Groundwater Management Area 13

January 14, 2022

Mr. Jeff Walker, Executive Administrator
Texas Water Development Board
1700 N. Congress Avenue
Austin, Texas 78701

Re: Groundwater Management Area 13 Desired Future Conditions Submission Packet

Mr. Walker,

The members of Groundwater Management Area 13 are pleased to submit the adopted Desired Future Conditions for Groundwater Management Area 13, the explanatory report, and supporting materials to the Texas Water Development Board for review. The information is stored in digital form in the included USB drive.

Requests for clarifications or supplemental information of a technical or modeling-related nature should be submitted to:

Dr. Jordan Furnans, PE, PG
LRE Water
Email: Jordan.Furnans@lrewater.com
Phone: (512) 736-6485
1101 Satellite View, #301
Round Rock, Texas 78664

Request for clarifications or supplemental information of an administrative nature should be submitted to me at:

Kelley Cochran
Guadalupe County GCD
830-379-5969
kelley@gcgcd.org
PO BOX 1221
Seguin, TX 78156

Regards,

Kelley Cochran

Kelley Cochran
GMA 13 Chair/Administrator

Cc: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD.

2021 JOINT PLANNING
DESIRED FUTURE CONDITIONS
EXPLANATORY REPORT

Prepared by:

Groundwater Management Area 13
Joint Planning Committee

With Technical Assistance by:

Jordan Furnans, PhD, PE, PG
Michael Keester, PG

January 14, 2022

LRE WATER
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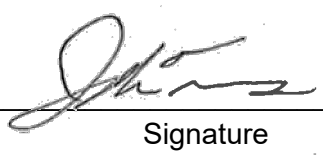
Geoscientist Seals and Contributors

Groundwater Management Area 13 contracted with LRE Water, a licensed professional geoscientist firm (Texas License No. 50516) to provide technical support related to the development and adoption of desired future conditions for managed aquifers. This report documents the work of the following licensed professional engineers and geoscientists in the State of Texas:

Jordan Furnans, PhD, PE, PG

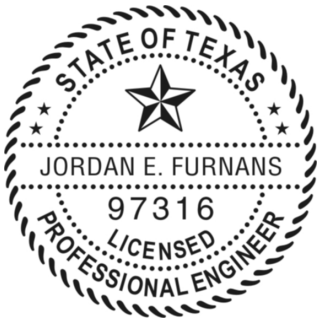
Dr. Furnans was responsible for overseeing all work performed by LRE Water staff during the completion of this project. On December 30, 2021 Dr. Furnans assumed full responsibility for the project upon the resignation of Michael Keester from LRE Water. Final preparation of this explanatory report was undertaken entirely by Dr. Furnans.



Signature

1/14/2022

Date



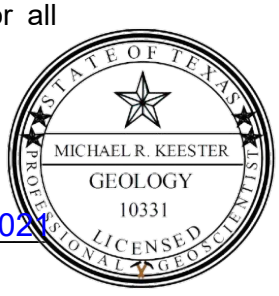
Michael Keester, P.G.

Mr. Keester was the technical lead responsible for performing modeling and developing information to support the members of Groundwater Management Area 13 in their development of desired future conditions for relevant aquifers. Mr. Keester is also the principal author of the explanatory report. On December 30, 2021 Mr. Keester resigned from LRE Water. Mr. Keester assumes professional responsibility for all project work prior to December 30, 2021.

Signature

12/30/2021

Date



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SECTION 1: INTRODUCTION

The Texas Legislature created Groundwater Management Areas (GMAs) "in order to provide for the conservation, preservation, protection, recharging, and prevention of waste of the groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions, consistent with the objectives of Section 59, Article XVI, Texas Constitution..." (Texas Water Code 35.001). The responsibility for GMA delineation was delegated to the Texas Water Development Board (TWDB) per Texas Water Code 35.004. The TWDB adopted the initial GMA delineations December 15, 2002, and has modified them when necessary, according to agency rules. There are 16 GMAs in Texas. Figure 1 shows the boundaries of these 16 GMAs, including GMA 13.

1.1 GROUNDWATER MANAGEMENT AREA 13

Figure 2 shows the location of the Edwards Aquifer Authority and 8 Groundwater Conservation Districts (GCDs) that are contained wholly or in part within the boundary of GMA 13. These eight GCDs are the Evergreen Underground Water Conservation District (UWCD), Gonzales County UWCD, Guadalupe County GCD, McMullen GCD, Medina County GCD, Plum Creek Conservation District (CD), Uvalde County UWCD, and Wintergarden GCD.

In GMA 13, the TWDB recognizes four major aquifers and three minor aquifers. Figure 3 shows the footprints of the four major aquifers, namely, the Gulf Coast Aquifer System, the Carrizo-Wilcox Aquifer, the Edwards (BFZ) Aquifer, and the Trinity Aquifer. Figure 4 shows the footprints of the minor aquifers, which include the Yegua-Jackson, the Sparta, and the Queen City aquifers. Table 1 provides the hydrogeologic units present within GMA 13 with the order representing each unit's position in the subsurface relative to the other units.

There are 17 counties in GMA 13. Table 2 lists the counties with their area and population projections. In 2010, the 17 counties had a population of 2,444,306 people, and the county with the largest population was Bexar County with 1,714,773 people. The population of the 17 counties is expected to grow to 4,819,206 people in 2070, with Bexar County expanding to a population of 3,094,726 people.

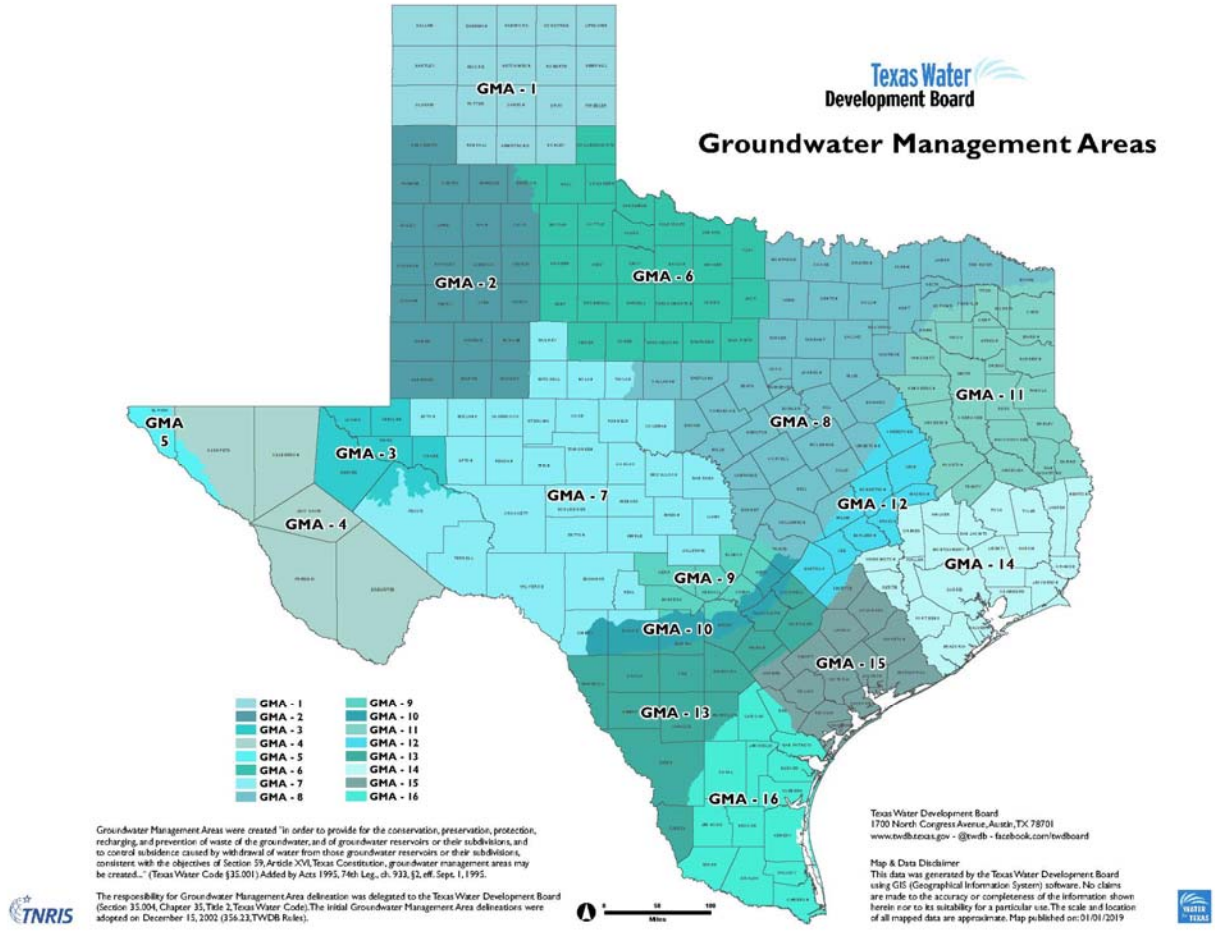

Figure 1. Delineation of 16 groundwater management zones in Texas
(obtained from https://www.tnris.org/maps/ on March 8, 2021).

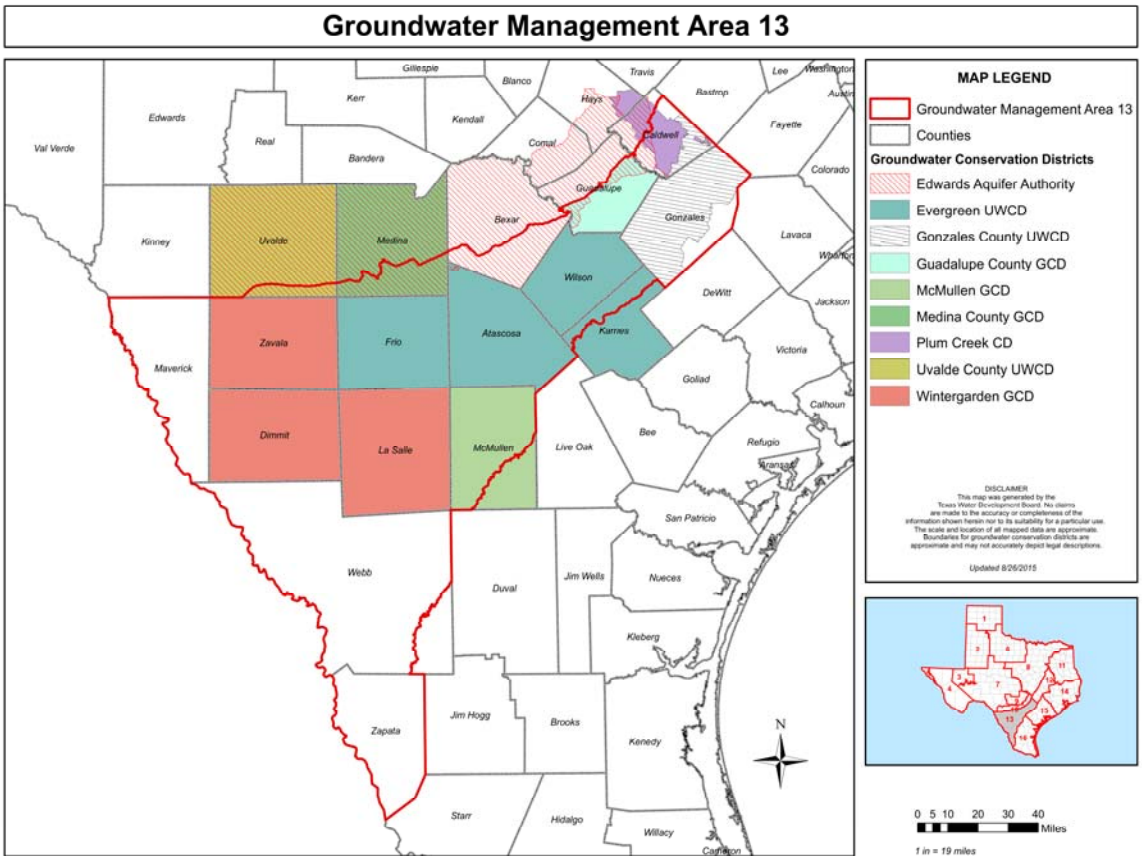

Figure 2. Delineation of GMA 13 showing locations of GCDs
(obtained from http://www.twdb.texas.gov/groundwater/management_areas/maps/GMA13_GCD.pdf).

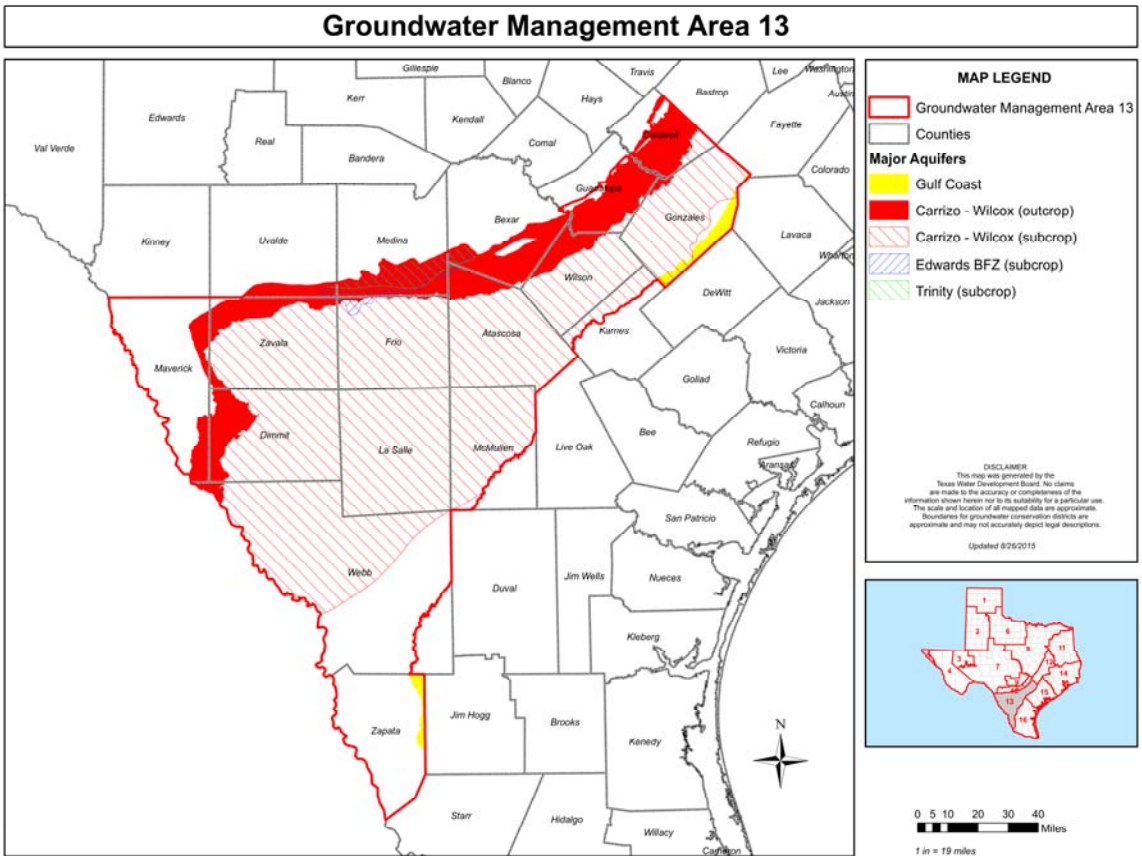

Figure 3. **Map of GMA 13 major aquifer boundaries.**
(obtained from http://www.twdb.texas.gov/groundwater/management_areas/maps/GMA13_MajorAquifer.pdf).

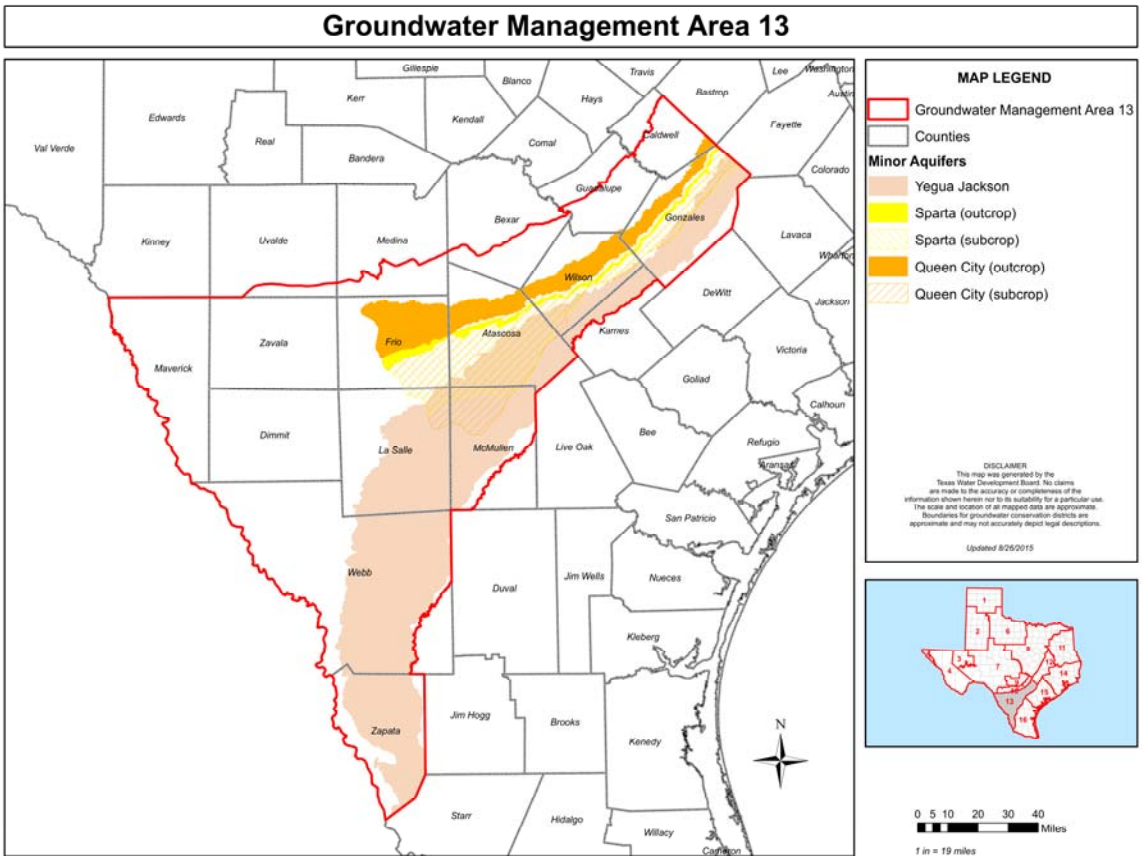

Figure 4. **Map of GMA 13 minor aquifer boundaries.**
(obtained from http://www.twdb.texas.gov/groundwater/management_areas/maps/GMA13_MinorAquifer.pdf).

Table 1. Hydrogeologic units in GMA 13.
Modified from Shi and others (2020), Deeds and others (2010), Young and others (2018), Holt, Jr (1956), and Lindgren and others (2004).

Geologic Unit		Hydrogeologic Unit
Alluvium and Eolian Sand		Alluvium/Eolian Aquifer
Beaumont		Chicot Aquifer
Lissie		
Willis		
Goliad		Evangeline Aquifer
Upper Fleming		
Middle Fleming		Burkeville Confining Unit
Lower Fleming		Jasper Aquifer
Oakville		
Catahoula		
Jackson Group	Whitsett	Yegua-Jackson Aquifer
	Manning	
	Wellborn	
	Caddell	
Claiborne Group	Yegua	
	Cook Mountain	Aquitard
	Sparta	Sparta Aquifer
	Weches	Aquitard
	Queen City	Queen City Aquifer
	Reklaw	Aquitard
	Carrizo	Carrizo-Wilcox Aquifer
Wilcox Group	Upper	
	Middle	
	Lower	
Midway Group	Kincaid	Aquitard
Navarro Group	Escondido	
	Corsicana Marl	
Taylor Marl		
Anacacho Limestone		
Austin Chalk		
Eagle Ford Shale		
Washita	Buda Limestone	
	Del Rio Clay	
	Georgetown	Edwards Aquifer
Edwards Group		
Trinity Group	Glen Rose	Trinity Aquifer
	Travis Peak	

Table 2. Population projections from 2021 Regional Water Planning.

County	Area (mi^2)*	2010*	2020	2030	2040	2050	2060	2070
Atascosa	1,220	44,911	52,574	60,755	68,210	75,481	82,324	88,676
Bexar**	1,240	1,714,773	1,974,041	2,231,550	2,468,254	2,695,668	2,904,319	3,094,726
Caldwell**	545	38,066	47,008	57,553	67,955	78,243	88,639	98,754
Dimmit	1,329	9,996	10,875	11,725	12,275	12,825	13,246	13,585
Frio	1,133	17,217	19,186	21,144	22,846	24,488	25,967	27,304
Gonzales	1,067	19,807	21,751	23,921	25,963	28,330	30,738	33,256
Guadalupe**	711	131,533	182,693	235,318	276,064	315,934	356,480	396,261
Karnes**	748	14,824	15,456	15,938	15,968	15,968	15,968	15,968
La Salle	1,487	6,886	7,776	8,517	9,209	9,987	10,657	11,279
Maverick	1,279	54,258	63,107	72,491	81,243	90,304	98,988	107,327
McMullen**	1,139	707	734	734	734	734	734	734
Medina**	1,325	46,006	52,653	59,694	65,676	70,896	75,605	79,700
Uvalde**	1,552	26,405	28,846	31,548	33,861	36,257	38,543	40,734
Webb**	3,361	250,304	318,028	393,284	464,960	530,330	591,945	647,433
Wilson	804	42,918	54,266	66,837	79,044	90,016	100,411	109,771
Zapata	998	14,018	16,819	19,709	22,876	26,365	29,976	33,742
Zavala	1,297	11,677	13,189	14,758	16,161	17,521	18,786	19,956
GMA 13**		2,444,306	2,879,002	3,325,476	3,731,299	4,119,347	4,483,326	4,819,206

*County areas and 2010 population from 2010 https://demographics.texas.gov/data/Decennial/2010/DPSF
**Values represent the whole county and not just the portion within GMA 13

1.2 DESIRED FUTURE CONDITION JOINT PLANNING PROCESS

Texas Water Code Chapter 36 includes requirements for annual and Desired Future Conditions (DFC) joint planning by two or more GCDs located within the same GMA boundaries. For DFC joint planning, Texas Water Code Section 36.108(d) specifically requires GCDs to propose DFCs for adoption for all relevant aquifers in the GMA by no later than May 1, 2021 and every five years thereafter. DFCs are defined in Texas Water Code 36.001(30) as the "quantitative description, adopted in accordance with Section 36.108, of the desired condition of the groundwater resources in a management area at one or more specified future times." The specified future time extends through at least the period that includes the current planning period for the development of regional water plans pursuant to Texas Water Code 16.053, or in perpetuity, as defined by participating districts within a GMA as part of the joint planning process. DFCs have to be physically possible, individually and collectively, if different DFCs are stated for different geographic areas overlying an aquifer or subdivision of an aquifer.

