upper portion of the Dockum Aquifer and equivalent units, and Layer 4 represents the lower portion of the Dockum Aquifer and equivalent units.

- Water budget values for the district were determined for the Ogallala Aquifer (Layer 1), Rita Blanca Aquifer (Layer 2), and the Dockum Aquifer (Layers 3 and 4). The Edwards-Trinity (High Plains) Aquifer does not occur within the North Plains Groundwater Conservation District and therefore no groundwater budget values are included for it in this report.

- The River package used in the model can represent a river, reservoir, or a general head boundary, however, the River package only represents rivers and reservoirs within North Plains Groundwater Conservation District.

- Water budget terms were averaged for the historical calibration period 1980 to 2012 (stress periods 52 through 84).

- The model was run with MODFLOW-NWT (Niswonger and others, 2011).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Dockum, Rita Blanca, and Ogallala aquifers located within the North Plains Groundwater Conservation District and averaged over the historical calibration period, as shown in Tables 1, 2 and 3.

1. Precipitation recharge—the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.

2. Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs.

3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.

4. Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

The information needed for the district's management plan is summarized in Table 1, 2, and 3. Figures 2, 4, and 6 provide a generalized diagram of the groundwater flow components provided in Tables 1, 2, and 3. Full water budgets for each aquifer within the district are provided in Appendix A. These budgets are included to assist North Plains Groundwater Conservation District in analyzing the effects of pumping and recharge on the aquifers within the district.

It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

TABLE 1: SUMMARIZED INFORMATION FOR THE DOCKUM AQUIFER THAT IS NEEDED FOR THE NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Dockum Aquifer	49
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Dockum Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Dockum Aquifer	402
Estimated annual volume of flow out of the district within each aquifer in the district	Dockum Aquifer	1,821
Estimated net annual volume of flow between each aquifer in the district	From Dockum Aquifer to Rita Blanca Aquifer	488
	To Dockum Aquifer from Ogallala Aquifer	908
	To Dockum Aquifer from Dockum equivalent units within district	55
	To Dockum Aquifer from equivalent units in Oklahoma and New Mexico	809

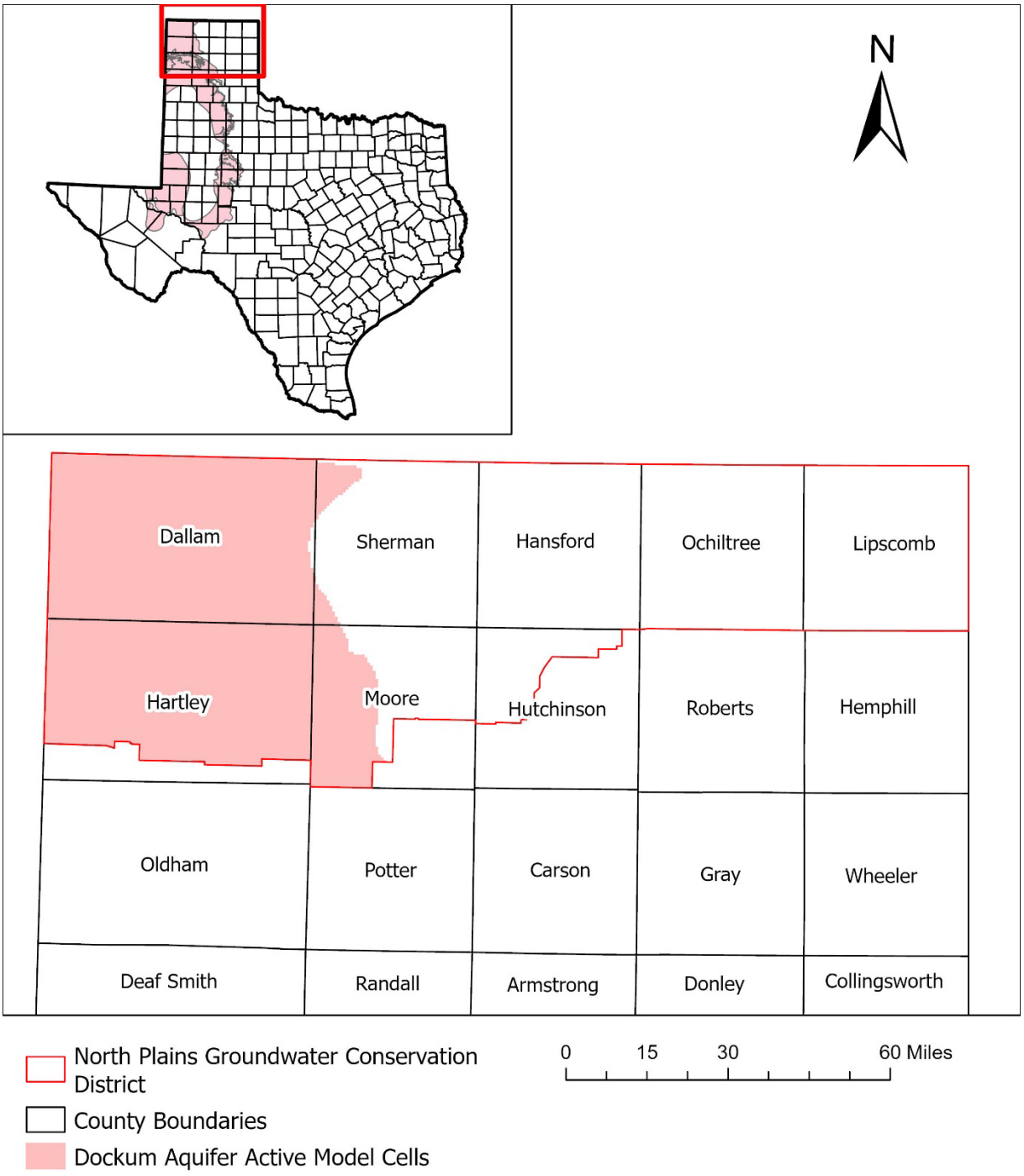
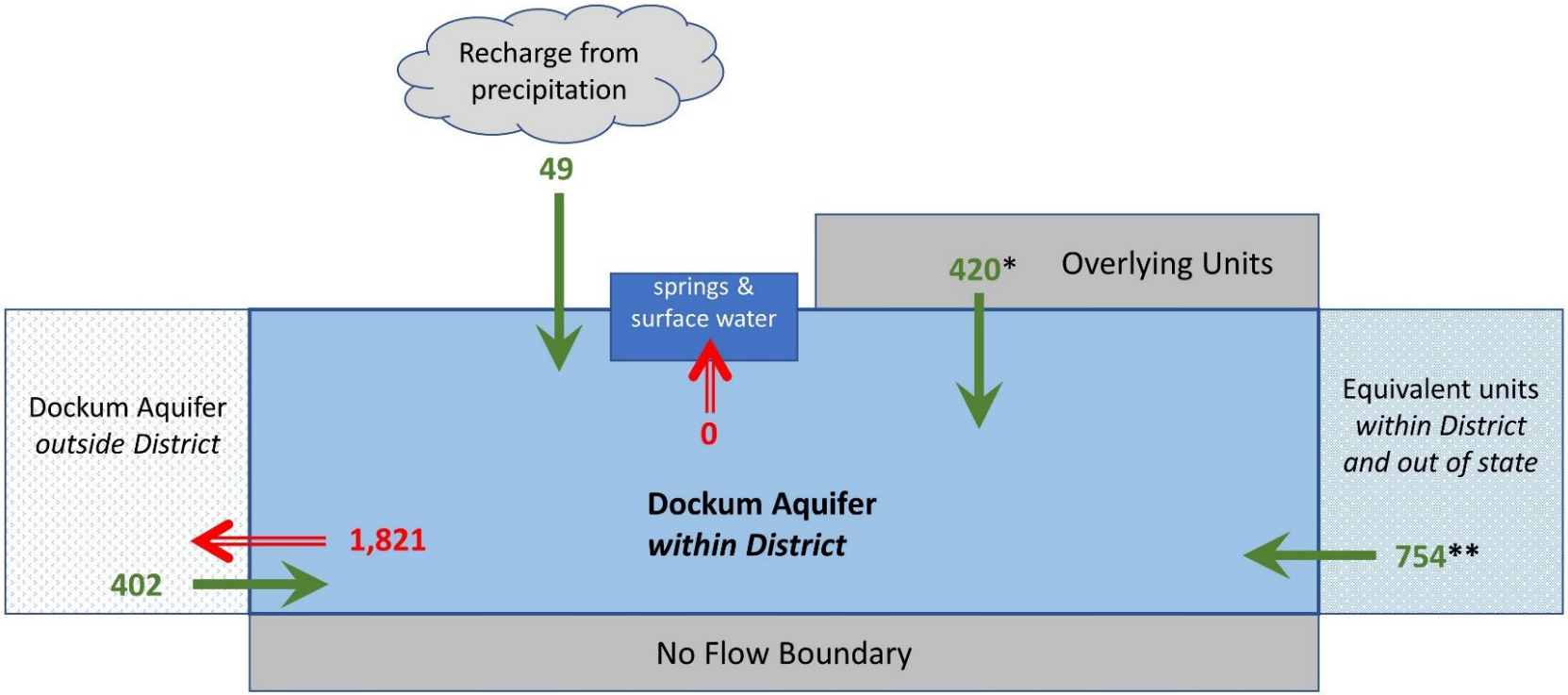


