LOST PINES GROUNDWATER CONSERVATION DISTRICT

MANAGEMENT PLAN

Adopted September 15, 2004;
Revised August 10, 2010;
Revised September 19, 2012;
Revised September 20, 2017;
Revised October 19, 2022

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Section 1. THE DISTRICT

The Lost Pines Groundwater Conservation District (District) was created in 1999 by Senate Bill 1911, 76th Texas legislature, pursuant to Section 59, Article 16 of the Texas Constitution and Article 7880-3c, Texas Civil Statutes (now Chapter 36, Texas Water Code); ratified by the 77th Texas Legislature in 2001; and confirmed by voters in Bastrop and Lee Counties in November 2002.

The District includes all of Bastrop and Lee Counties (**Map 1**).

For state water planning purposes, the District was designated by the Texas Water Development Board (TWDB) as part of Groundwater Management Area 12 (GMA 12) (**Map 2**). The District participates in GMA 12 along with Mid-East Texas Groundwater Conservation District, Brazos Valley Groundwater Conservation District, Post Oak Savannah Groundwater Conservation District, and Fayette County Groundwater Conservation District.

The District participates in two of the State's sixteen Regional Planning Areas: Bastrop County is in Lower Colorado Regional Planning Group or Region K and Lee County is in Brazos River Regional Planning Group or Region G (**Map 3**).

Section 2. DISTRICT MISSION AND GUIDING PRINCIPLES:
Actions, Procedures, Performance and Avoidance Necessary to Effectuate the Management Plan

Mission Statement: The mission of the Lost Pines Groundwater Conservation District (LPGCD) is to develop rules to provide protection to existing wells, prevent waste, promote conservation, provide a framework that will allow availability and accessibility of groundwater on a sustainable basis, protect the quality of the groundwater, maintain responsible local management of the aquifer resources beneath Bastrop and Lee Counties, and operate the District in a fair and equitable manner.

Based on current conditions, the statutory goal of controlling and preventing subsidence is applicable to the District. The TWDB subsidence risk Final Report: Identification of the Vulnerability of the Major and Minor aquifers of Texas to Subsidence with Regard to Groundwater Pumping, TWDB Contract Number 1648302062, March 21, 2017 shows the Carrizo-Wilcox aquifer within the District is in medium to high risk of subsidence in the map in Figure 4.7, page 4-13 and stated in section 7.3.7 on page 7-10.

Guiding Principles: The District's guiding principles derive from its mission statement. Groundwater resources within the District are of vital importance to the landowners or persons with private property rights in the District, residents, and businesses in Bastrop and Lee Counties and effectively constitute the only source of water available for most of the District. The District was created to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater within the two counties, while complying with statutory requirements. The District believes its groundwater resources can be managed in a prudent manner through education and conservation coupled with reasonable regulation, and based on increasing quantitative understanding of available groundwater resources, recharge, and current and future demand, including real-time information on aquifer conditions developed via a network of monitoring wells.

Policy:

1. District groundwater is to be conserved, preserved, and protected and waste prevented to maintain the viability of the groundwater supply for future generations within the District's jurisdiction, while complying with statutory requirements, as amended at the District's discretion, including those applicable to permits for transport of water out-of-District, and including without limitation certain provisions of Chapter 36 which are summarized in Appendix A (which may be supplemented when appropriate).

2. The District will manage the aquifers within its jurisdiction on a sustainable basis. The District defines sustainability as conservation and reasonable long-term management of groundwater in perpetuity.

3. The District, in cooperation with local municipalities and water supply companies, has established a monitoring well network and an aquifer water level monitoring program (the "Monitoring Well Program"), and a system for reporting water levels. The District will measure and monitor water levels to detect declines, to allow the District to consider appropriate action to avoid

or minimize depletion of the water supply and to maintain or achieve water levels which are consistent with the DFCs. For instance, it may be necessary for the District to reduce the amount of groundwater that non-exempt users pump to avoid or to minimize depletion of the groundwater supply in specified areas within the District and to achieve water levels which are consistent with the DFCs.

4. This Management Plan and the District rules, as amended from time to time, will be based on the best technical advice available to the District. The District will undertake investigations of the District's groundwater resources, including through the Monitoring Well Program, and will cooperate with investigations of groundwater resources and the interaction of groundwater and surface water by TWDB, TCEQ, GMA 12 or other entities, and will make the results of such investigations available to the Board and to the public. The District recognizes that good long-term groundwater management is built on availability of high-quality data, improved understanding of groundwater flow systems, and increasingly better understanding of the interaction between groundwater and surface water. The District recognizes the uncertainties inherent in long-term management of groundwater resources created by such factors as climate, drought, changes in exempt uses such as mining and oil and gas development, socioeconomic change and population growth, and also recognizes the uncertainties created by the geology and other characteristics of relevant aquifers. The District believes that uncertainties affecting decision-making can be reduced by the development and use of high-quality data.

5. The District will treat all citizens equally. The District may exercise its discretion to consider unique situations or local conditions and the potential for adverse economic and environmental consequences, guided by this Management Plan or the District's rules, and such exercise of discretion shall not be construed as limiting the power and authority of the District.

6. In implementing this Management Plan, the District will seek cooperation from municipalities, water supply companies, irrigators, and other groundwater users, and will also seek to cooperate and coordinate with state and regional water planning authorities and agencies as well as the districts of GMA 12.

7. In support of its mission of conserving, protecting and preserving interests in groundwater within Bastrop and Lee Counties, while addressing statutory goals and requirements, the Board may, among other actions, after notice and hearing, amend or revoke any permit for non-compliance, or reduce the groundwater production authorized by permit for the purpose of managing District groundwater resources consistent with the DFCs. The District may also enforce the terms and conditions of permits and District rules by fine and/or by enjoining the permit holder in a court of competent jurisdiction as provided by § 36.102.

The District's Board of Directors will implement this Management Plan and any necessary changes or modifications to adhere to the policy stated herein.

The District's rules, which may be amended at the Board's discretion, are available on the District website at:

https://www.lostpineswater.org/DocumentCenter/View/127/LPGCD-Rules---Adopted-10-16-19

Section 3. TIME PERIOD COVERED BY THE MANAGEMENT PLAN

This Management Plan was originally adopted on September 15, 2004. The first revision was on August 10, 2010, the second revision was approved on September 19, 2012, the third revision was approved on September 20, 2017, and this fourth revision was approved on October 19, 2022. The District may review the Management Plan annually, but at least once every five years, the District will review and re-adopt its Management Plan, with or without change, and submit it to TWDB pursuant to Chapter 36.[1]

[1] See § 36.1072.

Section 4. GOVERNANCE

Board of Directors. The District is governed by a ten-member Board of Directors, five appointed by the Bastrop County Judge and five appointed by the Lee County Judge, qualified and sworn as required by law. After the initial appointment of directors and the setting of staggered terms, each Director is appointed to a four-year term beginning in January. Thus, every second year, following the initial appointment of directors, two directors are appointed by the Bastrop County Judge and two Directors are appointed by the Lee County Judge. The succeeding second year, three Directors are appointed by the Lee County Judge and three Directors are appointed by the Bastrop County Judge.

Each year, in January, the Board selects one of its members to serve as president to preside over Board meetings and proceedings, a second member to serve as vice-president to preside over Board meetings and proceedings in the absence or recusal of the president, and a third to serve as secretary-treasurer to keep a true and correct account of all proceedings of the Board. The Board may appoint an assistant secretary to assist the secretary-treasurer. Unless a vacancy occurs, members of the Board and officers serve until their successors are appointed, qualified to hold office, and sworn in. In the event of a vacancy in any office, the Board shall select one of its members to fill out the term of office. In the absence of a General Manager, the president of the Board will serve as General Manager.

The president may establish committees for formulation of policy recommendations to the Board and may appoint the chair and membership of the committees, which may include members of the Board and/or non-board members. Committee members serve at the pleasure of the president.

The Board will hold regular meetings at least four times a year on a day and at a place that the Board may establish from time to time by Board resolution. At the request of the president, or by written request of at least three Board members, the Board may hold a special meeting. The business of the District will be conducted at regular or special Board meetings when a quorum is present. All Board meetings will be conducted in accordance with the Open Meetings Act.

Daily Operations. The Board may employ a person to be the General Manager, with full authority to manage and to operate the affairs of the District, subject only to direction provided by the Board through policies and orders adopted by the Board. The General Manager may, with Board approval, employ all persons necessary to carry out daily operations. The General Manager may delegate duties as may be necessary to efficiently and expeditiously accomplish those duties; provided that no delegation will relieve the General Manager from his or her responsibilities under the Texas Water Code, the District enabling act, District rules, or District policies, orders and permits.

The Board shall establish by resolution an official office of the District, and the office will maintain regular business hours.

Section 5. DISTRICT DESIRED FUTURE CONDITIONS (DFCs)

On August 10, 2010, the GMA-12 DFCs were adopted for the relevant aquifers, i.e., the major and minor aquifers within the District other than the Yegua-Jackson (the Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper aquifers) and submitted to TWDB. The Yegua-Jackson Aquifer was considered not relevant for the District and a DFC was not established for it. On April 27, 2017, the second round of DFCs was formally adopted by GMA-12, and on November 30, 2021, the third round of DFCs was formally adopted by GMA-12. See **Appendix A**. The District's DFCs by aquifer that were approved in 2021 are presented in **Table 1**.

Table 1- Desired Future Conditions

Aquifer	District-wide DFC (Average drawdown in feet from Jan. 2011 to Dec. 2070)
Sparta	22
Queen City	28
Carrizo	134
Calvert Bluff	132
Simsboro	240
Hooper	138

Section 6. MODELED AVAILABLE GROUNDWATER

Pursuant to the 2011 amendment of § 36.1071(e)(3), TWDB provided estimates of modeled available groundwater totals for the District, based on the DFCs established by GMA 12 under § 36.108. At the time of the preparation of this Management Plan, the TWDB had not finished reviewing the GMA-12 DFC submittal packet from the third round of joint groundwater planning, and had not issued modeled available groundwater totals for GMA 12. Therefore, the modeled available groundwater totals provided by the TWDB in 2017 are presented below in **Table 2**. The LPGCD plans to re-submit this Management Plan to the TWDB with the new modeled available groundwater in the Spring of 2023.

Table 2 - Modeled Available Groundwater Totals for the District

All values are in acre-feet/year

AQUIFER	2020	2030	2040	2050	2060	2070
Sparta	2,390	2,391	2,391	2,391	2,391	2,392
Queen City	1,315	1,315	1,315	1,315	1,315	1,315
Carrizo	7,618	8,358	9,263	11,800	12,052	12,052
Calvert Bluff	2,224	2,631	3,181	3,909	3,983	3,984
Simsboro	32,246	32,895	33,342	34,513	30,843	30,304
Hooper	713	857	1,048	1,295	1,296	1,255
TOTAL	**46,506**	**48,447**	**50,540**	**55,223**	**51,880**	**51,302**

Source: TWDB GAM Run 17-030 MAG.

Section 7. DISTRICT GROUNDWATER RESOURCES

This section presents information on District groundwater and surface water resources.

The annual amount of recharge from precipitation to each aquifer, the annual volume of water that discharges from the aquifer to springs and any surface water bodies and the annual volume of flow into and out of the District within each aquifer and between aquifers were obtained from the TWDB GAM Run 22-008, August 12, 2022 and is provided in **Attachment A**.

The District considered and used all information referenced in this Management Plan, including without limitation historic use, surface water supplies, water demands, water supply needs and water management strategies from the State Water Plan Datasets. The TWDB 2022 State Water Plan Dataset for the District is provided in **Attachment B**. The District acknowledges the water supply needs and water management strategies data values that are supplied in the data packet provided by TWDB.

The estimated historical groundwater use in the District for the last five years is provided in **Table 3**. **Attachment B,** pages 3 - 4 includes the estimated historical groundwater use in the District since 2004.

Table 3 - Estimated Historical Groundwater Use

Year	County	Municipal	Manufacturing	Mining	Steam Electric (Power)	Irrigation	Livestock	Total
2015	Bastrop	10,466	98	44	5,519	3,204	210	19,541
2016	Bastrop	10,346	71	22	3,272	2,872	215	16,798
2017	Bastrop	11,319	167	61	5,163	5,093	269	22,072
2018	Bastrop	11,733	245	47	5,309	5,571	278	23,183
2019	Bastrop	12,306	350	25	5,555	6,810	278	25,324
2015	Lee	2,316	7	904	0	519	321	4,067
2016	Lee	2,168	6	571	0	519	326	3,590
2017	Lee	2,266	8	699	0	692	396	4,061
2018	Lee	2,312	7	1,392	0	674	411	4,796
2019	Lee	2,456	9	741	0	1,142	411	4,759

A. GROUNDWATER RESOURCES

Except for a small area along the northwest border of Bastrop County south of the Colorado River that is not an aquifer, the geologic units exposed in Bastrop and Lee Counties are Tertiary and Quaternary in age. All the Tertiary age geologic units dip or tilt to the southeast, and are composed of varying portions of sand, silt, and clay. From oldest (westernmost) to youngest (easternmost), these exposed Tertiary geologic units include the Midway Group, the Wilcox Group, the Carrizo Formation, the Reklaw Formation, the Queen City Sand, the Weches Formation, the Sparta Sand, the Cook Mountain Formation, the Yegua Formation, and the Jackson Group. Quaternary geologic units include river or stream alluvium, such as along the Colorado River and Middle Yegua Creek, as well as topographically higher terrace deposits.

AQUIFERS

Most of these geologic formations found within the District will yield some quantity of water to wells, as shown by the stratigraphic section below in Table 4.

Table 4 - Stratigraphic Section

Aquifer or Unit	Maximum Thickness (feet)	Description	Water-Bearing Properties
Alluvium	100	Sand, gravel, silt, and clay	Yields small to moderate quantities of fresh to slightly saline water to wells
Yegua-Jackson	900	Medium to fine sand, silt, clay, some lignite	Yields small to moderate quantities of fresh to slightly saline water to wells
Cook Mountain Formation	400	Clay with some sand	Yields small quantities of fresh to slightly saline water to wells
Sparta Sand	170	Fine to medium sand with some clay and silt	Yields small to large quantities of fresh to slightly saline water to wells
Weches Greensand	100	Glauconitic clay and sand	Not known to yield significant quantities of water to wells
Queen City Sand	600	Fine to medium sand, clay, with some conglomerate	Yields small to large quantities of fresh to slightly saline water to wells
Reklaw Formation	100	Glauconitic sand and silt (lower) and clay with some sand (upper)	Yields very small water to wells in upper part of formation
Carrizo Sand	600	Fine to coarse sand with some sandstone and clay	Capable of yielding large quantities of water to wells

Calvert Bluff Formation (Wilcox Group)	1500	Fine to coarse grained sand and sandstone with some silt, mudstone, and lignite	Capable of yielding moderate quantities of water to wells
Simsboro Sand (Wilcox Group)	800	Massive, fine to medium, well sorted sand	Capable of yielding large quantities of water to wells
Hooper Formation (Wilcox Group)	1300	Predominantly mudstone, with some sand and lignite.	Capable of yielding small to moderate quantities of water to wells
Midway Group	?	Mostly shale	Not known to yield significant quantities of water to wells

However, only the Carrizo, Wilcox, Queen City, Sparta, and Colorado River alluvium aquifers yield sufficient quantities to have wells that have been permitted by the District. Each of these geologic units has different water-bearing characteristics and capabilities, and each is described separately below.

Carrizo-Wilcox Aquifer

The Carrizo Formation and the Wilcox Group (which includes the Hooper Formation (lower), the Simsboro Formation (middle), and the Calvert Bluff Formation (upper)) form a single, hydrologically connected aquifer system recognized by the State as the Carrizo-Wilcox Aquifer. The Carrizo-Wilcox Aquifer is a defined as a major aquifer by the state of Texas, and within Texas it stretches in a wide band from the Rio Grande in South Texas to Louisiana. The Carrizo-Wilcox crops out through the middle of Bastrop County and in the far northeastern portion of Lee County. Wells are completed in the Carrizo-Wilcox Aquifer in and near the outcrop of each of the four individual aquifer units.

Hooper Formation The lowermost aquifer within the Carrizo-Wilcox is the Hooper Formation, which is also generally the least productive of the three Wilcox Group aquifers. The Hooper is used by exempt wells in and near the outcrop area, as well as for municipal purposes by the City of Elgin, Aqua Water Supply Corporation, Manville Water Supply Corporation, and Lee County Water Supply Corporation.

The Hooper is comprised of predominantly mudstone, with varying amounts of sandstone, and some thin lignite beds in the upper part of the formation. The Hooper and the overlying Simsboro and Calvert Bluff Formations are no longer distinguishable as individual units much farther

west than the Colorado River. Beyond this point the Wilcox Group aquifer is referred to as undifferentiated Wilcox.

The Hooper crops out in a band approximately 3 miles wide in northwestern Bastrop County near the Travis County line, as well as in far western Lee County. From the outcrop, the Hooper dips at a rate of 125 to 200 feet per mile, with the top of the Hooper reaching a maximum depth of more than 5,000 feet in southern Lee County, although wells completed in the Hooper in the District are generally less than 700 feet deep. The Hooper Formation can be up to 1,300 feet thick within the District.

The Hooper Formation produces a small to moderate amount of water to wells, mainly in the outcrop area. Well yields of larger, non-exempt wells are generally between 200 and 350 gpm, although some Hooper wells can yield more than 500 gpm. Water quality of groundwater produced from the Hooper is generally good, although water quality deteriorates farther downdip from the outcrop.

Simsboro Formation The middle aquifer within the Wilcox Group is the Simsboro Formation. This aquifer is identifiable only from the middle of Bastrop County and eastward, including all of Lee County, and is a highly productive unit. It is used by numerous exempt wells and by the City of Elgin, Aqua Water Supply Corporation, and Manville Water Supply Corporation for municipal supplies. Water is also produced by Alcoa from the Simsboro as part of its mining operations.

The Simsboro is primarily composed of a massive, fine to coarse-grained sand, with relatively small amounts of silt, clay, and mudstone. The Simsboro crops out in a band two to three miles wide across Bastrop and far northwestern Lee County. From the outcrop, the Simsboro dips at a rate of 125 to 200 feet per mile, with the top of the Simsboro reaching a maximum depth of nearly 4,500 feet in southern Lee County. Wells completed in the Simsboro in the District are generally less than 1,000 feet deep, although wells of more than 1,500 feet have been completed in the District. The Simsboro is up to 800 feet thick within the District, although it is generally less than 500 feet thick.

The Simsboro Formation produces large quantities of fresh to slightly saline groundwater to wells. Wells of over 5,000 gpm have been completed in the Simsboro Formation, and yields of 900 to 1,200 gpm in existing non-exempt wells are common. Water quality of groundwater produced from the Simsboro is good, although water quality deteriorates farther downdip from the outcrop.

Calvert Bluff Formation The uppermost aquifer within the Wilcox Group is the Calvert Bluff Formation. The Calvert Bluff is used by numerous exempt wells in and near the outcrop, as well as for irrigation by two non-exempt wells and for municipal purposes by Aqua Water Supply Corporation, Manville Water Supply Corporation, and Bastrop County Water Control Improvement District Nos. 1 and 2.

The Calvert Bluff Formation is comprised primarily of fine to coarse-grained sand and sandstone, interbedded with silt, mudstone, and some lignite. The Calvert Bluff crops out in a band six to eight miles wide in Bastrop and Lee Counties, and from the outcrop the Calvert Bluff dips at a rate of 125 to 200 feet per mile. The top of the Calvert Bluff is more than 3,000 feet deep in southern Lee County, although wells completed in the Calvert Bluff within the District are generally less than 1,000 feet deep. The Calvert Bluff is up to 1,500 feet thick within the District.

The Calvert Bluff is more productive than the Hooper but not nearly as productive as the underlying Simsboro or overlying Carrizo aquifers. Typical non-exempt Calvert Bluff well yields within the District are 150 to 350 gpm, although several wells with yields of 500 to 1,000 gpm are

present. Water quality in the Calvert Bluff is generally good, although water quality deteriorates farther downdip from the outcrop.

Carrizo Formation The uppermost aquifer within the "Carrizo-Wilcox" Aquifer is the Carrizo Formation. The Carrizo is a highly utilized aquifer within the District, with a large number of smaller, exempt wells producing from it in and near the outcrop. In addition, numerous non-exempt wells produce from the Carrizo for municipal purposes, including those operated by the Cities of Lexington, Smithville, and Giddings, as well as by Aqua Water Supply Corporation and Lee County Water Supply Corporation. Some water produced from the Carrizo is also used for irrigation purposes.