The more substantive elements of the DFC joint planning process include:

(1) An explanatory report which is developed and submitted at the conclusion of the joint-planning process to document that certain required factors for consideration have been addressed;
(2) Modeled available groundwater (MAG), including the process for addressing exempt use, amounts, which are developed after final DFCs are adopted by the GMA;
(3) A minimum 90-day public comment period during which each GCD holds a public hearing on proposed DFCs before final adoption by at least two thirds of the GCD representatives in the GMA;
(4) Following GMA adoption of the DFCs required information is to be submitted to the Texas Water Development Board (TWDB) to determine administrative completeness of the DFC submission packet; and,
(5) As soon as possible after the TWDB determination of administrative completeness, individual GCDS then finally adopt the DFCs. Pursuant to Texas Water Code Section 36.108(d-3), GMAs must approve by resolution the adoption of the final DFCs no later than January 5, 2022.

Prior to adopting proposed DFCs, the districts must jointly consider technical and other information to determine the DFCs for the management area and, in doing so, are required to consider the nine following factors (Texas Water Code 36.108(d)):

(1) Aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another;
(2) The water supply needs and water management strategies included in the state water plan;
(3) Hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge;

(4) Other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water;
(5) The impact on subsidence;
(6) Socioeconomic impacts reasonably expected to occur;
(7) The impact on the interests and rights in private property, including ownership and the rights of management area landowners and their lessees;
(8) The feasibility of achieving the DFC; and
(9) Any other information relevant to the specific DFCs.

After final DFCs are adopted by a GMA, the TWDB calculates the MAG amounts based on those DFCs. A MAG is defined in the Texas Water Code 36.001(25) as “the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition established by Section 36.108.” The MAG amounts are then given to the GCDs within the GMA, and to the applicable Regional Water Planning Groups.

1.3 GMA 13 DFC JOINT PLANNING PROCESS

The DFC joint-planning process as outlined in Texas Water Code 36.108 is a public, transparent process, where all planning decisions are made in open, publicly-noticed meetings in accordance with provisions contained in Texas Water Code Chapter 36. From 2018 to 2021, GMA 13 convened 15 times within the boundary of the GMA at the dates listed in Table 3. All of the meetings were open to the public. All meeting notices were posted at least 10 days in advance of the meeting. Table 3 lists the dates and the major discussion topics of the GMA 13 joint planning meetings held during 2021 joint planning.

Table 3. List of meetings convened by GMA 13 from July 26, 2018 through January 14, 2022.

Meeting	Quorum	Major Discussion Topics
July 26, 2018	Yes	TWDB updates on aquifer vulnerability to subsidence concerning groundwater pumping. Discussed draft inter-local agreement for rules and cost sharing. Discussed the feasibility of using the TWDB BRACS Model to better characterize the groundwater resources in GMA 13. RFP for GMA 13 consulting service should include three model runs and additional runs upon request of individual districts and add breakdown for brackish water within the report. Discussion to setup similar rules committee, TAGD will send out a spreadsheet to the member districts.
October 12, 2018	Yes	Updates on TWDB activities and the Brackish Study. GMA 13 stakeholders presented the spreadsheet to compare rules. Current agreement for cost sharing kept. Agreed that request for qualifications for GMA 13 consulting service must be presented before action can be taken on a request for proposals. Similar Rules Committee highlighted that districts have different rules for production.
November 16, 2018	Yes	Request for qualifications for Southern Carrizo GAM posted. Agreed to issue a request for proposals for GMA 13 consulting services.
February 1, 2019	Yes	TWDB update on the Southern Carrizo GAM. LRE Water was selected for GMA 13 consulting services. Set a budget for DFCs Planning based on LRE Water's proposal. Discussion on defining negative impacts to the aquifer, brackish water production zones, and pumpage inputs for modeling DFCs. LRE Water presented a draft schedule of the process for modeling DFCs. Stakeholders stated that the two main points for similar rules between districts are spacing and allocation. LRE Water provided a timeline of activities.

Table 3 (cont.). List of meetings convened by GMA 13 from July 26, 2018 through January 14, 2022.

Meeting	Quorum	Major Discussion Topics
May 3, 2019	Yes	LRE Water presented on pumpage inputs for modeling DFCs. LRE Water asked for 2012-2016 pumping numbers, production amounts, and permitted amounts.
August 2, 2019	Yes	TWDB updates on future GAM updates and the brackish studies. San Antonio River Authority and USGS are working on a Groundwater/Surface Water Interaction Model for the San Antonio River Basin. LRE Water discussed the DFCs pumpage inputs and modeling.
November 8, 2019	Yes	Approved resolution appointing the voting representative for Wintergarden GCD.TWDB updates on surface water/groundwater exchanges in the Guadalupe River. Financial update from the GMA 13 treasurer. LRE Water presented on DFCs pumpage inputs and modeling. LRE Water will revise pumping to address dry cells, consider reducing input if unable to address dry cells and perform an aquifer equilibrium run.
February 7, 2020	Yes	TWDB updates on the socioeconomic impact analysis report and the GAM. Presentation on the surface-water/groundwater interaction for the lower San Antonio River Basin. Financial updates. LRE Water discussed modeling related to evaluations of potential DFCs, aquifer uses and conditions, water supply needs and water management strategies. LRE Water will run additional scenarios, set pumping distribution and amounts, revise modeling memo and do new equilibrium run. Members asked if LRE Water can provide drawdown and pumpage values by each district.
June 26, 2020	Yes	TWDB updates on new DFCs checklist, Springs Program Initiative, and Texas Water News Room. Montgomery & Associates update on the GAM. LRE Water made minor changes to pumping distribution and presented on a few considerations in regards to hydrological conditions. LRE Water will look at other considerations based on current modeling and look at a couple different scenarios members would like to see modeled.
November 13, 2020	Yes	TWDB updates. Financial report. LRE Water discussed modeling and factors related to potential DFCs as well as the DFCs schedule and timeline.
February 5, 2021	Yes	LRE Water discussed modeling and factors related to potential DFCs as well as the DFCs schedule and timeline.
March 19, 2021	Yes	LRE Water discussed modeling and factors related to potential DFCs as well as the DFCs schedule and timeline.

Table 3 (cont.). List of meetings convened by GMA 13 from July 26, 2018 through January 14, 2022.

Meeting	Quorum	Major Discussion Topics
April 23, 2021	Yes	GMA 13 proposes for adoption DFCs for the relevant aquifers within the management area per Texas Water Code 36.108(d).
June 11, 2021	Yes	GMA 13 discussed comments from Mr. Earl on proposed DFCs as they relate to Webb County
September 17, 2021	Yes	GMA 13 discussed comments on the proposed DFCs that were received during the comment period.
November 19, 2021	Yes	GMA 13 approved resolutions adopting the DFCs for the relevant aquifers.
January 14, 2022	Yes	Discussion and approval of Explanatory Report for submission to TWDB.

Appendix 1 contains the meeting notices and the minutes for the meetings. In February 2019, GMA 13 selected LRE Water, LLC to be their technical consultant. LRE Water performed the groundwater availability model (GAM) simulations for GMA 13, provided technical guidance, and supported the preparation of this explanatory report.

GMA 13 later learned that LRE Water, LLC was also hired by landowners in Webb County to perform consulting work in support of the Webb County landowners' efforts to modify the proposed DFCs. GMA 13 discussed this as a potential conflict of interest by LRE Water, LLC at the GMA 13 meeting on November 19, 2021, during which LRE communicated that LRE representative Dr. Furnans was representing the interests of the landowners and LRE representative Mr. Keester was representing the interests of GMA 13, and that Mr. Keester would be developing the Explanatory Report. Subsequent to the November 19, 2021 meeting, LRE announced that Mr. Keester had resigned from LRE and that Dr. Furnans would be responsible for final preparation of the Explanatory Report.

During the GMA 13 meeting on April 23, 2021, GMA 13 designated the draft Groundwater Management Area 13 Desired Future Conditions language as the Proposed Desired Future Conditions of Groundwater Management Area 13. As required by Texas Water Code Section 36.108(d-2), the proposed DFCs were subsequently distributed to the individual districts in GMA 13. A period of not less than 90 days was provided to allow for public comments on the proposed DFCs; during this comment period, each district held a public hearing on the proposed DFCs.

Table 4 lists the date that each district conducted a public hearing on the proposed DFCs.

Table 4. GCD public hearings regarding the GMA 13 proposed DFCs.

District	Public Hearing Date
Evergreen UWCD	June 25, 2021
Gonzales County UWCD	July 13, 2021
Guadalupe County GCD	July 8, 2021
McMullen GCD	August 30, 2021
Medina County GCD	June 16, 2021
Plum Creek CD	June 30, 2021
Uvalde County UWCD	May 14, 2021
Wintergarden GCD	July 14, 2021

SECTION 2: GMA 13 DESIRED FUTURE CONDITIONS

Texas Water Code 36.001 defines a desired future condition (DFC) as a quantitative description of the desired condition of the groundwater resources in a management area at one or more specified future times. The following provides the DFCs adopted by GMA 13 members in accordance with Texas Water Code 36.108.

2.1 CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS

The Carrizo-Wilcox Aquifer is comprised of four units as shown on in Table 1. The Queen City overlies and is separated from the Carrizo-Wilcox by the Reklaw. The Sparta overlies and is separated from the Queen City by the Weches. GMA 13 used the Groundwater Availability Model for the Southern Portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Kelley and others, 2004) to evaluate DFCs. GMA 13 used the zone delineations per file "qcsp_s_grid05132019" to define the areas representing the GMA and each of the aquifers.

Due to limitations of the Groundwater Availability Model for the Southern Portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers identified and discussed during 2016 (Hutchison, 2017a) and 2021 Joint Planning, Groundwater Management Area 13 proposes two desired future conditions for the Carrizo-Wilcox, Queen City, and Sparta aquifers:

The primary desired future condition for the Carrizo-Wilcox, Queen City and Sparta aquifers in Groundwater Management Area 13 is that 75 percent of the saturated thickness in the outcrop at the end of 2012 remains at the end of 2080. Due to limitations of the current Groundwater Availability Model, this desired future condition cannot be simulated as documented during 2016 Joint Planning in GMA 13 Technical Memorandum 16-08 (Hutchison, 2017d).

A secondary desired future condition for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area 13 is an average drawdown of 49 feet (+/- 5 feet) for all of Groundwater Management Area 13. The drawdown is calculated from the end of 2012 conditions through the year 2080. This desired future condition is consistent with simulation

"GMA13_2019_001" summarized during a meeting of Groundwater Management Area 13 members on March 19, 2021.

2.2 YEGUA-JACKSON AQUIFER

GMA 13 determined the Yegua-Jackson Aquifer as relevant for only Gonzales and Karnes counties. As shown in Table 1, the Yegua-Jackson Aquifer overlies and is separated from the Sparta Aquifer by the Cook Mountain. The Cook Mountain is an aquitard that impedes the flow of groundwater between the aquifers. GMA 13 used the Groundwater Availability Model for the Yegua-Jackson Aquifer (Deeds and others, 2010) to evaluate DFCs. GMA 13 used the zone delineations per file "ygjk_grid_poly070920" to define the areas representing the GMA, counties, and each aquifer.

Groundwater Management Area 13 (GMA 13) adopted the following desired future conditions for the Yegua-Jackson Aquifer in Groundwater Management Area 13:

- For Gonzales County, the average drawdown from end of 2010 through 2080 is 3 feet (+/- 1 foot).
- For Karnes County, the average drawdown from end of 2010 through 2080 is 1 foot (+/- 1 foot).
- For all other counties in Groundwater Management Area 13, the Yegua-Jackson is classified as not relevant for purposes of joint planning.

2.3 AQUIFERS DECLARED NOT RELEVANT FOR JOINT PLANNING PURPOSES

During an open meeting on February 5, 2021, GMA 13 discussed the potentially non-relevant aquifers for joint planning. Based upon the characteristics, use, and existing management of the Trinity Aquifer, Edwards (BFZ) Aquifer, Gulf Coast Aquifer System, and portions of the Yegua-Jackson Aquifer, GMA 13 deemed these aquifers not relevant for joint planning purposes.

2.3.1 Trinity Aquifer

GMA 13 considers the portion of the Trinity Aquifer within its boundary non-relevant for joint planning purposes. The Trinity Aquifer footprint extends into Atascosa, Bexar, Medina, and Uvalde counties within GMA13. The portion of this aquifer within GMA 13 is relatively small and only present at great depths. Figure 3 illustrates the location of the aquifer within GMA 13.

As shown on Table 1, the Trinity Aquifer is separated from the Carrizo-Wilcox Aquifer by several aquitards making the hydraulic connection between the aquifers negligible. Use and projected demands from the Trinity Aquifer within GMA 13 are negligible to non-existent. The total estimated recoverable storage (TERS) for the Trinity Aquifer within GMA 13 is 4,705,000 acre-feet. Table 5 provides the TERS values for the aquifer within GMA 13 as calculated by Wade and Bradley (2013).

Table 5. Trinity Aquifer total estimated recoverable storage within GMA 13 (Wade and Bradley, 2013).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Atascosa	35,000	8,750	26,250
Bexar	660,000	165,000	495,000
Medina	3,900,000	975,000	2,925,000
Uvalde	110,000	27,500	82,500
GMA 13	4,705,000	1,176,250	3,528,750

The portion of the aquifer in Medina and Uvalde counties is managed by Medina County GCD and Uvalde County UWCD, respectively. Each of these districts participate in joint planning within other groundwater management areas where the Trinity Aquifer is more prevalent and where management of the resource is addressed. The limited extent and use of the Trinity Aquifer within GMA 13, its hydraulic separation from the relevant aquifer system, and planning occurring for portions of the aquifer within other management areas, support GMA 13's decision to classify the aquifer as non-relevant for joint planning purposes within their boundary.

2.3.2 Edwards (BFZ) Aquifer

GMA 13 considers the portion of the Edwards (BFZ) Aquifer within its boundary non-relevant for joint planning purposes. The Edwards (BFZ) Aquifer footprint extends into Atascosa, Bexar, Frio, Medina, Uvalde, and Zavala counties within GMA13. The portion of this aquifer within GMA 13 is relatively small and only present at great depths. Figure 3 illustrates the location of the aquifer within GMA 13.

As shown on Table 1, the Edwards (BFZ) Aquifer is separated from the Carrizo-Wilcox Aquifer by several geologic layers making the hydraulic connection between the aquifers negligible. Use and projected demands from the Edwards (BFZ) Aquifer within GMA 13 are negligible to non-existent. The TERS for the Edwards (BFZ) Aquifer within GMA 13 is 1,718,400 acre-feet. Table 6 provides the TERS values for the aquifer within GMA 13 as calculated by Wade and Bradley (2013).

Table 6. Edwards (BFZ) Aquifer total estimated recoverable storage within GMA 13 (Wade and Bradley, 2013).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Atascosa	29,000	7,250	21,750
Bexar	130,000	32,500	97,500
Frio	240,000	60,000	180,000
Medina	1,200,000	300,000	900,000
Uvalde	110,000	27,500	82,500
Zavala	9,400	2,350	7,050
GMA 13	1,718,400	429,600	1,288,800

The Edwards (BFZ) Aquifer is managed by the Edwards Aquifer Authority and does not develop DFCs as part of the joint planning process. The limited extent and use of the Edwards (BFZ) Aquifer within GMA 13, its hydraulic separation from the relevant aquifer system, and the aquifer being managed by the Edwards Aquifer Authority, support GMA 13's decision to classify the aquifer as non-relevant for joint planning purposes within their boundary.

2.3.3 Gulf Coast Aquifer System

GMA 13 considers the portion of the Gulf Coast Aquifer System within its boundary non-relevant for joint planning purposes. The Gulf Coast Aquifer System footprint extends into Gonzalez and Zapata counties within GMA 13. The portion of this aquifer within GMA 13 is relatively small and shallow. Figure 3 illustrates the location of the aquifer within GMA 13.

As shown on Table 1, the Gulf Coast Aquifer System is directly above the Yegua-Jackson Aquifer. However, due to the composition and hydraulic properties of the geologic layers, the hydraulic connection between the aquifers likely negligible. Use and projected demands from the Gulf Coast Aquifer System within GMA 13 are negligible to non-existent. The TERS for the Gulf Coast Aquifer System within GMA 13 is 246,000 acre-feet. Table 7 provides the TERS values for the aquifer within GMA 13 as calculated by Wade and Bradley (2013).

Table 7. Gulf Coast Aquifer System total estimated recoverable storage within GMA 13 (Wade and Bradley, 2013).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Gonzales	360,000	90,000	270,000
Zapata	2,100,000	525,000	1,575,000
GMA 13	2,460,000	615,000	1,845,000

The Gulf Coast Aquifer System is managed by members of GMA 15 and GMA 16 where the aquifer is more prevalent and where management of the resource is addressed. The limited extent and use of the Gulf Coast Aquifer System within GMA 13, its hydraulic separation from the relevant aquifer system, and planning occurring for portions of the aquifer within other management areas, support GMA 13's decision to classify the aquifer as non-relevant for joint planning purposes within their boundary.

2.3.4 Yegua-Jackson Aquifer

GMA 13 considers the portion of the Yegua-Jackson Aquifer within all but two counties (Gonzales and Karnes) non-relevant for joint planning purposes. The non-relevant portion of the Yegua-Jackson Aquifer footprint is present in Atascosa, Frio, La Salle, McMullen, Webb, Wilson, and Zapata counties within GMA13. Figure 4 illustrates the location of the aquifer within GMA 13.

As shown on Table 1, the Yegua-Jackson Aquifer is directly below the Gulf Coast Aquifer System and separated from the Sparta by an aquitard making the hydraulic connection between the aquifers negligible. Use and projected demands from the non-relevant portions of the Yegua-Jackson Aquifer within GMA 13 are negligible to non-existent. The TERS for the Yegua-Jackson Aquifer within GMA 13 is 542,875,000 acre-feet. Table 8 provides the TERS values for the aquifer within GMA 13 as calculated by Wade and Bradley (2013).

The limited use of the Yegua-Jackson Aquifer within most counties in GMA 13 and its limited hydraulic separation from the relevant aquifer system, support GMA 13's decision to classify the aquifer as non-relevant for joint planning purposes for Atascosa, Frio, La Salle, McMullen, Webb, Wilson, and Zapata counties.

Table 8. Yegua-Jackson Aquifer total estimated recoverable storage within GMA 13 (Wade and Bradley, 2013).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Atascosa	40,000,000	10,000,000	30,000,000
Frio	75,000	18,750	56,250
Gonzales*	32,000,000	8,000,000	24,000,000
Karnes*	19,000,000	4,750,000	14,250,000
La Salle	56,000,000	14,000,000	42,000,000
McMullen	96,000,000	24,000,000	72,000,000
Webb	210,000,000	52,500,000	157,500,000
Wilson	6,800,000	1,700,000	5,100,000
Zapata	83,000,000	20,750,000	62,250,000
GMA 13	542,875,000	135,718,750	407,156,250

*Aquifer is relevant for joint planning

SECTION 3: POLICY JUSTIFICATION

The adoption of DFCs by GCDs, pursuant to the requirements and procedures set forth in Texas Water Code Chapter 36, is an important policy-making function. DFCs are planning goals that state a desired condition of the groundwater resources in the future in order to promote better long-term management of those resources. GCDs are authorized to utilize different approaches in developing and adopting DFCs based on local conditions and consider other statutory criteria as set forth in Texas Water Code 36.108.

GMA 13 and each of its member GCDs evaluated DFCs with regard to the nine factors required by Texas Water Code 36.108(d). In addition to these nine factors, GMA 13 and the individual districts evaluated DFCs with regard to providing a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, and recharging, and prevention of waste of groundwater in GMA 13.

In evaluating the DFCs, GMA 13 and the individual GCDs recognize that: 1) the production capability of the relevant aquifer varies across GMA 13; 2) historical groundwater production is different across GMA 13; and 3) the importance of groundwater production to the socioeconomic livelihood of an area varies among the GCDs. With this recognized variability, the GCDs are best equipped to manage the groundwater resources within their boundaries based on a simple DFC statement that is uniform for the GMA. As a result, GMA 13 has adopted primary and secondary quantitative DFC statements for the Carrizo-Wilcox, Queen City, and Sparta aquifers. For the Yegua-Jackson Aquifer, the policy decision extends to the recognition of Gonzales County GCD's and Evergreen UWCD's need to adopt DFCs while the other areas are non-relevent.

Each GCD in GMA 13 submitted a summary of the public comments and public hearing regarding the proposed DFCs, inclusive of all relevant comments received during the public comment period, from April 30, 2021 through July 30, 2021 (91 days). The summary included information regarding the proposed DFCs, any suggested revisions to the proposed DFCs, and the basis for the revisions. The summaries are provided in Appendix 3. GMA 13 Representatives reviewed the summary submittals during a meeting held on September 17, 2021. The DFCs that GMA 13 considered and proposed for final adoption specify acceptable depletion of saturated thickness and drawdown levels in the Carrizo-Wilcox, Queen City, and Sparta aquifers across GMA 13 along with acceptable drawdown levels in the Yegua-Jackson Aquifer for Gonzales County GCD and Evergreen UWCD.

SECTION 4: TECHNICAL JUSTIFICATION

GMA 13 adopted DFCs based on evaluations conducted using the Groundwater Availability Model for the Southern Portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (QCSP_s GAM) developed by Kelley and others (2004) and the Groundwater Availability Model for the Yegua-Jackson Aquifer (YGJK GAM) developed by Deeds and others (2010). The QCSP_s GAM represents the aquifer system with eight layers representing, from top to bottom, the Sparta, Weches, Queen City, Reklaw, Carrizo, Upper Wilcox, Middle Wilcox, and Lower Wilcox hydrostratigraphic units. The YGJK GAM represents the aquifer with five layers representing, from top to bottom, the outcrop areas of each layer followed by the Upper Jackson, Lower Jackson, Upper Yegua, and Lower Yegua. Figure 5 illustrates the extent of the QCSP_s GAM and Figure 6 illustrates the extent of the YGJK GAM.