FIGURE 1: AREA OF THE HIGH PLAINS AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE DOCKUM AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



* Flow from Overlying Units includes net outflow of 488 acre-feet per year from the Rita Blanca Aquifer and a net inflow of 908 acre-feet per year from the Ogallala Aquifer.

** Flow from Equivalent units within District and Out of State includes net outflow of 55 acre-feet per year to equivalent units within district and net inflow of 809 acre-feet per year from equivalent units in Oklahoma and New Mexico

Caveat: This diagram only includes the water budget items provided in Table 1. A complete water budget would include additional inflows and outflows. Please see Appendix A for a full water budget.

FIGURE 2: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 1, REPRESENTING DIRECTIONS OF FLOW FOR THE DOCKUM AQUIFER WITHIN NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR.

TABLE 2: SUMMARIZED INFORMATION FOR THE RITA BLANCA AQUIFER THAT IS NEEDED FOR THE NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Rita Blanca Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Rita Blanca Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Rita Blanca Aquifer	0
Estimated annual volume of flow out of the district within each aquifer in the district	Rita Blanca Aquifer	0
Estimated net annual volume of flow between each aquifer in the district	To the Rita Blanca Aquifer from the Dockum Aquifer	488
	To the Rita Blanca Aquifer from the Ogallala Aquifer	2,984
	From the Rita Blanca Aquifer to Rita Blanca equivalent units within district	126
	To the Rita Blanca Aquifer from equivalent units in Oklahoma and New Mexico	811