The Carrizo Formation is predominantly a fine to coarse-grained massive sand. It crops out in a band one to two miles wide though Bastrop and Lee Counties. From the outcrop the Carrizo dips at a rate of about 140 feet per mile when not affected by faulting, with the top of the Carrizo being found at more than 2,500 feet in southern Lee County. The Carrizo can be up to 600 feet thick within the District, but is generally between 300 and 500 feet thick. The Carrizo is a highly productive aquifer throughout much of its extent not only in the District but throughout much of Texas.

Yields of non-exempt Carrizo wells within the District are generally between 400 and 750 gpm, although well yields of up to 1,500 gpm have been observed. Water quality in the Carrizo is good, although, as with most aquifers in the District, water quality deteriorates farther downdip from the outcrop.

Queen City Aquifer

The Queen City Aquifer is defined as a minor aquifer by the state of Texas. It is located stratigraphically above the Carrizo-Wilcox aquifer, between the Reklaw and Weches formations. The Queen City is used by a large number of exempt wells within the District, as well as for municipal purposes by the cities of Lincoln and Giddings, and the Lee County Water Supply Corporation.

The Queen City Formation is comprised of a massive to thin-bedded, fine to medium-grained sandstone with some silt, clay, shale, and lignite. It crops out in a band two to four miles wide across both Bastrop and Lee Counties. From the outcrop the Queen City dips at a rate of 70 to 140 feet per mile, with the top of the formation being found at approximately 2,000 feet in southern Lee County. However, most Queen City wells are located in or near the outcrop area, with most being less than 1,400 feet deep. The Queen City is generally between 200 and 600 feet thick within the District.

The Queen City yields small to moderate quantities of fresh to slightly saline water to wells in and near the outcrop. Non-exempt Queen City wells in the District area typically yield between 130 and 250 gpm, although one Queen City well produced more than 450 gpm.

Sparta Aquifer

The Sparta Aquifer is defined as a minor aquifer by the state of Texas. It is located stratigraphically above the Queen City aquifer, between the Weches and Cook Mountain formations. The Sparta is used by exempt wells within the District for domestic and livestock purposes, and for municipal purposes by the Lee County Fresh Water Supply District and Lee County Water Supply Corporation.

The Sparta is primarily a loosely cemented, sand-rich unit, with some interbedded silt and clay. The Sparta crops out in a band one to ten miles wide from southern Bastrop County to north-eastern Lee County. From the outcrop the Sparta dips at a rate of approximately 100 feet per mile, with the top of the formation being found at approximately 1,500 feet in southern Lee County. Most Sparta wells are located in or near the outcrop and are less than approximately 500 feet deep. However, one well (59-50-706) is nearly 1,500 feet deep. The Sparta is up to 170 feet thick within the District, and yields small to moderate quantities of fresh to slightly saline water to wells. Yields of non-exempt wells in the District typically range from 100 to 250 gpm. Water quality of ground-water produced from the Sparta is generally good, although, as with other dipping aquifers in the District, water quality deteriorates farther downdip from the outcrop area.

Other aquifers

Colorado River Alluvium Aquifer In addition to the major and minor aquifers described above, the alluvium along the Colorado River also yields significant quantities of water to wells. The Colorado River Alluvium is not defined as a major or a minor aquifer by the State, and a DFC was not established for this aquifer. At the time of the preparation of this Management Plan, this aquifer is used for water for municipal supply by the City of Bastrop, as well as for irrigation purposes, from several non-exempt wells.

The Colorado River Alluvium includes alluvial deposits in river bottom land along the Colorado River. The alluvium generally consists of sand, with some small gravel and disconnected layers of silt and clay. The alluvium can be on one side of the river or on both sides. It is not always connected beneath the river, and the maximum thickness is less than 100 feet. The alluvium along the Colorado River generally yields small to moderate quantities of fresh to slightly saline water.

In addition to the alluvium along the Colorado River, most other streams have some alluvium associated with them. Small, exempt wells may be installed in these very localized alluvial aquifers.

Trinity Aquifer The Trinity Aquifer, classified as a major aquifer by the state of Texas, underlies the District. However, it is virtually unused because of the extreme depth and poor water quality of this aquifer with the District. No known wells are completed in the Trinity Aquifer within the District.

Yegua-Jackson Aquifer The Yegua-Jackson Aquifer is classified as a minor aquifer by the state of Texas, and is found in the southeastern third of Lee County and a very small part of Bastrop County. The Yegua-Jackson Aquifer is comprised of the Yegua Formation and the Jackson Group. These units consist of interbedded sand, silt, and clay, with some lignite beds. The thickness of the Yegua-Jackson Aquifer in the District is as much as 900 feet. A few exempt wells are completed in the Yegua-Jackson Aquifer, primarily in Lee County. Within the District, no non-exempt wells are completed in this aquifer, and it is not expected to yield significant quantities of water to wells within the District.

Midway Group The Midway Group is located stratigraphically beneath the Wilcox Group. The Midway consists of clay, silt, glauconitic sand, and thin beds of limestone and sandstone and can be more than 800 feet thick. Wells drilled into the Midway outcrop may yield small quantities of slightly to moderately saline water, and a few wells within the District have been installed into the Midway.

Reklaw Formation The Reklaw Formation is located stratigraphically between the overlying Carrizo and underlying Queen City Formations. The Reklaw is composed primarily of glauconitic sand and silt, and is about 100 feet thick. It is not considered to be an aquifer by the state of Texas, however a few exempt wells have been completed in the Reklaw within the District, mostly in the outcrop area.

Weches Formation The Weches Formation, sometimes referred to as the Weches Greensand, is located between the Queen City and Sparta Formations. The Weches consists of glauconitic shale, some sandstone, and some thin limestone beds, and is about 100 feet thick. It is not considered to be an aquifer by the state of Texas, however a few exempt wells have been completed in the Weches within the District, mostly in the outcrop area.

Cook Mountain Formation The Cook Mountain Formation is located stratigraphically above the Sparta Formation and below the Yegua Formation. The Cook Mountain consists primarily of clay, with some lenses of sand, sandstone, limestone, glauconite, and gypsum, and can be as much as 400 feet thick within the District. It is not considered to be an aquifer by the state of Texas, however exempt wells producing very small quantities of fresh to moderately saline groundwater have been completed in the Cook Mountain within the District, mostly in the outcrop area.

RECHARGE, DISCHARGE, AND GROUNDWATER FLOW

Recharge is the addition of water to an aquifer. Recharge to aquifers occurs from direct precipitation on aquifer outcrop at ground surface, from losses from surface water bodies to the underlying aquifer, and from inter-formational leakage between aquifers. Recharge estimates for the major and minor aquifers present within the District are included in **Attachment A**.

The amount of recharge that occurs due to direct precipitation appears to be more a function of the specific soils in an area than the amount of precipitation. Recharge of direct precipitation where sandy aquifer units crop out is higher than where the soils and formations at ground surface are clay-dominated. Effective recharge from precipitation, i.e. recharge that moves down dip into the deeper portions of the aquifer and is not discharged to surface streams, is typically only a few percent of average annual rainfall. Leakage between formations accounts for a large component of total recharge to an individual aquifer. Losses from surface water bodies to the underlying aquifers appear to be a minimal source of recharge for most of the aquifers in the District.
Discharge is the loss of water from an aquifer. Before the development of aquifers for groundwater supply purposes, all discharge was natural. This includes discharge to surface water sources such as springs, streams, rivers, and lakes, as well as the removal of groundwater from an aquifer by evapotranspiration and inter-formational leakage. Discharge to surface water bodies are shown in **Attachment A**. After the development of District aquifers for supply purposes, most discharge that occurs is to wells. Other sources of anthropogenic discharge may include gravel pits, mining operations, or other activities that intersect the water table.

Groundwater moves from areas of higher hydraulic head to areas of lower hydraulic head, which is from areas of recharge to areas of discharge. Under normal conditions within the District, the movement of water is in a downdip direction. However, these normal, undeveloped conditions are altered by pumpage that occurs in the aquifer. Because pumpage has become the dominant form of discharge from many of the aquifers in the District, groundwater tends to flow towards areas of pumpage. These natural and altered flow patterns result in not only the movement of groundwater across District boundaries, but also between aquifers within the District. **Attachment A** also includes the amount of water that flows laterally into and out of the District to adjacent districts or counties, and the amount of water that moves vertically between aquifers, respectively. These values do not distinguish between fresh, brackish, and saline water, and therefore all flows include all of these water types.

B. SURFACE WATER RESOURCES

Bastrop and Lee Counties lie along the inner edge of the Texas Gulf Coastal Plain. The topography is flat to gently rolling, with elevations ranging from slightly less than 400 feet where the Colorado River exits Bastrop County to slightly more than 650 feet along the Bastrop-Lee county line just north of the upper reaches of West Yegua Creek.

The District lies within three river basins: the Guadalupe, Colorado, and Brazos. The Colorado River bisects Bastrop County, and a majority of Bastrop County and the southern quarter of Lee County lie within the Colorado River Basin and its tributaries, including Cummins, Rabbs, Pin Oak, Big Sandy, Wilbarger, and Cedar Creeks. The remainder of Lee County lies within the Brazos River basin, with the significant tributaries to the Brazos River within Lee County being the Middle and West Yegua Creeks. In addition to the Colorado and Brazos River basins, the extreme southern portion of Bastrop County lies within the Guadalupe River basin, an area drained by Peach Creek.

Currently surface water resources are little used in Bastrop and Lee Counties because of lack of availability and because what is available has already been appropriated. Surface water from the Colorado River is used as make-up water for Lake Bastrop (which functions as a cooling pond for the LCRA Sim Gideon power plant), for cooling water for another privately owned power plant in Bastrop County, for some irrigation, and for livestock watering in Lee County. No other District uses of surface water are known. The current availability of surface water within Bastrop and Lee Counties is included in **Attachment B,** page 5.

C. DISTRICT WATER DEMANDS, NEEDS AND STRATEGIES

Based on data from the 2021 Regional Water Plan data, over the planning horizon, regional water planning data from Region G and Region K shows population is expected to increase from 95,487 in 2020 in Bastrop County to 384,244 in 2070 (an increase of 302%), and from 19,131 in 2020 in Lee County to 23,889 in 2070 (an increase of 25%). In addition, over the planning horizon, total water demands are projected to increase in Bastrop County from 34,240 acre-feet/year in 2020 to 75,154 acre-feet/year in 2070, and to increase in Lee County from 8,573 acre-feet/year in 2020 to 5,947 acre-feet/year in 2070.

Demands within the District, water supply needs within the District, and water management strategies are included in the 2022 State Water Plan Datasets in **Attachment B,** pages 6 - 7, pages 8 - 9, and 10 - 13 respectively.

Groundwater currently meets virtually all District demand for municipal, manufacturing, mining, livestock, and irrigation purposes, with surface water used principally to meet some irrigation and all steam-electric demand (cooling water). Currently, the two largest uses are mining and municipal purposes, including rural-domestic use. Almost all mining water use is from the Simsboro Aquifer.

It is important to note that the 2022 State Water Plan Projected Net Water Demands:

- do not distinguish between projected demands met by surface water and those met by groundwater;
- do not include out-of-District demand for District groundwater;
- do not account for groundwater pumpage within the District that is exported out-of-District (such as demand represented by the District's current export of groundwater to Fayette County) (demand estimates from Regions G and K submitted to TWDB are for in-District demands only);
- do not account for demand in areas outside the District which are served by pumpage within the District by retail rural water sellers or other special utility districts whose "Certificate of Convenience and Necessity" (CCN) extends beyond District boundaries.

Such demands must be separately evaluated.

The District expects that improvements to the applicable GAM and expanded data from the Monitoring Well Program will allow better understanding of District groundwater resources and better future estimates of groundwater availability as the District seeks to manage the District's groundwater resources consistently with the DFCs and its mission.

Municipal demands are expected to nearly quadruple in Bastrop County by 2070. Mining demands are expected to decrease significantly in both Bastrop and Lee Counties by 2070.

Section 8. MANAGEMENT GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

A. Statutory Goals.

GOAL 1: Provide the most efficient use of groundwater.

Management Objective 1.1: The General Manager will develop and evaluate a schedule for expanding the monitoring well network in the Monitoring Well Program and will measure and record water levels in the monitoring wells.

> Performance Standard: The General Manager will annually, before March 31st, evaluate and report to the Board on the monitoring well network.

Management Objective 1.2: The General Manager will make available to the public information on efficient use of groundwater, at the District office, on the District website, and/or by public workshops or other presentations.

> Performance Standard: The General Manager will report annually, before March 31st, to the Board, in the Annual Report or otherwise, on information on efficient use of groundwater which has been made available, identifying the publications and the number and dates of any public workshops or other presentations.

GOAL 2: Controlling and preventing waste of groundwater.

Management Objective 2.1: The District will make available to the public information on controlling and preventing waste of groundwater, at the District office, on the District website, or by public workshops or other presentations.

> Performance Standard: The General Manager will report annually, before March 31st, to the Board, in the Annual Report or otherwise, on information on efficient use of groundwater which has been made available, identifying the publications and the number and dates of any public workshops or other presentations.

Management Objective 2.2: The General Manager will document and promptly report to the relevant water supply entity any water leaks from pipelines or distribution systems which are noted or reported to the District.

> Performance Standard: The General Manager will report annually, before March 31st, to the Board, in the Annual Report or otherwise, any leaks noted and reported.

GOAL 3: Controlling and preventing subsidence: This goal is applicable to the District according to the TWDB subsidence risk report.

Management Objective: The District will monitor drawdowns to track and prevent land subsidence.

Performance standard 1:
At least once every five years, beginning in 2023, the General Manager will investigate and report projected land subsidence for areas where water levels will decrease more than 300 feet (over a 50-year period) based on groundwater availability model (GAM) simulations used for the joint planning process and areas of high risk based on the TWDB subsidence risk assessment tool.

Performance Standard 2:
If actual subsidence is suspected or confirmed, the District will consider whether or not production should be curtailed in impacted areas or undertake any other action deemed to be necessary to reduce or halt further subsidence.

GOAL 4: Address conjunctive surface water management issues.

Management Objective 4.1: The District will encourage the use of surface water supplies, where available and practical, to meet the needs of specific user groups within the District.

> Performance Standard: The District will participate at least annually in the Region G and Region K Regional Water Planning processes, and encourage the development of surface water supplies where appropriate and document any such activity in the Annual Report.

GOAL 5: Address natural resource issues that impact the use and availability of groundwater and which are impacted by the use of groundwater.

Management Objective: the District will identify potential hazards that might negatively impact water quality or reduce the availability of high quality groundwater for consumptive use.

Performance Standard 1:
The General Manager will produce a map that includes the location of all known and identifiable mining hazards as well as the monitoring wells nearest to these sites, no later than November 2023. The hazardous sites will be noted as to type (e.g., coal ash, gravel and sand, etc).

Performance Standard 2:
The General Manager will water test annually the wells nearest these mapped sites for contamination and report results no later than November 1st of each year.

Performance Standard 3:
The General Manager will produce a map that includes the location of all known active or abandoned oil and gas production wells, no later than November 1, 2024.

Performance Standard 4:
The General Manager will test monitoring wells nearest the oil and gas well sites for contamination and report results no later than November 2024.

Performance Standard 5:
The Management Committee, or another committee of the Board of Directors, will conduct an investigation to determine sources for potential hazards and develop in-house database for all hazards of negative impact on water quality or availability, and summarize findings by March 31st of each year.

GOAL 6: Address drought conditions.

Management Objective 6.1: The District will monitor information on drought severity and provide a link to the drought information on the District website.

> Performance Standard: The General Manager will monitor a public source on local drought conditions, such as https://waterdatafortexas.org/drought , make the information available to the public on the District website, and report annually to the Board on the status of this objective in the Annual Report or otherwise.

Management Objective 6.2. The District will monitor District monitoring wells at specified intervals.

> Performance Standard: The General Manager will provide a summary of water levels in District monitoring wells at least annually to the Board.

GOAL 7: Address conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective.

Recharge enhancement: The District does not currently have the financial resources to buy property and construct recharge structures. Therefore, based on current conditions, this goal is not currently applicable.

Precipitation enhancement: The District does not know of any precipitation enhancement activity currently applicable to the District. Therefore, this goal is not currently applicable.

Management Objective 7.1: The District will make available to the public at the District office and/or on the District website information on water conservation on topics such as advances in plumbing fixtures that conserve water, xeriscaping, and other related subjects, where appropriate and cost-effective, identified by the District.

> Performance Standard: The General Manager will report annually to the Board, in the Annual Report or otherwise, on information on conservation which has been made available, identifying the information and the number and dates of any public workshops or other presentations.

Management Objective 7.2: The District will make available to the public at the District office and/or on the District website information concerning rainwater harvesting where appropriate and

cost effective, including one or more publications related to advances in rainwater harvesting or any other related subject identified by the District.

Performance Standard: The General Manager will report annually to the Board, in the Annual Report or otherwise, on information on rainwater harvesting which has been made available, identifying the information and the number and dates of any public workshops or other presentations.

Management Objective 7.3: The District will make available to the public information concerning brush control where appropriate and cost effective, including on topics related to brush control or any other related subject identified by the District.

Performance Standard: The General Manager will report annually to the Board, in the Annual Report or otherwise, on information on brush control which has been made available, identifying the information and the number and dates of any public workshops or other presentations.

GOAL 8: Address desired future conditions (DFCs) of the groundwater resources established pursuant to § 36.108.

Management Objective 8.1: The District will assure conformance with the desired future conditions (DFC) adopted by the District and the "estimated future DFC" as defined in certain District permits.

Performance standard 1:
At least once a year in by March 31st, the General Manager will report to the Board the measured water levels obtained from the monitoring wells for each Management Zone and aquifer, calculated from the measured water levels of the monitoring wells within the Management Zone. A comparison of the "Estimated Future DFC" with the DFCs for each Management Zone and aquifer to include the current average water level, the current annual drawdown, the current rate of change, and the current average rate of change.

Performance standard 2: the General Manager will report annually by March 31st to the Board the total permitted production and the estimated total annual production for each aquifer and compare these amounts to the MAGs listed in the District's management plan for each aquifer.

Management Objective 8.2: The District will assess whether or not management zones should be established within its counties, or, if established, modified.

Performance Standard: The General Manager will annually assess by March 31st of each year and report to the Board whether management zones should be established within its counties, or, if established, modified.

B. District-Specific Goals

GOAL: Provide public education on groundwater resources including watershed protection, drought management and water conservation.

Management Objective: Educating public school children to better understand the water cycle, surface and groundwater characteristics and their relationships.

Performance standard 1: A teacher or member of the Education committee will do at least one presentation to fifth grade students within school districts of LPGCD in 2023.

Performance standard 2: The Education committee will secure a stream hydrology trailer by Spring of 2023 for use in educational presentations to K-12 students and the public.

Performance standard 3: The Education committee will secure an aquifer model by Spring of 2023 for use in educational presentations to K-12 students and the public.

Performance standard 4: A teacher or a member of the Education Committee will coordinate an essay contest in area high schools every fall semester beginning in 2023, with topics such as health, water quantity and quality, economics, energy production, recreation.

GOAL: Provide community outreach so that the community is aware of LPGCD existence and mission.

Management Objective: Carry out activities that increase community awareness and support of LPGCD.

Performance standard 1: A member of the Outreach committee will hold a photo contest, each odd year, beginning in the Spring of 2023. Winners will be published in a calendar.

Performance standard 2: A member of the Outreach committee will publish at least 6 informational articles in local newspapers each year beginning in 2023.

Performance standard 3: The Assistant General Manager will publish and distribute at least 10 monthly newsletters each year that provide relevant and timely information about LPGDC and distribute in public places, beginning in 2023.

GOAL: Register all wells within District boundaries.

Management Objective: The District will register all exempt wells drilled since the District Rules became effective and work towards registering all pre-existing exempt wells.

Performance Standard: The District will encourage registration of newly drilled exempt wells by refunding the drilling permit fee upon submittal of completion reports, well logs, and well registration materials. Because registration of exempt wells existing prior to the effective date of District rules is voluntary, the General Manager or the General Manager's designated representative will note the existence of unregistered wells, locate such wells on a map as best possible, and visit with the landowner, if possible, to encourage registration of the wells. The District will document such attempts at the District office.

GOAL: Publicize operating permit requirements

Management Objective: The District will publicize the requirement for operating permits for non-exempt wells, not otherwise excluded, and notify operating permit holders of the need to renew their operating permit at least sixty days prior to expiration.

Performance Standard: At least annually, the District will notify all known water-well drillers and pump installers operating in the District of the requirement for owners of non-exempt wells, not otherwise excluded, to obtain an operating permit and the requirement that the driller and/or pump installer insure that no non-exempt well, not otherwise excluded, is placed into service within the District without an operating permit. Such notice may be by publication in one or more newspapers of general circulation in Bastrop and Lee Counties.