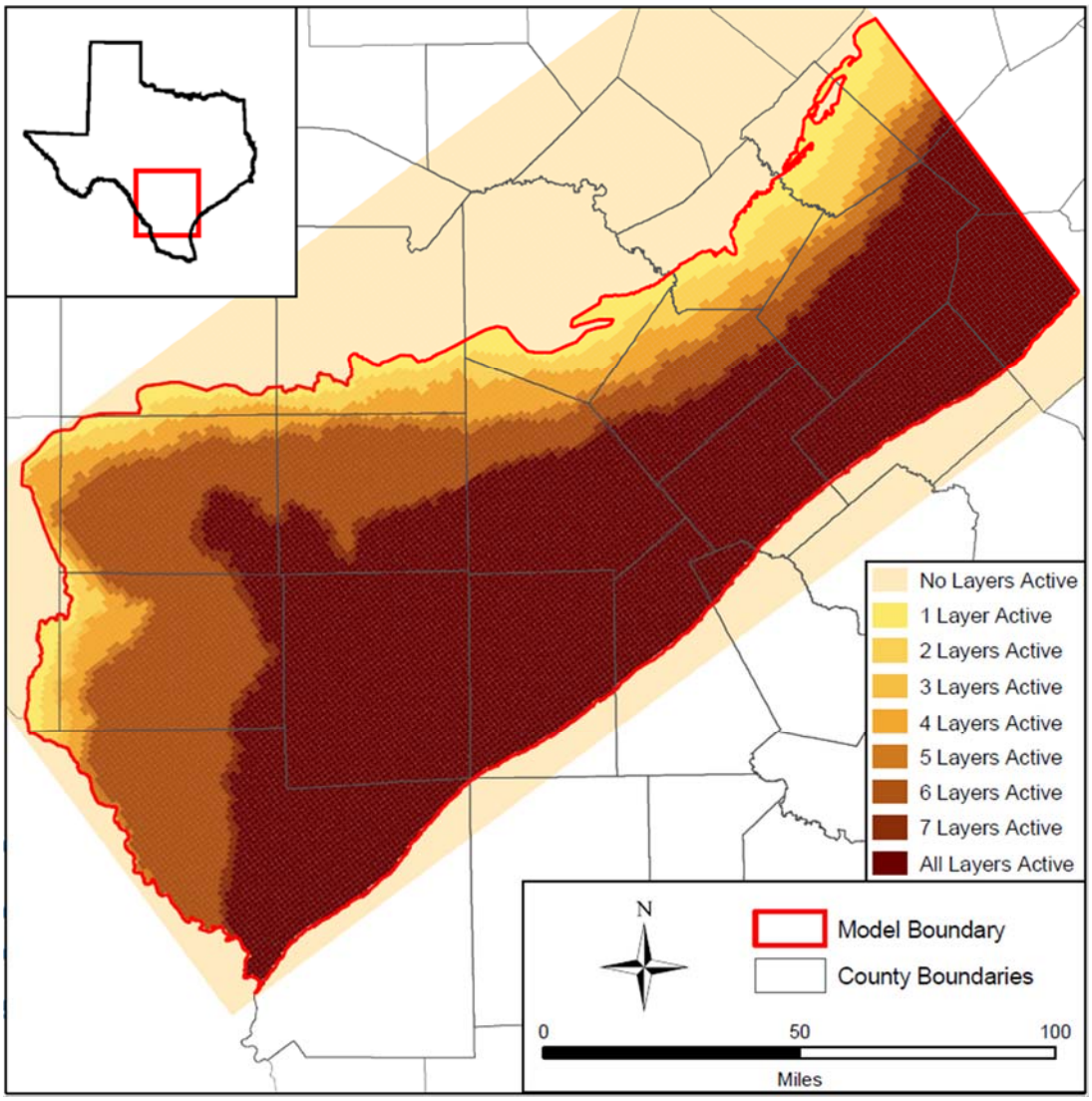

Figure 5. Extent of the Southern Portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers GAM (Kelley and others, 2004).

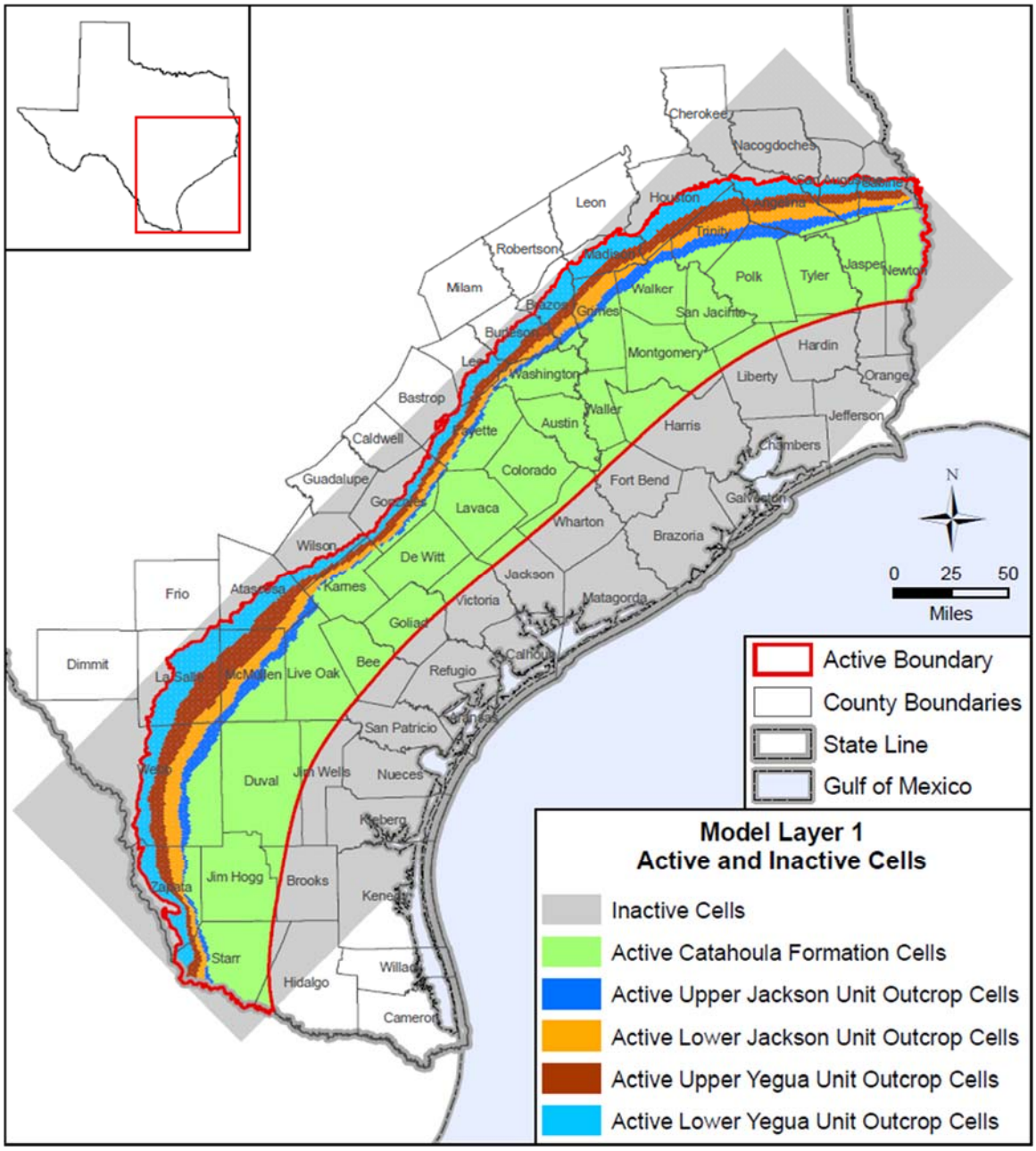

Figure 6. Extent of the Yegua-Jackson Aquifer GAM (Deeds and others, 2010).

Kelley and others (2004) calibrated the QCSP_s GAM through the end of 1999. Deed and others (2010) calibrated the YGJK GAM through the end of 1997. Oliver (2010) later extended the end date for the YGJK GAM through 2010. The predictive period of the QCSP_s GAM begins with the year 2000 while the predictive period of the YGJK GAM begins with the year 2011. During 2016 joint planning, the predictive period for both models ended in 2070 (Hutchison, 2017a; Hutchison, 2017c) and GMA 13 elected to extend the GAM input values for 2070 through 2080 so the end of the predictive period would coincide with regional water planning. In addition, GMA 13 extended

the work of Hutchison (2017b) and updated the pumping input values for the QCSP_s GAM for 2012-2016 to more accurately reflect estimated actual pumping during those years (see Appendix 4).

Kelley and others (2004) and Deeds and others (2010) calibrated the GAMs with the objective of matching available data as best as possible. By matching the available data, they deemed the GAMs to reasonably represent groundwater flow through the modeled hydrostratigraphic units. However, as discussed by Hutchison (2017a) there is ample evidence of error and uncertainty with the QCSP_s GAM with similar uncertainty associated with results from the YGJK GAM.

GMA 13 recognizes the uncertainty and error in the QCSP_s GAM results. In fact, this recognition is incorporated into the DFC statement as a preface to the first and secondary DFCs for the Carrizo-Wilcox, Queen City, and Sparta aquifers. In addition, GMA 13 incorporates variances on the average drawdown DFCs in recognition of the model uncertainty. While there is uncertainty in the GAM results, it is important to remember that any model will have some level of uncertainty.

SECTION 5: FACTOR CONSIDERATION

Texas Water Code 36.108(d) identifies factors districts must consider before voting on proposed DFCs. GMA 13 considered each of the required factors during open meetings. Table 9 lists the factors in Texas Water Code 36.108(d) and the meeting during which GMA 13 members considered each factor.

Table 9. GMA 13 meetings during which members considered factors enumerated in Texas Water Code 36.108(d) prior to voting on proposed DFCs.

Texas Water Code 36.108(d)	Consideration	Meeting Date
(1)	Aquifer uses/condition	02/07/2020
(2)	Water needs/strategies	02/07/2020
(3)	Hydrological conditions	06/26/2020; 02/05/2021
(4)	Environmental conditions	06/26/2020; 02/05/2021
(5)	Subsidence	11/11/2020
(6)	Socioeconomic impacts	11/11/2020
(7)	Private property	11/11/2020
(8)	DFC feasibility	02/05/2021
(9)	Other information	02/05/2021

Consideration of each factor included the preparation of a technical memorandum and a presentation during the GMA 13 meeting. Appendix 5 contains copies of the technical memoranda and presentations associated with each consideration. The following provides a brief summary of the information provided in each memorandum.

5.1 AQUIFER USES OR CONDITIONS

Appendix 5.1 and Appendix 5.2 provide detailed information regarding GMA 13's consideration of "aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another" (Texas Water Code 36.108(d)(1)). Most of the pumping in GMA 13 is from the Carrizo Aquifer followed by the Wilcox. Pumping amounts generally decline across the GMA from the north to south with the lowest pumping volumes coming from the Yegua-Jackson Aquifer along the southeast boundary of GMA 13.

Total groundwater pumping in GMA 13 was just over 350,000 acre-feet in 2011 and declined to about 250,000 acre-feet in 2016. Much of the difference in pumping is due to high pumping in Atascosa and Frio counties where the estimated 2016 pumping is about one-half the estimated 2011 pumping volume. Of the total use, irrigation was the dominant groundwater use within GMA 13 accounting for 54 percent of the estimated total annual use. Municipal or Public Supply was the second most common use followed by exempt use (combined domestic and livestock use). Most irrigation and public supply wells are completed in the Carrizo Aquifer.

5.2 WATER SUPPLY NEEDS AND WATER MANAGEMENT STRATEGIES

Appendix 5.3 and Appendix 5.4 provide detailed information regarding GMA 13's consideration of "the water supply needs and water management strategies included in the state water plan" (Texas Water Code 36.108(d)(2)). GMA 13 covers parts of Regional Water Planning Areas L, M, and N. According to the 2017 State Water Plan the projected demand for the counties within GMA 13 is 948,828 acre-feet in 2020 and increases to 1,149,496 acre-feet in 2070. Review of the adopted demand projections for the 2021 regional plans and 2022 State Water Plan shows that projected demand for the counties within GMA 13 is 970,054 acre-feet in 2020 and increases to 1,160,829 acre-feet in 2070.

Most of the projected water demand is in Bexar County where the 2070 demand is expected to be 471,297 acre-feet according to the adopted values for the 2022 State Water Plan. Projected 2070 demands in other counties in GMA 13 are significantly less and range from 1,978 acre-feet in McMullen County to 96,389 acre-feet in Webb County. To meet the projected water supply need, strategies that will utilize groundwater from Sparta, Queen City, Carrizo-Wilcox, or Yegua-Jackson total 65,656 acre-feet in 2070.

5.3 HYDROLOGICAL CONDITIONS

Appendix 5.5 and Appendix 5.6 provide detailed information regarding GMA 13's consideration of "hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge" (Texas Water Code 36.108(d)(3)). The total estimated recoverable storage for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers in GMA 13 is 2,747,027,800 acre-feet (Wade and Bradley, 2013). The most significant source of modeled outflow from the Carrizo-Wilcox, Queen City, and Sparta aquifers is pumping with significant inflows to the model from captured streamflow though the values are relative since the GAM is not designed to provide a robust simulation of the stream/aquifer interaction. The most significant source of modeled outflow from the Yegua-Jackson Aquifer is to streams. For the Yegua-Jackson Aquifer, modeled inflow from recharge averages more than 85,000 acre-feet per year within GMA 13 while modeled recharge to the Carrizo-Wilcox, Queen City, and Sparta aquifers averages about 205,000 acre-feet per year.

Estimated storage declines in the Carrizo-Wilcox, Queen City, and Sparta aquifers in GMA 13 are between approximately 180,000 and 230,000 acre-feet per year during the period from 2020 through 2080. Estimated storage declines in the Yegua- Jackson Aquifer are about 26,000 acre-feet per year during the period from 2020 through 2080. The storage reduction in each of the aquifers in GMA 13 is less than one percent of the aquifer's TERS value. Modeling results indicate the amount of water stored in Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers in GMA 13 will not be reduced significantly due to the predicted production.

5.4 ENVIRONMENTAL IMPACTS

Appendix 5.7 and Appendix 5.8 provide detailed information regarding GMA 13's consideration of "other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water" (Texas Water Code 36.108(d)(4)). Typically the primary environmental factor of interest is the impact of pumping on baseflows in rivers and streams. However, quantitative assessment of how pumping associated with potential desired future conditions may affect streamflow is not possible with the available tools.

Anaya and others (2016) conducted a study that included an assessment of the contribution of groundwater to surface water. The study results identified average annual groundwater discharge from the Carrizo-Wilcox, Queen City, and Sparta aquifers of about 170,000 acre-feet and from the Yegua-Jackson Aquifer of about 100,000 acre-feet occurring in the counties in GMA 13. While there may be some diminishment in groundwater contribution to streamflow due to declining water levels associated with pumping, the adopted DFCs are unlikely to have a measureable impact.

5.5 SUBSIDENCE IMPACTS

Appendix 5.9 and Appendix 5.10 provide detailed information regarding GMA 13's consideration of "impacts on subsidence" (Texas Water Code 36.108(d)(5)). As noted in the explanatory reports for the 2016 Joint Planning, land subsidence has not been an issue with the Sparta, Queen City, Carrizo-Wilcox, or Yegua-Jackson aquifers (Hutchison, 2017a; Hutchison, 2017c). While subsidence has not historically been an issue, that does not mean it has not or will not occur.

Clay thickness within the GMA 13 aquifers is typically less than 100 feet. Furnans and others (2018) characterize the clays of the Carrizo-Wilcox, Queen City, and Sparta aquifers as hard with the clays of the Yegua-Jackson Aquifer characterized as stiff. When water levels in the aquifers decline it causes a depressurization of the aquifer which releases water slowly from the clay layers. The slow dewatering of these clay layers causes the reorientation of the clay grains perpendicular to the vertical load causing aquifer compaction and land surface subsidence (Kasmarek, 2013). Much of GMA 13 has a low to medium risk for subsidence associated with groundwater pumping. Based on the aquifer characteristics, predicted water level declines and our available tools, we do not expect subsidence will become an issue within GMA 13 during the planning period.

5.6 SOCIOECONOMIC IMPACTS

Appendix 5.11 and Appendix 5.12 provide detailed information regarding GMA 13's consideration of "socioeconomic impacts reasonably expected to occur" (Texas Water Code 36.108(d)(6)). Regional and state water planning in Texas considers socioeconomic impacts as required by statute. To carry out this requirement, the TWDB staff prepares regional water planning analyses of social and economic impacts based on water supply needs from the regional water plans. The TWDB prepared information for use by all regional water planning groups for the 2021 regional water plans, including Regions L, M, and N, the three regional water planning groups that cover some portion of GMA 13. However, these analyses **do not** evaluate socioeconomic impacts of DFCs at the GMA level.

During 2016 joint planning, Hutchison (2017a; 2017c) referred to the socioeconomic reports developed by the TWDB. These reports quantified the socioeconomic impact of not meeting needs identified in the regional water plans. In addition, Hutchison (2017a; 2017c) pointed out that there are two active mitigation programs in GMA 13 that are in place to address impacts of groundwater development on local landowners.

The 2016 joint planning considerations remain applicable during the 2021 joint planning. To extend the considerations, GMA 13 prepared an estimate of the socioeconomic impact associated with the DFCs utilizing information developed by Dr. John Ellis (2019a; 2019b; 2019c) for the 2021 regional water plans for Regions L, M, and N. The highest projected income and job losses associated with groundwater strategies are for not meeting municipal needs.

5.7 PRIVATE PROPERTY RIGHTS

Appendix 5.13 and Appendix 5.14 provide detailed information regarding GMA 13's consideration of "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] Section 36.002" (Texas Water Code 36.108(d)(7)). Per Texas Water Code 36.002, "a landowner owns the groundwater below the surface of the landowner's land as real property." While a landowner owns the groundwater under the statute, the Texas Water Code does not entitle the landowner the right to capture a specific amount of groundwater.

The GMA 13 members considered the impact on private property rights within the context of the inclusion of proposed water management strategies in the adopted pumping scenarios used in the model simulations that are the basis for the desired future condition. GMA 13 worked to include all proposed water management strategies using groundwater resources in the model simulations. As discussed during GMA 13 meetings on November 8, 2019 and February 7, 2020, not all pumping inputs are realized in the final model outputs due to the model limitations. However, the GMA 13 sought to provide landowners or lessees the opportunity to produce the groundwater beneath their property.

With regard to private property rights and the ownership of groundwater, the DFCs adopted by GMA 13 do not appear to create a restriction on a landowner's ability to produce their groundwater to meet projected beneficial use demands. With the DFCs being based on the model results using pumping scenarios that include projected demands, it does not appear that there would be any significant impact on private property rights.

5.8 ACHIEVEMENT FEASIBILITY

Appendix 5.15 and Appendix 5.16 provide detailed information regarding GMA 13's consideration of "the feasibility of achieving the desired future condition." (Texas Water Code 36.108(d)(8)). In practice the test for the reasonableness or feasibility of DFCs was whether or not they could be modeled with the TWDB adopted GAM for the aquifer. However, the feasibility of achieving the DFCs could also be considered relative to measured water levels.

In a well-calibrated model, the trends between measured and simulated water levels should be similar. Evaluation of the trend of water levels measured since January 1, 2000 indicates an average measured water-level trend for the Carrizo-Wilcox, Queen City, and Sparta aquifers ranges from a slight rise of 0.12 feet per year in Caldwell County to a decline of 8.77 feet per year in La Salle County. For GMA 13 as a whole, the average decline is nearly 2 feet per year for the Carrizo-Wilcox, Queen City, and Sparta aquifers. For the Yegua-Jackson Aquifer, the average measured water level decline trend was 0.76 feet per year. The average simulated water level decline trend for the Carrizo-Wilcox, Queen City, and Sparta aquifers is 1.23 feet per year less than the measured water level decline trend and it is 0.73 feet per year less for the Yegua-Jackson aquifer.

GMA 13 recognizes the importance of measured water levels and the use of the collected data to evaluate aquifer status relative to the adopted DFCs. Only through evaluation of real-world data are they able to determine the achievement of the DFCs (which are long-term management goals).

5.9 OTHER INFORMATION

The GMA 13 members did not identify other information beyond the previous eight considerations that was relevant to the DFCs.

SECTION 6: OTHER DESIRED FUTURE CONDITIONS CONSIDERED

GMA 13 also considered a secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers of 63 feet (+/- 5 feet) of average drawdown. This other DFC was considered based on a public comment letter submitted by Mr. David L. Earl within which he requested the secondary DFC be increased to 75 feet (+/- 5 feet). The 12-foot difference was due to a calculation error which was identified and corrected prior to consideration by the GMA 13 representatives.

Appendix 4 contains summaries of modeling and pumping scenarios reviewed during the 2021 Joint Planning by GMA 13. Besides the secondary DFC proposed by Mr. Earl which is discussed further in Appendix 6, GMA 13 did not consider other DFCs for the relevant aquifers.

SECTION 7: DISCUSSION OF OTHER RECOMMENDATIONS

GMA 13 representatives provided the public with the opportunity to comment on the DFC Joint Planning Process or recommend other DFCs during the joint planning meetings. Each District also held respective public hearings to discuss the Proposed DFCs with the public in their local service areas (

Table 4).

On May 11, 2021, each District in GMA 13 received a letter from Mr. David L. Earl "requesting the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area 13 to be an average drawdown of 75 feet (+/- 5 feet) for all of Groundwater Management Area 13 from the end of 2012 conditions through the year 2080" (included in Appendix 6.1). As identified in Mr. Earl's letter, Mr. Keester with LRE Water performed GAM simulations using the GMA 13 pumping file that represents the proposed DFCs for the Carrizo-Wilcox, Queen City, and Sparta aquifers and Mr. Earl reported the results of those simulations. During a meeting on June 11, 2021, GMA 13 received information regarding comments received from Mr. David L. Earl on the proposed DFCs for the Carrizo-Wilcox, Queen City, and Sparta aquifers (presentation included in Appendix 6.2). According to the presentation and discussed during the meeting, the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers would increase to no more than 67 feet of average drawdown, rather than 75 feet, depending upon the amount of pumping added at the location identified north of Laredo. Following the end of the comment period, GMA 13 received a letter dated November 5, 2021 from Legacy W.S.C. (included in Appendix 6.3) regarding the amount of pumping included within Webb County.

During the GMA 13 meetings on June 11, 2021, September 17, 2021, and November 19, 2021, District representatives discussed the request to include additional production in the pumping file used to represent the proposed DFCs. The GMA 13 representatives elected to not revise the proposed DFCs based on those discussions and the information presented as part of those discussions. Further information on these discussions, including summaries of public comments made during each meeting, is provided in Appendix 1.