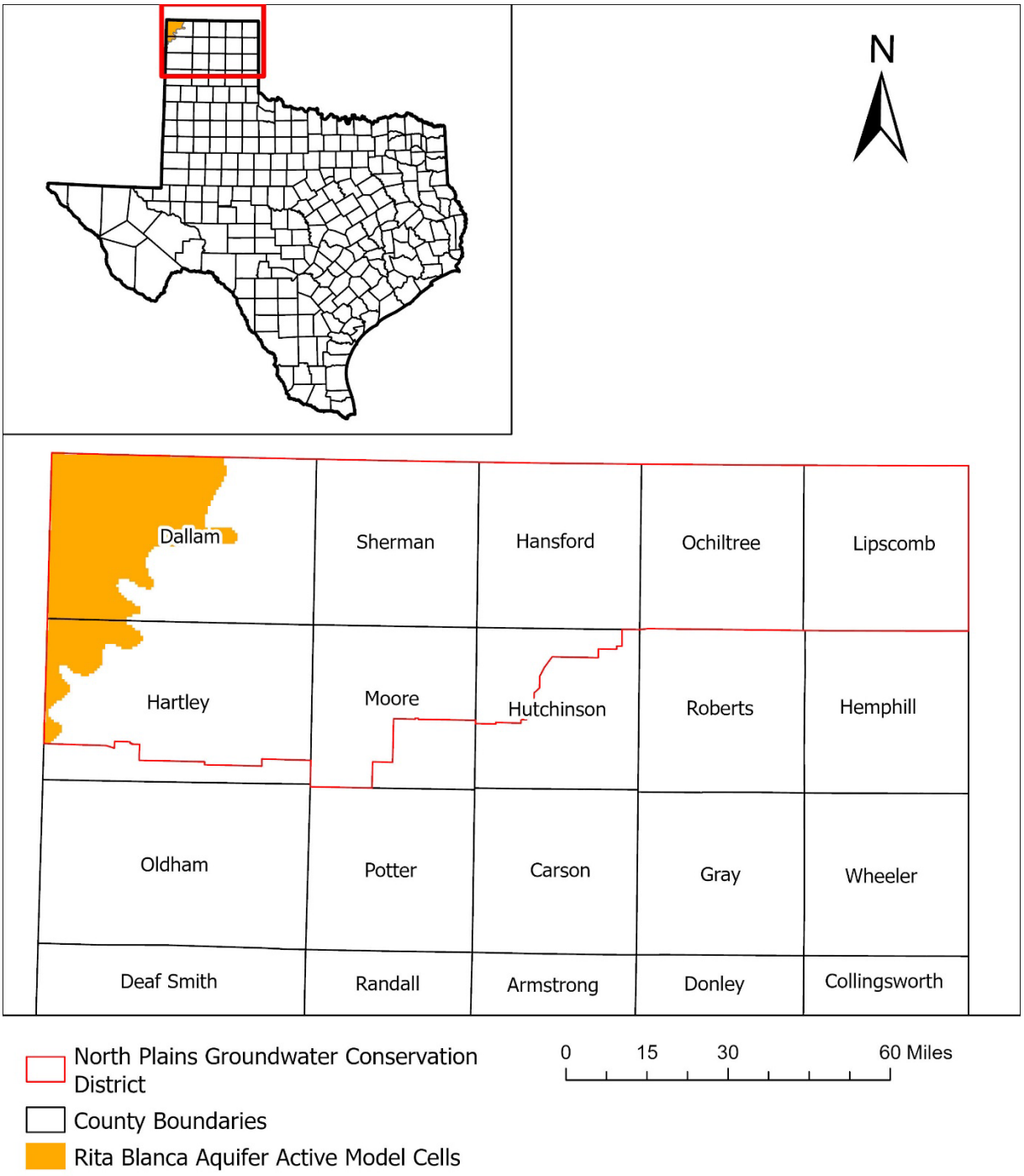
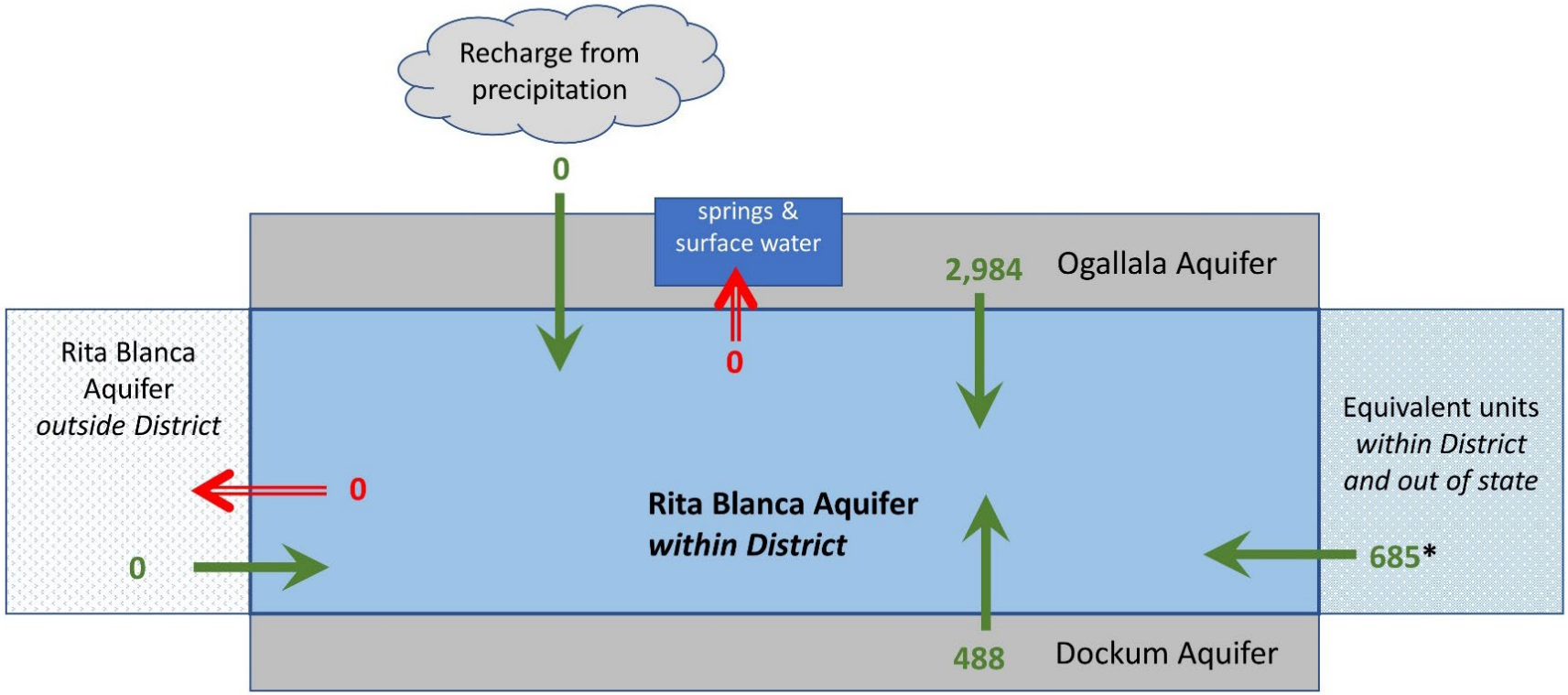


FIGURE 3: AREA OF THE HIGH PLAINS AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE RITA BLANCA AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



* Flow from Equivalent Units within District and Out of State includes net outflow of 126 acre-feet per year from equivalent units within the district and net inflow of 811 acre-feet per year from equivalent units in Oklahoma and New Mexico.

Caveat: This diagram only includes the water budget items provided in Table 2. A complete water budget would include additional inflows and outflows. Please see Appendix A for a full water budget.

FIGURE 4: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 2, REPRESENTING DIRECTIONS OF FLOW FOR THE RITA BLANCA AQUIFER WITHIN NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR.

TABLE 3: SUMMARIZED INFORMATION FOR THE OGALLALA AQUIFER THAT IS NEEDED FOR THE NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Ogallala Aquifer	137,004
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Ogallala Aquifer	26,369
Estimated annual volume of flow into the district within each aquifer in the district	Ogallala Aquifer	7,324
Estimated annual volume of flow out of the district within each aquifer in the district	Ogallala Aquifer	50,907
Estimated net annual volume of flow between each aquifer in the district	From the Ogallala Aquifer to the Dockum Aquifer	908
	From the Ogallala Aquifer to the Rita Blanca Aquifer	2,984
	From the Ogallala Aquifer to Ogallala equivalent units within district	3,060
	To the Ogallala Aquifer from equivalent units in Oklahoma and New Mexico	1,887