GOAL: Publicize transport permit requirements

Management Objective: The District will publicize the requirement for transport permits and to notify holders of transport permits of the need to renew their transfer permit prior to expiration.

Performance Standard: At least annually, the District shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee Counties a publication including or related to the requirement to obtain a transport permit to transport groundwater out of the District.

GOAL: Timely process operating permits and transport permits.

Management Objective: The District will endeavor to set an application on the agenda for a Board meeting within sixty (60) days of the date on which the General Manager determines that an application is Administratively Complete as defined by District rules.

Performance Standard: On an annual basis the District will track the dates on which applications and components of requested information are received, the dates on which (following technical review) an application is determined to be administratively complete, and the dates on which the Board considers applications. For any permit application taking longer than sixty days to process, the General Manager will cause a brief comment to be included in the files as to the reason for the delay. The General Manager will include an annual summary of permit application tracking in the Annual Report. Upon review and approval of the Annual Report, the District will make it available for public review at the District office.

GOAL: Maintain a single database of registration of exempt wells, operating permits of non-exempt wells, and transport permits, permitting development of spacing and completion information for District wells, water level data, water production data, water quality and other information which facilitates management of groundwater consistent with DFCs.

Management Objective: The District will maintain a single database of **water level data, water production data, water quality for** each registration of an exempt well, each operating permit for a non-exempt well, and each transport permit, such that the District can generate plots of the locations of each registered and permitted well, access available completion and other relevant information for wells, and compute distances between the wells.

> Performance Standard: Data on **water level data, water production data, water quality for** each registration of an exempt well, each operating permit for a non-exempt well, and each transport permit shall be entered in the database within sixty (60) days of issuance of the operating permit or registration. A summary of exempt wells will be provided in the annual hydrological data report.

Section 9. DISTRICT CERTIFICATIONS

A. Regional Cooperation and Coordination

Evidence of coordination by the District with the relevant surface water entities in its boundaries is provided in **Appendix B**. In addition:

Lower Colorado River Regional Planning Group (Region K). The District regularly coordinates with Region K by participating at regional planning meetings and by written and verbal communication as needed.

Brazos River Regional Planning Group (Region G). The District regularly coordinates and communicates with Region G. A District representative commonly attends Region G planning meetings.

Lower Colorado River Authority (LCRA). The District communicates with LCRA through the Region K planning group and directly as needed. The District will participate when regular communication begins on conjunctive use of surface and groundwater.

Brazos River Authority (BRA). The District communicates with BRA through the Region G planning group and directly as needed. BRA representatives commonly attend District Board meetings. The District will participate when regular communication begins on conjunctive use of surface and groundwater.

B. District's Resolution Adopting Management Plan

Appendix C contains a certified copy of the District resolution adopting this Management Plan.

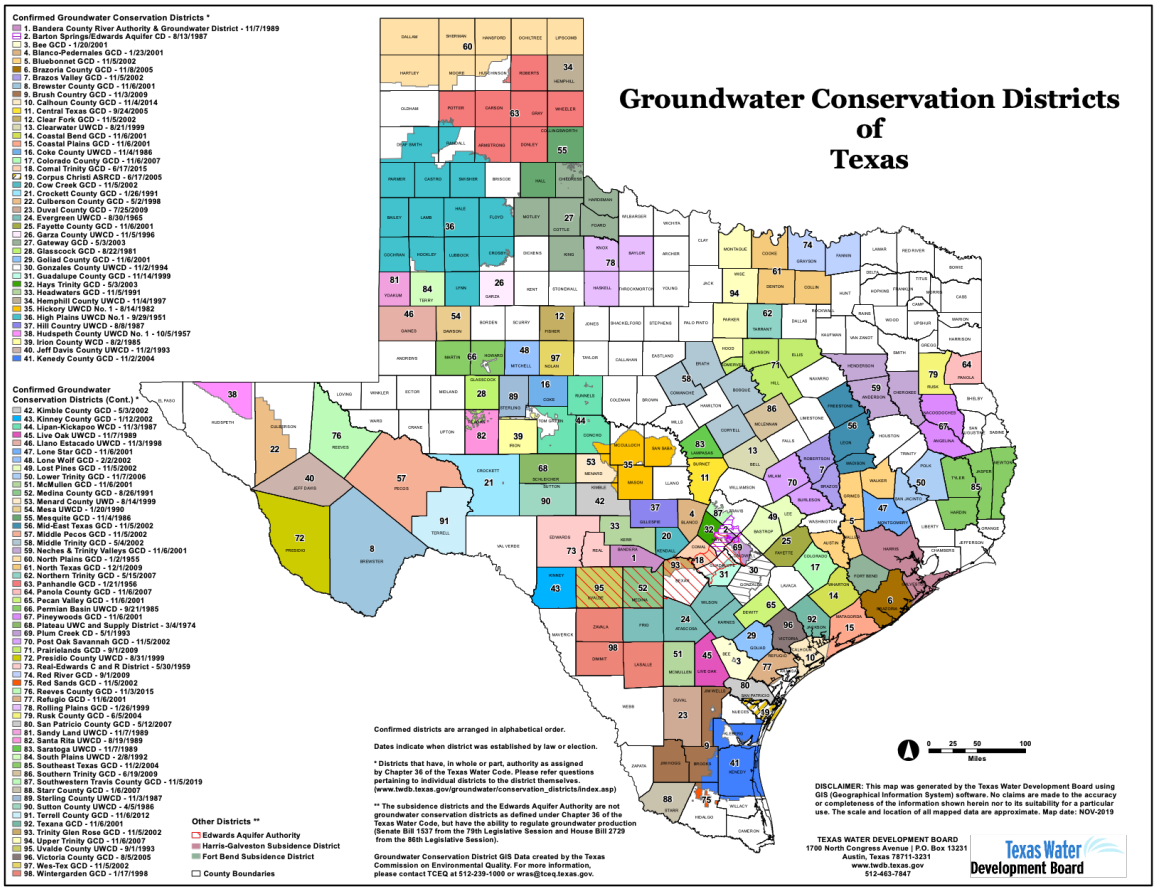
C. Evidence of Public Notice and Hearing of Management Plan

Appendix D contains evidence of public notice and hearing prior to adoption of this Management Plan.

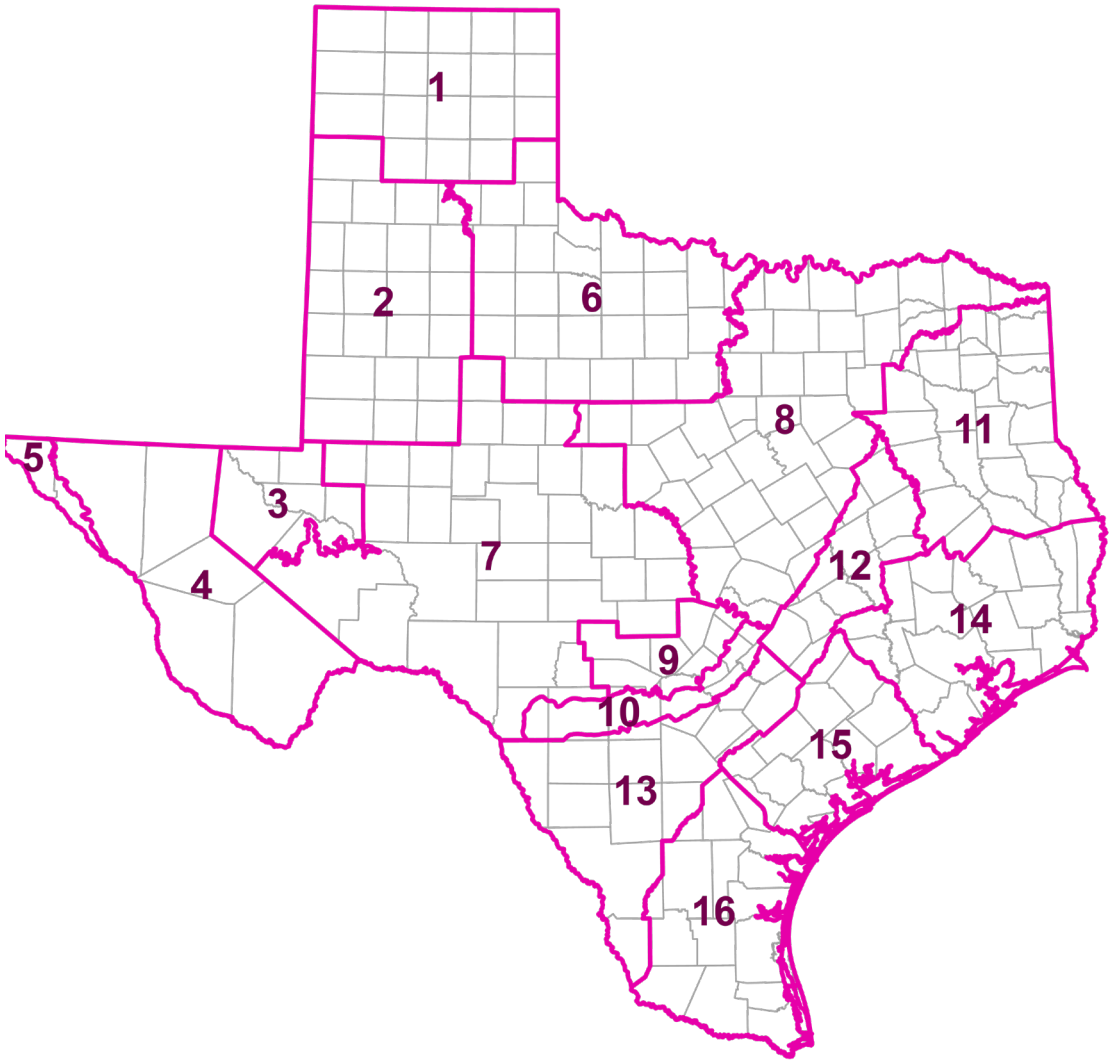
D. Site-Specific Information Provided to the TWDB

No site-specific information is available to provide to the Executive Administrator regarding the estimates required in subsections 31 TAC §356.52(a)(5)(C), (D), and (E).

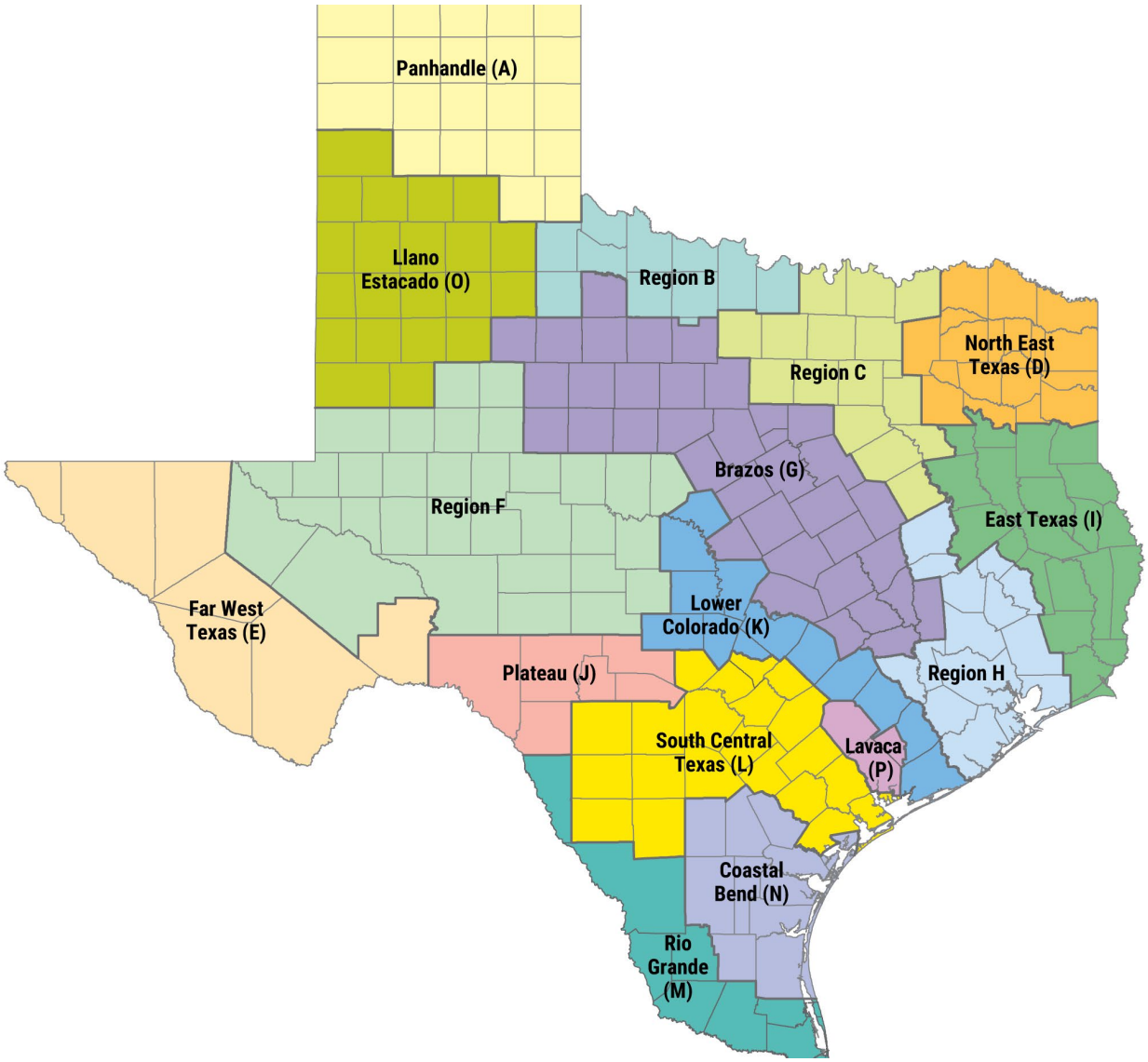
Maps



Map 1. Groundwater Conservation Districts



Map 2. Groundwater Management Areas



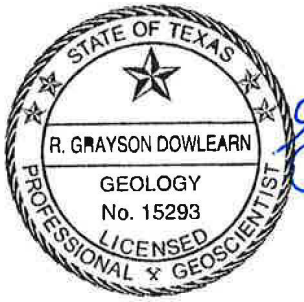
Map 3. Regional Water Planning Groups

Attachment A

GAM Run 22-008: Lost Pines GCD Groundwater Management Plan

GAM Run 22-008: Lost Pines Groundwater Conservation District Management Plan

Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
(512) 475-1552
August 12, 2022



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GAM RUN 22-008: LOST PINES GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
(512) 475-1552
August 12, 2022

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

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

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

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

The groundwater management plan for the Lost Pines Groundwater Conservation District should be adopted by the district on or before October 26, 2022 and submitted to the executive administrator of the TWDB on or before November 25, 2022. The current management plan for the Lost Pines Groundwater Conservation District expires on January 24, 2023.

Five modeled aquifers are located within Lost Pines Groundwater Conservation District, which include the following: Trinity, Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers. We used three groundwater availability models to estimate the management plan information for the aquifers within the Lost Pines Groundwater Conservation District. We used the groundwater availability models for the northern portion of the Trinity Aquifer and the Woodbine Aquifer (Kelley and others, 2014), the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Young and others, 2018 and Young and Kushnereit, 2020), and the Yegua-Jackson Aquifer (Deeds and others, 2010) to estimate the groundwater management plan information for the Lost Pines Groundwater Conservation District.

This report replaces the results of GAM Run 16-014 (Wade, 2017) because it includes results from the updated groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Young and Kushnereit, 2020). Values may also differ from the previous report as a result of routine updates to the spatial grid files used to define county, groundwater conservation district, and aquifer boundaries, which can impact the calculated water budget values. Additionally, the approach used for analyzing model results is reviewed during each update and may have been refined to better delineate groundwater flows. This report also includes a new figure not included in the previous report to help groundwater conservation districts better visualize water budget components. Tables 1 through 5 summarize the groundwater availability model data required by statute and Figures 1, 3, 5, 7, and 9 show the area of the models from which the values in Tables 1 through 5 were extracted. Figures 2, 4, 6, 8, and 10 provide generalized diagrams of the groundwater flow components provided in Tables 1 through 5. If, after review of the figures, the Lost Pines 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 models mentioned above were used to estimate information for the Lost Pines Groundwater Conservation District management

plan. Water budgets were extracted for the historical model periods for the Trinity Aquifer (1980 through 2012) and the Yegua-Jackson Aquifer (1980 through 1997) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Water budgets were extracted for the historical model periods for the Carrizo-Wilcox, Queen City, and Sparta aquifers (1980 through 2010) using ZONEBUDGET USG Version 1.00 (Panday and others, 2015). 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:

Trinity Aquifer

- We used version 2.01 of the groundwater availability model for the northern portion of the Trinity Aquifer and the Woodbine Aquifer. See Kelley and others (2014) for assumptions and limitations of the model.
- The groundwater availability model for the northern portion of the Trinity Aquifer and Woodbine Aquifer contains eight layers that generally represent the following: Layer 1 (the surficial outcrop area of the units in layers 2 through 8 and units younger than Woodbine Aquifer), Layer 2 (Woodbine Aquifer), Layer 3 (Washita and Fredericksburg Groups, and the Edwards [Balcones Fault Zone] Aquifer), and Layers 4 through 8 (Trinity Aquifer). Layers 2 through 7 also include pass-through cells. The Woodbine Aquifer does not occur within the Lost Pines Groundwater Conservation District and therefore no groundwater budget values are included for it in this report.
- Perennial rivers and reservoirs were simulated using the MODFLOW River package. Ephemeral streams, flowing wells, springs, and evapotranspiration in riparian zones along perennial rivers were simulated using the MODFLOW Drain package.
- Water budget terms were averaged for the period 1980 through 2012 (stress periods 92 through 124)
- The model was run using MODFLOW-NWT (Niswonger and others, 2011).

Carrizo-Wilcox, Queen City, and Sparta aquifers

- We used version 3.02 of the groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers. See Young and

Kushnereit (2020) and Young and others (2018) for assumptions and limitations of the model.

- The groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers contains ten layers that generally represent the following: Layer 1 (Colorado River and Brazos River alluvium), Layer 2 (shallow flow system of all units in layers 3 through 10), Layer 3 (Sparta Aquifer and equivalent units), Layer 4 (Weches Formation), Layer 5 (Queen City Aquifer and equivalent units), Layer 6 (Reklaw Formation), and Layers 7 through 10 (Carrizo-Wilcox Aquifer and equivalent units).

- The MODFLOW River package was used to simulate groundwater exchange with major rivers and perennial streams. Outflow from ephemeral streams, intermittent streams, and seeps were simulated using the MODFLOW Drain package. The evapotranspiration package was used to simulate groundwater evapotranspiration from the model.

- Water budget terms were averaged for the period 1980 through 2010 (stress periods 52 through 82).

- The model was run with MODFLOW-USG (unstructured grid; Panday and others, 2015).

Yegua-Jackson Aquifer

- We used version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model.

- This groundwater availability model includes five layers, which represent the following: Layer 1 (Yegua-Jackson Aquifer outcrop and the Catahoula Formation and other younger overlying units), Layer 2 (the upper portion of the Jackson Group), Layer 3 (the lower portion of the Jackson Group), Layer 4 (the upper portion of the Yegua Group), and Layer 5 (the lower portion of the Yegua Group).

- An overall water budget for the district was determined for the Yegua-Jackson Aquifer (Layer 1 through Layer 5, collectively, for the portions of the model that represent the Yegua-Jackson Aquifer).

- Water budget terms were averaged for the period 1980 through 1997 (stress periods 10 through 27).

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

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 Trinity, Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifer located within the Lost Pines Groundwater Conservation District and averaged over the historical calibration period, as shown in Tables 1 through 5.

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

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

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

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

The information needed for the district's management plan is summarized in Tables 1 through 5. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

TABLE 1: SUMMARIZED INFORMATION FOR THE TRINITY AQUIFER THAT IS NEEDED FOR THE LOST PINES 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	Trinity Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Trinity Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	355
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	135
Estimated net annual volume of flow between each aquifer in the district	From the Trinity Aquifer to Trinity equivalent units	242
	From the Trinity Aquifer to overlying units	2
The model assumes a no-flow boundary at the base of the Trinity Aquifer.		