SECTION 8: REFERENCES

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APPENDIX 1 —
2021 JOINT PLANNING MEETING NOTICES AND MINUTES

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Edwards Aquifer Authority, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD and McMullen GCD, will be held on **Thursday July 26, 2018 at 10:00 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann

Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Declaration of Quorum and Call Meeting to Order.
2. Welcome and Introductions.
3. Action on the Minutes of the November 21, 2016 Meeting.
4. Update/Report from the Texas Water Development Board.
5. Update/Presentations from GMA 13 stakeholders.
6. Discussion and action on selection of GMA 13 officers.
7. Discussion and action on current GMA 13 budget.
8. Discussion and action on a draft inter-local agreement for rules and cost sharing.
9. Discussion and action on using the TWDB Bracs Report/Model to better characterize the groundwater resources in GMA 13.
10. Discussion and action on issuing a Request for Proposal for GMA 13 consulting services.
11. GMA 13 Groundwater District Management Plan review and discussion.
    a. Evergreen UWCD
    b. Gonzales County UWCD
    c. Guadalupe County GCD
    d. Edwards Aquifer Authority
    e. Medina County GCD
    f. Uvalde County UWCD
    g. Wintergarden GCD
    h. Plum Creek GCD
    i. McMullen GCD
12. Discussion and action on setting up a similar rules committee.
13. Update to Schedule/Timeline of Activities.
14. Discuss future agenda items and/or set date for next meeting.
15. Public comment.
16. Adjournment.

THE ORIGINAL WAS

POSTED

JUN 27 2018

2:15 PM

SYLVIA SHEFFIELD

COUNTY CLERK, GONZALES COUNTY TEXAS

BY _____ DEPUTY

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized

by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

MINUTES

GROUNDWATER MANAGEMENT AREA 13
JULY 26, 2018 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present:	Ron Naumann, Guadalupe Co. GCD
	Greg Sengelmann, Gonzales Co. UWCD
	Daniel Meyers, Plum Creek CD
`	Russell Labus, Evergreen UWCD
	Lonnie Stewart, McMullen Co. GCD
	Diane Savage, Evergreen UWCD
	Ed Walker, Wintergarden GCD
	David Caldwell, Medina Co. GCD
	Victor Hilderbran, Uvalde Co. UWCD
Guests Present:	See Attached Sign in Sheet.
Agenda:	Attached.

Declaration of Quorum and Call Meeting to Order:

A quorum was present and Mr. Sengelmann called the meeting to order at 10:15 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the November 21, 2016 Meeting:

The minutes of the November 21, 2016 meeting were presented to the Members. Mr. Naumann moved to approve the minutes as presented. Mr. Stewart seconded the motion and there being no further discussion the motion carried unanimously.

Update and Report from TWDB:

Natalie Ballew from the Texas Water Development Board stated that the report, “Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence in Regard to Groundwater Pumping”, is available on the website as well as the Subsidence Prediction Tool.

Update/Presentations from GMA 13 Stakeholders:

David Caldwell said that with the legislation session coming up this is a good opportunity for stakeholders to express their concerns and or suggestions instead of having to go to Austin to do so.

Discussion and Action on Selection of GMA 13 Officers:

Mrs. Savage made the motion to keep the current officers. Mr. Caldwell seconded the motion and there being no further discussion the motion carried unanimously.

Chairman: Greg Sengelmann
Vice-Chairman: Lonnie Stewart
Treasurer: Russell Labus

Discussion and Action on Current GMA 13 Budget:

Item was tabled.

Discussion and Action on Draft Inter-Local Agreement for Rules and Cost Sharing:

There was some discussion on section 3.04 of the agreement to change that all action should be by unanimous vote to majority vote by the member districts.

Daniel Meyers stated that he took this interlocal agreement to his board and attorney. Mr. Meyers said that they agreed with the concept but had some questions and concerns with the structure of the agreement. Mr. Meyers mentioned that it was suggested that each district have their own separate agreement or contract with the technical consultant as well as payment for services.

Item was tabled.

Discussion and Action on using the TWDB Bracs Report/Model to better Characterize the Groundwater Resources in GMA 13:

Greg Sengelmann said he is not sure if the breakdown of brackish water can be done by the TWDB or if we should have our consultant work on this. Natalie Ballew stated that she will go back to the modeling team and see if this is possible with the current model and get back to us.

No action was taken. Item tabled.

Discussion and Action on Issuing a Request for Proposal for GMA 13 Consulting Services:

The members agreed that the proposal should include for three model runs to be done and any additional runs would be upon request of the individual district and add the breakdown of brackish water within the report. Mr. Sengelmann said he will revise the proposal and send a draft to all members.

No action was taken. Item tabled.

GMA 13 Groundwater District Management Plan Review and Discussion:

a. Evergreen UWCD
b. Gonzales County UWCD
c. Guadalupe County GCD
d. Edwards Aquifer Authority
e. Medina County GCD
f. Uvalde County UWCD
g. Wintergarden GCD
h. Plum Creek GCD
i. McMullen GCD

Greg Sengelmann asked all members if they have revised their management plan with the new DFC. At this moment none of the districts have updated or presented their management plan.

Discussion and Action on Setting up a Similar Rules Committee:

Lonnie Stewart said it will be good to set up a similar rules committee so that all districts within the same GMA are in agreement when it comes to rules. Mr. Stewart mentioned that Sarah with TAGD will be sending an excel spreadsheet to all districts to fill out and that way all can see what changes may need to be made in order to have similar rules.

Greg Sengelmann asked the stakeholders present whether they would like to set up their own committee in order to share their input with the GMA 13 members since the similar rules will affect them.

Item was tabled.

Update to Schedule/Timeline of Activities:

Greg Sengelmann suggested that we meet soon in order to approve the Proposal for Consultant and the Interlocal and Cost Sharing Agreements.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, October 12, 2018 at 10:00 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments

None.

Adjourn:

Mr. Hilderbran made the motion to adjourn. Mr. Naumann seconded the motion, and the motion carried unanimously.
There being no further business to come before the Members, Mr. Sengelmann adjourned the meeting at 11:13 a.m.

THE ORIGINAL WAS

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Edwards Aquifer Authority, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD and McMullen GCD, will be held on **Friday October 12, 2018 at 10:00 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann

Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Declaration of Quorum and Call Meeting to Order.
2. Welcome and Introductions.
3. Action on the Minutes of the July 26, 2018 Meeting.
4. Update/Report from the Texas Water Development Board.
5. Update/Presentations from GMA 13 stakeholders.
6. Discussion and action on a draft inter-local agreement for rules and cost sharing.
7. Discussion and action on issuing a Request for Proposal for GMA 13 consulting services.
8. Discussion and action on setting up a similar rules committee.
9. Update to Schedule/Timeline of Activities.
10. Discuss future agenda items and/or set date for next meeting.
11. Public comment.
12. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

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POSTED

SEP 2 1 2018

10:45 AM

SYLVIA SHEFFIELD

COUNTY CLERK, GONZALES COUNTY TEXAS

BY _____ DEPUTY

MINUTES

GROUNDWATER MANAGEMENT AREA 13
October 12, 2018 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present:	Ron Naumann, Guadalupe Co. GCD
	Greg Sengelmann, Gonzales Co. UWCD
	Daniel Meyers, Plum Creek CD
`	Russell Labus, Evergreen UWCD
	Lonnie Stewart, McMullen Co. GCD
	Diane Savage, Evergreen UWCD
	Ed Walker, Wintergarden GCD
	David Caldwell, Medina Co. GCD
	Victor Hilderbran, Uvalde Co. UWCD
Guests Present:	See Attached Sign in Sheet.
Agenda:	Attached.

Declaration of Quorum and Call Meeting to Order:

A quorum was present and Mr. Sengelmann called the meeting to order at 10:06 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the July 26, 2018 Meeting:

The minutes of the July 26, 2018 meeting were presented to the Members. Mr. Naumann moved to approve the minutes as presented. Mr. Stewart seconded the motion and there being no further discussion the motion carried unanimously.

Update and Report from TWDB:

Jean Perez with the TWDB mentioned that there will be a Water for Texas Conference on January 23-25, 2019 in Austin. Mr. Perez said that the TWDB is working hard on the Management Plans and that the Brackish Study is still moving along. Mr. Perez will be the administrative contact manager for the GAM.

Update/Presentations from GMA 13 Stakeholders:

The members briefly went over the spreadsheet created by the stakeholders listing member districts with their rules to compare. Uvalde County UWCD and Medina County GCD were inadvertently omitted from the list and will be added.

Discussion and Action on Draft Inter-Local Agreement for Rules and Cost Sharing:

Mr. Meyer stated that his board recommended to keep the agreement the same as it has been for previous years.

Mr. Hilderbran moved to keep the current agreement for cost sharing. Mr. Walker seconded the motion and there being no further discussion the motion carried unanimously.

Discussion and Action on Issuing a Request for Proposal for GMA 13 Consulting Services:

No action was taken. Discussion ensued on the need to present an RFQ before action can be taken on an RFP. Mr. Sengelmann stated that he will put together a list of tasks and a request for qualifications for consulting services so that we can move forward.

Discussion and Action on Setting up a Similar Rules Committee:

No action was taken. During discussion it was mentioned that one of the main issues is the different rules for production between all districts.

Update to Schedule/Timeline of Activities:

- Request for Qualifications.
- Request for Proposals.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, November 16, 2018 at 10:00 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments

None.

Adjourn:

Mr. Stewart made the motion to adjourn. Mr. Walker seconded the motion, and the motion carried unanimously.
There being no further business to come before the Members, Mr. Sengelmann adjourned the meeting at 11:05 a.m.

NOTICE OF OPEN MEETING

THE ORIGINAL WAS

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD and McMullen GCD, will be held on **Friday November 16, 2018 at 10:00 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann

Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

POSTED

NOV 01 2018

SYLVIA SHEFFIELD
COUNTY CLERK, GONZALES COUNTY TEXAS
BY _____ DEPUTY

1. Declaration of Quorum and Call Meeting to Order.
2. Welcome and Introductions.
3. Action on the Minutes of the October 12, 2018 Meeting.
4. Update/Report from the Texas Water Development Board.
5. Update/Presentations from GMA 13 stakeholders.
6. Discussion and action on issuing a Request for Proposal (RFP) for GMA 13 consulting services.
7. Discussion with stakeholders on the similar rules spreadsheet.
8. Update to Schedule/Timeline of Activities.
9. Discuss future agenda items and/or set date for next meeting.
10. Public comment.
11. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

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MINUTES

GROUNDWATER MANAGEMENT AREA 13
November 16, 2018 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyers, Plum Creek CD
` Russell Labus, Evergreen UWCD
Lonnie Stewart, McMullen Co. GCD
Diane Savage, Evergreen UWCD
Ed Walker, Wintergarden GCD
Victor Hilderbran, Uvalde Co. UWCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Declaration of Quorum and Call Meeting to Order:

A quorum was present and Mr. Sengelmann called the meeting to order at 10:06 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the October 12, 2018 Meeting:

The minutes of the October 12, 2018 meeting were presented to the Members. Mr. Walker moved to approve the minutes as presented. Mr. Stewart seconded the motion and there being no further discussion the motion carried unanimously.

Update and Report from TWDB:

Natalie Ballew mentioned that the RFQ for the Southern Carrizo GAM has been posted and the deadline to submit comments is December 20, 2018.

Update/Presentations from GMA 13 Stakeholders:

None.

Discussion and Action on Issuing a Request for Proposal (RFP) for GMA 13 Consulting Services:

Mr. Stewart made the motion to submit the Request for Proposal. Mr. Hilderbran seconded the motion, and the motion carried unanimously.

Discussion with Stakeholders on the Similar Rules Spreadsheet:

Michael Seymour with RW Harden stated that the spreadsheet has not had any further updates since the last meeting.

Update to Schedule/Timeline of Activities:

- RFP Selection
- Similar Rules Spreadsheet
- GMA 13 Budget
- Pumpage for GAM Runs.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, February 1, 2019 at 10:00 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments

Steve Seibert with SAWS asked if the RFP could be sent to all Stakeholders.

Adjourn:

Mr. Stewart made the motion to adjourn. Mr. Walker seconded the motion, and the motion carried unanimously.

There being no further business to come before the Members, Mr. Sengelmann adjourned the meeting at 10:36 a.m.

THE ORIGINAL WAS

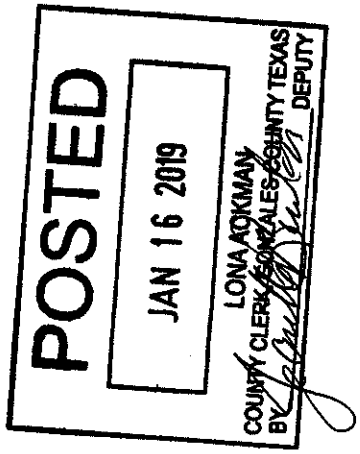
NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, February 1, 2019 at 10:00 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Declaration of Quorum and Call Meeting to Order.
2. Welcome and Introductions.
3. Action on the Minutes of the November 16, 2018 Meeting.
4. Update/Report from the Texas Water Development Board.
5. Presentation of RFP submittals for GMA 13 consulting services.
6. Discussion and action on selecting a consultant for GMA 13.
7. Discussion and action on setting a budget for DFC planning.
8. Discussion on defining negative impacts to the aquifers.
9. Discussion on the brackish water production zones.
10. Discussion on pumpage inputs for modeling DFCs.
11. Update/Presentations from GMA 13 stakeholders.
12. Discussion with stakeholders on the similar rules spreadsheet.
13. Update to Schedule/Timeline of Activities.
14. Discuss future agenda items and/or set date for next meeting.
15. Public comment.
16. Adjournment.



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MINUTES
GROUNDWATER MANAGEMENT AREA 13
FEBRUARY 1, 2019 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyer, Plum Creek CD
` Russell Labus, Evergreen UWCD
Lonnie Stewart, McMullen Co. GCD
Diane Savage, Evergreen UWCD
Ed Walker, Wintergarden GCD
Victor Hilderbran, Uvalde Co. UWCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 10:06 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the November 16, 2018 Meeting:

The minutes of the November 16, 2018 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Mr. Meyer seconded the motion and there being no further discussion the motion carried unanimously.

Update and Report from TWDB:

Natalie Ballew gave an update on the Southern Carrizo GAM. Ms. Ballew stated that they have received all Statements of Qualifications and are in the process of reviewing them.

Presentation of RFP Submittals for GMA 13 Consulting Services:

There was only one proposal submitted for GMA 13 consulting services, which was by LRE Water, LLC. Mike Keester with LRE gave a brief background of the company and a summary of services that will be performed.

Discussion and Action on Selecting a Consultant for GMA 13:

Mr. Stewart made a motion to select LRE Water, LLC for GMA 13 consulting services. Mr. Hilderbran seconded the motion and there being no further discussion the motion carried unanimously.

Discussion and Action on Setting a Budget for DFC Planning:

Mr. Labus provided a spreadsheet of the GMA 13 budget based on LRE Water, LLC's proposal. Mr. Hilderbran made the motion for each district to be invoiced the full amount according to the spreadsheet and that Melissa Gonzalez with the EUWCD would send out the invoices to each district. Mr. Walker seconded the motion and there being no further discussion the motion carried unanimously.

Discussion on Defining Negative Impacts to the Aquifers:

Discussion on the report, "Sources of Groundwater Pumpage in a Layered Aquifer System in the Upper Gulf Coastal Plain, USA."

Discussion on the Brackish Water Production Zones:

Discussion on the Brackish Report and House Bill 722.

Discussion on Pumpage Inputs for Modeling DFCs:

Mike Keester with LRE Water, LLC presented a spreadsheet of a draft schedule of the process for modeling DFCs.

Update/Presentations from GMA 13 Stakeholders:

No updates were presented.

Discussion with Stakeholders on the Similar Rules Spreadsheet:

Greg Sengelmann mentioned that he needs an update from Uvalde County UWCD to add the spreadsheet. James Bene stated that the two main points that they gather from the spreadsheet are spacing and allocation.

Update to Schedule/Timeline of Activities:

Mike Keester with LRE Water provided a timeline of activities.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, May 3, 2019 at 10:00 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:
There being no further business to come before the Members, Mr. Sengelmann adjourned the meeting at 11:21 a.m.

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, May 3, 2019 at 10:00 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Declaration of Quorum and Call Meeting to Order.
2. Welcome and Introductions.
3. Action on the Minutes of the February 1, 2019 Meeting.
4. Update/Brackish Water Presentation from the Texas Water Development Board.
5. Update/Presentations from GMA 13 stakeholders.
6. Discussion on pumpage inputs for modeling DFCs.
7. Discussion on Senate Bill 1010 and the similar rules spreadsheet.
8. Update to Schedule/Timeline of Activities.
9. Discuss future agenda items and/or set date for next meeting.
10. Public comment.
11. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

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MINUTES
GROUNDWATER MANAGEMENT AREA 13
MAY 3, 2019 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyer, Plum Creek CD
` Russell Labus, Evergreen UWCD
Lonnie Stewart, McMullen Co. GCD
Debbie Farmer, Wintergarden GCD
Victor Hilderbran, Uvalde Co. UWCD
David Caldwell, Medina Co. GCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 10:03 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the February 1, 2019 Meeting:

The minutes of the February 1, 2019 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Mr. Hildebran seconded the motion and there being no further discussion the motion carried unanimously.

Update/Brackish Water Presentation from the TWDB:

Mark Robinson with TWDB gave a PowerPoint presentation.

Update/Presentations from GMA 13 Stakeholders:

Steve Raabe mentioned that the San Antonio River Authority has been working with the USGS on a Groundwater and Surface Water Interaction Model and once complete would like the report presented at a GMA 13 meeting.

Discussion on Pumpage Inputs for Modeling DFCs:

A PowerPoint Presentation was given by Mike Keester with LRE Water.

Discussion on Senate Bill 1010 and Similar Rules Spreadsheet:

Greg Sengelmann said that if this Senate Bill passes he suggests that we look at all the different district's rules at the GMA 13 level then take back to each district's board. Mr. Sengelmann asked each member to go to their board and ask how they would like to pursue this.

Update to Schedule/Timeline of Activities:

Mike Keester with LRE Water asked for 2012-2016 pumping numbers, production amounts and permitted amounts be submitted by the end of May for all member districts.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

Agenda Item: Resolution to appoint Debbie Farmer with the Wintergarden GCD to the GMA 13 board.

The next meeting will be held on Friday, August 2, 2019 at 10:00 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Hilderbran made the motion to adjourn the meeting. Mr. Stewart seconded the motion, and there being no further business to come before the Members, Mr. Sengelmann adjourned the meeting at 11:10 a.m.

THE ORIGINAL WAS

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, August 2, 2019 at 10:00 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Declaration of Quorum and Call Meeting to Order.
2. Welcome and Introductions.
3. Action on the Minutes of the May 3, 2019 Meeting.
4. Update/Report from the Texas Water Development Board.
5. Update/Presentations from GMA 13 stakeholders.
6. Discussion on DFC pumpage inputs and modeling from GMA 13 consultant.
7. Update to Schedule/Timeline of Activities.
8. Discuss future agenda items and/or set date for next meeting.
9. Public comment.
10. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

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POSTED

JUL 22 2019
9:17

LONA ACKMAN
COUNTY CLERK, GONZALES COUNTY TEXAS
BY _____ DEPUTY

MINUTES
GROUNDWATER MANAGEMENT AREA 13
AUGUST 2, 2019 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyer, Plum Creek CD
` Russell Labus, Evergreen UWCD
Diane Savage, Evergreen UWCD
Victor Hilderbran, Uvalde Co. UWCD
Lonnie Stewart, McMullen Co. GCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 10:08 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the May 3, 2019 Meeting:

The minutes of the May 3, 2019 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Mrs. Vickers seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew mentioned that there will be a stakeholder meeting later today at 1:30 p.m. for those who would like to attend. Ms. Ballew said that the Groundwater Availability Model Group has received more funding and will be able to hire more staff and update the current models. Ms. Ballew stated that the Brackish Group has received an extension on the deadline for brackish studies and will also be hiring more staff.

Update/Presentations from GMA 13 Stakeholders:

Steve Raabe, with the San Antonio River Authority, mentioned that SARA has been working with USGS on a Groundwater/Surface Water Interaction Model for the San Antonio River Basin and would like to give a presentation at our next meeting.

Discussion on DFC Pumpage Inputs and Modeling from GMA 13 Consultant:

Mike Keester gave a slide presentation.

Update to Schedule/Timeline of Activities:

Mike Keester mentioned that at the next meeting he will present the updated modeling results and conduct additional model runs based on baseline numbers.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

- SARA/USGS Presentation

The next meeting will be held on Friday, November 8, 2019 at 10:00 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mrs. Vickers seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:47 a.m.

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, November 8, 2019 at 9:30 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann

Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on a resolution from Wintergarden Groundwater Conservation District for appointment of Debbie Farmer as the GMA 13 voting representative.
5. Action on the Minutes of the August 2, 2019 Meeting.
6. Update/Report from the Texas Water Development Board.
7. Update/Presentations from GMA 13 stakeholders.
8. Update/Report from GMA 13 Treasurer.
9. Discussion on DFC pumpage inputs and modeling from GMA 13 consultant.
10. Update to Schedule/Timeline of Activities.
11. Discuss future agenda items and/or set date for next meeting.
12. Public comment.
13. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

POSTED

OCT 25 2019

LONA ACKMAN

COUNTY CLERK, GONZALES COUNTY TEXAS

BY _____ DEPUTY

MINUTES
GROUNDWATER MANAGEMENT AREA 13
NOVEMBER 8, 2019 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyers, Plum Creek CD
` Russell Labus, Evergreen UWCD
Diane Savage, Evergreen UWCD
Victor Hilderbran, Uvalde Co. UWCD
Lonnie Stewart, McMullen Co. GCD
David Caldwell, Medina Co. GCD
Debbie Farmer, Wintergarden GCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:34 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on a Resolution from Wintergarden Groundwater Conservation District for Appointment of Debbie Farmer as the GMA 13 Voting Representative:

Mr. Hildebran moved to approve the resolution appointing Debbie Farmer as the GMA 13 voting representative for the Wintergarden GCD. Mr. Caldwell seconded the motion and there being no further discussion the motion carried unanimously.

Action on the Minutes of the August 2, 2019 Meeting:

The minutes of the August 2, 2019 meeting were presented to the Members. Ms. Vickers moved to approve the minutes as presented. Mr. Stewart seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

John Perez, Contract Manager, introduced the TWDB Modeling Group that were present.

Bill Hutchison spoke in regard to the letter from the TWDB modeling team requesting data or information related to the southern portions of the Queen City, Sparta, and Carrizo-Wilcox aquifers.

Update/Presentations from GMA 13 Stakeholders:

Ryan Banta gave a presentation, "Insights into Surface-Water/Groundwater Exchanges in the Guadalupe River, Texas, From Floating Geophysical Methods".

Update/Report from GMA 13 Treasurer:

Mr. Labus stated that all contributions from all members have been made and gave copies of the two invoices that have been paid since the last meeting.

Discussion on DFC Pumpage Inputs and Modeling from GMA 13 Consultant:

Mike Keester gave a slide presentation.