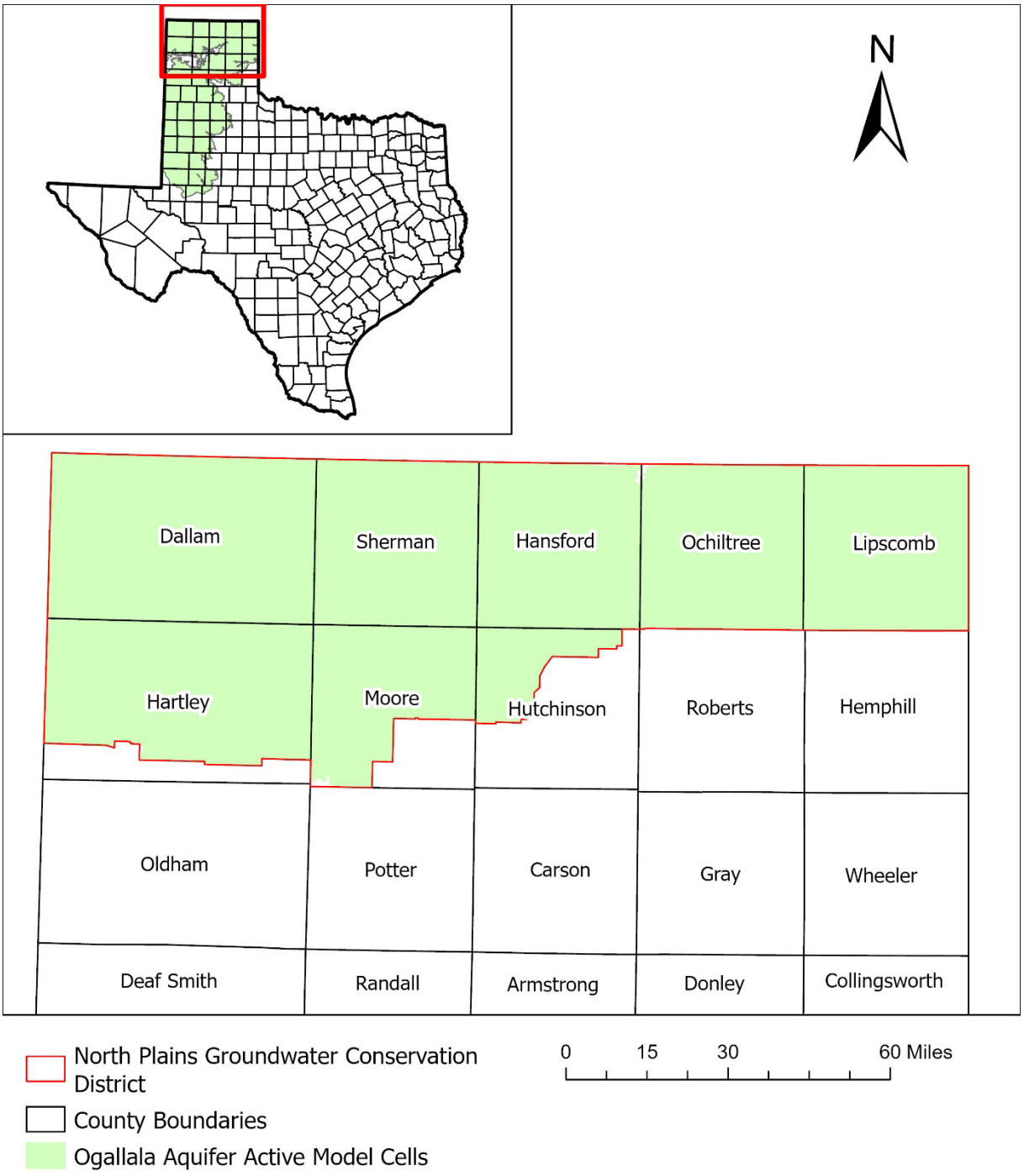
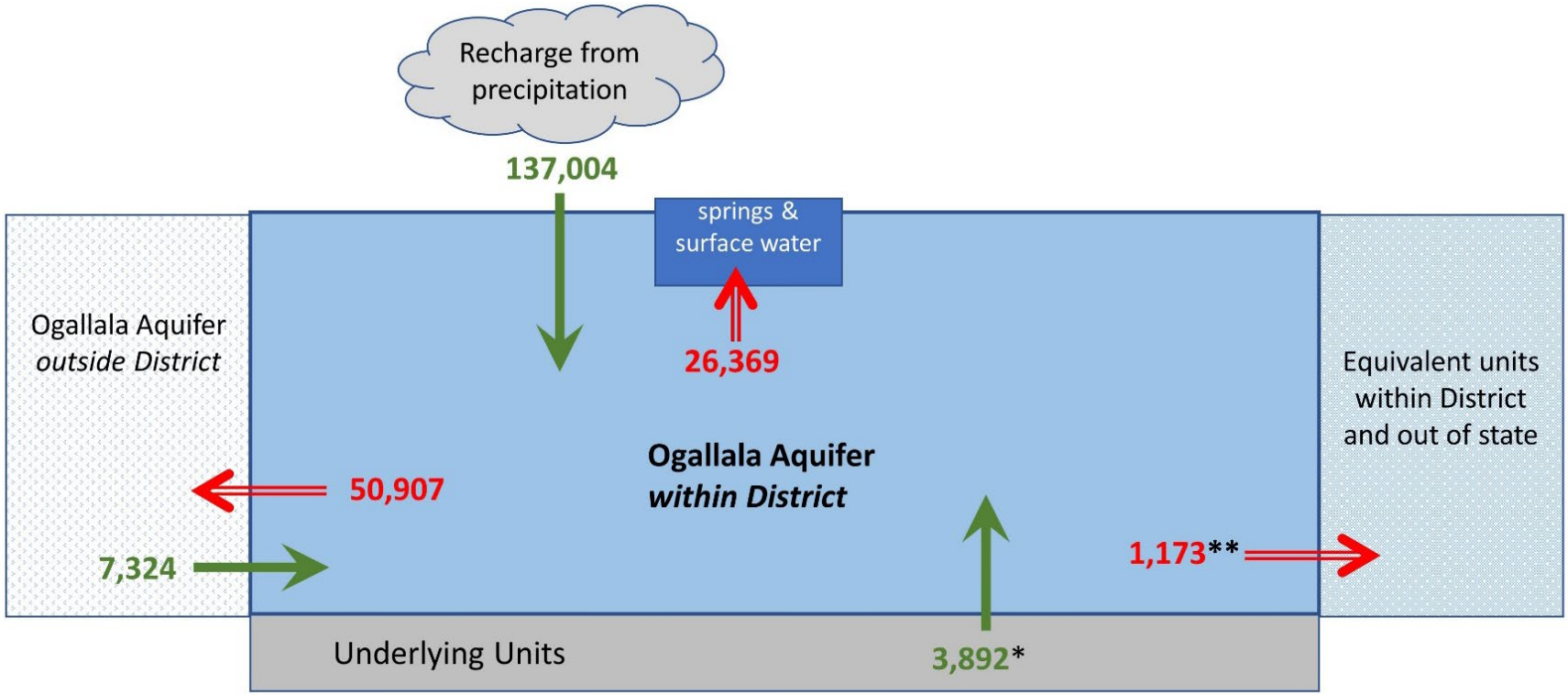


FIGURE 5: AREA OF THE HIGH PLAINS AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 3 WAS EXTRACTED (THE OGALLALA AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



* Flow from Underlying Units includes net outflows of 908 acre-feet per year from the Dockum Aquifer and 2,984 acre-feet per year from the Rita Blanca Aquifer.
** Flow from Equivalent Units within District and Out of State includes net outflow of 3,060 acre-feet per year from equivalent units within district and net inflow of 1,887 acre-feet per year from equivalent units in Oklahoma and New Mexico.

Caveat: This diagram only includes the water budget items provided in Table 3. A complete water budget would include additional inflows and outflows. Please see Appendix A for a full water budget.

FIGURE 6: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 3, REPRESENTING DIRECTIONS OF FLOW FOR THE OGALLALA AQUIFER WITHIN NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR.