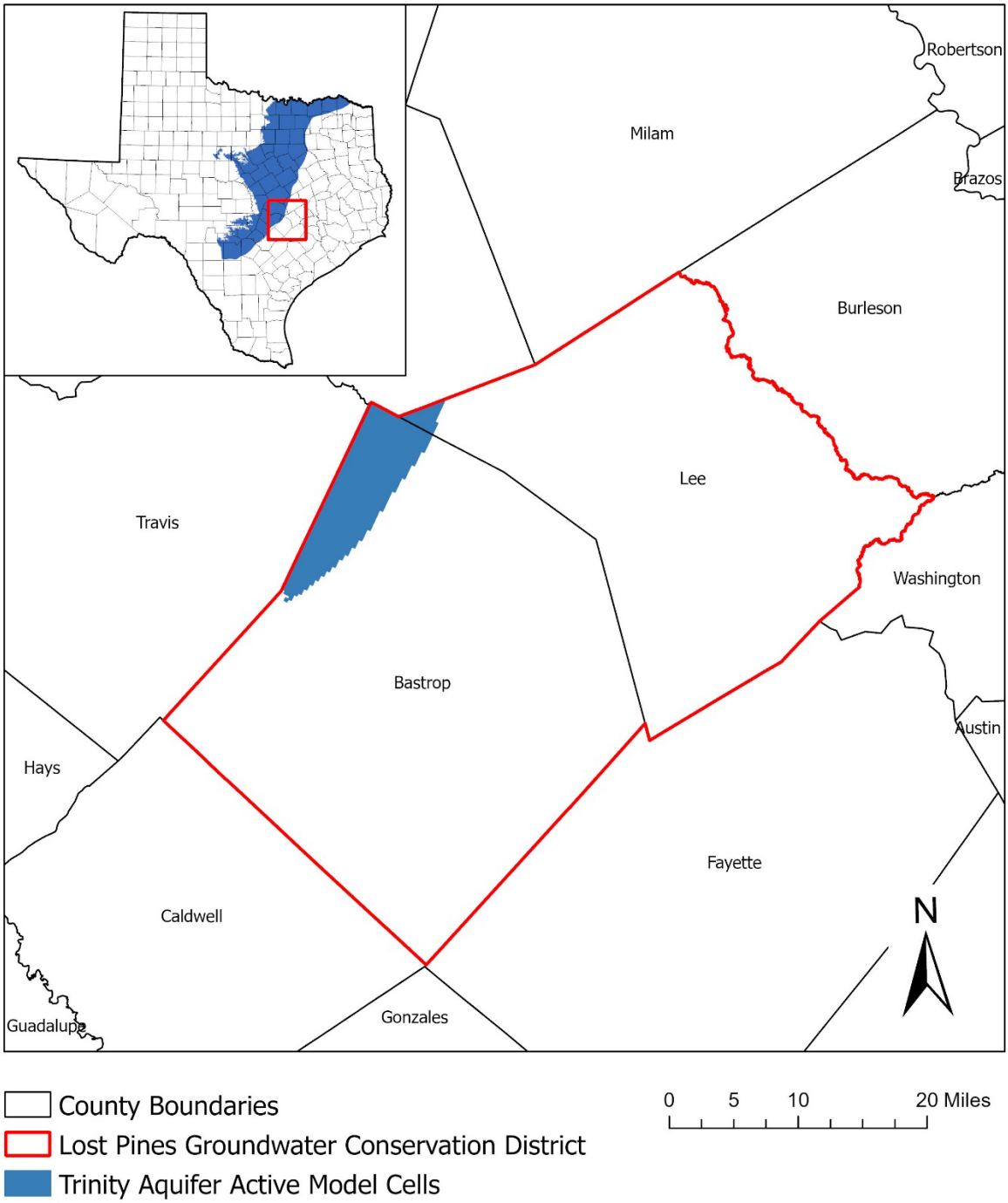
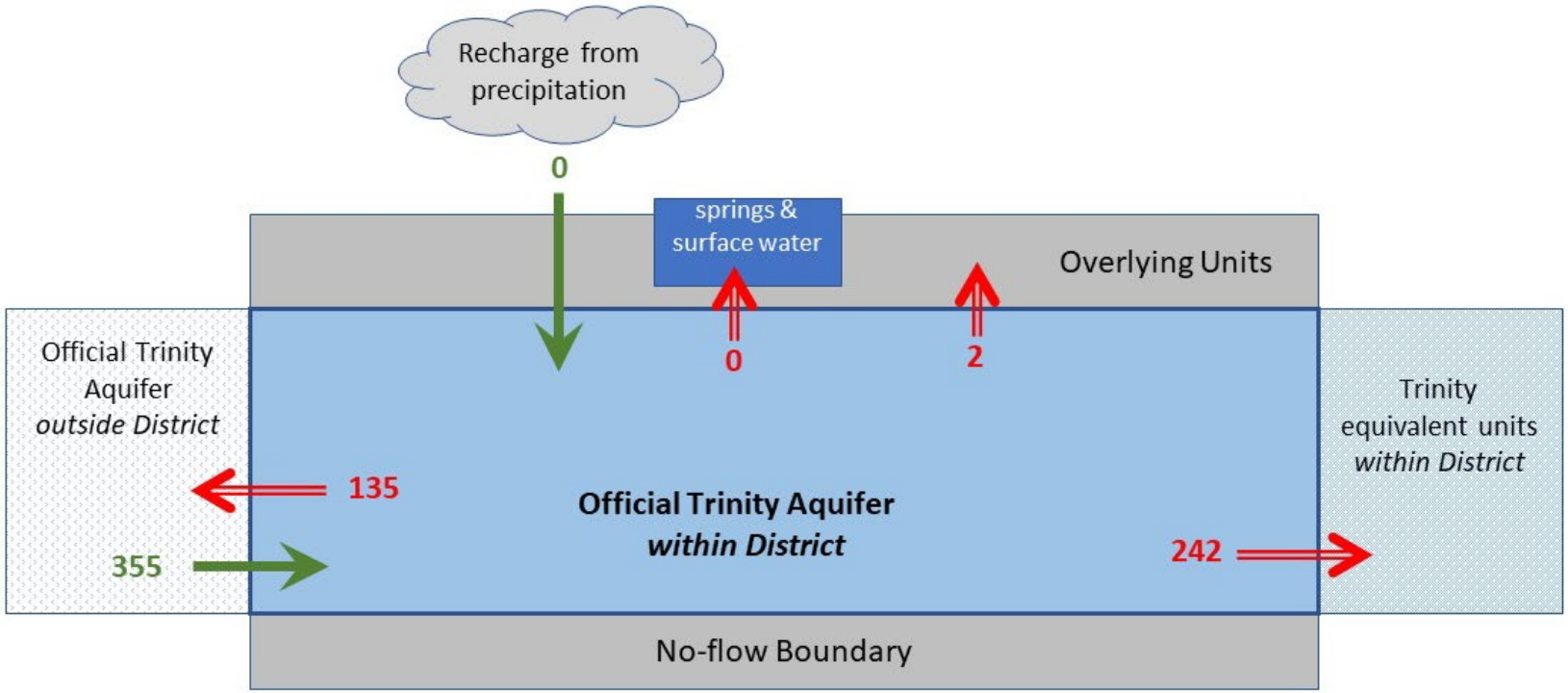


FIGURE 1: AREA OF THE NORTHERN TRINITY AND WOODBINE AQUIFER GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE TRINITY AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



Caveat: This diagram only includes the water budget items provided in Table 1. A complete water budget would include additional inflows and outflows. If the District requires values for additional water budget items, please contact TWDB.

FIGURE 2: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 1, REPRESENTING DIRECTIONS OF FLOW FOR THE TRINITY AQUIFER WITHIN LOST PINES GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR (AFY).

TABLE 2: SUMMARIZED INFORMATION FOR THE CARRIZO-WILCOX AQUIFER THAT IS NEEDED FOR THE LOST PINES 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	Carrizo-Wilcox Aquifer	42,520
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Carrizo-Wilcox Aquifer	64,202
Estimated annual volume of flow into the district within each aquifer in the district	Carrizo-Wilcox Aquifer	12,454
Estimated annual volume of flow out of the district within each aquifer in the district	Carrizo-Wilcox Aquifer	13,228
Estimated net annual volume of flow between each aquifer in the district	To the Carrizo-Wilcox Aquifer from Carrizo-Wilcox equivalent units	596
	To the Carrizo-Wilcox Aquifer from the Reklaw confining unit	452
	From the Carrizo-Wilcox Aquifer to the Queen City Aquifer	625
	From the Carrizo-Wilcox Aquifer to the Weches confining unit	331
	From the Carrizo-Wilcox Aquifer to overlying alluvium	18,490
The model assumes a no-flow boundary at the base of the Carrizo-Wilcox Aquifer.		

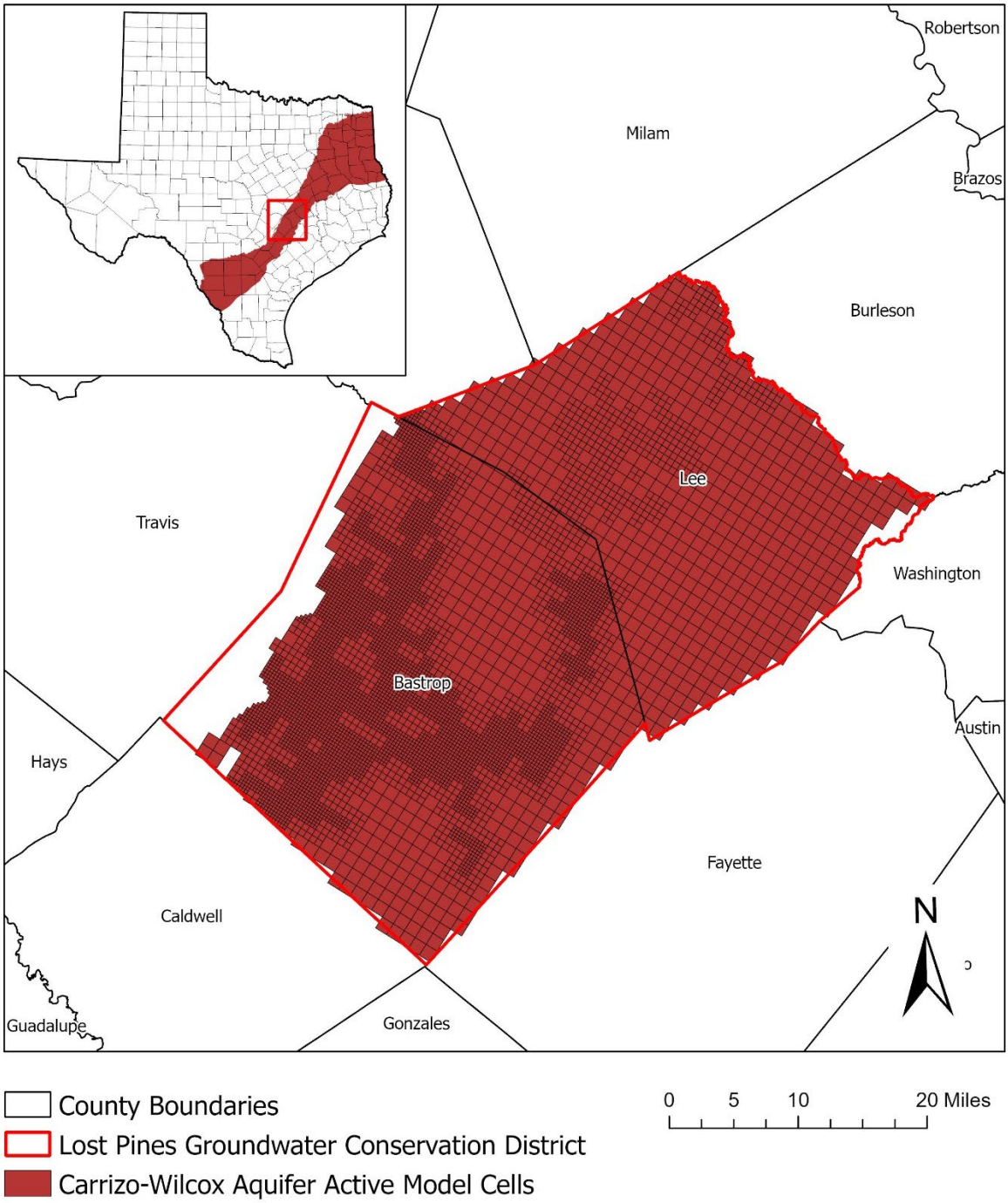
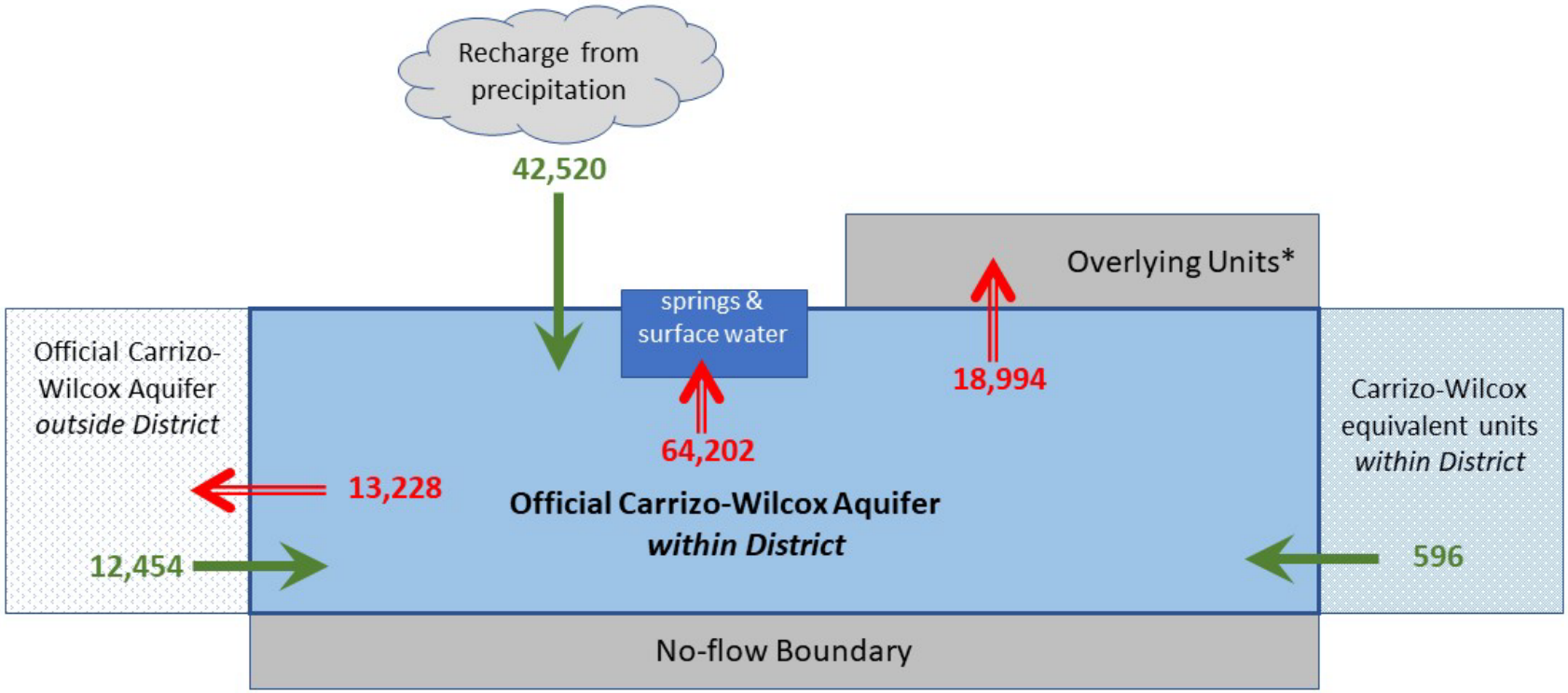


FIGURE 3: AREA OF THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE CARRIZO-WILCOX AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



* Flow to overlying units includes net inflow of 452 acre-feet per year from Reklaw confining unit, net outflow of 625 acre-feet per year to the Queen City Aquifer, net outflow of 331 acre-feet per year to the Weches confining unit, net outflow of 15,582 acre-feet per year to the Colorado River Alluvium, and net outflow of 2,908 acre-feet per year to other alluvium aquifers.

Caveat: This diagram only includes the water budget items provided in Table 2. A complete water budget would include additional inflows and outflows. If the District requires values for additional water budget items, please contact TWDB.

FIGURE 4: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 2, REPRESENTING DIRECTIONS OF FLOW FOR THE CARRIZO-WILCOX AQUIFER WITHIN LOST PINES GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR (AFY).

TABLE 3: SUMMARIZED INFORMATION FOR THE QUEEN CITY AQUIFER THAT IS NEEDED FOR THE LOST PINES 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	Queen City Aquifer	11,188
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Queen City Aquifer	7,802
Estimated annual volume of flow into the district within each aquifer in the district	Queen City Aquifer	2,371
Estimated annual volume of flow out of the district within each aquifer in the district	Queen City Aquifer	3,380
Estimated net annual volume of flow between each aquifer in the district	To the Queen City Aquifer from the Carrizo-Wilcox Aquifer	625
	From the Queen City Aquifer to the Reklaw confining unit	3,240
	From the Queen City Aquifer to Queen City equivalent units	624
	To the Queen City Aquifer from the Weches confining units	818
	From the Queen City Aquifer to the Sparta Aquifer	1,057
	From the Queen City Aquifer to overlying alluvium	1,957

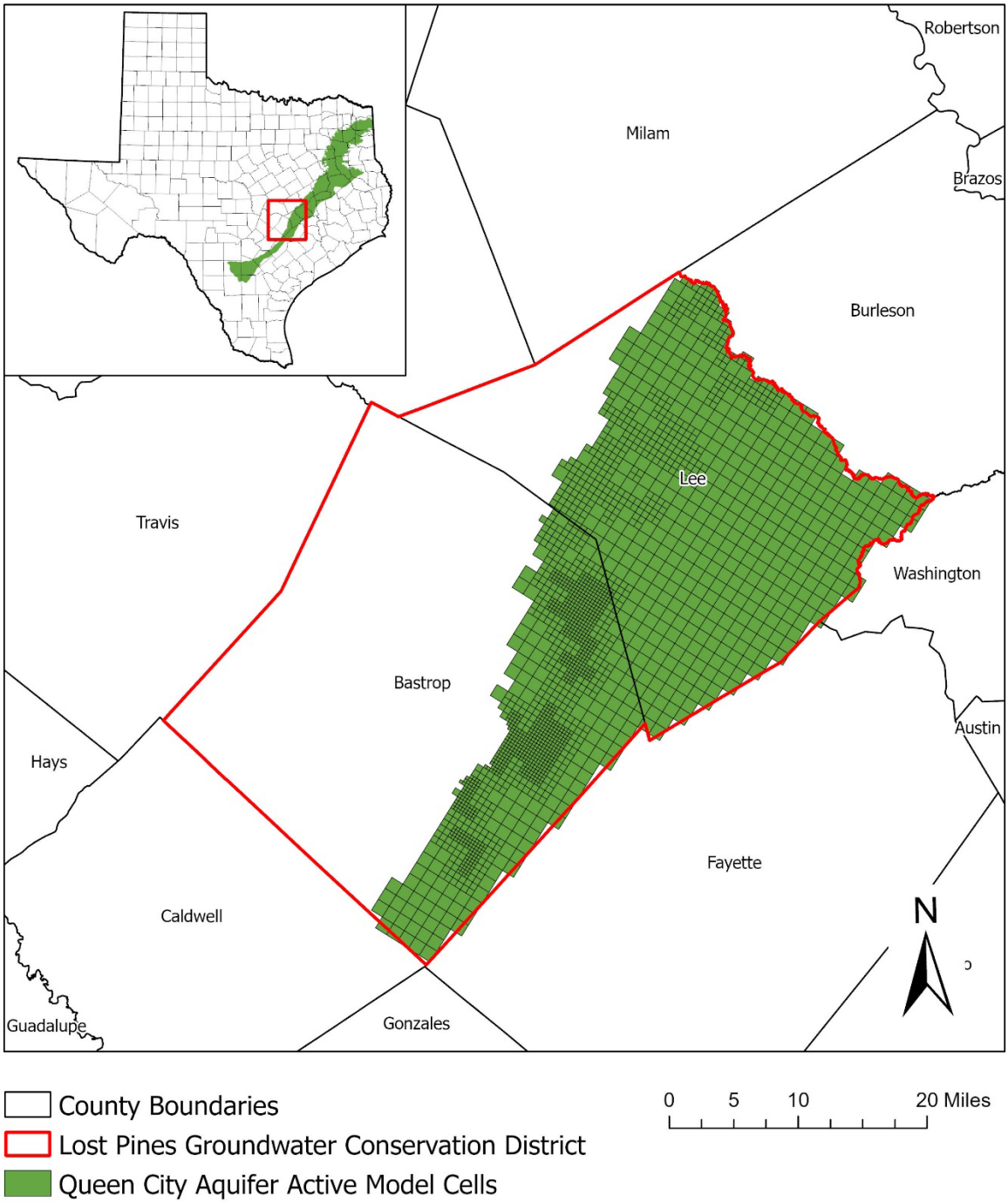
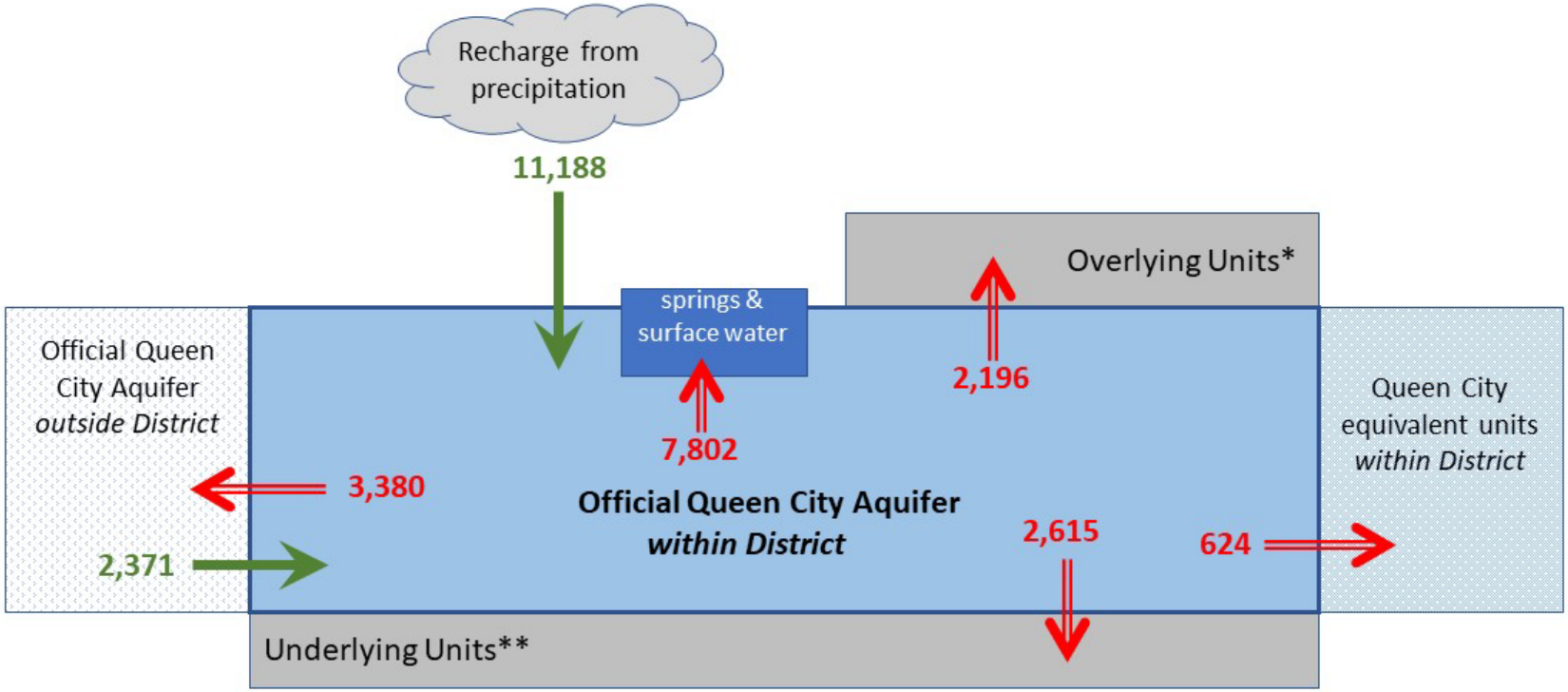