Update to Schedule/Timeline of Activities:

Mr. Keester said he is going to continue to revise pumping to address dry cells, consider reducing input if he is unable to address dry cells, and perform an aquifer equilibrium run.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

- SARA/USGS Presentation

The next meeting will be held on Friday, February 7, 2020 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mr. Hildebran seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:27 a.m.

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, February 7, 2020 at 9:30 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on the Minutes of the November 8, 2019 Meeting.
5. Update/Report from the Texas Water Development Board.
6. Update/Presentations from GMA 13 stakeholders.
7. Update/Report from GMA 13 Treasurer.
8. Discussion on DFC pumpage inputs/modeling and draft explanatory report from GMA 13 consultant.
9. Update to Schedule/Timeline of Activities.
10. Discuss future agenda items and/or set date for next meeting.
11. Public comment.
12. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

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POSTED
JAN 28 2020
8:45 AM
LONA ACKMAN
COUNTY CLERK, GONZALES COUNTY TEXAS
BY _____ DEPUTY

MINUTES
GROUNDWATER MANAGEMENT AREA 13
FEBRUARY 7, 2020 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyers, Plum Creek CD
` Russell Labus, Evergreen UWCD
Diane Savage, Evergreen UWCD
Victor Hilderbran, Uvalde Co. UWCD
Lonnie Stewart, McMullen Co. GCD
Debbie Farmer, Wintergarden GCD

Members Absent: David Caldwell, Medina Co. GCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:32 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the November 8, 2019 Meeting:

The minutes of the November 8, 2019 meeting were presented to the Members. Ms. Vickers moved to approve the minutes as presented. Mr. Stewart seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew mentioned that the Socioeconomic Impact Analysis Report is available on the TWDB website and that this month they will send the exempt use estimates.

Bill Hutchison gave an update on the GAM.

Update/Presentations from GMA 13 Stakeholders:

Linzy Foster gave the Presentation "Investigating Surface-Water/Groundwater Interaction for the Lower San Antonio River Basin".

Update/Report from GMA 13 Treasurer:

Mr. Labus gave an updated financial spreadsheet to all members and mentioned that two invoices have been paid to LRE Water since the November meeting.

Discussion on DFC Pumpage Inputs and Modeling from GMA 13 Consultant:

Mike Keester Presentations:

- Discussion of Modeling Related to Evaluations of Potential DFCs.
- Discussion of Aquifer Uses and Conditions.
- Discussion of Water Supply Needs and Water Management Strategies.

Update to Schedule/Timeline of Activities:

Mr. Keester stated that there will need to be additional scenarios that need to be ran, need to set pumping distribution and amounts, make revisions to modeling memo, and do a new equilibrium run.
Members asked if Mr. Keester can provide drawdown and pumpage numbers by each district.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, May 8, 2020 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mr. Hildebran seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:44 a.m.

An urgent public necessity exists requiring the Groundwater Management Area 13 Planning Committee to alter our meeting procedures due to COVID-19 pandemic. Notice is hereby given to all interested members of the public that the Groundwater Management Area 13 Planning Committee will hold a public meeting via audio and video conference call pursuant to Texas Government Code, Section 551.125, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas).

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, June 26, 2020 at 9:30 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

INSTRUCTIONS FOR PARTICIPATION IN GMA 13 PLANNING COMMITTEE MEETING

Audio and Video Conference Opens 5 minutes before 9:30 a.m.

Note: Participation via video conference is not required. If you plan on participating in the meeting during the public comment period please contact the District at 830-569-4186 or melissa.gonzalez@evergreenuwcd.org to register as a speaker. You may also register as a speaker at the beginning of the meeting. Registration as a speaker will require providing (1) first name; (2) last name; (3) email address, and (4) phone number. Any person participating in the meeting must be recognized and identified by the Chairman each time they speak.

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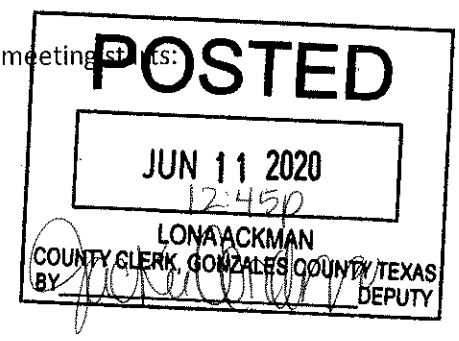

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on the Minutes of the February 7, 2020 Meeting.
5. Update/Report from the Texas Water Development Board.
6. Update/Presentations from GMA 13 stakeholders.
7. Update/Report from GMA 13 Treasurer.
8. Discussion on modeling and factors related to potential DFCs from GMA 13 consultant.
9. Update to Schedule/Timeline of Activities.
10. Discuss future agenda items and/or set date for next meeting.
11. Public comment.
12. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

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MINUTES
GROUNDWATER MANAGEMENT AREA 13
JUNE 26, 2020 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas. Due to the COVID-19 pandemic the meeting was also made available via audio and video conference call.

Members Present: Kelley Vickers, Guadalupe Co. GCD (online)
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyer, Plum Creek CD (online)
Russell Labus, Evergreen UWCD
Diane Savage, Evergreen UWCD (phone)
Victor Hilderbran, Uvalde Co. UWCD
Lonnie Stewart, McMullen Co. GCD (online)
Debbie Farmer, Wintergarden GCD (online)
David Caldwell, Medina Co. GCD (online)

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:33 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the Evergreen Underground Water Conservation Districts office. Members and Guests introduced themselves.

Action on the Minutes of the February 7, 2020 Meeting:

The minutes of the February 7, 2020 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Mr. Caldwell seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew said that there is a new DFC checklist and it is posted on the TWDB website. Ms. Ballew mentioned that Chuck Crawford, with the Recorder Well Program, has been working hard on the automated recorder equipment and now has some assistance from Fred Bertram from the Groundwater Monitoring Department. Ms. Ballew said that all members should have received the exempt use estimates and said that if there are any changes or feedback to contact John Perez. Ms. Ballew said that they are

launching a new Springs Program Initiative and said that if any members have a Spring in their district they would like checked to let them know, and have also launched Texas Water News Room on their website.

Steffan Schorr, with Montgomery & Associates, gave a slide presentation update on the GAM and mentioned that they are currently working heavily on the Conceptual Model and then will move on to the Numerical Model.

Update/Presentations from GMA 13 Stakeholders:

No update given.

Update/Report from GMA 13 Treasurer:

No update given.

Discussion on Modeling and Factors Related to Potential DFCs from GMA 13 Consultant:

Mike Keester said that he made some minor changes to pumping distributions on the model based on the information given by Lonnie Stewart. Mr. Keester gave a slide presentation on a few considerations in regard to the hydrological conditions.

Update to Schedule/Timeline of Activities:

Mike Keester said that for the next meeting he would like to take a look at other considerations based on the current modeling and look at a couple different scenarios the members would like to see modeled.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, August 7, 2020 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Hilderbran made the motion to adjourn the meeting. Mr. Stewart seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:16 a.m.

An urgent public necessity exists requiring the Groundwater Management Area 13 Planning Committee to alter our meeting procedures due to COVID-19 pandemic. Notice is hereby given to all interested members of the public that the Groundwater Management Area 13 Planning Committee will hold a public meeting via audio and video conference call pursuant to Texas Government Code, Section 551.125, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas).

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, November 13, 2020 at 9:30 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

INSTRUCTIONS FOR PARTICIPATION IN GMA 13 PLANNING COMMITTEE MEETING

Audio and Video Conference Opens 5 minutes before 9:30 a.m.

Note: Participation via video conference is not required. If you plan on participating in the meeting during the public comment period please contact the District at 830-569-4186 or melissa.gonzalez@evergreenuwcd.org to register as a speaker. You may also register as a speaker at the beginning of the meeting. Registration as a speaker will require providing (1) first name; (2) last name; (3) email address, and (4) phone number. Any person participating in the meeting must be recognized and identified by the Chairman each time they speak.

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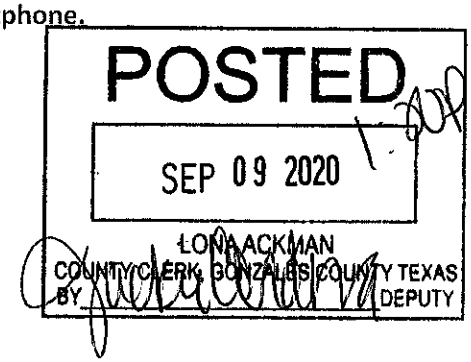

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At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on the Minutes of the June 26, 2020 Meeting.
5. Update/Report from the Texas Water Development Board.
6. Update/Presentations from GMA 13 stakeholders.
7. Update/Report from GMA 13 Treasurer.
8. Discussion on modeling and factors related to potential DFCs from GMA 13 consultant.
9. Update to Schedule/Timeline of Activities.
10. Discuss future agenda items and/or set date for next meeting.
11. Public comment.
12. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

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MINUTES
GROUNDWATER MANAGEMENT AREA 13
NOVEMBER 13, 2020 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas. Due to the COVID-19 pandemic the meeting was also made available via audio and video conference call.

Members Present: Kelley Vickers, Guadalupe Co. GCD (online)
Greg Sengelmann, Gonzales Co. UWCD (online)
Daniel Meyer, Plum Creek CD (online)
` Russell Labus, Evergreen UWCD
Diane Savage, Evergreen UWCD (phone)
Lonnie Stewart, McMullen Co. GCD (online)
Debbie Farmer, Wintergarden GCD (online)
David Caldwell, Medina Co. GCD (online)

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:32 a.m.

Welcome and Introductions:

Mr. Sengelmann welcomed the members to the online meeting of the GMA 13.

Action on the Minutes of the June 26, 2020 Meeting:

The minutes of the June 26, 2020 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Mrs. Savage seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew stated that there is a new checklist for the Explanatory Report that is posted on the TWDB website. Ms. Ballew mentioned that Chuck Crawford has left the agency and Andrew Weinberg has taken his place as Team Lead.

Update/Presentations from GMA 13 Stakeholders:

No update given.

Update/Report from GMA 13 Treasurer:

Mr. Labus gave a financial report. Report is attached.

Discussion on Modeling and Factors Related to Potential DFCs from GMA 13 Consultant:

Mike Keester gave an updated PowerPoint presentation. Presentation is attached.

Update to Schedule/Timeline of Activities:

Mr. Keester and the GMA members discussed the DFC schedule and timeline. No changes were needed at this time.

Discussion for Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, February 5, 2021 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mr. Sengelmann seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:16 a.m.

An urgent public necessity exists requiring the Groundwater Management Area 13 Planning Committee to alter our meeting procedures due to COVID-19 pandemic. Notice is hereby given to all interested members of the public that the Groundwater Management Area 13 Planning Committee will hold a public meeting via audio and video conference call pursuant to Texas Government Code, Section 551.125, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas).

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Greg Sengelmann
Administrator Groundwater Management Area 13

INSTRUCTIONS FOR PARTICIPATION IN GMA 13 PLANNING COMMITTEE MEETING

Audio and Video Conference Opens 5 minutes before 9:30 a.m.

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At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on the Minutes of the November 13, 2020 Meeting.
5. Update/Report from the Texas Water Development Board.
6. Update/Presentations from GMA 13 stakeholders.
7. Update/Report from GMA 13 Treasurer.
8. Discussion on modeling and factors related to potential DFCs from GMA 13 consultant.
9. Update to Schedule/Timeline of Activities.
10. Discuss future agenda items and/or set date for next meeting.
11. Public comment.
12. Adjournment.

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MINUTES
GROUNDWATER MANAGEMENT AREA 13
FEBRUARY 5, 2021 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas. Due to the COVID-19 pandemic the meeting was also made available via audio and video conference call.

Members Present: Kelley Vickers, Guadalupe Co. GCD (online)
Greg Sengelmann, Gonzales Co. UWCD (online)
Daniel Meyer, Plum Creek CD (online)
` Russell Labus, Evergreen UWCD
Diane Savage, Evergreen UWCD (phone)
Lonnie Stewart, McMullen Co. GCD (online)
Debbie Farmer, Wintergarden GCD (online)

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:32 a.m.

Welcome and Introductions:

Natalie Ballew introduced Even Strickland with the Conservation Innovation Water Technologies Group.

Action on the Minutes of the November 13, 2020 Meeting:

The minutes of the November 13, 2020 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Mrs. Savage seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew mentioned that in January the TWDB board adopted the 16 Regional Water Plans and are currently in the process of developing the 2022 State Water Plan. Ms. Ballew said that they adopted the Brackish Groundwater Production Zone Rules and will be developing guidance

on amending brackish groundwater production zones and will be soliciting public input. Ms. Ballew stated that the Statewide Survey for Aquifer Storage & Recovery Suitability Across the State is now published and available on the website. Ms. Ballew said that the Priority Groundwater Management Report was published and available on the TCEQ website. Ms. Ballew said that they are accepting applications for the Agriculture Conservation Grant through next week.

Evan Strickland gave an Edwards-Trinity Aquifer Brackish Groundwater Study presentation.

Update/Presentations from GMA 13 Stakeholders:

Bill Hutchison gave an update on the Southern Carrizo GAM and said the draft conceptual report has been submitted and is available on the TWDB website. Mr. Hutchison mentioned that there will be a Stakeholder meeting on March 4, 2021 and encourages anyone who will join the meeting to review the report beforehand. Mr. Hutchison said that the deadline for comment is March 18, 2021 and the deadline for the Preliminary Model Grid is June 30, 2021 which both will be submitted to the TWDB.

Update/Report from GMA 13 Treasurer:

Mr. Labus gave a financial report. Report is attached.

Discussion on Modeling and Factors Related to Potential DFCs from GMA 13 Consultant:

Mike Keester gave an updated PowerPoint presentation. Presentation is attached.

Update to Schedule/Timeline of Activities:

- Recommends continuing to declare the Trinity, Edwards, and Gulf Coast Aquifers as nonrelevant for GMA 13 joint planning purposes.
- Provide brief memo summarizing modeling results.
- Next Meeting-Mid-March.
- Address any remaining questions.
- Take information to boards for discussion.
- Adopt Proposed DFC by May 1, 2021.

Discuss Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, March 19, 2021 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mrs. Savage seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:42 a.m.

MINUTES
GROUNDWATER MANAGEMENT AREA 13
MARCH 19, 2021 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas. Due to the COVID-19 pandemic the meeting was also made available via audio and video conference call.

Members Present: Kelley Vickers, Guadalupe Co. GCD (online)
Greg Sengelmann, Gonzales Co. UWCD (online)
Daniel Meyer, Plum Creek CD (online)
Diane Savage, Evergreen UWCD (phone)
Lonnie Stewart, McMullen Co. GCD (online)
Debbie Farmer, Wintergarden GCD (online)

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:32 a.m.

Welcome and Introductions:

There were no new attendees.

Action on the Minutes of the February 5, 2021 Meeting:

The minutes of the February 5, 2021 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Ms. Vickers seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew gave a reminder for those members that have a Management Plan approval coming up this year to keep an eye out for an email from Steve Allen that includes the data packet and all the information you will need from the board that needs to be included with the Management Plan. Ms. Ballew encouraged all to be actively engaged in the prereview process because this will make the final approval of the Management Plan a lot faster.

Update/Presentations from GMA 13 Stakeholders:

Bill Hutchison gave a model update. Mr. Hutchison mentioned that on March 4, 2021 the second Stakeholder Advisory Forum meeting was held and the information from this meeting will be posted on the TWDB website. Mr. Hutchison said that the next deadline will be on June 30, 2021 and the interim draft model design will be submitted to the board. Mr. Hutchison stated that the model update is on schedule and the final report deadline is scheduled for June 30, 2022.

Update/Report from GMA 13 Treasurer:

There were no updates.

Discussion on Modeling and Factors Related to Potential DFCs from GMA 13 Consultant:

Mike Keester gave an updated PowerPoint presentation. Presentation is attached.

Discussion on Changing the Yegua-Jackson Aquifer DFC Start Date:

Mike Keester discussed changing the DFC start date to December 31, 2015 and extend to December 31, 2080.

Update to Schedule/Timeline of Activities:

- Approve Proposed DFCS

Discuss Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, April 23, 2021 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mr. Meyer seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:30 a.m.

THE ORIGINAL WAS

An urgent public necessity exists requiring the Groundwater Management Area 13 Planning Committee to alter our meeting procedures due to COVID-19 pandemic. Notice is hereby given to all interested members of the public that the Groundwater Management Area 13 Planning Committee will hold a public meeting via audio and video conference call pursuant to Texas Government Code, Section 551.125, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas).

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, March 19, 2021 at 9:30 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

INSTRUCTIONS FOR PARTICIPATION IN GMA 13 PLANNING COMMITTEE MEETING

Audio and Video Conference Opens 5 minutes before 9:30 a.m.

Note: Participation via video conference is not required. If you plan on participating in the meeting during the public comment period please contact the District at 830-569-4186 or melissa.gonzalez@evergreenuwcd.org to register as a speaker. You may also register as a speaker at the beginning of the meeting. Registration as a speaker will require providing (1) first name; (2) last name; (3) email address, and (4) phone number. Any person participating in the meeting must be recognized and identified by the Chairman each time they speak.

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POSTED
MAR 05 2021
1:10 pm
LONA ACKMAN
COUNTY CLERK, GONZALES COUNTY TEXAS
BY _____ DEPUTY

THE ORIGINAL WAS

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on the Minutes of the February 5, 2021 Meeting.
5. Update/Report from the Texas Water Development Board.
6. Update/Presentations from GMA 13 stakeholders.
7. Update/Report from GMA 13 Treasurer.
8. Discussion on modeling and factors related to potential DFCs from GMA 13 consultant.
9. Discussion on changing the Yegua-Jackson Aquifer DFC start date.
10. Update to Schedule/Timeline of Activities.
11. Discuss future agenda items and/or set date for next meeting.
12. Public comment.
13. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

POSTED

MAR 05 2021

1:10 p.m.

LONA ACKMAN

COUNTY CLERK, GONZALES COUNTY TEXAS

BY _____ DEPUTY

An urgent public necessity exists requiring the Groundwater Management Area 13 Planning Committee to alter our meeting procedures due to COVID-19 pandemic. Notice is hereby given to all interested members of the public that the Groundwater Management Area 13 Planning Committee will hold a public meeting via audio and video conference call pursuant to Texas Government Code, Section 551.125, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas).

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, April 23, 2021 at 9:30 a.m.** at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

INSTRUCTIONS FOR PARTICIPATION IN GMA 13 PLANNING COMMITTEE MEETING

Audio and Video Conference Opens 5 minutes before 9:30 a.m.

Note: Participation via video conference is not required. If you plan on participating in the meeting during the public comment period please contact the District at 830-569-4186 or melissa.gonzalez@evergreenuwcd.org to register as a speaker. You may also register as a speaker at the beginning of the meeting. Registration as a speaker will require providing (1) first name; (2) last name; (3) email address, and (4) phone number. Any person participating in the meeting must be recognized and identified by the Chairman each time they speak.

POSTED
MAR 30 2021
10:00 AM
LONA ACKMAN
COUNTY CLERK, GONZALES COUNTY TEXAS
BY _____ DEPUTY

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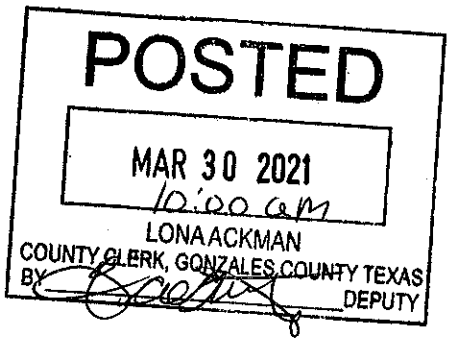
At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on the Minutes of the March 19, 2021 Meeting.
5. Update/Report from the Texas Water Development Board.
6. Update/Presentations from GMA 13 stakeholders.
7. Update/Report from GMA 13 Treasurer.
8. Discussion on modeling and factors related to potential DFCs from GMA 13 consultant.
9. Discussion and possible action to propose the Edwards, Gulf Coast, and Trinity Aquifers not relevant for purposes of joint planning.
10. Discussion and possible action on proposed Desired Future Conditions for the following aquifers within the boundaries of GMA 13:
    - Carrizo-Wilcox, Queen City, and Sparta Aquifers
    - Yegua-Jackson Aquifers
11. Update to Schedule/Timeline of Activities.
12. Discuss future agenda items and/or set date for next meeting.
13. Public comment.
14. Adjournment.



The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

MINUTES
GROUNDWATER MANAGEMENT AREA 13
APRIL 23, 2021 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas. Due to the COVID-19 pandemic the meeting was also made available via audio and video conference call.

Members Present: Kelley Vickers, Guadalupe Co. GCD (online)
Greg Sengelmann, Gonzales Co. UWCD (online)
Daniel Meyer, Plum Creek CD (online)
David Caldwell, Medina Co. GCD (online)
Lonnie Stewart, McMullen Co. GCD (online)
Debbie Farmer, Wintergarden GCD (online)
Russell Labus, Evergreen UWCD (online)

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:37 a.m.

Welcome and Introductions:

There were no new attendees.

Action on the Minutes of the March 19, 2021 Meeting:

The minutes of the March 19, 2021 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Mr. Meyer seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew mentioned that the 2022 State Water Plan has been released to the public in draft form and is posted online. The comment period on the draft will be open until May 26, 2021.

Update/Presentations from GMA 13 Stakeholders:

Bill Hutchison mentioned that Mr. Meyer sent him some materials that Feathers put together and compared these materials to see how much has already been put into the model. Mr. Hutchison said that the deadline to submit the model framework is due at the end of June.

Update/Report from GMA 13 Treasurer:

Mr. Labus gave an update report and stated that there has been one new invoice paid since the last meeting and at this time the total paid to LRE is $33,518.75.

Discussion on Modeling and Factors Related to Potential DFCs from GMA 13 Consultant:

Mike Keester gave an updated PowerPoint presentation. Presentation is attached.

Discussion and Possible Action to Propose the Edwards, Gulf Coast, and Trinity Aquifers not relevant for Purposes of Joint Planning:

Ms. Vickers moved to propose the Edwards, Gulf Coast, and Trinity Aquifers as not relevant for purposes of joint planning. Mr. Caldwell seconded the motion, and there being no further discussion the motion passed.

Discussion and Possible Action on Proposed Desired Future Conditions for the Following Aquifers Within the Boundaries of GMA 13:

- **Carrizo-Wilcox, Queen City, and Sparta Aquifers**
- **Yegua-Jackson Aquifers**

Mr. Stewart moved to approve the proposed Desired Future Conditions for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers. Mr. Labus seconded the motion, and there being no further discussion the motion passed.

Update to Schedule/Timeline of Activities:

- Mail Proposed DFCs to the Districts
- 90 Day Public Comment Period
- Compile Relevant Comments
- Public Hearings
- Adopt DFCs

Discuss Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, September 17, 2021 at 9:30 a.m. by Video Conference/Phone or at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mr. Meyer seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 10:08 a.m.