LIMITATIONS:

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

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

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

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

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

REFERENCES:

Deeds, N. E., Harding, J. J., Jones, T. L., Singh, A., Hamlin, S. and Reedy, R. C., 2015, Final Conceptual Model Report for the High Plains Aquifer System Groundwater Availability Model, 590 p., https://www.twdb.texas.gov/groundwater/models/gam/hpas/HPAS_GAM_Conceptual_Report.pdf

Deeds, N. E. and Jigmond, M., 2015, Numerical Model Report for the High Plains Aquifer System Groundwater Availability Model, 640 p., https://www.twdb.texas.gov/groundwater/models/gam/hpas/HPAS_GAM_Numerical_Report.pdf?d=4324

Goswami, R., 2017, GAM Run 17-008: Texas Water Development Board, GAM Run 17-008 Report, 13 p., https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR17-008.pdf.

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

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

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

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

Appendix A – Full Groundwater Budget Diagrams

Full water budget diagrams presented in Figures A-1 through A-6 are included to assist the North Plains Groundwater Conservation District in analyzing the effects of pumping and recharge on the aquifers within the district. These diagrams are intended to provide additional insight for groundwater conservation districts to better understand their aquifers and to provide more detailed information to inform groundwater management.

Figures A-1, A-3, and A-5 show the full water budgets for the years of minimum and maximum pumping within each aquifer in the district during the historical calibration period described in the Parameters and Assumptions section (years 1980 to 2012). Figures A-2, A-4, and A-6 show the full water budgets for the first and last years of the historical calibration period of the model. Years of minimum and maximum recharge are not included because the model keeps recharge constant for each stress period within the district during the historical calibration period. Table A-1 lists each component and provides an explanation of each component contained in the full water budget diagrams.

TABLE A-1: EXPLANATION OF EACH BUDGET COMPONENT INCLUDED IN THE FULL WATER BUDGETS FOR NORTH TEXAS GROUNDWATER CONSERVATION DISTRICT.

Full water budget component	Explanation
Recharge	Representative of recharge to the aquifer from areally distributed rainfall that reaches the water table of the aquifer.
Pumping	The amount of water pumped out of the aquifer through water wells located within the aquifer.
Natural Discharge	Represents the combination of water leaving the aquifer through ephemeral streams, evapotranspiration, springs, and free flowing wells. - Ephemeral streams are streams that do not flow year-round - Springs are locations where groundwater is directly connected to the ground surface and water leaves the aquifer - Free flowing wells are wells which connect to the aquifer where the water level is above ground surface and water will flow without the need of pumping
River Leakage	Only representative of the net exchange of water between the rivers/reservoirs and the aquifer in the model

TABLE A-1: EXPLANATION OF EACH BUDGET COMPONENT INCLUDED IN THE FULL WATER BUDGETS FOR NORTH TEXAS GROUNDWATER CONSERVATION DISTRICT.

Full water budget component	Explanation
Evapotranspiration	Only represents the amount of water removed from the water table by vegetation or direct evaporation from the water table. This does not include total evapotranspiration for all plants or water features covering the modeled area
Groundwater Exchanges	The sum of the net exchange of groundwater between the aquifer of interest within the district and all geologic units within and outside of the district boundaries
Storage	Represents the difference from the previous year in the amount of water contained within the aquifer and indicates a relative water level rise (negative Storage value) or water level decline (positive Storage value). Change in storage (dS) is the difference between inflows and outflows (Equation 1). To solve the zero-sum budget over the volume of the aquifer within the district, the term dS must be subtracted from both sides of Equation 1 (Equation 2). If total inflows are greater than outflow, Storage will be negative. If total outflows are greater than total inflows, Storage will be positive. $dS = Inflows - Outflows$ **Equation 1** $0 = Inflows - Outflows - dS$ **Equation 2**

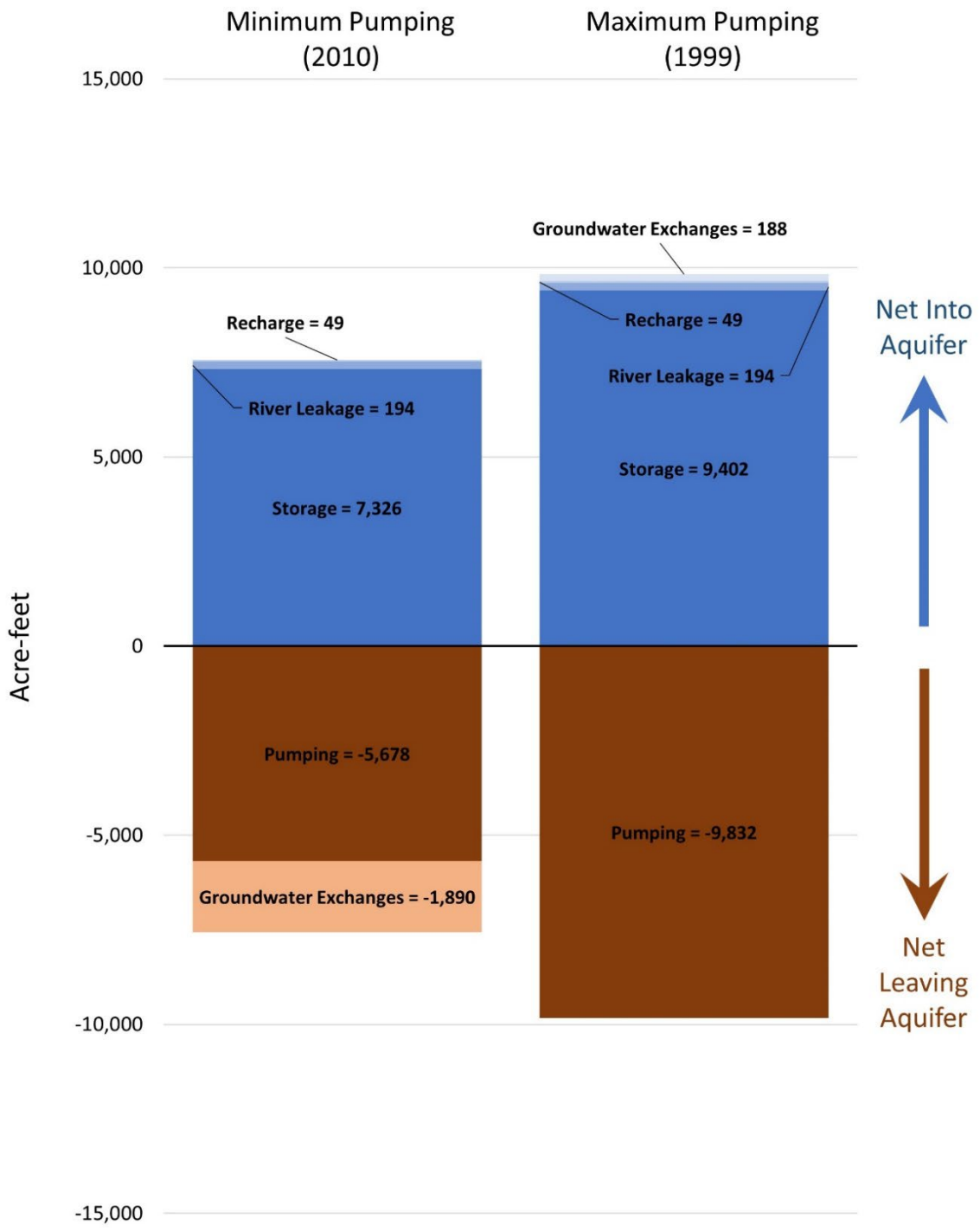


FIGURE A-1: FULL WATER BUDGETS FOR THE DOCKUM AQUIFER WITHIN THE NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT SHOWING THE YEAR OF MINIMUM PUMPING AND THE YEAR OF MAXIMUM PUMPING BETWEEN 1980 AND 2012.