FIGURE 5: AREA OF THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 3 WAS EXTRACTED (THE QUEEN CITY AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



* Flow to overlying units includes net inflow of 818 acre-feet per year from the Weches confining unit, net outflow of 1,057 acre-feet per year to the Sparta Aquifer, and net outflow of 1,957 acre-feet per year to the Colorado River Alluvium.

** Flow to underlying units includes net inflow of 625 acre-feet per year from the Carrizo-Wilcox Aquifer and net outflow of 3,240 acre-feet per year to the Reklaw confining unit.

Caveat: This diagram only includes the water budget items provided in Table 3. A complete water budget would include additional inflows and outflows. If the District requires values for additional water budget items, please contact TWDB.

FIGURE 6: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 3, REPRESENTING DIRECTIONS OF FLOW FOR THE QUEEN CITY AQUIFER WITHIN LOST PINES GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR (AFY).

TABLE 4: SUMMARIZED INFORMATION FOR THE SPARTA AQUIFER THAT IS NEEDED FOR THE LOST PINES 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	Sparta Aquifer	8,702
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Sparta Aquifer	13,664
Estimated annual volume of flow into the district within each aquifer in the district	Sparta Aquifer	434
Estimated annual volume of flow out of the district within each aquifer in the district	Sparta Aquifer	1,975
Estimated net annual volume of flow between each aquifer in the district	To the Sparta Aquifer from the Reklaw confining unit	26
	To the Sparta Aquifer from the Queen City Aquifer	1,057
	To the Sparta Aquifer from the Weches confining unit	2,321
	To the Sparta Aquifer from Sparta equivalent units	538
	From the Sparta Aquifer to the Cook Mountain confining unit	2,555
	From the Sparta Aquifer to overlying alluvium	1,529

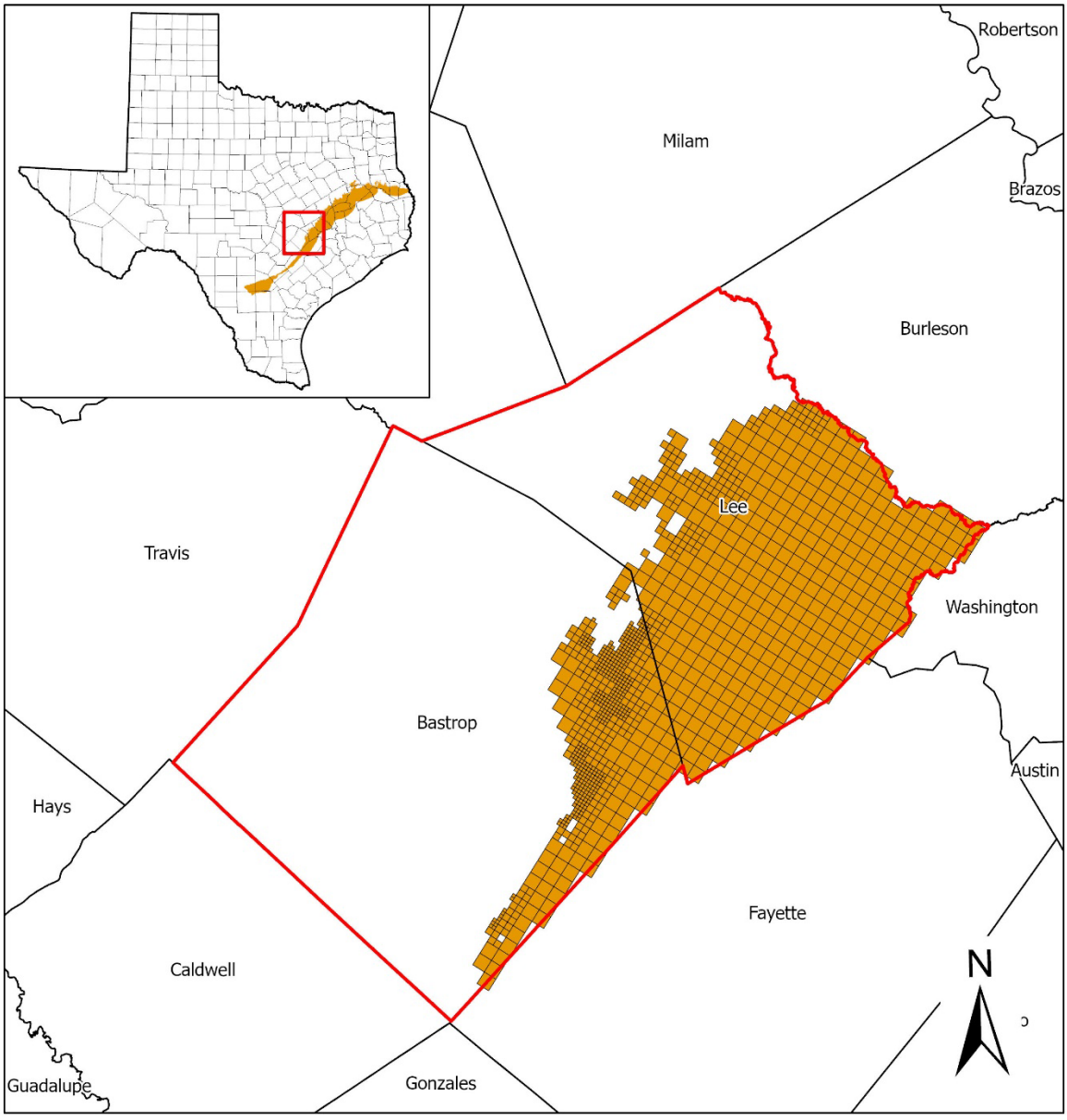
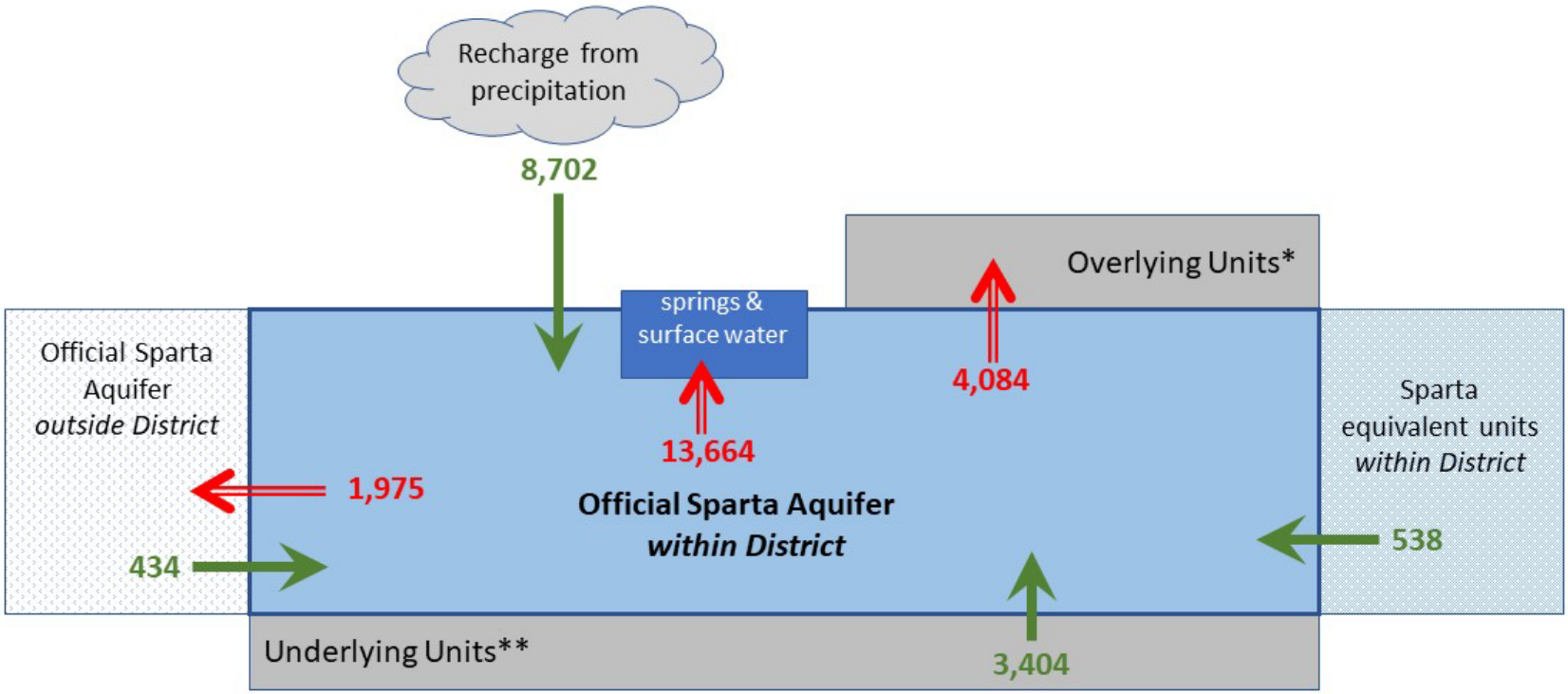


FIGURE 7: AREA OF THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 4 WAS EXTRACTED (THE SPARTA AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



* Flow to overlying units includes net outflow of 2,555 acre-feet per year from the Cook Mountain confining unit and net outflow of 1,529 acre-feet per year to the Colorado River Alluvium.

** Flow from underlying units includes net inflow of 26 acre-feet per year from the Reklaw confining unit, net inflow of 1,057 acre-feet per year from the Queen City Aquifer, and new inflow of 2,321 acre-feet per year from the Weches confining unit.

Caveat: This diagram only includes the water budget items provided in Table 4. A complete water budget would include additional inflows and outflows. If the District requires values for additional water budget items, please contact TWDB.

FIGURE 8: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 4, REPRESENTING DIRECTIONS OF FLOW FOR THE SPARTA AQUIFER WITHIN LOST PINES GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR (AFY).

TABLE 5: SUMMARIZED INFORMATION FOR THE YEGUA-JACKSON AQUIFER THAT IS NEEDED FOR THE LOST PINES 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	Yegua-Jackson Aquifer	38,860
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Yegua-Jackson Aquifer	35,781
Estimated annual volume of flow into the district within each aquifer in the district	Yegua-Jackson Aquifer	5,882
Estimated annual volume of flow out of the district within each aquifer in the district	Yegua-Jackson Aquifer	10,154
The model assumes a no-flow boundary at the base of the Yegua-Jackson Aquifer.		

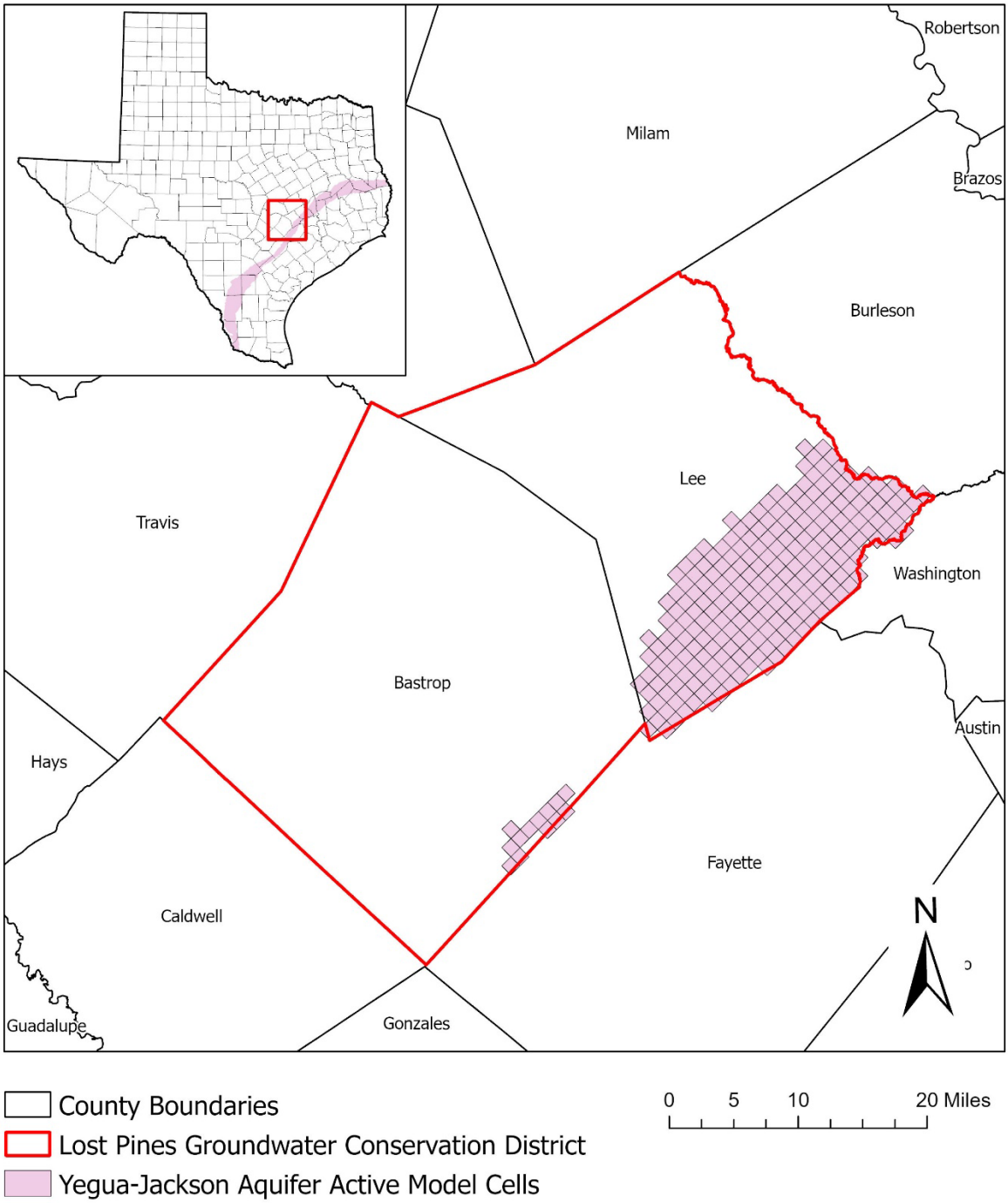
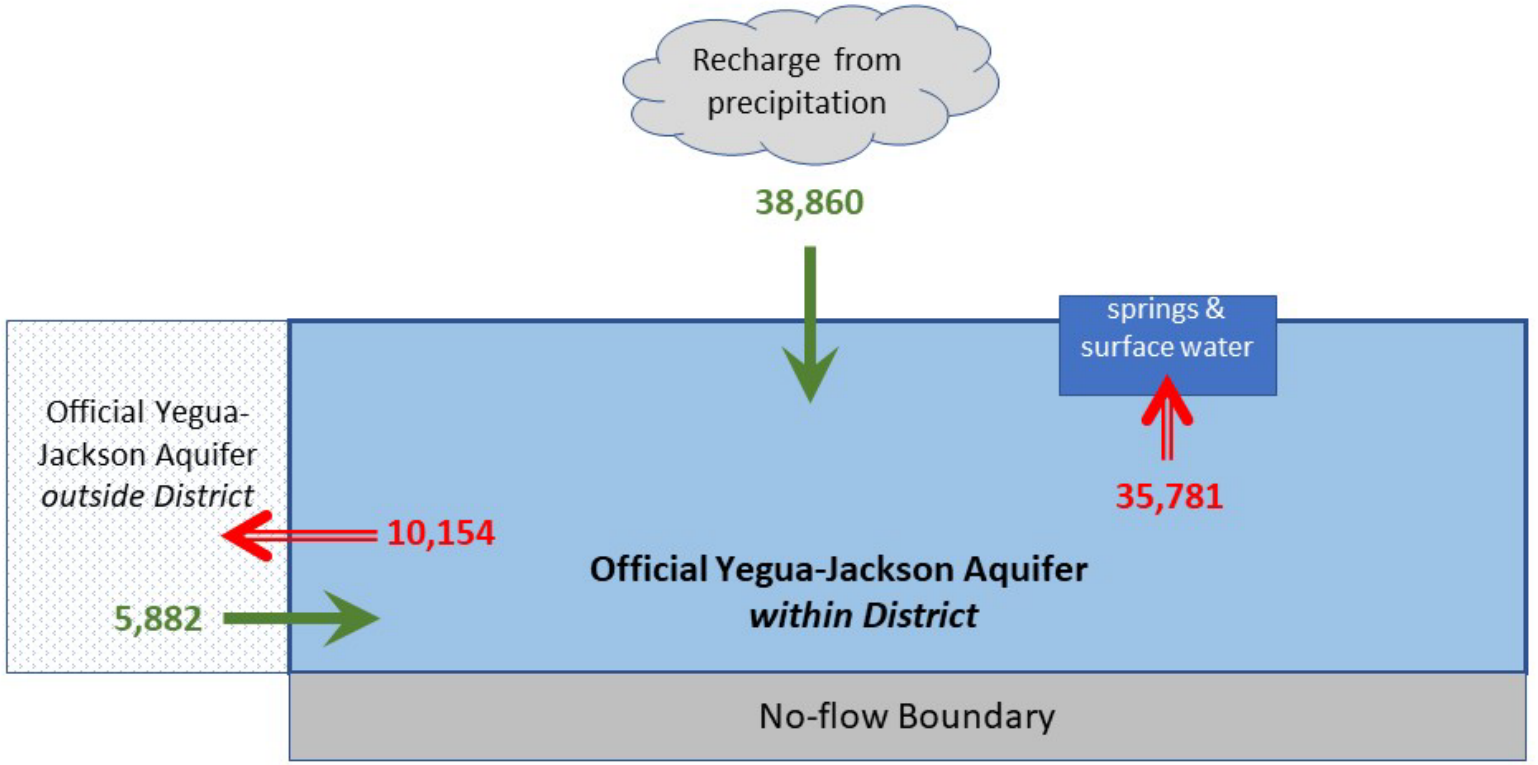


FIGURE 9: AREA OF THE YEGUA-JACKSON AQUIFER GROUNDWATER AVAILABILITY MODEL FROM WHICH THE INFORMATION IN TABLE 5 WAS EXTRACTED (THE YEGUA-JACKSON AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).