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on Friday, June 11, 2021 at 9:30 a.m. at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Greg Sengelmann
Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Action on the Minutes of the April 23, 2021 Meeting.
5. Update/Report from the Texas Water Development Board.
6. Update/Presentations from GMA 13 stakeholders.
7. Discussion of comments received to date regarding potential DFCs from GMA 13 consultant.
8. Update to Schedule/Timeline of Activities.
9. Discuss future agenda items and/or set date for next meeting.
10. Public comment.
11. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

MINUTES
GROUNDWATER MANAGEMENT AREA 13
JUNE 11, 2021 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Greg Sengelmann, Gonzales Co. UWCD
Daniel Meyer, Plum Creek CD
Diana Savage, Evergreen UWCD
Lonnie Stewart, McMullen Co. GCD
Debbie Farmer, Wintergarden GCD
Russell Labus, Evergreen UWCD
Vic Hilderbran, Uvalde Co. UWCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Sengelmann called the meeting to order at 9:34 a.m.

Welcome and Introductions:

New Attendees: David Earl, Attorney and Francisco Hernandez, SAWS Intern

Action on the Minutes of the April 23, 2021 Meeting:

The minutes of the April 23, 2021 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Ms. Vickers seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew said that there are no new updates but will gladly answer any questions.

Update/Presentations from GMA 13 Stakeholders:

None.

Discussion of Comments Received to Date Regarding Potential DFCs from GMA 13 Consultant:

Mike Keester gave a PowerPoint presentation on comments received by Mr. Earl who represents the Walker family, landowners in Webb County. Presentation is attached.

Update to Schedule/Timeline of Activities:

No updates to schedule.

Discuss Future Agenda Items, and/or Set Date for Next Meeting:

The next meeting will be held on Friday, September 17, 2021 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Hilderbran made the motion to adjourn the meeting. Ms. Savage seconded the motion, and there being no further business to come before the members, Mr. Sengelmann adjourned the meeting at 11:15 a.m.

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on Friday, September 17, 2021 at 9:30 a.m. at the office of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.

Lonnie Stewart

Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order.
3. Welcome and Introductions.
4. Discussion and action on election of a new Administrator for GMA 13.
5. Action on the Minutes of the June 11, 2021 Meeting.
6. Update/Report from the Texas Water Development Board.
7. Update/Presentations from GMA 13 stakeholders.
8. Discussion and action on comments received to date regarding potential DFCs.
9. Appoint a representative to Region N, L, and M for GMA 13
10. Update to Schedule/Timeline of Activities.
11. Discuss future agenda items and/or set date for next meeting.
12. Public comment.
13. Adjournment.

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

MINUTES
GROUNDWATER MANAGEMENT AREA 13
SEPTEMBER 17, 2021 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Laura Martin, Gonzales Co. UWCD
Daniel Meyer, Plum Creek CD
Lonnie Stewart, McMullen Co. GCD
Debbie Farmer, Wintergarden GCD
Russell Labus, Evergreen UWCD
Vic Hilderbran, Uvalde Co. UWCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Mr. Stewart called the meeting to order at 9:33 a.m.

Welcome and Introductions:

All those in attendance introduced themselves.

Discussion and Action on Election of New Administrator for GMA 13:

Mr. Labus moved to appoint Kelly Vickers as the new administrator for GMA 13. Ms. Farmer seconded the motion, and there being no further discussion the emotion carried unanimously.

Action on the Minutes of the June 11, 2021 Meeting:

The minutes of the June 11, 2021 meeting were presented to the Members. Mr. Stewart moved to approve the minutes as presented. Ms. Farmer seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report from the TWDB:

Natalie Ballew mentioned that the State Water Plan is available online and asked that the Explanatory report be submitted in USB form.

Bill Hutchison gave an update on the model. The calibrated model will be done by the end of the year.

Update/Presentations from GMA 13 Stakeholders:

None.

Discussion and Action on Comments Received to Date Regarding Potential DFCs:

David Earl, with Earl & Associates, who represents the Walker Family in Webb County gave a presentation and water development update. Asking to amend the DFC to include up to 3500 acre feet pumping in Webb County. Mr. Earl also is asking to include the updated Webb County Project information in the GMA 13 Explanatory Report, Region M Water Plan, and in the State Water Plan.

Appoint a representative to Region N, L, and M for GMA 13:

Mr. Hilderbran moved to appoint Diane Savage to Region L, Debbie Farmer to Region M, and Lonnie Stewart to Region N. Mr. Stewart seconded the motion, and there being no further discussion the motion carried unanimously.

Update to Schedule/Timeline of Activities:

Mike Keester showed a slide of the schedule of activities.

Discuss Future Agenda Items, and/or Set Date for Next Meeting:

- Treasurer's Report

The next meeting will be held on Friday, November 19, 2021 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

Dean Davenport, Ranch Owner in Webb County asked if our decision will be made on only one pump test.

Arturo Garcia, Utilities Director for the City of Laredo, wanted to inform us that the city is in the process of developing and updating their water master plan and in that plan their consultant is evaluating alternate water sources, which includes groundwater.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Mr. Labus seconded the motion, and there being no further business to come before the members, Ms. Vickers adjourned the meeting at 10:24 a.m.

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CGD, and McMullen GCD, will be held on **Friday, November 19, 2021 at 9:30 a.m**. at the office of the Evergreen Underground Water Conservation District located at **110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.**

Kelley Vickers

Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order
3. Welcome and Introductions
4. Action on the Minutes of the meeting held September 17, 2021
5. Update/Report on Financials
6. Discuss/Review consultant LRE Water, LLC joint representation and invoices submitted by LRE Water, LLC, and possible action on same
7. Update/Report from the Texas Water Development Board
8. Update/Presentations from GMA 13 stakeholders
9. Update/Presentation from consultant on Desired Future Condition(s)
10. Discussion/review of summary submittals of public comments received on proposed DFCs
11. Review and Discussion on the Draft Explanatory Report
12. Discussion and possible action on adopting resolutions to declare the Edwards (Balcones Fault Zone), Gulf Coast, Trinity Aquifers, and the portion of the Yegua-Jackson within all but two counties (Gonzales and Karnes) not relevant for purposes of joint planning
13. Discussion and possible action on adopting resolutions for adoption of Desired Future Condition(s) for the following aquifers within the boundaries of GMA 13:
    a) Carrizo-Wilcox, Queen City, and Sparta Aquifers
    b) Yegua-Jackson Aquifer within Gonzales and Karnes Counties
14. Update to Schedule/Timeline of Activities
15. Discuss future agenda items and/or set date for next meeting
16. Public comment
17. Adjournment

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

MINUTES
GROUNDWATER MANAGEMENT AREA 13
NOVEMBER 19, 2021 – PLANNING COMMITTEE

The Regular Scheduled Meeting of the Planning Committee of the Groundwater Management Area 13 was held, pursuant to notice, at the Evergreen Underground Water Conservation District Office, 110 Wyoming Blvd., Pleasanton, and Atascosa County, Texas.

Members Present: Kelley Vickers, Guadalupe Co. GCD
Laura Martin, Gonzales Co. UWCD
Daniel Meyer, Plum Creek CD
Diana Savage, Evergreen UWCD
Lonnie Stewart, McMullen Co. GCD
Debbie Farmer, Wintergarden GCD
Russell Labus, Evergreen UWCD
Vic Hilderbran, Uvalde Co. UWCD

Guests Present: See Attached Sign in Sheet.

Agenda: Attached.

Public Comment:

None.

Declaration of Quorum and Call Meeting to Order:

A quorum was present, and Ms. Vickers called the meeting to order at 9:33 a.m.

Welcome and Introductions:

Kelley Vickers welcomed all present.

Action on the Minutes of the September 17, 2021 Meeting:

The minutes of the September 17, 2021 meeting were presented to the Members. Mr. Stewart moved to approve the minutes with corrections. Mr. Hildebran seconded the motion and there being no further discussion the motion carried unanimously.

Update/Report on Financials:

Mr. Labus presented the financial report. Report attached. Mr. Stewart moved to approve the financial report. Ms. Farmer seconded the motion and there being no further discussion the motion carried unanimously.

Discuss/Review Consultant LRE Water, LLC Joint Representation and Invoices Submitted by LRE Water, LLC and Possible Action on Same:

Peter Gregg, attorney representing the Wintergarden GCD, stated that there is a conflict of interest in regard to LRE Water, LLC representing both the GMA 13 and Earl & Associates and landowners in Webb County. Mr. Gregg also asked if the previous invoiced paid to LRE Water included work done for Earl & Associates. Mike Keester said no that the invoice was only for task 12 which just included the comments from Earl & Associates.

Jordan Fernans, with LRE Water, said that they have did their best to keep both parties happy and to have no conflict. He is personally working with Earl & Associates and Webb County landowners and Mike Keester is working with the GMA 13.

Ms. Farmer stated that she feels there is potential for conflict of interest and that there should have been some kind of letter of transparency from LRE Water stating they were working with both parties. Ms. Farmer made the motion that LRE Water discontinue working for Earl & Associates while working for GMA 13 as the work relate to the DFCs. Motion dies without a second motion.

Mr. Earl interrupted with a Point of Order claiming this item was a non-action item.

Members discussed that in the future contracts and agreements should include a conflict-of-interest disclosure statement.

Update/Report from the TWDB:

Natalie Ballew mentioned that the Recorder Program is looking for sites for monitor wells. Ms. Ballew said that the TWDB is under sunset review and open for comments until December 15, 2021.

Bill Hutchison said that they are doing the calibration of the model and the deadline to turn in the draft calibrated model is at the end of January.

Update/Presentations from GMA 13 Stakeholders:

None.

Update/Presentation from Consultant on Desired Future Conditions:

Mike Keester said there was nothing new to report and that he is summarizing all comments and submit the Explanatory report on January 18, 2022.

Discussion/Review on Summary Submittals of Public Comments Received on Proposed DFCs:

Dean Davenport, landowner in Webb County asked Ms. Farmer for the DFCs for the Wintergarden GCD in acre feet. Ms. Farmer stated she did not know that at this moment but could get the information.

DJ Brask said that he was concerned that the GMA would restrict his future pumping.

David Earl, with Earl & Associates, stated that the Legacy WSC in Webb County is asking to increase the DFCs from 30,000 to 50,000 acre feet.

Review/Discussion on the Explanatory Report:

Mr. Hildebran made the motion to include in the Explanatory Report that LRE Water, LLC was performing consulting work for both the landowners in Webb County and the GMA 13 at the same time. Ms. Farmer seconded the motion, and there being no further discussion the motion carried unanimously.

Discussion/Possible Action on Adopting Resolutions to Declare the Edwards (Balcones Fault Zone), Gulf Coast, Trinity Aquifers, and the Portion of the Yegua-Jackson within all but Two Counties (Gonzales and Karnes) not Relevant for Purposes of Joint Planning:

Mr. Stewart moved to adopt. Mr. Hildebran seconded the motion, and there being no further discussion the motion carried unanimously.

Discussion/Possible Action on Adopting Resolutions for Adoption of Desired Future Conditions for the Following Aquifers within the Boundaries of GMA 13:

a. **Carrizo-Wilcox, Queen City, and Sparta Aquifers:**
   Mr. Stewart moved to postpone this item. Motion died for lack of a second motion. Mr. Hildebran moved to adopt. Ms. Savage seconded the motion, and there being no further discussion the motion passed.
b. **Yegua-Jackson Aquifer within Gonzales and Karnes Counties:**
   Ms. Martin moved to adopt. Ms. Savage seconded the motion, and there being no further discussion the motion carried unanimously.

Update to Schedule/Timeline of Activities:

No updates to schedule.

Discuss Future Agenda Items, and/or Set Date for Next Meeting:

- Draft Explanatory Report
- Conflict of Interest Statement om Future Contracts/Agreements

The next meeting will be held on Friday, January 14, 2022 at 9:30 a.m. at the Evergreen Underground Water Conservation District office located at 110 Wyoming Blvd., Pleasanton, TX 78064.

Public Comments:

None.

Adjourn:

Mr. Stewart made the motion to adjourn the meeting. Ms. Savage seconded the motion, and there being no further business to come before the members, Ms. Vickers adjourned the meeting at 11:05 a.m.

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NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 13 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen UWCD, Gonzales County UWCD, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Wintergarden GCD, Plum Creek CD, and McMullen GCD, will be held on **Friday, January 14, 2022 at 9:30 a.m**. at the office of the Evergreen Underground Water Conservation District located at **110 Wyoming Blvd., Pleasanton, Atascosa County, Texas.**

Kelley Cochran

Administrator Groundwater Management Area 13

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Public Comment
2. Declaration of Quorum and Call Meeting to Order
3. Welcome and Introductions
4. Action on the Minutes of the meeting held November 19, 2021
5. Update/Report on Financials
6. Update/Report from the Texas Water Development Board
7. Update/Presentations from GMA 13 stakeholders
8. Update/Presentation from consultant on Desired Future Condition(s)
9. Discussion and possible action to approve the 2021 Joint Planning Desired Future Conditions Explanatory Report
10. Discussion and possible action to approve Resolution 01142022 re: inclusion of potential conflict of interest statement in future contracts/agreements
11. Update to Schedule/Timeline of Activities
12. Discuss future agenda items and/or set date for next meeting
13. Public comment
14. Adjournment

RECEIVED
2021 DEC 29 AM 11:59
TERESA KIEL
COUNTY CLERK GUADALUPE COUNTY
BY

The Groundwater Management Area 13 Planning Committee reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.087 (Deliberations Regarding Economic Development Negotiations).

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call 830.569.4186 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

APPENDIX 2 —
RESOLUTION TO ADOPT THE DESIRED FUTURE CONDITIONS FOR GROUNDWATER MANAGEMENT AREA 13

Groundwater Management Area 13
Resolution 21-01

Declaration that the Edwards (Balcones Fault Zone), Gulf Coast, and Trinity Aquifers Are Not Relevant for Purposes of Joint Planning in Groundwater Management Area 13

WHEREAS, Groundwater Conservation Districts (GCDs) located within or partially within Groundwater Management Area 13 (GMA 13) are required under Chapter 36.108, Texas Water Code to conduct joint planning and designate the Desired Future Conditions of aquifers within GMA 13 and;

WHEREAS, the Groundwater Conservation Districts located wholly or partially within GMA 13, as designated by the Texas Water Development Board, as of the date of this Resolution are: Evergreen Underground Water Conservation District, Gonzales County Underground Water Conservation District, Guadalupe County Groundwater Conservation District, Medina County Groundwater Conservation District, McMullen County Groundwater Conservation District, Plum Creek Conservation District, Uvalde County Underground Water Conservation District, Wintergarden Groundwater Conservation District.

WHEREAS, the Board Presidents or their Designated Representatives of GCDs in GMA 13 have met in various meetings and conducted joint planning in accordance with §36.108, Texas Water Code since September 2010; and

WHEREAS, the GMA 13 committee has received and considered Groundwater Availability Model runs and other technical advice regarding local aquifers, hydrology, geology, recharge characteristics, the nine factors set forth in §36.108(d) of the Texas Water Code, local groundwater demands and usage, population projections, total water supply and quality of water supply available from all aquifers within the respective GCDs, regional water plan water management strategies, ground and surface water interactions, that affect groundwater conditions through the year 2080; and

WHEREAS on this day of Nov. 19, 2021, at an open meeting duly noticed and held in accordance with law at the offices of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Texas, the GCDs within GMA 13, have voted, 7 districts favored, 0 districts opposed, 0 districts abstained to declare the Edwards (Balcones Fault Zone), Gulf Coast, and Trinity aquifers not relevant for the purposes of joint planning pursuant to Section 36.108 of the Texas Water Code and therefore not requiring the establishment of DFCs by GMA 13, nor the determination by the Texas Water Development Board (TWDB) of Modeled Available Groundwater (MAGs).

NOW THEREFORE BE IT RESOLVED, that Groundwater Management Area 13 does hereby document, record, and confirm the above-described declaration that the Edwards (Balcones Fault Zone), Gulf Coast, and Trinity Aquifers are not relevant for the purposes of joint planning and therefore not requiring the establishment of DFCs by GMA 13, nor the determination by the Texas Water Development Board (TWDB) of Modeled Available Groundwater (MAGs) for those aquifers in GMA 13, approved by the following votes of the Designated Representatives of Groundwater Conservation Districts present and voting on Nov. 19, 2021.

FAVORED

Diane Savage, Evergreen Underground Water Conservation District

Laura Martin, Gonzales County Underground Water Conservation District

Kelley Vickers, Guadalupe County Groundwater Conservation District

Not Present

David Caldwell, Medina County Groundwater Conservation District

Lonnie Stewart, McMullen County Groundwater Conservation District

Daniel Meyer, Plum Creek Conservation District

Vic Hildebran, Uvalde County Underground Water Conservation District

Debbie Farmer

Debbie Farmer, Wintergarden Groundwater Conservation District

OPPOSED

None

ABSTAINED

None

Groundwater Management Area 13
Resolution 21-02

Desired Future Conditions for the Carrizo-Wilcox, Queen City, and Sparta Aquifers in Groundwater Management Area 13

WHEREAS, Groundwater Conservation Districts (GCDs) located within or partially within Groundwater Management Area 13 (GMA 13) are required under Chapter 36.108, Texas Water Code to conduct joint planning and designate the Desired Future Conditions of aquifers within GMA 13 and;

WHEREAS, the Groundwater Conservation Districts located wholly or partially within GMA 13, as designated by the Texas Water Development Board, as of the date of this Resolution are: Evergreen Underground Water Conservation District, Gonzales County Underground Water Conservation District, Guadalupe County Groundwater Conservation District, Medina County Groundwater Conservation District, McMullen County Groundwater Conservation District, Plum Creek Conservation District, Uvalde County Underground Water Conservation District, Wintergarden Groundwater Conservation District.

WHEREAS, the Board Presidents or their Designated Representatives of GCDs in GMA 13 have met in various meetings and conducted joint planning in accordance with §36.108, Texas Water Code since September 2010; and

WHEREAS, the GMA 13 committee has received and considered Groundwater Availability Model runs and other technical advice regarding local aquifers, hydrology, geology, recharge characteristics, the nine factors set forth in §36.108(d) of the Texas Water Code, local groundwater demands and usage, population projections, total water supply and quality of water supply available from all aquifers within the respective GCDs, regional water plan water management strategies, ground and surface water interactions, that affect groundwater conditions through the year 2080; and

WHEREAS, the member GCDs of GMA 13, having given proper and timely notice, held an open meeting on 11-19-21 2021 at the offices of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Texas, to vote to adopt proposed Desired Future Conditions for the Carrizo-Wilcox, Queen City, and Sparta aquifers within the boundaries of GMA 13; and

WHEREAS, the member GCDs in which the Carrizo-Wilcox, Queen City, and Sparta aquifers are relevant for joint planning purposes held open meetings within each said district between April 30, 2021 and July 30, 2021 to take public comment on the proposed DFCs for that district; and

WHEREAS on this day of 11-19-21, at an open meeting duly noticed and held in accordance with law at the offices of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Texas, the GCDs within GMA 13, having considered at this meeting comments submitted to the individual districts during the comment period and at this meeting, have voted, 7 districts favored, 0 districts

opposed, 0 districts abstained to adopt the following DFCs for in the following counties and districts through the year 2080 as follows:

Due to limitations of the Groundwater Availability model for the Southern Portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers identified and discussed during 2016 (Hutchison, 2017a) and 2021 Joint Planning, Groundwater Management Area 13 proposes two desired future conditions for the Carrizo-Wilcox, Queen City, and Sparta aquifers as described below.

- The first desired future condition for the Carrizo-Wilcox, Queen City and Sparta aquifers in Groundwater Management Area 13 is that 75 percent of the saturated thickness in the outcrop at the end of 2012 remains at the end 2080. Due to limitations of the current Groundwater Availability Model, this desired future condition cannot be simulated as documented during 2016 Joint Planning in GMA 13 Technical Memorandum 16-08 (Hutchison, 2017d).

- In addition, a secondary desired future condition for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area 13 is an average drawdown of 49 feet (+/- 5 feet) for all of GMA 13. The drawdown is calculated from the end of 2012 conditions to the year 2080. This desired future condition is consistent with simulation "GMA13_2019_001" summarized during a meeting of Groundwater Management Area 13 members on March 19, 2021.

NOW THEREFORE BE IT RESOLVED, that Groundwater Management Area 13 does hereby document, record, and confirm the above-described Desired Future Conditions for the Carrizo-Wilcox, Queen City, and Sparta Aquifers which were adopted by vote of the following Designated Representatives of Groundwater Conservation Districts present and voting on Nov. 19, 2021.

FAVORED

Diane Savage, Evergreen Underground Water Conservation District

Laura Martin, Gonzales County Underground Water Conservation District

Kelley Vickers, Guadalupe County Groundwater Conservation District

Not Present

David Caldwell, Medina County Groundwater Conservation District

Lonnie Stewart, McMullen County Groundwater Conservation District

Daniel Meyer, Plum Creek Conservation District

Vic Hildebran, Uvalde County Underground Water Conservation District

Debbie Farmer, Wintergarden Groundwater Conservation District

OPPOSED

None

ABSTAINED

None

Groundwater Management Area 13
Resolution 21-03

Desired Future Conditions for the Yegua-Jackson Aquifer within Gonzales and Karnes Counties within Groundwater Management Area 13

WHEREAS, Groundwater Conservation Districts (GCDs) located within or partially within Groundwater Management Area 13 (GMA 13) are required under Chapter 36.108, Texas Water Code to conduct joint planning and designate the Desired Future Conditions of aquifers within GMA 13 and;

WHEREAS, the Groundwater Conservation Districts located wholly or partially within GMA 13, as designated by the Texas Water Development Board, as of the date of this Resolution are: Evergreen Underground Water Conservation District, Gonzales County Underground Water Conservation District, Guadalupe County Groundwater Conservation District, Medina County Groundwater Conservation District, McMullen County Groundwater Conservation District, Plum Creek Conservation District, Uvalde County Underground Water Conservation District, Wintergarden Groundwater Conservation District.