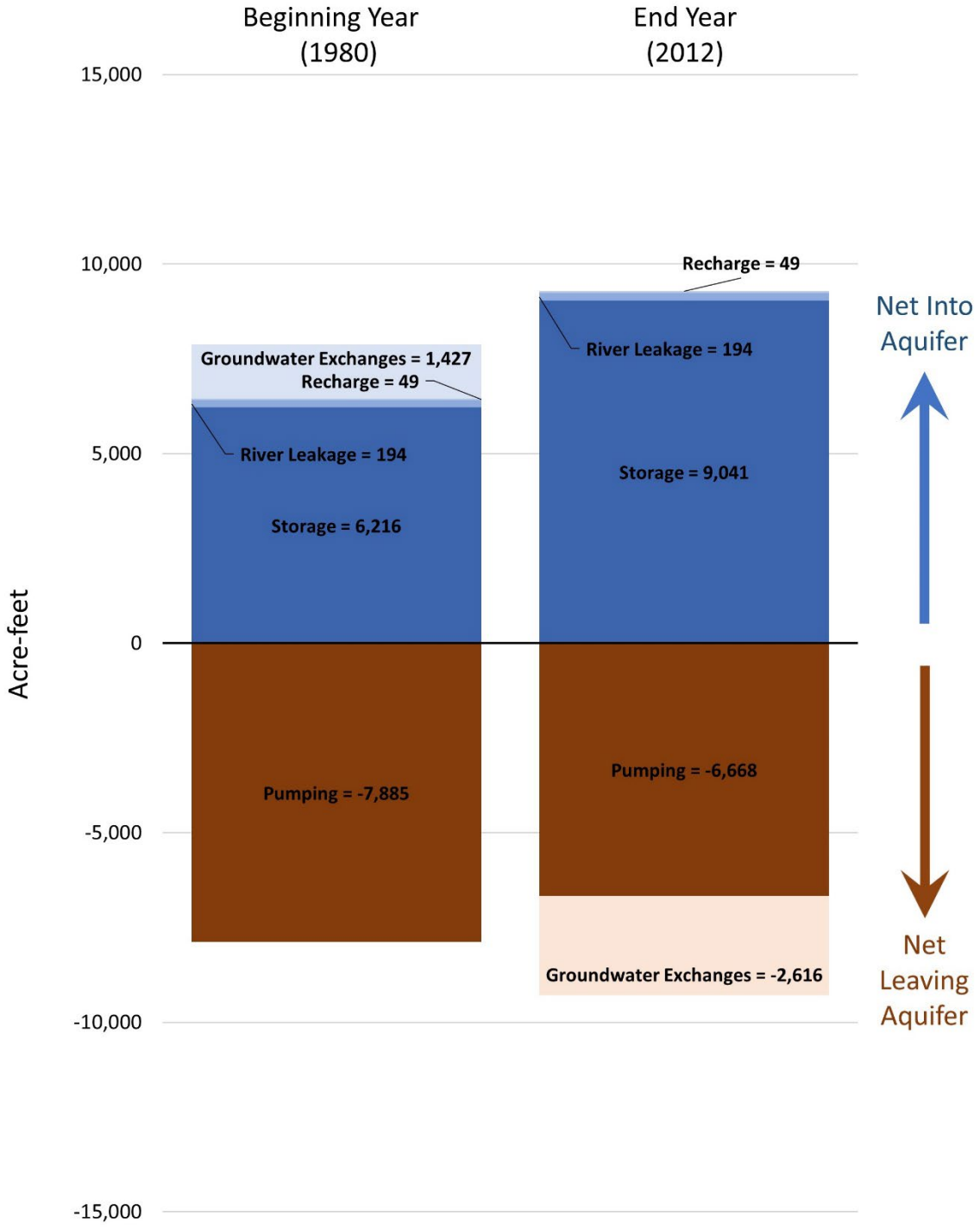


FIGURE A-2: FULL WATER BUDGETS FOR THE DOCKUM AQUIFER WITHIN THE NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT SHOWING THE FIRST AND LAST YEAR OF THE HISTORICAL TRANSIENT PERIOD BETWEEN 1980 AND 2012.