Caveat: This diagram only includes the water budget items provided in Table 5. A complete water budget would include additional inflows and outflows. If the District requires values for additional water budget items, please contact TWDB.

FIGURE 10: GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 5, REPRESENTING DIRECTIONS OF FLOW FOR THE YEGUA-JACKSON AQUIFER WITHIN LOST PINES GROUNDWATER CONSERVATION DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR (AFY).

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.

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https://www.twdb.texas.gov/groundwater/models/gam/hpas/HPAS_GAM_Conceptual_Report.pdf

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Attachment B

Estimated Historical Water Use and 2022 State Water Plan Datasets: Lost Pines Groundwater Conservation District

Estimated Historical Water Use And 2022 State Water Plan Datasets:

Lost Pines Groundwater Conservation District

Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
June 28, 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 Water 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 2022Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2022 SWP data available as of 6/28/2022. 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 in order to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

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

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

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.

BASTROP COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	12,306	350	25	5,555	6,810	278	25,324
	SW	0	0	244	1,764	256	1,112	3,376
2018	GW	11,733	245	47	5,309	5,571	278	23,183
	SW	0	0	0	1,809	0	1,112	2,921
2017	GW	11,319	167	61	5,163	5,093	269	22,072
	SW	0	0	4	1,742	0	1,077	2,823
2016	GW	10,346	71	22	3,272	2,872	215	16,798
	SW	0	0	0	2,572	0	859	3,431
2015	GW	10,466	98	44	5,519	3,204	210	19,541
	SW	0	0	0	2,245	0	842	3,087
2014	GW	9,771	93	34	3,400	2,444	206	15,948
	SW	0	0	1	3,389	0	825	4,215
2013	GW	10,611	81	44	0	2,533	192	13,461
	SW	0	2	0	5,549	531	769	6,851
2012	GW	11,010	60	45	0	2,829	215	14,159
	SW	0	22	0	6,426	952	859	8,259
2011	GW	12,129	81	0	0	3,861	260	16,331
	SW	0	23	0	7,646	1,200	1,042	9,911
2010	GW	10,473	74	2,130	0	6,299	261	19,237
	SW	0	5	48	3,491	750	1,046	5,340
2009	GW	11,256	79	2,117	0	2,915	257	16,624
	SW	0	10	48	4,535	0	1,027	5,620
2008	GW	11,075	70	2,105	0	371	267	13,888
	SW	8	12	47	7,306	0	1,065	8,438
2007	GW	9,303	66	0	0	365	232	9,966
	SW	2	30	0	2,019	0	924	2,975
2006	GW	11,021	66	0	0	596	325	12,008
	SW	3	8	0	6,841	0	1,300	1,625
2005	GW	10,071	30	0	0	627	325	11,053
	SW	11	31	0	3,514	0	1,300	4,856
2004	GW	8,741	36	0	0	539	441	9,757
	SW	1	29	0	2,229	0	1,242	3,501

LEE COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	2,456	9	741	0	1,142	411	4,759
	SW	0	0	24	0	0	957	981
2018	GW	2,312	7	1,392	0	674	411	4,796
	SW	0	0	92	0	0	957	1,049
2017	GW	2,266	8	699	0	692	396	4,061
	SW	0	0	24	0	0	923	947
2016	GW	2,168	6	571	0	519	326	3,590
	SW	0	0	2	0	0	760	762
2015	GW	2,316	7	904	0	519	321	4,067
	SW	0	0	26	0	0	750	776
2014	GW	2,327	6	439	0	802	316	3,890
	SW	0	0	35	0	2	736	773
2013	GW	2,538	6	6,081	0	837	305	9,767
	SW	0	0	10	0	0	713	723
2012	GW	2,503	6	5,674	0	1,017	356	9,556
	SW	0	0	2	0	0	833	835
2011	GW	2,886	7	5,478	0	1,609	422	10,402
	SW	0	0	0	0	0	983	983
2010	GW	2,328	6	6,966	0	1,575	425	11,300
	SW	0	0	0	0	0	993	993
2009	GW	2,371	6	6,895	0	966	464	10,702
	SW	0	0	0	0	0	1,084	1,084
2008	GW	2,305	7	6,705	0	319	439	9,775
	SW	0	0	0	0	0	1,025	1,025
2007	GW	1,996	11	0	0	116	704	2,827
	SW	1	0	0	0	56	1,643	1,700
2006	GW	2,436	15	0	0	426	628	3,505
	SW	1	0	0	0	0	1,465	2,093
2005	GW	2,494	13	0	0	470	667	3,644
	SW	2	0	0	0	0	1,556	1,558
2004	GW	2,307	13	0	0	579	481	3,380
	SW	0	0	0	0	3	1,172	1,175

Projected Surface Water Supplies
TWDB 2022 State Water Plan Data

BASTROP COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
K	County-Other, Bastrop	Colorado	Highland Lakes Lake/Reservoir System	744	744	744	744	744	744
K	Irrigation, Bastrop	Colorado	Highland Lakes Lake/Reservoir System	850	850	850	850	850	850
K	Livestock, Bastrop	Brazos	Brazos Livestock Local Supply	94	94	94	94	94	94
K	Livestock, Bastrop	Colorado	Colorado Livestock Local Supply	696	696	696	696	696	696
K	Livestock, Bastrop	Guadalupe	Guadalupe Livestock Local Supply	72	72	72	72	72	72
K	Mining, Bastrop	Colorado	Colorado Other Local Supply	8	7	7	9	9	9
K	Steam-Electric Power, Bastrop	Colorado	Highland Lakes Lake/Reservoir System	7,679	6,766	6,266	5,132	5,452	5,561
	Sum of Projected Surface Water Supplies (acre-feet)			**10,143**	**9,229**	**8,729**	**7,597**	**7,917**	**8,026**

LEE COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
G	Irrigation, Lee	Brazos	Brazos Run-of-River	1	1	1	1	1	1
G	Livestock, Lee	Brazos	Brazos Livestock Local Supply	1,020	1,020	1,020	1,020	1,020	1,020
G	Livestock, Lee	Colorado	Brazos Livestock Local Supply	196	196	196	196	196	196
	Sum of Projected Surface Water Supplies (acre-feet)			**1,217**	**1,217**	**1,217**	**1,217**	**1,217**	**1,217**

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.

BASTROP COUNTY

All values are in acre-feet

WUG	RWPG	WUG Basin	2020	2030	2040	2050	2060	2070
K	Aqua WSC	Brazos	90	116	150	197	262	347
K	Aqua WSC	Colorado	9,072	11,636	15,054	19,775	26,231	34,832
K	Aqua WSC	Guadalupe	64	82	106	140	185	246
K	Bastrop	Colorado	2,046	2,709	3,590	4,803	6,458	8,660
K	Bastrop County WCID 2	Colorado	479	690	971	1,357	1,882	2,580
K	County-Other, Bastrop	Brazos	9	10	11	14	17	21
K	County-Other, Bastrop	Colorado	1,375	1,567	1,828	2,187	2,677	3,333
K	County-Other, Bastrop	Guadalupe	34	39	45	54	67	83
K	Creedmoor-Maha WSC	Colorado	2	3	3	3	4	4
K	Elgin	Colorado	1,317	1,674	2,155	2,822	3,734	4,950
K	Irrigation, Bastrop	Brazos	257	257	257	257	257	257
K	Irrigation, Bastrop	Colorado	3,808	3,808	3,808	3,808	3,808	3,808
K	Irrigation, Bastrop	Guadalupe	215	215	215	215	215	215
K	Lee County WSC	Brazos	54	68	88	115	153	203
K	Lee County WSC	Colorado	73	93	120	157	208	276
K	Livestock, Bastrop	Brazos	70	70	70	70	70	70
K	Livestock, Bastrop	Colorado	1,011	1,011	1,011	1,011	1,011	1,011
K	Livestock, Bastrop	Guadalupe	54	54	54	54	54	54
K	Manufacturing, Bastrop	Colorado	188	215	215	215	215	215
K	Mining, Bastrop	Brazos	173	409	450	360	24	29
K	Mining, Bastrop	Colorado	2,567	6,064	6,674	5,339	355	423
K	Mining, Bastrop	Guadalupe	144	340	374	299	20	24
K	Polonia WSC	Colorado	29	36	45	58	76	100
K	Smithville	Colorado	821	1,048	1,351	1,774	2,353	3,125
K	Steam-Electric Power, Bastrop	Colorado	10,288	10,288	10,288	10,288	10,288	10,288
	Sum of Projected Water Demands (acre-feet)		**34,240**	**42,502**	**48,933**	**55,372**	**60,624**	**75,154**

LEE COUNTY

All values are in acre-feet

WUG	RWPG	WUG Basin	2020	2030	2040	2050	2060	2070
G	Aqua WSC	Brazos	465	510	535	543	550	554
G	County-Other, Lee	Brazos	97	103	108	111	112	113
G	County-Other, Lee	Colorado	36	39	41	41	42	42
G	Giddings	Brazos	560	615	644	653	662	666

G	Giddings	Colorado	594	653	684	694	702	708
G	Irrigation, Lee	Brazos	1,145	1,145	1,145	1,145	1,145	1,145
G	Irrigation, Lee	Colorado	23	23	23	23	23	23
G	Lee County WSC	Brazos	646	704	736	745	753	759
G	Lee County WSC	Colorado	313	342	357	361	366	368
G	Lexington	Brazos	244	268	280	284	288	290
G	Livestock, Lee	Brazos	1,020	1,020	1,020	1,020	1,020	1,020
G	Livestock, Lee	Colorado	196	196	196	196	196	196
G	Manufacturing, Lee	Colorado	7	8	8	8	8	8
G	Mining, Lee	Brazos	2,480	2,480	0	0	0	0
G	Mining, Lee	Colorado	700	700	0	0	0	0
G	Southwest Milam WSC	Brazos	47	51	53	54	55	55
	Sum of Projected Water Demands (acre-feet)		**8,573**	**8,857**	**5,830**	**5,878**	**5,922**	**5,947**

Projected Water Supply Needs
TWDB 2022 State Water Plan Data

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

BASTROP COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	Aqua WSC	Brazos	0	0	0	0	0	0
K	Aqua WSC	Colorado	-224	-2,788	-5,698	-9,228	-16,703	-26,087
K	Aqua WSC	Guadalupe	0	0	0	0	0	0
K	Bastrop	Colorado	712	49	-832	-2,045	-3,700	-5,902
K	Bastrop County WCID 2	Colorado	759	636	416	141	-442	-1,178
K	County-Other, Bastrop	Brazos	12	11	10	7	4	0
K	County-Other, Bastrop	Colorado	0	0	0	0	0	0
K	County-Other, Bastrop	Guadalupe	0	0	0	0	0	0
K	Creedmoor-Maha WSC	Colorado	143	142	142	142	141	141
K	Elgin	Colorado	0	0	0	-534	-1,545	-2,853
K	Irrigation, Bastrop	Brazos	7	5	4	2	0	0
K	Irrigation, Bastrop	Colorado	74	69	47	24	0	0
K	Irrigation, Bastrop	Guadalupe	0	5	10	17	24	24
K	Lee County WSC	Brazos	132	141	164	197	234	274
K	Lee County WSC	Colorado	177	194	224	268	318	372
K	Livestock, Bastrop	Brazos	24	24	24	24	24	24
K	Livestock, Bastrop	Colorado	0	0	0	0	0	0
K	Livestock, Bastrop	Guadalupe	18	18	18	18	18	18
K	Manufacturing, Bastrop	Colorado	27	0	0	0	0	0
K	Mining, Bastrop	Brazos	277	41	0	90	5	0
K	Mining, Bastrop	Colorado	-449	-3,947	-4,557	-3,220	1,764	1,696
K	Mining, Bastrop	Guadalupe	-2	-243	-308	-233	44	24
K	Polonia WSC	Colorado	52	48	46	44	42	38
K	Smithville	Colorado	643	584	398	187	-503	-1,348
K	Steam-Electric Power, Bastrop	Colorado	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-675**	**-6,978**	**-11,395**	**-15,260**	**-22,893**	**-37,368**

LEE COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	Aqua WSC	Brazos	0	0	0	0	0	0
G	County-Other, Lee	Brazos	17	10	5	3	1	1
G	County-Other, Lee	Colorado	6	4	2	1	1	0
G	Giddings	Brazos	280	224	194	184	176	170
G	Giddings	Colorado	296	237	206	196	186	181

G	Irrigation, Lee	Brazos	190	194	197	202	207	207
G	Irrigation, Lee	Colorado	0	0	0	0	0	0
G	Lee County WSC	Brazos	1,563	1,464	1,370	1,272	1,153	1,021
G	Lee County WSC	Colorado	758	711	665	615	560	496
G	Lexington	Brazos	423	399	387	383	379	377
G	Livestock, Lee	Brazos	0	0	0	0	0	0
G	Livestock, Lee	Colorado	0	0	0	0	0	0
G	Manufacturing, Lee	Colorado	6	6	7	8	9	10
G	Mining, Lee	Brazos	-215	-132	2,429	2,512	2,592	2,592
G	Mining, Lee	Colorado	-60	-37	686	709	732	732
G	Southwest Milam WSC	Brazos	5	-7	-13	-13	-11	-12
	Sum of Projected Water Supply Needs (acre-feet)		**-275**	**-176**	**-13**	**-13**	**-11**	**-12**

Projected Water Management Strategies
TWDB 2022 State Water Plan Data

BASTROP COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Aqua WSC, Brazos (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	17	23	30	39	52	69
Municipal Conservation - Aqua WSC	DEMAND REDUCTION [Bastrop]	4	2	1	0	0	0
Municipal Water Conservation	DEMAND REDUCTION [Bastrop]	0	0	0	0	0	1
		21	**25**	**31**	**39**	**52**	**70**
Aqua WSC, Colorado (K)							
Downstream Return Flows	Indirect Reuse [Travis]	0	0	0	0	0	1,200
Drought Management	DEMAND REDUCTION [Bastrop]	1,733	2,278	3,058	3,949	5,246	6,966
Expansion of Current Groundwater Supplies - Carrizo-Wilcox Aquifer	Carrizo-Wilcox Aquifer [Bastrop]	0	300	350	550	800	800
LCRA - Import Return Flows from Williamson County	Brazos Run-of-River [Williamson]	0	0	2,500	6,000	12,000	18,800
Municipal Conservation - Aqua WSC	DEMAND REDUCTION [Bastrop]	408	244	116	33	0	0
Municipal Water Conservation	DEMAND REDUCTION [Bastrop]	7	12	18	28	42	59
		2,148	**2,834**	**6,042**	**10,560**	**18,088**	**27,825**
Aqua WSC, Guadalupe (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	12	16	21	28	37	49
Municipal Conservation - Aqua WSC	DEMAND REDUCTION [Bastrop]	3	2	1	0	0	0
		15	**18**	**22**	**28**	**37**	**49**
Bastrop, Colorado (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	372	471	631	849	1,143	1,534
LCRA - Import Return Flows from Williamson County	Brazos Run-of-River [Williamson]	0	0	0	1,000	2,500	4,000
Municipal Conservation - Bastrop	DEMAND REDUCTION [Bastrop]	184	355	433	558	744	992
		556	**826**	**1,064**	**2,407**	**4,387**	**6,526**
Bastrop County WCID 2, Colorado (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	24	35	49	68	94	129
LCRA - Import Return Flows from Williamson County	Brazos Run-of-River [Williamson]	0	0	0	0	500	1,500
Municipal Conservation - Bastrop County WCID 2	DEMAND REDUCTION [Bastrop]	0	0	0	0	93	125

		24	**35**	**49**	**68**	**687**	**1,754**
County-Other, Bastrop, Brazos (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	2	2	2	2	3	4
Municipal Conservation - Bastrop County-Other	DEMAND REDUCTION [Bastrop]	1	1	1	2	2	2
		3	**3**	**3**	**4**	**5**	**6**
County-Other, Bastrop, Colorado (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	250	274	322	386	474	591
Municipal Conservation - Bastrop County-Other	DEMAND REDUCTION [Bastrop]	124	198	219	255	307	381
		374	**472**	**541**	**641**	**781**	**972**
County-Other, Bastrop, Guadalupe (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	6	7	8	10	12	15
Municipal Conservation - Bastrop County-Other	DEMAND REDUCTION [Bastrop]	3	5	5	6	8	9
		9	**12**	**13**	**16**	**20**	**24**
Elgin, Colorado (K)							
Development of New Groundwater Supplies - Trinity Aquifer	Trinity Aquifer [Travis]	0	0	0	0	1,000	1,825
Drought Management	DEMAND REDUCTION [Bastrop]	213	213	197	158	210	279
Expansion of Current Groundwater Supplies - Carrizo-Wilcox Aquifer	Carrizo-Wilcox Aquifer [Bastrop]	0	0	0	0	50	50
Municipal Conservation - Elgin	DEMAND REDUCTION [Bastrop]	66	119	224	405	531	700
		279	**332**	**421**	**563**	**1,791**	**2,854**
Lee County WSC, Brazos (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	7	8	9	11	15	19
		7	**8**	**9**	**11**	**15**	**19**
Lee County WSC, Colorado (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	10	11	13	15	20	26
		10	**11**	**13**	**15**	**20**	**26**
Mining, Bastrop, Guadalupe (K)							
Mining Conservation - Bastrop County	DEMAND REDUCTION [Bastrop]	2	243	308	233	0	0
		2	**243**	**308**	**233**	**0**	**0**
Polonia WSC, Colorado (K)							
Drought Management	DEMAND REDUCTION [Bastrop]	3	4	4	5	6	8
		3	**4**	**4**	**5**	**6**	**8**
Smithville, Colorado (K)							
Development of New Groundwater Supplies - Yegua-Jackson Aquifer	Yegua-Jackson Aquifer [Fayette]	0	700	700	700	700	700
Drought Management	DEMAND REDUCTION [Bastrop]	150	198	259	343	456	606

LCRA - Import Return Flows from Williamson County	Brazos Run-of-River [Williamson]	0	0	0	0	0	700
Municipal Conservation - Smithville	DEMAND REDUCTION [Bastrop]	69	59	54	59	75	97
		219	**957**	**1,013**	**1,102**	**1,231**	**2,103**
Steam-Electric Power, Bastrop, Colorado (K)							
LCRA - Enhanced Municipal and Industrial Conservation	DEMAND REDUCTION [Bastrop]	55	64	73	82	82	82
		55	**64**	**73**	**82**	**82**	**82**
Sum of Projected Water Management Strategies (acre-feet)		**3,725**	**5,844**	**9,606**	**15,774**	**27,202**	**42,318**

LEE COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Aqua WSC, Brazos (G)							
Municipal Water Conservation	DEMAND REDUCTION [Lee]	0	1	1	1	1	1
Municipal Water Conservation - Aqua WSC	DEMAND REDUCTION [Lee]	0	11	4	0	0	0
		0	**12**	**5**	**1**	**1**	**1**
Giddings, Brazos (G)							
Municipal Water Conservation - Giddings	DEMAND REDUCTION [Lee]	0	46	97	115	116	116
		0	**46**	**97**	**115**	**116**	**116**
Giddings, Colorado (G)							
Municipal Water Conservation - Giddings	DEMAND REDUCTION [Lee]	0	49	102	122	122	124
		0	**49**	**102**	**122**	**122**	**124**
Lexington, Brazos (G)							
Municipal Water Conservation - Lexington	DEMAND REDUCTION [Lee]	0	20	23	21	21	21
		0	**20**	**23**	**21**	**21**	**21**
Mining, Lee, Brazos (G)							
Carrizo Aquifer Development - Lee County Mining	Carrizo-Wilcox Aquifer [Lee]	140	8	0	0	0	0
Industrial Water Conservation	DEMAND REDUCTION [Lee]	74	124	0	0	0	0
		214	**132**	**0**	**0**	**0**	**0**
Mining, Lee, Colorado (G)							
Carrizo Aquifer Development - Lee County Mining	Carrizo-Wilcox Aquifer [Lee]	40	2	0	0	0	0
Industrial Water Conservation	DEMAND REDUCTION [Lee]	21	35	0	0	0	0
		61	**37**	**0**	**0**	**0**	**0**
Southwest Milam WSC, Brazos (G)							
Carrizo Aquifer Development - Southwest Milam WSC	Carrizo-Wilcox Aquifer [Lee]	0	7	13	13	11	12
		0	**7**	**13**	**13**	**11**	**12**