WHEREAS, the Board Presidents or their Designated Representatives of GCDs in GMA 13 have met in various meetings and conducted joint planning in accordance with §36.108, Texas Water Code since September 2010; and

WHEREAS, the GMA 13 committee has received and considered Groundwater Availability Model runs and other technical advice regarding local aquifers, hydrology, geology, recharge characteristics, the nine factors set forth in §36.108(d) of the Texas Water Code, local groundwater demands and usage, population projections, total water supply and quality of water supply available from all aquifers within the respective GCDs, regional water plan water management strategies, ground and surface water interactions, that affect groundwater conditions through the year 2080; and

WHEREAS, the member GCDs of GMA 13, having given proper and timely notice, held an open meeting on Nov. 19 2021 at the offices of the Evergreen Underground Water Conservation District located at 110 Wyoming Blvd., Pleasanton, Texas, to vote to adopt proposed Desired Future Conditions for the Yegua-Jackson Aquifer within Gonzales and Karnes Counties within the boundaries of GMA 13; and

WHEREAS, the member GCDs in which the Yegua-Jackson aquifer within Gonzales and Karnes Counties is relevant for joint planning purposes held open meetings within each said district between April 30, 2021 and July 30, 2021 to take public comment on the proposed DFCs for that district; and

WHEREAS on this day of 11-19-21, at an open meeting duly noticed and held in accordance with law at the offices of the Evergreen Underground Water Conservation District

located at 110 Wyoming Blvd., Pleasanton, Texas, the GCDs within GMA 13, having considered at this meeting comments submitted to the individual districts during the comment period and at this meeting, have voted, 7 districts favored, 0 districts opposed, 0 districts abstained in adoption of the following DFCs for in the following counties and districts through the year 2080 as follows:

- For Gonzales County, the average drawdown from the end of 2010 through 2080 is 3 feet (+/- 1 foot).
- For Karnes County, the average drawdown from the end of 2010 through 2080 is 1 foot (+/- 1 foot).
- For all other counties in Groundwater Management Area 13, the Yegua-Jackson is classified as not relevant for purposes of joint planning.

GMA 13 determined the Yegua-Jackson Aquifer as relevant for only Gonzales and Karnes counties. The Yegua-Jackson Aquifer overlies and is separated from the Sparta Aquifer by the Cook Mountain. The Cook Mountain is an aquitard that impedes the flow of groundwater between the aquifers. GMA 13 used the Groundwater Availability Model for the Yegua-Jackson Aquifer (Deeds and others, 2010) to evaluate DFCs. GMA 13 used the zone delineations per file "ygjk_grid_poly070920" to define the areas representing the GMA, counties, and each aquifer.

NOW THEREFORE BE IT RESOLVED, that Groundwater Management Area 13 does hereby document, record, and confirm the above-described Desired Future Conditions for the Yegua-Jackson Aquifer within Gonzales and Karnes Counties which were adopted by vote of the following Designated Representatives of Groundwater Conservation Districts present and voting on Nov. 19, 2021.

FAVORED

Diane Savage

Diane Savage, Evergreen Underground Water Conservation District

Laura Martin, Gonzales County Underground Water Conservation District

Kelley Vickers, Guadalupe County Groundwater Conservation District

Not Present

David Caldwell, Medina County Groundwater Conservation District

Lonnie Stewart, McMullen County Groundwater Conservation District

Daniel Meyer, Plum Creek Conservation District

Vic Hildebran, Uvalde County Underground Water Conservation District

Debbie Farmer, Wintergarden Groundwater Conservation District

OPPOSED

None

ABSTAINED

None

APPENDIX 3 —
GCD SUMMARY OF REPORTS OF INFORMATION RECEIVED DURING THE PUBLIC COMMENT PERIOD

NOTICE OF OPEN MEETING AND PUBLIC HEARING
REGULAR BOARD OF DIRECTORS MEETING
Wednesday, June 16, 2021 11:04 A. M.
1607 Avenue K Hondo, Texas
MINUTES

1. Call to Order
2. Public Comment: There were public comments sent by Earl & Associates.
3. PUBLIC HEARING

Groundwater Management Area 13
Proposed Desired Future Conditions and Relevant Aquifer Designations

June 16, 2021, 11:04a.m., at the Medina County Groundwater Conservation District boardroom

At an open meeting of the Groundwater Management Area 13 Joint Planning Committee (GMA-13) held on April 23, 2021 in a livestream meeting, and attended by representatives from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen Underground Water Conservation District, Gonzales County Underground Water Conservation District, Guadalupe County Groundwater Conservation District, McMullen Groundwater Conservation District, Medina County Groundwater Conservation District, Plum Creek Conservation District, and Wintergarden Groundwater Conservation District; GMA-13 considered and adopted the following Proposed Desired Future Conditions (DFCs) for GMA-13 regional groundwater planning purposes:

Groundwater Management Area 13 Proposed Desired Future Conditions and Relevant Aquifer Designations

- The first proposed desired future condition for the Carrizo-Wilcox/Queen City/Sparta Aquifers in Groundwater Management Area 13 is that 75 percent of the saturated thickness in the outcrop at the end of 2012 remains in 2070. This desired future condition is considered feasible despite model predictions to the contrary as detailed in GMA 13 Technical Memorandum 16-08.
- In addition, a secondary proposed desired future condition for the Carrizo-Wilcox/Queen City/Sparta Aquifers in Groundwater Management Area 13 is an average drawdown of 48 feet for all of GMA 13. The drawdown is calculated from the end of 2012 conditions to the year 2070.

This desired future condition is consistent with Scenario 9 as detailed in GMA 13 Technical Memorandum 16-01 and GMA 13 Technical Memorandum 16-08.

- The proposed desired future conditions for the Yegua-Jackson Aquifer in Groundwater Management Area 13 are summarized in GMA 13 Technical Memorandum 16-04 (Draft 1). For Gonzales County, the average drawdown from 2010 to 2070 is 3 feet, for Karnes County, the average drawdown from 2010 to 2070 is 1 foot, and for all other counties in GMA 13, the Yegua-Jackson is classified as not relevant for purposes of joint planning.
- The Trinity, Edwards, and Gulf Coast Aquifers are designated as non-relevant for all counties in GMA 13 for purposes of joint planning.

Members of the public are invited to attend and provide oral comment, testimony, and/or submit other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations to the Board of Directors at this Public Hearing.

If unable to attend the Public Hearing, members of the public are invited to submit written comments, testimony, and/or other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations to the Board of Directors at the District Office located at:

Medina County GCD
1607 Avenue K
Hondo, TX 78816

There is a standardized Public Comment Form to help you organize and substantiate your submission. This form is available at the address above. It is available at the Medina County GCD website in the information page http://www.medinagwcg.org/information.html

The Public Comment period runs from April 30, 2021 through July 30, 2021.

The District will prepare a report of any relevant comments received at the Public Hearing and attach any written comments, testimony, and/or other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations received through July 30, 2021. This report and attachments will be provided to the GMA-13 Committee for their review, consideration, and incorporation into the DFC decision-making process.

Questions or requests for additional information may be submitted to:

David Caldwell
General Manager
Medina County Groundwater Conservation District (GCD)
1607 Avenue K
Hondo, TX 78861

Phone: (830) 741-3162
Cell: (830) 741-9733
Fax: (830) 741-3540
e-mail: gmmcgcd@att.net

4. Adjournment

Respectfully submitted,

Robert J. Rothe
Secretary

Medina County Groundwater Conservation District

1607 Avenue K
Hondo, Texas 78861
Telephone 830-741-3162
Fax 830-741-3540

NOTICE OF OPEN MEETING AND PUBLIC HEARING
REGULAR BOARD OF DIRECTORS MEETING
Wednesday, June 16, 2021 11:04 A. M.
1607 Avenue K Hondo, Texas
AGENDA

1. Call to Order
2. Public Comment
3. PUBLIC HEARING

Groundwater Management Area 13 Proposed Desired Future Conditions and Relevant Aquifer Designations

June 16, 2021, 11:04a.m., at the Medina County Groundwater Conservation District boardroom

At an open meeting of the Groundwater Management Area 13 Joint Planning Committee (GMA-13) held on April 23, 2021 in a livestream meeting, and attended by representatives from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen Underground Water Conservation District, Gonzales County Underground Water Conservation District, Guadalupe County Groundwater Conservation District, McMullen Groundwater Conservation District, Medina County Groundwater Conservation District, Plum Creek Conservation District, and Wintergarden Groundwater Conservation District; GMA-13 considered and adopted the following Proposed Desired Future Conditions (DFCs) for GMA-13 regional groundwater planning purposes:

Groundwater Management Area 13 Proposed Desired Future Conditions and Relevant Aquifer Designations

- The first proposed desired future condition for the Carrizo-Wilcox/Queen City/Sparta Aquifers in Groundwater Management Area 13 is that 75 percent of the saturated thickness in the outcrop at the end of 2012 remains in 2070. This desired future condition is considered feasible despite model predictions to the contrary as detailed in GMA 13 Technical Memorandum 16-08.
- In addition, a secondary proposed desired future condition for the Carrizo-Wilcox/Queen City/Sparta Aquifers in Groundwater Management Area 13 is an average drawdown of 48 feet for all of GMA 13. The drawdown is calculated from the end of 2012 conditions to the year 2070.

This desired future condition is consistent with Scenario 9 as detailed in GMA 13 Technical Memorandum 16-01 and GMA 13 Technical Memorandum 16-08.

- The proposed desired future conditions for the Yegua-Jackson Aquifer in Groundwater Management Area 13 are summarized in GMA 13 Technical Memorandum 16-04 (Draft 1). For Gonzales County, the average drawdown from 2010 to 2070 is 3 feet, for Karnes County, the average drawdown from 2010 to 2070 is 1 foot, and for all other counties in GMA 13, the Yegua-Jackson is classified as not relevant for purposes of joint planning.
- The Trinity, Edwards, and Gulf Coast Aquifers are designated as non-relevant for all counties in GMA 13 for purposes of joint planning.

Members of the public are invited to attend and provide oral comment, testimony, and/or submit other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations to the Board of Directors at this Public Hearing.

If unable to attend the Public Hearing, members of the public are invited to submit written comments, testimony, and/or other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations to the Board of Directors at the District Office located at:

Medina County GCD
1607 Avenue K
Hondo, TX 78816

There is a standardized Public Comment Form to help you organize and substantiate your submission. This form is available at the address above. It is available at the Medina County GCD website in the information page http://www.medinagwcg.org/information.html

The Public Comment period runs from April 30, 2021 through July 30, 2021.

The District will prepare a report of any relevant comments received at the Public Hearing and attach any written comments, testimony, and/or other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations received through July 30, 2021. This report and attachments will be provided to the GMA-13 Committee for their review, consideration, and incorporation into the DFC decision-making process.

Questions or requests for additional information may be submitted to:

David Caldwell
General Manager
Medina County Groundwater Conservation District (GCD)
1607 Avenue K
Hondo, TX 78861

Phone: (830) 741-3162
Cell: (830) 741-9733
Fax: (830) 741-3540
e-mail: gmmcgcd@att.net

4. Adjournment

In this Notice of Open Meeting ("Notice"), the posting of an agenda item as a matter to be discussed in open session is not intended to limit or require discussion of that matter in open session if it is otherwise appropriate to discuss the matter in closed session. If, during the discussion of any agenda item, a

matter is raised that is appropriate for discussion in closed session the board may, as permitted by the Texas Open Meetings Act, adjourn into closed session to deliberate on the matter. Additionally, the posting of an agenda item as a matter to be discussed in closed session is not intended to limit or require discussion of that matter in closed session. In open session, the Board may discuss and take action on any matter for which notice has been given in this Notice, including an agenda item posted for closed session. In no event, however, will the Board take action on any agenda item in closed session, whether it is posted for open or closed session discussion.

CERTIFICATE AS TO POSTING TO GIVING OF NOTICE

On this 4th day of June, 2021, not later than 5:00 P. M., this notice was (1) posted on a bulletin board located at a place readily accessible and convenient to the public at the Medina County Courthouse, Hondo, Texas; (2) provided to the county clerk of Medina County; and (3) posted at the Medina County Groundwater Conservation District office.

David M. Caldwell

David Caldwell
General Manager

EARL & ASSOCIATES
attorneys at law

DAVID L. EARL
ATTORNEY AT LAW/SHAREHOLDER

MEGAN J. EARL
ATTORNEY AT LAW/SHAREHOLDER

May 11, 2021

GMA-13 Contact
c/o Medina County Groundwater Conservation District
1607 Avenue K
Hondo, TX 78861
gmmcgcd@att.net

RE: GMA 13 Desired Future Conditions for the Carrizo-Wilcox, Queen City, and Sparta aquifers

Dear GMA-13 Voting Member,

My firm represents a landowner in Webb County who is beginning the development of several thousand acres just a few miles north of the City of Laredo. As part of that development, we have begun the exploration and development of the groundwater resources from the Laredo Formation (that is, Sparta Aquifer) and Carrizo-Wilcox Aquifer. We have begun testing of the shallower formation and will conduct drilling and testing of the Carrizo-Wilcox Aquifer in the third quarter of this year.

Results of our initial investigations indicate groundwater resources are available beyond what the proposed secondary desired future condition (DFC) for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area (GMA) 13 reflects. Upon review of the documents used by the GMA 13 Joint Planning Committee in creating the proposed DFCs (http://bit.ly/GMA_13_3rd_Round), we believe inclusion of additional pumping from the Sparta and Carrizo layers within Webb County will not affect your first proposed DFC focusing on maintaining the saturated thickness in the outcrop. As such, we are requesting an increase in the secondary proposed desired future condition for the Carrizo-Wilcox, Queen City, and Sparta aquifers. **Specifically, we are requesting the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area 13 to be an average drawdown of 75 feet (+/- 5 feet) for all of Groundwater Management Area 13 from the end of 2012 conditions through the year 2080.**

As our work on developing groundwater resources is just beginning, we are expanding our awareness of the GMA joint planning process and how it ties in with regional water planning. We now understand how the work you are doing to develop DFCs will result in the modeled available groundwater (MAG) that the Region M planning group will use to consider possible strategies during the 2026 regional water planning cycle. In addition, we understand that certain funding options from the Texas Water Development Board

(TWDB) require that the strategy be included in the regional water plan. As such, we are requesting the change to the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers within GMA 13 for the purpose of ensuring the MAG values may include production associated with our development plans.

To determine the requested secondary DFC, Mr. Keester performed a series simulations with pumping added to the "GMA13_2019_001" simulation beginning in the year 2025 and continuing through the year 2080. The pumping simulations Mr. Keester performed are summarized in Table 1 along with the resulting GMA 13 average drawdown. As shown in Table 1, our requested change to the secondary DFC falls within the range of results from the simulations with the additional production.

Table 1. Pumping added to simulation "GMA13_2019_001" in Webb County north of near Laredo, Texas.

Total Pumping (acre-feet per year)	Sparta Pumping (acre-feet per year)	Carrizo Pumping (acre-feet per year)	GMA 13 Average Drawdown (feet)
20,000	1,000	19,000	68
25,000		24,000	71
30,000		29,000	73
35,000		34,000	76
40,000		39,000	78
45,000		44,000	78

We understand you have been working diligently over the last several years to consider various factors associated with the proposed DFCs. Relative to each of those considerations, we offer the following:

- Consideration 1 – "Aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another:"

  There are few users of the Carrizo Aquifer groundwater resources near Laredo. We are looking to develop the resource as a water supply for our development and to potentially serve other water needs in the county.

- Consideration 2 – "The water supply needs and water management strategies included in the state water plan:"

  The current simulated production from the aquifers in Webb County is about 1,000 acre-feet per year. Most groundwater use is for domestic, livestock, and mining activities. We believe additional groundwater supplies, possibly brackish, are available for various uses.

- Consideration 3 – "Hydrological conditions, including for each aquifer in the management area, the total estimated recoverable storage as provided by the

executive administrator, and the average annual recharge, inflows, and discharge:"

The total estimated recoverable storage for the Carrizo-Wilcox Aquifer in Webb County is 380,000,000 acre-feet of groundwater. Total proposed production from the Carrizo will be a small fraction of the total volume. Due the depth of the Carrizo at our location (more than 3,000 feet below ground level), the change in DFC associated with the production will not measurably affect recharge, inflows, or discharge.

- Consideration 4 – "Other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water:"

  Due the depth of the Carrizo at our location (more than 3,000 feet below ground level), the change in the secondary DFC associated with the production will not measurably affect surface water resources. Similarly, we do not anticipate production from the Laredo Formation to have any environmental impact.

- Consideration 5 – "The impact on subsidence:"

  As discussed in the GMA 13 documents, subsidence is not expected to be an issue in GMA 13 and we do not believe our proposed revision to the secondary DFC will change that expectation.

- Consideration 6 – "Socioeconomic impacts reasonably expected to occur:"

  No deleterious socioeconomic impacts would reasonably be expected to occur with the revision to the secondary DFC. On the contrary, including the additional production in the model will increase the MAG within Webb County which would allow for the development of the resource through affordable TWDB funding options.

  Consideration 7 – "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:"

  The requested revision to the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers in GMA 13 is specifically associated with a private landowner seeking to develop the groundwater resources beneath the property. Not including the anticipated production could directly impact the private property rights of the landowner by limiting the ability to market the groundwater resources at an affordable price.

- Consideration 8 – “The feasibility of achieving the desired future condition:”

  As discussed in the GMA 13 documents, the groundwater availability model (GAM) is not capable of simulating the first DFC of limiting the reduction in saturated thickness in the outcrop. Similarly, the hydraulic properties assigned to the aquifers in the GAM within Webb County are very low and inhibit the flow of groundwater. As such the modeled impact is likely greater than will actually occur just as it is in other areas simulated with the GAM. As such, we do not believe the modification to the secondary DFC will affect the feasibility of GMA 13 achieving the primary DFC.

- Consideration 9 – “Any other information relevant to the specific desired future conditions:”

  Webb County is not within a groundwater conservation district. We are reaching out to each GMA 13 member to provide our information and request for a modification to the GMA 13 secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers in GMA 13.

We appreciate the opportunity to present our request to include additional production within Webb County. Mr. Keester with LRE Water has performed the simulations of the impact with the additional production and can distribute those model files to the GMA 13 members. While the simulation results increase the average drawdown for GMA 13 as a whole, we are only requesting changes to pumping within our project area in Webb County. We are respectfully requesting that our potential production be included in the pumping file so that it may become part of the MAG for use in the 2026 regional water plan for Region M.

Sincerely,

EARL & ASSOCIATES, P.C.

By: David L. Earl.....
David L. Earl,
Attorney at Law/Shareholder

EARL & ASSOCIATES
attorneys at law

DAVID L. EARL
ATTORNEY AT LAW/SHAREHOLDER

MEGAN J. EARL
ATTORNEY AT LAW/SHAREHOLDER

June 15, 2021

GMA-13 Contact
c/o Medina County Groundwater Conservation District
1607 Avenue K
Hondo, TX 78861
gmmcgcd@att.net

RE: Supplement to Comments Sent on May 11, 2021

Dear GMA-13 Voting Member,

Subsequent to sending our comments on May 11, 2021, we discovered there was an error on one of the Tables that was sent to you. Please substitute the Table below for the one in the previous comments, as it corrects that error. The original comment identified a 75 feet drawdown and this corrected Table shows the correct drawdown of 67 feet.

Table 1. Pumping added to simulation "GMA13_2019_001" in Webb County north of near Laredo, Texas.

Total Pumping (acre-feet per year)	Sparta Pumping (acre-feet per year)	Carrizo Pumping (acre-feet per year)	GMA 13 Average Drawdown (feet)
5,000	1,000	4,000	51
10,000		9,000	53
15,000		14,000	56
20,000		19,000	58
25,000		24,000	60
30,000		29,000	63
35,000		34,000	65
40,000		39,000	67
45,000		44,000	67

If any of you schedule individual district meetings and will be considering this issue, please let us know and we will be happy to be present to make a presentation.

Thank you for your consideration in this matter and all you do to preserve water resources in Texas.

Sincerely,

EARL & ASSOCIATES, P.C.

By: *David L. Earl*

David L. Earl,
Attorney at Law/Shareholder

EUWCD

Evergreen Underground Water Conservation District

110 Wyoming Blvd

Pleasanton, TX 78064

September 14, 2021

Lonnie Stewart
Interim GMA 13 Administrator

RE: Public comments and adoption of the DFC's for Groundwater Management Area 13

Dear Mr. Stewart:

The purpose of this letter is to inform you that the Evergreen Underground Water Conservation District has completed the public comment period on the proposed DFC's for GMA 13. The District posted notice of a public hearing on the proposed DFC's. The District held its public hearing on June 25, 2021 in conjunction with its normally scheduled monthly Board meeting. There were no verbal public comments during the hearing, however, the Board was presented with a letter from attorney David Earl with Earl & Associates on a proposed water supply project in Webb County for the city of Laredo. The public hearing was then adjourned. The Evergreen Board then re-convened into its regular meeting. It was the consensus of the Board that the project would not affect water levels in the Evergreen District. As a result, the Evergreen UWCD does not have any suggested revision to the GMA 13 DFC's.

Sincerely,

Russell Labus

Russell Labus
General Manager
Evergreen UWCD

Phone: 830-569-4186
Fax: 830-569-4238
Email: info@evergreenuwcd.org
Website: Evergeenuwcd.org

NOTICE OF PUBLIC HEARING

Notice is given that a **Public Hearing** by the Plum Creek Conservation District will be held at the District offices(1101 San Antonio St., Lockhart, TX 78644) on **Wednesday, June 30th , 2021, at 1 p.m.** for the following purpose:

Groundwater Management Area 10
Proposed Desired Future Conditions and Relevant Aquifer Designations

At an open meeting of the **Groundwater Management Area 10 Joint Planning Committee** (GMA-10) held on April 20, 2021 via zoom, and attended by representatives from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 10: Edwards Aquifer Authority, Medina County Groundwater Conservation District, Uvalde County Underground Water Conservation District, Plum Creek Conservation District, Barton Springs/Edwards Aquifer Conservation District, Comal Trinity Groundwater Conservation District, and Kinney County Groundwater Conservation District; GMA-10 considered and adopted the following Proposed Desired Future Conditions (DFCs) for GMA-10 regional groundwater planning purposes:

Groundwater Management Area 10 Proposed Desired Future Conditions and Relevant Aquifer Designations

Austin Chalk (Uvalde County)

No drawdown (including exempt and non-exempt use).

Buda Limestone (Uvalde County)

No drawdown (including exempt and non-exempt use) through 2080.

Edwards (BFZ) Northern Subdivision

Springflow at Barton Springs during average recharge conditions shall be no less than 49.7 cubic feet per second averaged over an 84 month (7-year) period; and during extreme drought conditions, including those as severe as a recurrence of the 1950s drought of record, springflow of Barton Springs shall be no less than 6.5 cubic feet per second averaged on a monthly basis through 2080.

Edwards (BFZ) Northern Subdivision Saline Zone

No more than 75 feet of regional average potentiometric surface drawdown due to pumping when compared to pre-development conditions through 2080.