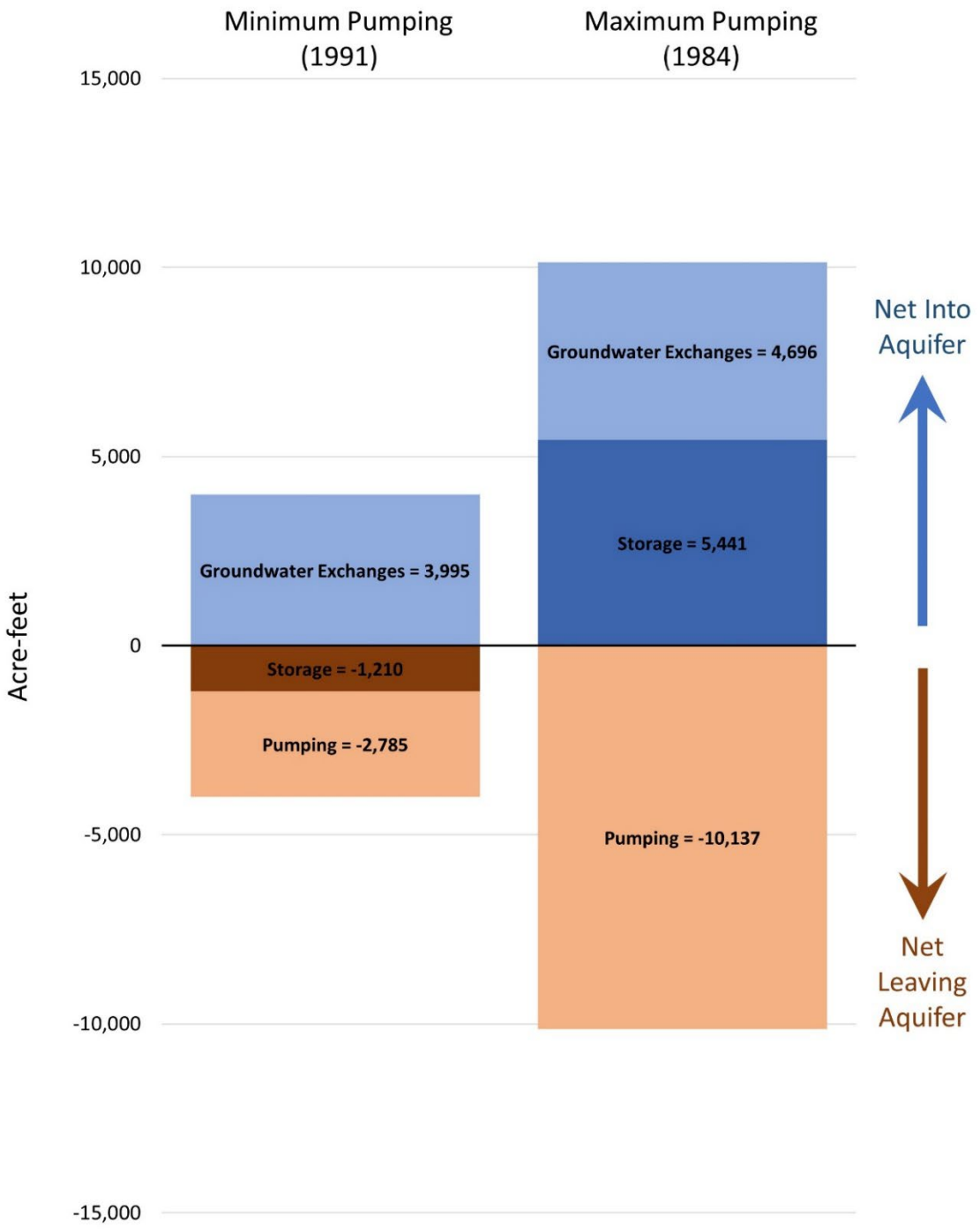


FIGURE A-3: FULL WATER BUDGETS FOR THE RITA BLANCA AQUIFER WITHIN NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT SHOWING THE YEAR OF MINIMUM PUMPING AND THE YEAR OF MAXIMUM PUMPING BETWEEN 1980 AND 2012.

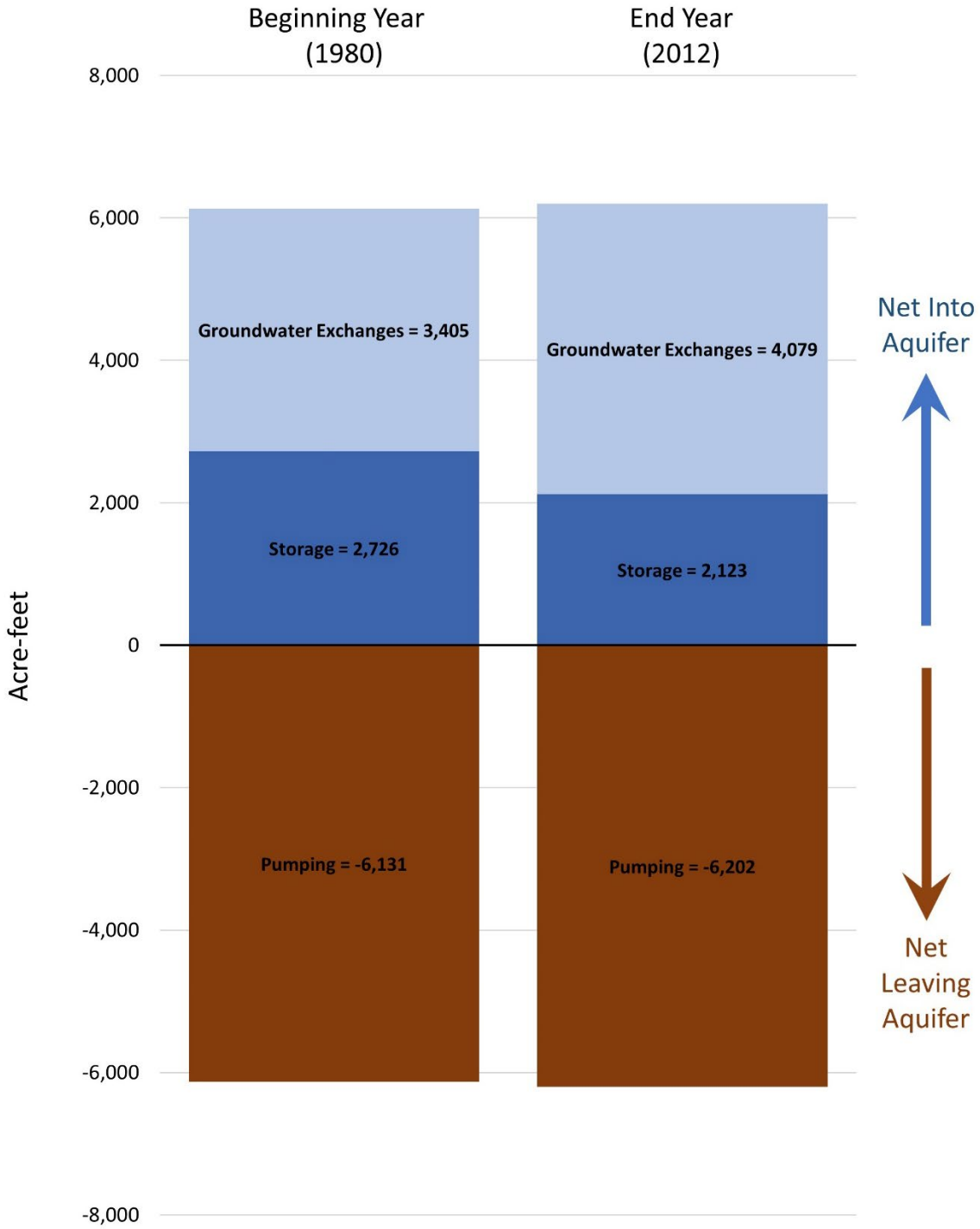


FIGURE A-4: FULL WATER BUDGETS FOR THE RITA BLANCA AQUIFER WITHIN THE NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT SHOWING THE FIRST AND LAST YEAR OF THE HISTORICAL TRANSIENT MODEL BETWEEN 1980 AND 2012.