Sum of Projected Water Management Strategies (acre-feet)	**275**	**303**	**240**	**272**	**271**	**274**

Appendix A

Copy of GMA 12 Resolution and Submittal Adopting DFCs

RESOLUTION TO ADOPT DESIRED FUTURE CONDITIONS FOR AQUIFERS IN GROUNDWATER MANAGEMENT AREA 12

THE STATE OF TEXAS §
§
GROUNDWATER MANAGEMENT AREA 12 §
§
GROUNDWATER CONSERVATION DISTRICTS §

WHEREAS, Texas Water Code § 36.108 requires the groundwater conservation districts located in whole or in part in a groundwater management area ("GMA") designated by the Texas Water Development Board to adopt desired future conditions for the relevant aquifers located within the management area;

WHEREAS, the groundwater conservation districts located wholly or partially within Groundwater Management Area 12 ("GMA 12"), as designated by the Texas Water Development Board, as of the date of this resolution are as follows: Brazos Valley Groundwater Conservation District, Fayette County Groundwater Conservation District, Lost Pines Groundwater Conservation District, Mid-East Texas Groundwater Conservation District, and Post Oak Savannah Groundwater Conservation District (collectively hereinafter "the GMA 12 Districts");

WHEREAS, the GMA 12 Districts are each a local government operating under Chapter 36, Texas Water Code and their specific enabling act;

WHEREAS, the GMA 12 Districts desire to fulfill the requirements of Texas Water Code §36.108 through mutual cooperation and joint planning efforts;

WHEREAS, Section 36.108(d-3) of the Texas Water Code requires the GMA 12 Districts to approve a resolution adopted by a two-thirds (2/3) vote of all the district representatives not later than January 5, 2022, and every five years thereafter;

WHEREAS, the GMA 12 Districts have had numerous public meetings, including stakeholder meetings for the specific purpose of receiving comments and input from stakeholders within GMA 12, and they have engaged in joint planning efforts to promote comprehensive management of the aquifers located in whole or in part in Groundwater Management Area 12;

WHEREAS, the representatives of the GMA 12 Districts held meetings on May 11, 2018; October 9, 2018; January 29, 2019; May 30, 2019; August 2, 2019; September 24, 2019; November 15, 2019; January 29, 2020; July 24, 2020; September 18, 2020; October 22, 2020; December 10, 2020; January 15, 2021; February 12, 2021; March 18, 2021; April 20, 2021; June 24, 2021; October 6, 2021; October 13, 2021; November 12, 2021, and November 30, 2021 in order to comply with their statutory duty to publicly consider the factors and criteria required for proposing Desired Future Conditions for adoption under § 36.108 of the Texas Water Code;

WHEREAS, each of the GMA 12 Districts secured hydrogeologic and engineering consulting services to provide technical support in their efforts to establish requisite DFCs;

WHEREAS, information was presented for consideration to the GMA 12 Districts concerning the following factors, listed in §36.108(d), including:

(1) groundwater availability models and other data or information for the management area;

(2) aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another;
(3) the water supply needs and water management strategies included in the state water plan;
(4) hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the Texas Water Development Board Executive Administrator and the average annual recharge inflows, and discharge;
(5) other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water;
(6) the impact of subsidence;
(7) socioeconomic impacts reasonably expected to occur;
(8) the impact on the interests and rights in private property, including ownership and the rights of management area landowners and their lessees and assigns in groundwater as recognized under Texas Water Code §36.002;
(9) the feasibility of achieving the desired future conditions; and
(10) any other information relevant to the specific desired future conditions, including comments received from the Texas Water Development Board regarding the initially submitted desired future conditions;

WHEREAS, pursuant to Section 36.108(d-2) of the Texas Water Code, the GMA 12 Districts also considered the balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharging, and prevention of waste of groundwater and control of subsidence in the management area;

WHEREAS, after consideration of multiple GAM simulations and other data and information relevant to the development of DFCs as required by Section 36.108 of the Texas Water Code, the representatives of GMA 12 Districts voted to approve proposed DFCs for the relevant aquifers in GMA 12 on March 18, 2021, at a publicly held meeting;

WHEREAS, the proposed DFCs approved by the representatives of GMA 12 Districts were distributed by mail to each GMA 12 District, initiating a 90-day public comment period by which each GMA 12 District held a public hearing on the proposed DFCs relevant to that district pursuant to section 36.108(d-2) of the Texas Water Code;

WHEREAS, each GMA 12 District compiled a written summary report inclusive of relevant comments received during the comment period on the proposed DFCs, any suggested revisions to the proposed DFCs, and the basis for any such revisions;

WHEREAS, the GMA 12 Districts' summary reports were submitted for review and consideration by GMA 12 district representatives at the November 12, 2021 meeting in accordance with Section 36.108, Texas Water Code;

WHEREAS, after considering the factors listed in 36.108(d), Texas Water Code, the GMA 12 Districts may establish different desired future conditions for: (1) each aquifer, subdivision of an aquifer, or geologic strata located in whole or in part within the boundaries of GMA 12; or (2) each geographic area overlying an aquifer in whole or in part or subdivision of an aquifer within the boundaries of GMA 12;

WHEREAS, the GMA 12 Districts recognize that GMA 12 includes a geographically and hydrologically diverse area with a variety of land uses and a diverse mix of water users;

WHEREAS, in accordance with Section 36.108, Texas Water Code, at least two-thirds of the GMA 12 Districts had a voting representative in attendance at the reconvened November 12, 2021 meeting; Brazos Valley Groundwater Conservation District, Fayette County Groundwater Conservation District, Lost Pines Groundwater Conservation District, Mid-East Texas Groundwater Conservation District, and Post Oak Savannah Groundwater Conservation District were in attendance to review the reports and consider any district-suggested revisions to the proposed desired future conditions and

WHEREAS, on November 30, 2021, at an open meeting duly noticed and held in accordance with law at the Post Oak Savannah Groundwater Conservation District's office located at 310 East Avenue C, Milano, Texas, all GCDs within GMA 12, having had a chance to consider this Resolution at this meeting as well as comments submitted to the individual districts during the comment period have voted on the DFCs for in the counties and districts according to the tables in Attachment A.

NOW, THEREFORE, BE IT RESOLVED BY THE AUTHORIZED VOTING REPRESENTATIVES OF THE GMA 12 DISTRICTS AS FOLLOWS:

1. Each of the above affirmations and recitals set forth herein are true and correct and fully incorporated into this resolution.

2. The authorized voting representatives of the GMA 12 Districts hereby establish the Desired Future Conditions of the aquifer(s) as set forth in Attachment B by the vote reflected in the Minutes attached hereto as Attachment D, summarized as follows:

GCD	Aquifer: Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro and Hooper	Aquifer: Yegua-Jackson	Aquifer: Brazos River Alluvium
Brazos Valley GCD	Y	Y	Y
Fayette County GCD	Y	Y	Y
Lost Pines GCD	N	Y	Y
Mid-East Texas GCD	Y	Y	Y
Post Oak Savannah GCD	Y with objection as to process	Y with objection as to process	Y with objection as to process

3. The authorized voting representatives of the GMA 12 Districts declare that the following aquifers are non-relevant for the purpose of adopting Desired Future Conditions in Groundwater Management Area 12, as the districts determined that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition for the: the Gulf Coast Aquifer in Brazos County; the Trinity Aquifer in Bastrop, Lee, and Williamson counties; the Yegua-Jackson Aquifer in Bastrop and Lee counties; and the Wilcox portion of the Carrizo-Wilcox Aquifer in Fayette County. Technical justifications of the non-relevant aquifers, as required by 31 Tex. Admin. Code §356.31, is set forth in Attachment C.

4. The GMA 12 Districts and their agents and representatives, individually and collectively, are further authorized to take all actions necessary to implement this resolution, including but not limited to additional actions required for adoption of the DFCs in accordance with Section 36.108 of the Texas Water Code.

5. The Desired Future Conditions of the aquifer(s) adopted by the GMA 12 Districts and attached hereto, along with the explanatory report, and proof of the notice of the meeting in which Desired Future Conditions adoption occurred, shall be submitted to the Texas Water Development Board and sent to the GMA 12 Districts, as required by Section 36.108(d-3), Texas Water Code.

AND IT IS SO ORDERED. PASSED AND ADOPTED on this 30th day of November, 2021.

ATTEST:

Brazos Valley Groundwater Conservation District

Fayette County Groundwater Conservation District

Lost Pines Groundwater Conservation District

Mid-East Texas Groundwater Conservation District

Post Oak Savannah Groundwater Conservation

ATTACHMENTS

A: Copies of notices of November 30, 2021, meeting
B: Desired Future Conditions
C: Non-relevant Aquifers
D: Minutes of November 12, 2021

Attachment A
Notice for November 30, 2021 GMA 12 Meeting
Attachment B
GMA 12 DESIRED FUTURE CONDITIONS

A. Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper Aquifers

The Sparta, Queen City, and Carrizo aquifers are present and used in all GCDs within GMA 12. Therefore, all GCDs submitted DFCs for these aquifers. The Calvert Bluff, Simsboro, and Hooper aquifers are present in all GCDs but not used in Fayette County. Therefore, GMA 12 declared these aquifers not relevant for Fayette County, and Fayette County GCD did not submit a DFC for these aquifers. For the purpose of establishing DFCs, the Groundwater Availability Model (GAM) for the Sparta, Queen City and Carrizo-Wilcox Aquifer (Young and others, 2020) was used to determine the compatibility and physical possibility of the DFCs proposed by each GCD. The DFCs proposed by each GCD for these six aquifers are provided in **Table 2-1**, as well as the DFC adopted by GMA 12 as a whole. The DFCs are based on the average drawdown from January 2011 through December 2070 in all instances except for the Brazos Valley Groundwater Conservation District where the DFCs are based on the average drawdown from January 2000 through December 2070. Note that the DFCs for Fayette County GCD in the Sparta, Queen City, and Carrizo aquifers are for all of Fayette County, and not just the portion of Fayette County within GMA 12. This is because GMA 15 has declared these aquifers not relevant for Fayette County, and all joint groundwater planning for these aquifers is done through GMA 12.

Table 2-1 Adopted DFCs for the Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper Aquifers

GCD or County	Average Aquifer Drawdown (ft) measured from January 2011 through December 2070					
	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
Brazos Valley GCD	53	44	84	111	262	167
Fayette County GCD	43*	73*	140*	--	--	--
Lost Pines GCD	22	28	134	132	240	138
Mid-East Texas GCD	25	20	48	57	76	69
Post Oak Savannah GCD	32	30	146	156	278	178
Falls County	--	--	--	--	7	3
Limestone County	--	--	--	2	3	3
Navarro County	--	--	--	0	1	0
Williamson County	--	--	--	25	31	24

* Fayette County GCD DFCs are for all of Fayette County.
Brazos Valley GCD DFCs are for 2000 through 2070

Based on the principle of using the GAM as a joint planning tool and the fact that the GAM predictions contain uncertainty, GMA 12 considered the DFCs to be compatible and physically

possible if the difference between modeled drawdown results and the DFC drawdown targets are within a 10 percent variance for all aquifers in the Queen City-Sparta/Carrizo-Wilcox GAM of the GAM simulation. Factors considered for determining tolerance criteria include:

- model calibration results and statistics;
- information used to calibrate the GAM;
- aquifer and recharge information collected since the GAM was developed;
- sensitivity of the GAM calibration and GAM predictions to change in the model parameters; and
- range of uncertainty in the model parameters including historical and future pumping, temporal variation in recharge distribution and magnitude.

Reference:

Young, S., Jigmond, M., Jones, T., and Ewing, T., 2020. Groundwater Availability Model for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifers, prepared for the Texas Water Development Board, Austin, Texas

B. Yegua-Jackson Aquifer

The Yegua-Jackson Aquifer is present in all GCDs in GMA 12. All GCDs manage the Yegua-Jackson Aquifer as a single unit. The DFCs proposed by each GCD for the Yegua-Jackson Aquifer are provided in **Table 2-2**, as well as the DFC adopted by GMA 12 as a whole. Lost Pines GCD did not propose a DFC because the district has declared the Yegua-Jackson Aquifer as a non-relevant aquifer. For the purpose of establishing and evaluating DFCs, the GAM for the Yegua-Jackson Aquifer (Deeds and others, 2010) was used to determine the compatibility and physical possibility of the DFCs submitted by each GCD. The DFC is based on the average drawdown from January 2010 through December 2069.

Table 2-2 Adopted DFCs for the Yegua and Jackson Aquifers

GCD	Average Aquifer Drawdown (ft) measured from January 2010 through December 2069
	Yegua-Jackson
Brazos Valley GCD	67
Fayette County GCD	81
Lost Pines GCD	--
Mid-East Texas GCD	8
Post Oak Savannah GCD	61

Based on the principle of using the GAM as a joint planning tool and the fact that the GAM predictions contain uncertainty, GMA 12 considered the DFCs to be compatible and physically possible if the difference between modeled drawdown results and the DFC drawdown targets are within a 10 percent for the Yegua-Jackson Aquifer in the GAM simulation. Factors considered for determining tolerance criteria include:

- model calibration results and statistics;
- information used to calibrate the GAM;

- aquifer and recharge information collected since the GAM was developed;
- sensitivity of the GAM calibration and GAM predictions to change in the model parameters; and
- range of uncertainty in the model parameters including historical and future pumping, temporal variation in recharge distribution and magnitude.

Reference:
Deeds, N.E., Yan, T., Sungh, A., Jones, T.L., Kelley, V.A., Knox, P.R., and Young, S.C., 2010, Groundwater Availability Model for the Yegua-Jackson Aquifer, final report prepared for the Texas Water Development Board, March, 2010, 582 pp.

C. Brazos Alluvium Aquifer

In GMA 12, the Brazos River Alluvium Aquifer is only present in Post Oak Savannah GCD and the Brazos Valley GCD. For this reason, GMA 12 adopted DFCs at a county level in these two GCDs, as shown in **Table 2-3**. DFCs for the Brazos River Alluvium Aquifer were not adopted for GMA 12 as a whole.

Table 2-3 Adopted DFCs for the Brazos River Alluvium Aquifer

GCD	County	Brazos River Alluvium Aquifer
Brazos Valley	Brazos & Robertson	North of State Highway 21: Percent saturation shall average at least 30% of total well depth from January 2013 to December 2069. South of State Highway 21: Percent saturation shall average at least 40% of total well depth from January 2013 to December 2069.
Post Oak Savannah	Burleson	A decrease in 6 feet in the average saturated thickness over the period from January 2010 to December 2069.
	Milam	A decrease of 5 feet in average saturated thickness over the period from January 2010 to December 2069

D. Non-relevant Areas of Aquifers

There are four areas where aquifers were declared non-relevant during the current cycle of joint groundwater planning. The Trinity Aquifer was declared non-relevant in Bastrop, Lee and Williamson counties because of its small areal coverage, great depth and poor water quality. The Yegua-Jackson Aquifer was declared non-relevant in Lost Pines GCD because it has a minimal amount of pumpage within the district. The Gulf Coast Aquifer was declared non-relevant in Brazos Valley GCD within GMA 12 since the small outcrop in the southernmost part of Brazos County is thin, can only provide water in small quantities and is very limited in areal extent. Also, the Wilcox portion of the Carrizo-Wilcox Aquifer in Fayette County was declared non-relevant because of the great depth to these units, the poor water quality and the lack of wells in the Wilcox aquifers within the district.

Attachment C
NON-RELEVANT AQUIFER: GULF COAST AQUIFER IN BRAZOS COUNTY

I. INTRODUCTION

The Texas Water Development Board, in its May 2020 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

> *Districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant (31 Texas Administrative Code 356.31 (b)). This proposed classification of an aquifer may be made if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition.*
>
> *The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
>
> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Gulf Coast Aquifer as not relevant for purposes of joint planning.

II. AQUIFER DESCRIPTION AND LOCATION

As described in George and others (2011):

> ***The Gulf Coast Aquifer*** *is a major aquifer paralleling the Gulf of Mexico coastline from the Louisiana border to the border of Mexico. It consists of several aquifers, including the Jasper, Evangeline, and Chicot aquifers, which are composed of discontinuous sand, silt, clay, and gravel beds. The maximum total sand thickness of the Gulf Coast Aquifer ranges from 700 feet in the south to 1,300 feet in the north. Freshwater saturated thickness averages about 1,000 feet. Water quality varies with depth and locality: it is generally good in the central and northeastern parts of the aquifer, where the water contains less than 500 milligrams per liter of total dissolved solids, but declines to the south, where it typically contains 1,000 to more than 10,000 milligrams per liter of total dissolved solids and where the productivity of the aquifer decreases. High levels of radionuclides, thought mainly to be naturally occurring, are found in some wells*

in Harris County in the outcrop and in South Texas. The aquifer is used for municipal, industrial, and irrigation purposes. In Harris, Galveston, Fort Bend, Jasper, and Wharton counties, water level declines of as much as 350 feet have led to land subsidence. The regional water planning groups, in their 2006 Regional Water Plans, recommended several water management strategies that use the Gulf Coast Aquifer, including drilling more wells, pumping more water from existing wells, temporary overdrafting, constructing new or expanded treatment plants, desalinating brackish groundwater, developing conjunctive use projects, and reallocating supplies.

Figure 1 (taken from Wade and others, 2014) shows the limited extent of the Gulf Coast Aquifer in GMA 12. Note that it occurs only in a small portion of Brazos County.

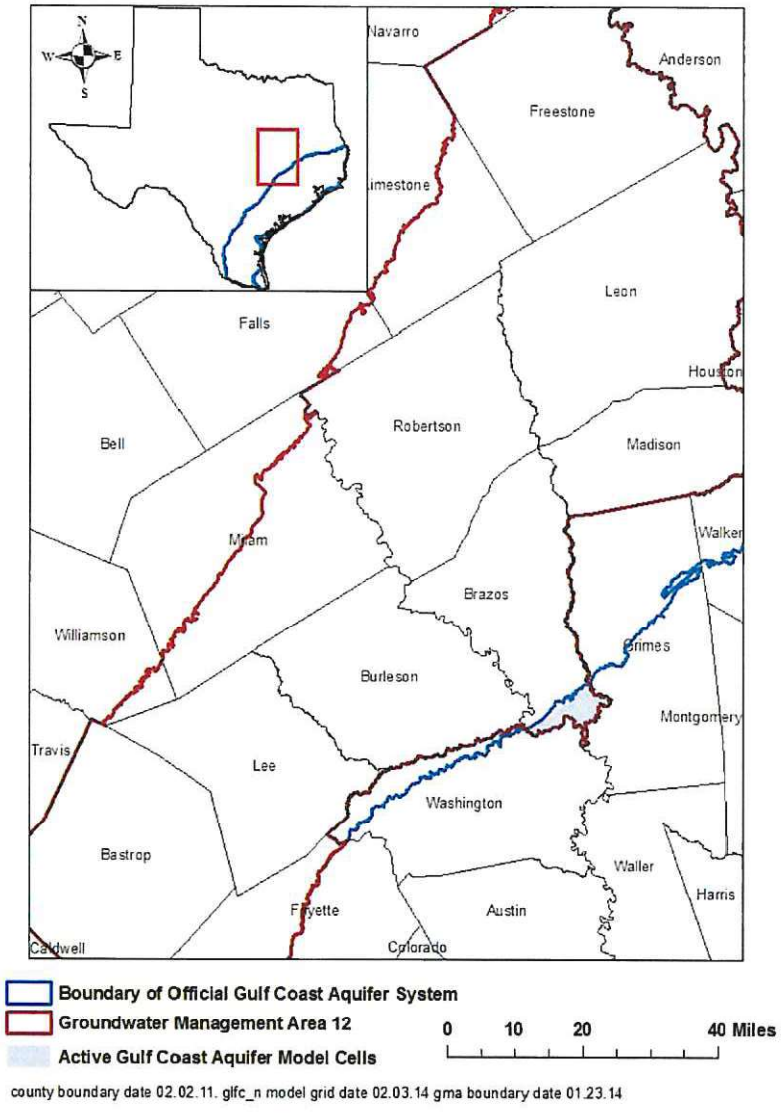


Figure 1. Location of Gulf Coast Aquifer in GMA 12

III. AQUIFER CHARACTERISTICS

The Catahoula Sandstone, the very basal unit to the Gulf Coast Aquifer, occurs in the very south part of Brazos County with the outcrop covering the upper part of low rolling hills with the Jackson Group below the Catahoula Sandstone. The Catahoula Sandstone is described as clay, tuff, sand, sandstone in interbedded layers with a capacity to yield small quantities of fresh to slightly saline water. The aquifer covers about 1.3 percent of the Brazos Valley Groundwater Conservation District and is less than 250 feet in thickness.