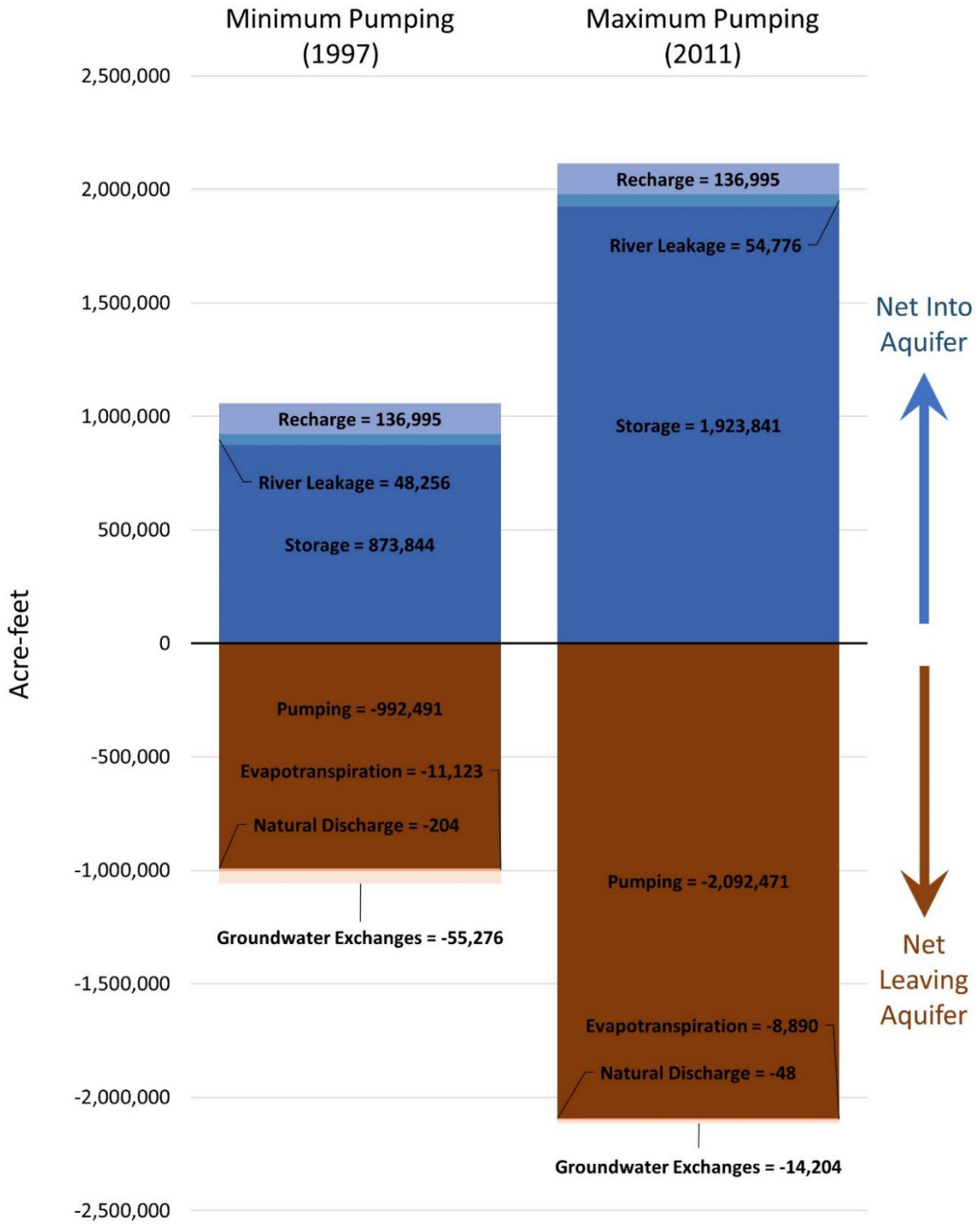


FIGURE A-5: FULL WATER BUDGETS FOR THE OGALLALA AQUIFER WITHIN NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT SHOWING THE YEAR OF MINIMUM PUMPING AND THE YEAR OF MAXIMUM PUMPING BETWEEN 1980 AND 2012.

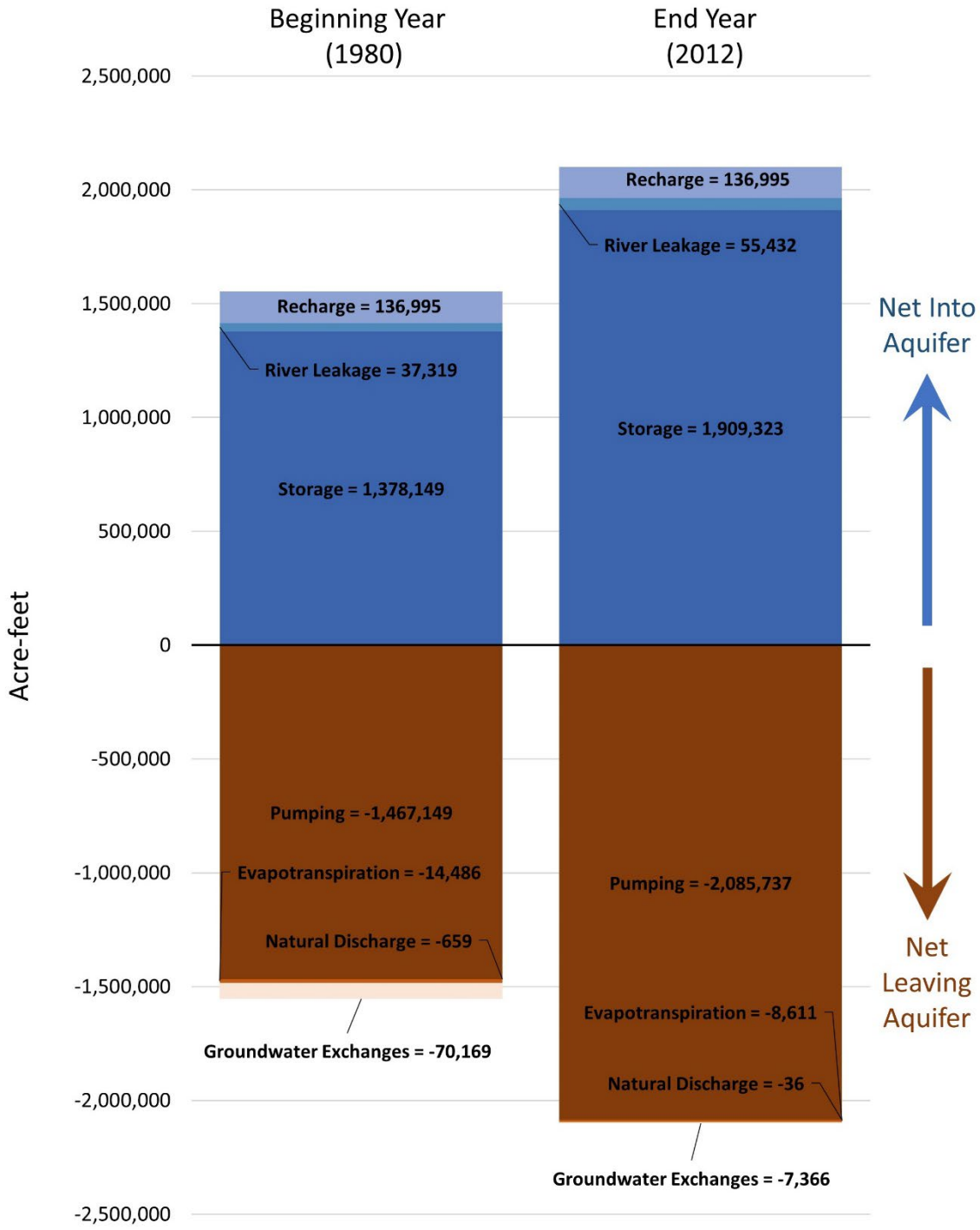


FIGURE A-6: FULL WATER BUDGETS FOR THE OGALLALA AQUIFER WITHIN THE NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT SHOWING THE FIRST AND LAST YEAR OF THE HISTORICAL TRANSIENT MODEL BETWEEN 1980 AND 2012.