IV. GROUNDWATER DEMANDS AND CURRENT GROUNDWATER USES

The Texas Water Development Board pumping database lists limited pumping from the Gulf Coast Aquifer in Brazos County that ranged from 6 to 23 acre-feet/year between 2007 and 2016.

V. TOTAL ESTIMATED RECOVERABLE STORAGE

Wade and others (2014) developed total estimated recoverable storage for the Gulf Coast Aquifer in GMA 12 as follows:

County	*Total Storage (acre-feet)*	*25 percent of Total Storage (acre-feet)*	*75 percent of Total Storage (acre-feet)*
Brazos	450,000	112,500	337,500
Total	450,000	112,500	337,500

Total storage is given in the first column. Lower percentages of storage are given in the next two columns.

VI. EXPLANATION OF NON-RELEVANCE

Due to its very limited areal extent, shallow depth and low use, the Gulf Coast Aquifer is classified as not relevant for purposes of joint planning in Groundwater Management Area 12.

VII. REFERENCES

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Wade, S. and Shi, J., 2014. GAM Task 13-035 Version 2: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 12. Texas Water Development Board, Groundwater Resources Division, May 16, 2014, 43p.

NON-RELEVANT AQUIFER:
THE TRINITY AQUIFER IN BASTROP, LEE AND WILLIAMSON COUNTIES

I. INTRODUCTION

The Texas Water Development Board, in its May 2020 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

> *Districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant (31 Texas Administrative Code 356.31 (b)). This proposed classification of an aquifer may be made if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition.*
>
> *The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
>
> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Trinity Aquifer as not relevant for purposes of joint planning.

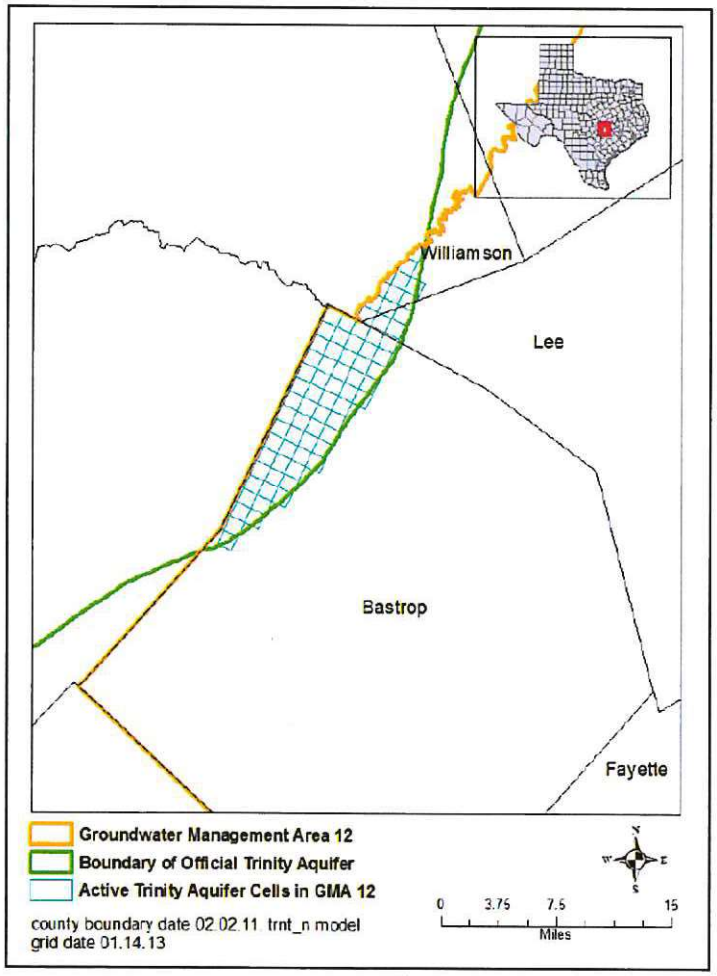
II. AQUIFER DESCRIPTION AND LOCATION

As described in George and others (2011):

> ***The Trinity Aquifer*** *extends across much of the central and northeastern part of the state. It is composed of several smaller aquifers contained within the Trinity Group. Although referred to differently in different parts of the state, they include the Antlers, Glen Rose, Paluxy, Twin Mountains, Travis Peak, Hensell, and Hosston aquifers. These aquifers consist of limestones, sands, clays, gravels, and conglomerates. Their combined freshwater saturated thickness averages about 600 feet in North Texas and about 1,900 feet in Central Texas. In general, groundwater is fresh but very hard in the outcrop of the aquifer. Total dissolved solids increase from less than 1,000 milligrams per liter in the east and southeast to between 1,000 and 5,000 milligrams per liter, or slightly to moderately saline, as the depth to the aquifer increases. Sulfate and chloride concentrations also tend*

to increase with depth. The Trinity Aquifer discharges to a large number of springs, with most discharging less than 10 cubic feet per second. The aquifer is one of the most extensive and highly used groundwater resources in Texas. Although its primary use is for municipalities, it is also used for irrigation, livestock, and other domestic purposes. Some of the state's largest water level declines, ranging from 350 to more than 1,000 feet, have occurred in counties along the IH-35 corridor from McLennan County to Grayson County. These declines are primarily attributed to municipal pumping, but they have slowed over the past decade as a result of increasing reliance on surface water. The regional water planning groups, in their 2006 Regional Water Plans, recommended numerous water management strategies for the Trinity Aquifer, including developing new wells and well fields, pumping more water from existing wells, overdrafting, reallocating supplies, and using surface water and groundwater conjunctively.

Figure 1 (taken from Wade and others, 2014) shows the limited extent of the Trinity Aquifer in GMA 12. Note that it occurs only in a small portion of Bastrop, Lee, and Williamson Counties.



I.

Figure 1. Location of Trinity Aquifer in GMA 12

III. AQUIFER CHARACTERISTICS

The Trinity Aquifer is a highly prolific aquifer across much of the northern part of the state. However, within GMA 12 it is only found at extreme depths in a very small portion of the GMA. There are no known wells in this area that produce from the Trinity, and therefore the aquifer characteristics within GMA 12 are unknown.

IV. GROUNDWATER DEMANDS AND CURRENT GROUNDWATER USES

The Texas Water Development Board pumping database lists limited pumping from the Trinity Aquifer in Williamson County that ranged from 1,353 and 3,116 acre-feet/year between 2007 and 2014. However, all of this is from the portion of Williamson County that lies outside of GMA 12. As noted above, there are no known wells producing from the Trinity Aquifer within GMA 12. The Texas Water Development Board pumping database shows no production from the Trinity Aquifer in Bastrop or Lee Counties.

V. TOTAL ESTIMATED RECOVERABLE STORAGE

Wade and others (2014) developed total estimated recoverable storage for the Trinity Aquifer in GMA 12 as follows:

County	*Total Storage (acre-feet)*	*25 percent of Total Storage (acre-feet)*	*75 percent of Total Storage (acre-feet)*
Bastrop	9,000,000	2,250,000	6,750,000
Lee	500,000	125,000	375,000
Williamson	1,600,000	400,000	1,200,000
Total	11,100,000	2,775,000	8,325,000

Total storage is given in the first column. Lower percentages of storage are given in the next two columns.

VI. EXPLANATION OF NON-RELEVANCE

Due to its very limited areal extent, extreme depth and no known use within GMA 12, the Trinity Aquifer is classified as not relevant for purposes of joint planning in Groundwater Management Area 12.

VII. REFERENCES

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Wade, S. and Shi, J., 2014. GAM Task 13-035 Version 2: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 12. Texas Water Development Board, Groundwater Resources Division, May 16, 2014, 43p.

NON-RELEVANT AQUIFER:
THE YEGUA-JACKSON AQUIFER IN BASTROP AND LEE COUNTIES

I. INTRODUCTION

The Texas Water Development Board, in its May 2020 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

> *Districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant (31 Texas Administrative Code 356.31 (b)). This proposed classification of an aquifer may be made if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition.*
>
> *The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
>
> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Yegua-Jackson Aquifer as not relevant for purposes of joint planning in Bastrop and Lee Counties (the Lost Pines GCD).

II. AQUIFER DESCRIPTION AND LOCATION

As described in George and others (2011):

> ***The Yegua-Jackson Aquifer*** *is a minor aquifer stretching across the southeast part of the state. It includes water-bearing parts of the Yegua Formation (part of the upper Claiborne Group) and the Jackson Group (comprising the Whitsett, Manning, Wellborn, and Caddell formations). These geologic units consist of interbedded sand, silt, and clay layers originally deposited as fluvial and deltaic sediments. Freshwater saturated thickness averages about 170 feet. Water quality varies greatly owing to sediment composition in the aquifer formations, and in all areas the aquifer becomes highly mineralized with depth. Most groundwater is produced from the sand units of the aquifer, where the water is fresh and ranges from less than 50 to 1,000 milligrams per liter of total dissolved solids. Some*

slightly to moderately saline water, with concentrations of total dissolved solids ranging from 1,000 to 10,000 milligrams per liter, also occurs in the aquifer. No significant water level declines have occurred in wells measured by the TWDB. Groundwater for domestic and livestock purposes is available from shallow wells over most of the aquifer's extent. Water is also used for some municipal, industrial, and irrigation purposes. The regional water planning groups, in their 2006 Regional Water Plans, recommended several water management strategies that use the Yegua-Jackson Aquifer, including drilling more wells and desalinating the water.

Figure 1 (taken from Wade and others, 2014) shows the limited extent of the Yegua-Jackson Aquifer in GMA 12.

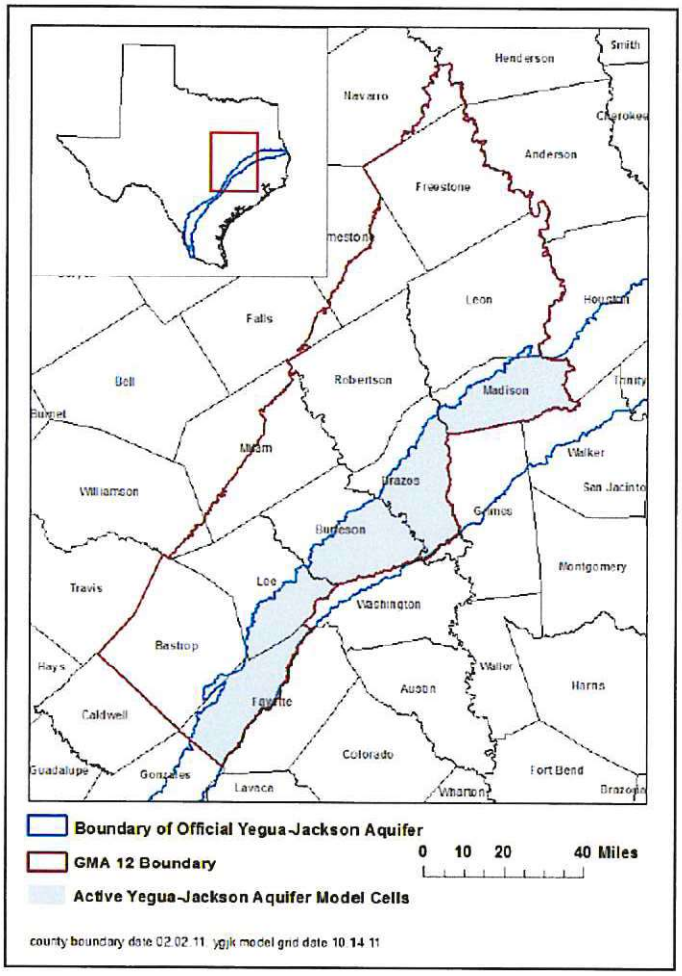


Figure 1. Location of Yegua-Jackson Aquifer in GMA 12

III. AQUIFER CHARACTERISTICS

The Yegua-Jackson Aquifer occurs in the very southern part of Bastrop County and the lower third of Lee County. The aquifer is described as interbedded layers of sand, silt, and clay with a capacity to yield small quantities of fresh to moderately saline water. Wells producing from the Yegua-Jackson Aquifer can produce as much as 500 gpm, although well capacities are typically much lower than that.

IV. GROUNDWATER DEMANDS AND CURRENT GROUNDWATER USES

The Texas Water Development Board pumping database lists limited pumping from the Yegua-Jackson Aquifer in Bastrop County that ranged from 2 to 3 acre-feet/year and 46 to 76 acre-feet/year in Lee County between 2007 and 2014. There is no permitted pumpage from the Yegua-Jackson Aquifer within the Lost Pines GCD and all use listed in the TWDB database is estimated to be rural domestic and livestock use.

V. TOTAL ESTIMATED RECOVERABLE STORAGE

Wade and others (2014) developed total estimated recoverable storage for the Yegua-Jackson Aquifer in the Lost Pines GCD as follows:

County	*Total Storage (acre-feet)*	*25 percent of Total Storage (acre-feet)*	*75 percent of Total Storage (acre-feet)*
Bastrop	290,000	72,500	217,500
Lee	10,000,000	2,500,000	7,500,000
Total	10,290,000	2,572,500	7,717,500

Total storage is given in the first column. Lower percentages of storage are given in the next two columns.

VI. EXPLANATION OF NON-RELEVANCE

Due to its very low use, lack of permitted production, and no anticipated permitted production in the future, the Yegua-Jackson Aquifer is classified as not relevant for purposes of joint planning in Bastrop and Lee Counties (the Lost Pines GCD) in Groundwater Management Area 12.

VII. REFERENCES

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Wade, S. and Shi, J., 2014. GAM Task 13-035 Version 2: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 12. Texas Water Development Board, Groundwater Resources Division, May 16, 2014, 43p.

THE WILCOX PORTION OF THE CARRIZO-WILCOX AQUIFER

IN FAYETTE COUNTY

I. INTRODUCTION

The Texas Water Development Board, in its May 2020 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

> *Districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant (31 Texas Administrative Code 356.31 (b)). This proposed classification of an aquifer may be made if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition. The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
>
> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is nonrelevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Wilcox portion of the Carrizo-Wilcox Aquifer in Fayette County as not relevant for purposes of joint planning.

II. AQUIFER DESCRIPTION AND LOCATION

As described in George and others (2011):

> ***The Carrizo-Wilcox Aquifer*** *is a major aquifer extending from the Louisiana border to the border of Mexico in a wide band adjacent to and northwest of the Gulf Coast Aquifer. It consists of the Wilcox Group and the overlying Carrizo Formation of the Claiborne Group. The aquifer is primarily composed of sand locally interbedded with gravel, silt, clay, and lignite. Although the Carrizo-Wilcox Aquifer reaches 3,000 feet in thickness, the freshwater saturated thickness of the sands averages 670 feet. The groundwater, although hard, is generally fresh and typically contains less than 500 milligrams per liter of total dissolved solids*

in the outcrop, whereas softer groundwater with total dissolved solids of more than 1,000 milligrams per liter occurs in the subsurface. High iron and manganese content in excess of secondary drinking water standards is characteristic of the deeper subsurface portions of the aquifer. Parts of the aquifer in the Winter Garden area are slightly to moderately saline, with total dissolved solids ranging from 1,000 to 7,000 milligrams per liter. Irrigation pumping accounts for slightly more than half the water pumped, and pumping for municipal supply accounts for another 40 percent. Water levels have declined in the Winter Garden area because of irrigation pumping and in the northeastern part of the aquifer because of municipal pumping. The regional water planning groups, in their 2006 Regional Water Plans, recommended several water management strategies that use the Carrizo-Wilcox Aquifer, including developing new wells and well fields, withdrawing additional water from existing wells, desalinating brackish water, using surface water and groundwater conjunctively, reallocating supplies, and
transporting water over long distances.

Figure 1 (taken from Wade and others, 2014) shows the extent of the Carrizo-Wilcox Aquifer in GMA 12.

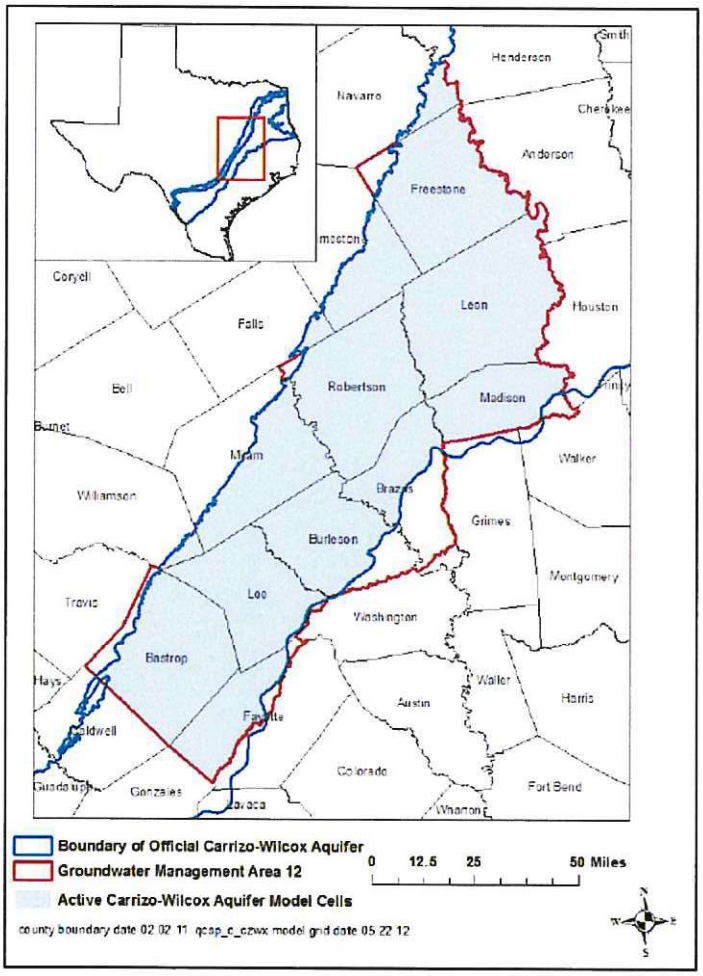


Figure 1. Location of Carrizo-Wilcox Aquifer in GMA 12

III. AQUIFER CHARACTERISTICS

The Wilcox portion of the Carrizo-Wilcox Aquifer occurs below the Carrizo Aquifer. In Fayette County, the depth of wells producing from the Carrizo Aquifer ranges from 1,700 to 3,200 feet. The Wilcox units (including the Calvert Bluff, Simsboro, and Hooper) occur below the Carrizo, and therefore wells producing from these units would be at least 2,000 feet deep. Water quality in these Wilcox units is estimated to be brackish to saline. There are no known wells in the Wilcox units within Fayette County, and therefore the aquifer characteristics within the county are unknown.

IV. GROUNDWATER DEMANDS AND CURRENT GROUNDWATER USES

The Texas Water Development Board pumping database lists limited pumping from the Carrizo-Wilcox Aquifer in Fayette County that ranged from 10 to 390 acre-feet/year between 2007 and 2018. However, this use is all from the Carrizo portion of the Carrizo-Wilcox Aquifer, as there are no known wells producing from the Wilcox units within Fayette County.

V. TOTAL ESTIMATED RECOVERABLE STORAGE

Wade and others (2014) developed total estimated recoverable storage for the Carrizo-Wilcox Aquifer in GMA 12 as follows:

County	*Total Storage (acre-feet)*	*25 percent of Total Storage (acre-feet)*	*75 percent of Total Storage (acre-feet)*
Fayette	95,000,000	23,750,000	71,250,000
Total	95,000,000	23,750,000	71,250,000

Total storage is given in the first column. Lower percentages of storage are given in the next two columns.

VI. EXPLANATION OF NON-RELEVANCE

Due to its extreme depth, poor water quality, lack of use and zero anticipated use in the future, the Wilcox portion of the Carrizo-Wilcox Aquifer is classified as not relevant for purposes of joint planning in Fayette County in Groundwater Management Area 12.

VII. REFERENCES

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Wade, S. and Shi, J., 2014. GAM Task 13-035 Version 2: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 12. Texas Water Development Board, Groundwater Resources Division, May 16, 2014, 43p.

Appendix B

Evidence of Coordination with Surface Water Management Entities

Appendix C

Certified Copy of District Resolution Adopting Management Plan

Appendix D

Evidence of Public Notice and Hearing on Management Plan