Filed this 28th day of MAY 20 21
3:05 PM

TERESA RODRIGUEZ
COUNTY CLERK, CALDWELL COUNTY, TEXAS
By Sabrina Medina Deputy

Edwards (BFZ) San Antonio Segment within Edwards Aquifer Authority

Desired future conditions and modeled available groundwater for the Edwards Aquifer within jurisdiction of the Edwards Aquifer Authority are set by the Texas Legislature (Act of May 28, 2007, 80th Leg., R.S., ch. 1351, § § 2.02 and 2.06, 2007 Tex. Gen. Laws, 4612, 4627, and 4627; Act of May 28, 2007, 80th Leg., R.S. ch. 1430, § § 12.02 and 12.06, 2007 Tex. Gen. Laws 5848, 5901, and 5903). The DFCs are specified in Sections 1.14(a), (f), (h), and 1.26 of the Edwards Aquifer Authority Act. The DFCs are specified in Sections 1.14(a), (f), (h), and 1.26 of the Edwards Aquifer Authority Act, and relate to levels in index wells (J-17 in the San Antonio pool and J-27 in the Uvalde pool) or flows in the Comal Springs and San Marcos Springs. Refer to the Edwards Aquifer Authority Groundwater Management Plan for details.

Edwards (Kinney County)

Water level in well number 70-38-902 shall not fall below 1184 feet mean sea level through 2080.

Leona Gravel (Uvalde County)

No drawdown (including exempt and non-exempt use) through 2080.

Trinity

Average regional well drawdown not exceeding 25 feet during average recharge conditions (including exempt and non-exempt use); within Uvalde County: 20 feet through 2080.

Trinity (Plum Creek GCD only)

Declared Non-relevant

Members of the public are invited to attend and provide oral comment, testimony, and/or submit other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations to the Board of Directors at this Public Hearing.

If unable to attend the Public Hearing, members of the public are invited to submit written comments, testimony, and/or other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations via the U.S. Postal Service, hand delivery or via email to the Board of Directors at the District Office located at the physical mailing address or email address described below:

GMA-10 has prepared standardized Public Comment Forms to help you organize and substantiate your submission. This form is available at the address above or on our website at www.pccd.org

The Public Comment period runs from April 23, 2021 through July 22, 2021.

The District will prepare a report of any relevant comments received at the Public Hearing and attach any written comments, testimony, and/or other documentation and information relevant to

the Proposed DFCs and Relevant Aquifer Designations received through July 22, 2021. This report and attachments will be provided to the GMA-10 Committee for their review, consideration, and incorporation into the DFC decision-making process.

Questions or requests for additional information may be submitted to:
Daniel Meyer telephone (512) 398-2383, email daniel.meyer@pccd.org or at the District Office:

Plum Creek Conservation District, 1101 W. San Antonio St., Lockhart, TX 78644

The District will make available in the District Office at the address above a copy of the documentation of factors considered under Texas Water Code section 36.108(d) and groundwater availability model results.

Came to hand and posted on a Bulletin Board in the Courthouse, Caldwell County, Texas, on this, the_____ day of May 2021, at _____ p.m.

_____, Deputy Clerk
Caldwell County, TEXAS

PUBLIC HEARING
Groundwater Management Area 13
Proposed Desired Future Conditions and Relevant Aquifer Designations

Filed this 28th day of MAY 20 21
3:05 PM
TERESA RODRIGUEZ
COUNTY CLERK, CALDWELL COUNTY, TEXAS
By Sabrina Medina Deputy

Date: Wednesday, June 30th, 2021
Time: 11:00 AM
Location: 1101 W. San Antonio St., Lockhart, TX 78644

At an open meeting of the **Groundwater Management Area 13 Joint Planning Committee** (GMA-13) held virtually on April 23, 2021 and attended by representatives from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 13: Evergreen Underground Water Conservation District, Gonzales County Underground Water Conservation District, Guadalupe County Groundwater Conservation District, McMullen Groundwater Conservation District, Medina County Groundwater Conservation District, Plum Creek Conservation District, Uvalde County Underground Water Conservation District, Wintergarden Groundwater Conservation District; GMA-13 considered and adopted the following Proposed Desired Future Conditions (DFCs) for GMA-13 regional groundwater planning purposes:

1. Due to limitations of the Groundwater Availability Model for the Southern Portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers identified and discussed during 2016 and 2021 Joint Planning, Groundwater Management Area 13 proposes two desired future conditions for the Carrizo-Wilcox, Queen City, and Sparta aquifers:

   - The first proposed desired future condition for the Carrizo-Wilcox, Queen City and Sparta aquifers in Groundwater Management Area 13 is that 75 percent of the saturated thickness in the outcrop at the end of 2012 remains at the end of 2080. Due to limitations of the current Groundwater Availability Model, this desired future condition cannot be simulated as documented during 2016 Joint Planning in GMA 13 Technical Memorandum 16-08.

   - A secondary proposed desired future condition for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area 13 is an average drawdown of 49 feet (+/- 5 feet) for all of Groundwater Management Area 13. The drawdown is calculated from the end of 2012 conditions through the year 2080. This desired future condition is consistent with simulation "GMA13_2019_001" summarized during a meeting of Groundwater Management Area 13 members on March 19, 2021.

2. The desired future conditions for the Yegua-Jackson Aquifer in Groundwater Management Area 13:

   - For Gonzales County, the average drawdown from end of 2010 through 2080 is 3 feet (+/- 1 foot).
   - For Karnes County, the average drawdown from end of 2010 through 2080 is 1 foot (+/- 1 foot).
   - For all other counties in Groundwater Management Area 13, the Yegua-Jackson is classified as not relevant for purposes of joint planning.

3. Declaration of non-relevant aquifers in Groundwater Management Area 13:

    - Groundwater Management Area 13 does hereby document, record, and confirm that the Edwards (Balcones Fault Zone), Gulf Coast, and Trinity aquifers are not relevant for purposes of joint planning within Groundwater Management Area 13 and therefore do not require the establishment of desired future conditions by Groundwater Management Area 13, nor the determination by the Texas Water Development Board of Modeled Available Groundwater for those aquifers in Groundwater Management Area 13.

Groundwater conservation districts located wholly or partially within Groundwater Management Area 13 include: Evergreen Underground Water Conservation District, Gonzales County Underground Water Conservation District, Guadalupe County Groundwater Conservation District, McMullen Groundwater Conservation District, Medina County Groundwater Conservation District, Plum Creek Conservation District, Uvalde County Underground Water Conservation District, and Wintergarden Groundwater Conservation District.

Members of the public are invited to attend and provide oral comment, testimony, and/or submit other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations to the Board of Directors at this Public Hearing.

If unable to attend the Public Hearing, members of the public are invited to submit written comments, testimony, and/or other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations to the Board of Directors at the District Office located at:

Plum Creek Conservation District
P.O. Box 328
1101 W. San Antonio St.
Lockhart, TX 78640

GMA-13 has prepared standardized Public Comment Forms to help you organize and substantiate your submission. This form is available at the address above. http://pccd.org/forms

The Public Comment period runs from April 30th, 2021 through July30th, 2021.

The District will prepare a report of any relevant comments received at the Public Hearing and attach any written comments, testimony, and/or other documentation and information relevant to the Proposed DFCs and Relevant Aquifer Designations received through July 30th, 2021. This report and attachments will be provided to the GMA-13 Committee for their review, consideration, and incorporation into the DFC decision-making process.

Questions or requests for additional information may be submitted to:

Daniel Meyer
Plum Creek Conservation District
P.O. Box 328

1101 W. San Antonio St.
Lockhart, TX 78640
Tel. (512) 398 – 2383
daniel.meyer@pccd.org

PUBLIC HEARING
Groundwater Management Area 13
Proposed Desired Future Conditions and Relevant Aquifer Designations

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Time: 11:00 AM
Location: 1101 W. San Antonio St., Lockhart, TX 78644

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Daniel Meyer
Plum Creek Conservation District
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1101 W. San Antonio St.
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Tel. (512) 398 – 2383
daniel.meyer@pccd.org

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Groundwater Management Area 10 Proposed Desired Future Conditions and Relevant Aquifer Designations

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Groundwater Management Area 10 Proposed Desired Future Conditions and Relevant Aquifer Designations

Austin Chalk (Uvalde County)

No drawdown (including exempt and non-exempt use).

Buda Limestone (Uvalde County)

No drawdown (including exempt and non-exempt use) through 2080.

Edwards (BFZ) Northern Subdivision

Springflow at Barton Springs during average recharge conditions shall be no less than 49.7 cubic feet per second averaged over an 84 month (7-year) period; and during extreme drought conditions, including those as severe as a recurrence of the 1950s drought of record, springflow of Barton Springs shall be no less than 6.5 cubic feet per second averaged on a monthly basis through 2080.

Edwards (BFZ) Northern Subdivision Saline Zone

No more than 75 feet of regional average potentiometric surface drawdown due to pumping when compared to pre-development conditions through 2080.

Edwards (BFZ) San Antonio Segment within Edwards Aquifer Authority

Desired future conditions and modeled available groundwater for the Edwards Aquifer within jurisdiction of the Edwards Aquifer Authority are set by the Texas Legislature (Act of May 28, 2007, 80th Leg., R.S., ch. 1351, § § 2.02 and 2.06, 2007 Tex. Gen. Laws, 4612, 4627, and 4627; Act of May 28, 2007, 80th Leg., R.S. ch. 1430, § § 12.02 and 12.06, 2007 Tex. Gen. Laws 5848, 5901, and 5903). The DFCs are specified in Sections 1.14(a), (f), (h), and 1.26 of the Edwards Aquifer Authority Act. The DFCs are specified in Sections 1.14(a), (f), (h), and 1.26 of the Edwards Aquifer Authority Act, and relate to levels in index wells (J-17 in the San Antonio pool and J-27 in the Uvalde pool) or flows in the Comal Springs and San Marcos Springs. Refer to the Edwards Aquifer Authority Groundwater Management Plan for details.

Edwards (Kinney County)

Water level in well number 70-38-902 shall not fall below 1184 feet mean sea level through 2080.

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Average regional well drawdown not exceeding 25 feet during average recharge conditions (including exempt and non-exempt use); within Uvalde County: 20 feet through 2080.

Trinity (Plum Creek GCD only)

Declared Non-relevant

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GMA-10 has prepared standardized Public Comment Forms to help you organize and substantiate your submission. This form is available at the address above or on our website at www.pccd.org

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Questions or requests for additional information may be submitted to:
Daniel Meyer telephone (512) 398-2383, email daniel.meyer@pccd.org or at the District Office:

Plum Creek Conservation District, 1101 W. San Antonio St., Lockhart, TX 78644

The District will make available in the District Office at the address above a copy of the documentation of factors considered under Texas Water Code section 36.108(d) and groundwater availability model results.

Came to hand and posted on a Bulletin Board in the Courthouse, Hays County, Texas, on this, the_____ day of May 2021, at _____ p.m.

_____, Deputy Clerk
Hays County, TEXAS

Hays County
Elaine H. Cárdenas, MBA, PhD, County Clerk
Hays Government Center
712 S. Stagecoach Trail Ste. 2008
San Marcos, Texas 78666
512-393-7330

Receipt: 21-20196

Product	Name	Extended
PUBNOTICE	PUBLIC NOTICE	$3.00
	# of Notices	1
PUBNOTICE	PUBLIC NOTICE	$3.00
	# of Notices	1
Total		$6.00
Tender (On Account)		$6.00

Account #	250
Account Name	PLUM CREEK CONSERVATION DISTRICT
Balance	($28.00)

Thank You

5/28/21 9:21 AM airaheta

The 90 day comment period for the Desired Future Condition and Relevant Aquifer Designations ended on July 30, 2021. Plum Creek Conservation District received one written public comment from Attorney David Earl of Earl and Associates, PC.

PCCD Hearing GMA 13 June 30th, 2021 MINUTES
June 30, 2021 1pm

Mr. Daniel Meyer, executive manager-PCCD opened the public hearing at 1 pm.

Mr. Meyer explained the purpose of the Hearing: to accept written or oral comments or any documentation on the proposed GMA 13 DFCs

Mr. Meyer then read out loud the proposed GMA DFCs and non-relevant aquifers.

Mr. Meyer indicated that there were no public present.

Mr. Meyer closed the Hearing at 1:30pm

Sincerely,

Daniel Meyer
Executive Manager
Plum Creek Conservation District

Wintergarden Groundwater Conservation District
P. O. Box 1433
Carrizo Springs, TX 78834
830-876-3801 Office 830-876-3782 Fax
833-876-3888 Toll Free
www.wgcd.net (Email wgcd@wgcd.net)
"An Equal Opportunity Employer"

August 2, 2021

Mr. Lonnie Stewart, Vice-Administrator
Groundwater Management Area 13 (GMA 13)
P. O. Box 232
Tilden, Texas 78072

RE: Public Comments on GMA 13 Desired Future Conditions & Relevant Aquifer Designations

Dear Mr. Stewart:

Please accept this letter as the Wintergarden Groundwater Conservation District's (the "District") summary of relevant comments received and suggested revisions to the proposed Desired Future Conditions (DFC) for GMA 13.

Following the required notice publication and posting, the District held a public hearing in conjunction with the Board's regular meeting on Wednesday, July 14, 2021, at the District's Office, 2881 Hwy. 277 West, Carrizo Springs, TX. There was no public comment received during the hearing. Prior to the public hearing and during the 90-day comment period, a letter was received from David Earle, Attorney/Stakeholder, for a Webb County developer. Please see the attached letter dated May 11, 2021, and a supplement letter dated June 15, 2021, requesting revisions to the proposed secondary DFC.

Following a review of the letter and supplement letter, the Board did not propose any suggested revisions to the GMA 13's proposed DFCs.

Regards,

Debbie Farmer

Debbie Farmer,
General Manager

Enclosure (2)

APPENDIX 4 —
SUMMARY OF MODELING AND PUMPING UPDATES

Appendix 4.1 —
May 3, 2019 Discussion of Pumping Inputs for Modeling DFCs

MEMORANDUM

TO: Groundwater Management Area 13

FROM: Michael R. Keester, P.G.

SUBJECT: Status Summary of Third Round of Joint Planning

DATE: May 3, 2019

During the previous GMA 13 meeting on February 1, 2019 we discussed updating the pumping file associated with the adopted DFCs and MAGs from the second round of joint planning. We have recently spoken with three of the GMA 13 members about the representation of pumping in the model. These discussions centered around the amount and distribution of pumping to identify any modifications that may be needed.

The first modification will be to extend the transition period pumping through at least 2016. This update will build upon the work by Dr. Hutchison by modifying pumping amounts to reasonably match District records or TWDB Water Use Survey amounts. To the greatest extend possible, the pumping will be placed where it is known to have occurred.

One of the other items we addressed is to update the even distribution of pumping across counties in some areas and model layers (see maps available at https://1drv.ms/f/s!AsuL8I-1iq-6golbY5k0INqcdZRp5A). For example, the MAG pumping file has small amounts of pumping evenly distributed across La Salle and Webb counties for the Middle and Lower Wilcox, but it is unlikely that pumping would occur. Our goal for updating the pumping distribution is simply to have the modeled pumping better reflect what we foresee to reasonably occur.

For the predictive period, we will also update the pumping as needed to correct locations, timing, or amounts as applicable. The following summarizes work items and information from our discussions:

- The period from 2012 through 2016 is being updated to reflect estimates of actual pumping
    - The period ends at 2016 because this year represents the last year with pumping estimates for all counties in GMA 13
    - The distribution will build upon work conducted to update the period from 2000 through 2011
    - For the amount of annual pumping, TWDB water use survey data are being used except where GCD specific data have been provided or identified
- For predictive pumping (2017 through 2070), we are implementing the following adjustments based on feedback:
    - Evergreen UWCD – To be determined
    - Gonzales County UWCD (4/25/2019)

        - Pumping in the northern portion of the county for Middle Wilcox appears to be too high. Need to check and modify. May simply need to flip distribution in the county
        - Lower Wilcox may be too high. Need to verify
        - Overall Wilcox amount is reasonable, but distribution needs to be cleaned up
        - Queen City and Sparta pumping amounts appear reasonable
        - Pumping in the Yegua-Jackson needs to increase
        - SAWS pumping needs to be continuous
        - Schertz-Sequin currently using about one-half of their amount
        - Update the pumping to when it might reasonably occur and use exempt pumping numbers up until pumping begins.
    - Guadalupe County GCD (4/25/2019)
        - Pumping amounts appear reasonable
        - Projected pumping should be consistent with permitted amounts
        - Update pumping as necessary for CRWA predicted pumping
    - McMullen GCD (4/25/2019)
        - O&G is the majority of pumping
        - Carrizo should be 5,500 to 6,000 AFY and kept steady
        - Is not aware of any wells in the Yegua-Jackson
    - Medina County GCD – To be determined
    - Plum Creek CD – To be determined
    - Uvalde County UWCD – To be determined
    - Wintergarden GCD – To be determined

As the well files are updated, we will begin performing simulations.

I also meet with the TWDB on April 29, 2019 to discuss any lessons learned during the previous round from their perspective. They did not identify anything in the explanatory reports that was an issue during the last round. Rather, the focus of the TWDB staff was on the modeling and having clear communication with them regarding how the simulations were performed, what the assumptions were in the modeling, and how the DFCs were calculated from the model run results. I was provided copies of the issues that needed clarification during the previous round to help with addressing them ahead of time during this 3rd round. Some of the items they identified as issues to make sure are addressed were:

- How are dry cells treated? – Currently, the cells are removed from the calculation whether they go dry before the baseline year or after. An alternative would be to use the base of the aquifer for calculating drawdown in cells that go dry after the baseline year.
- Include a tolerance in the DFC – for example, +/- 1 feet. This tolerance was included for the 2nd round following clarifications.

- Specify if the model boundaries or the aquifer boundaries are used for the calculation. Model boundaries were used during the 2nd round and for consistency we anticipate using the same method.
- Make sure RWPG projects are included in the simulation

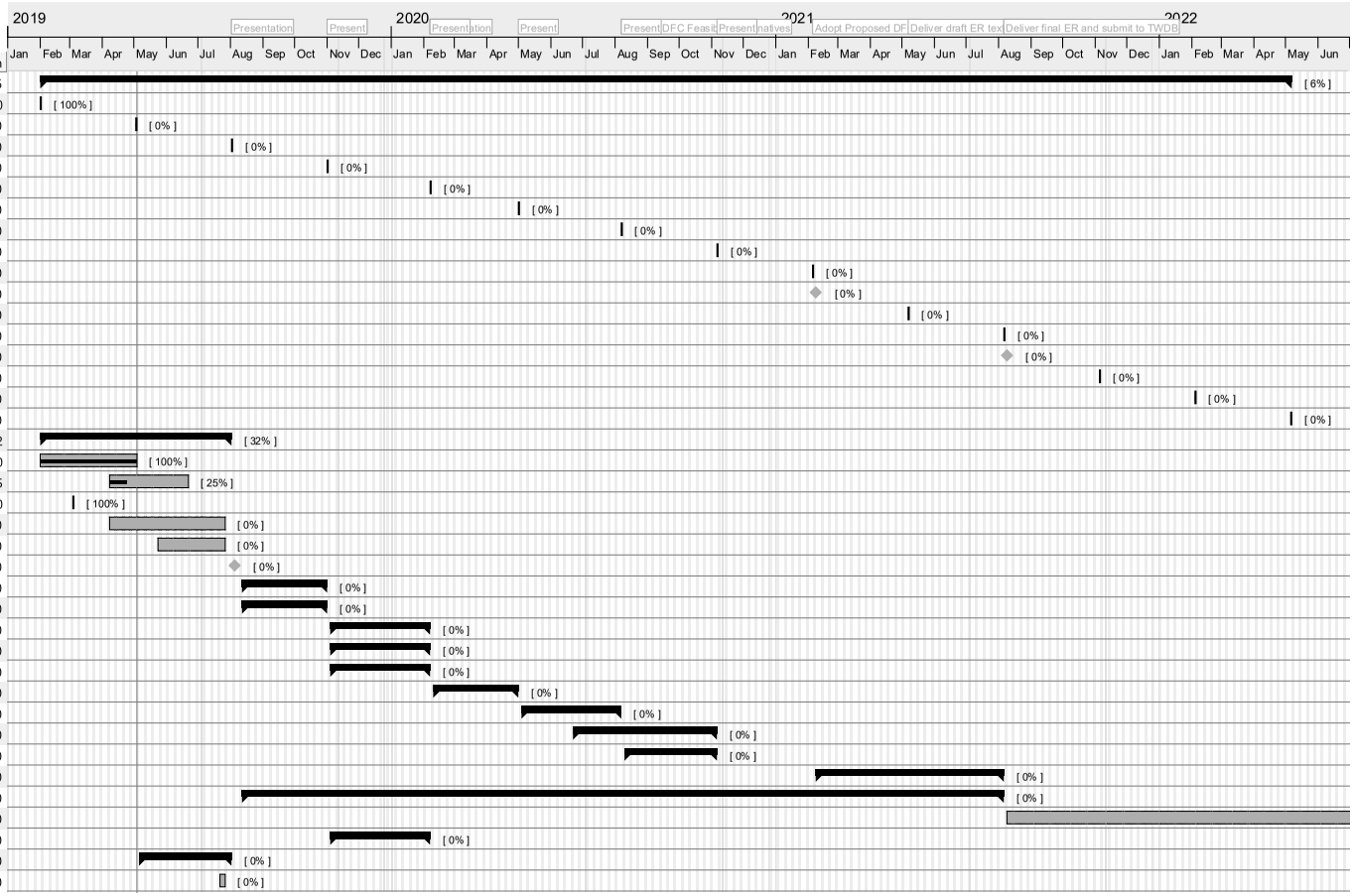
During the next GMA 13 meeting, we anticipate presenting draft modeling results. As preliminary results are developed, we will distribute for feedback and discussion.

If you have any questions, please let me know.

Gantt Chart

LREWater,LLC
a Leonard Rice Engineers Company

Outline n...	Name	Begin date	End date	Completion
1	GMA 15 Meetings	2/1/19	5/6/22	6
1.1	Meeting	2/1/19	2/1/19	100
1.2	Meeting	5/3/19	5/3/19	0
1.3	Meeting	8/2/19	8/2/19	0
1.4	Meeting	11/1/19	11/1/19	0
1.5	Meeting	2/7/20	2/7/20	0
1.6	Meeting	5/1/20	5/1/20	0
1.7	Meeting	8/7/20	8/7/20	0
1.8	Meeting	11/6/20	11/6/20	0
1.9	Meeting	2/5/21	2/5/21	0
1.10	Adopt Proposed DFCs	2/5/21	2/5/21	0
1.11	Meeting	5/7/21	5/7/21	0
1.12	Meeting	8/6/21	8/6/21	0
1.13	Adopt Final DFCs	8/6/21	8/6/21	0
1.14	Meeting	11/5/21	11/5/21	0
1.15	Meeting	2/4/22	2/4/22	0
1.16	Meeting	5/6/22	5/6/22	0
2	Model Groundwater Availability	2/1/19	8/1/19	32
2.1	Kickoff and summarize current MAG distribution	2/1/19	5/3/19	100
2.2	Update pumping distributions	4/8/19	6/21/19	25
2.3	Meet with TWDB to discuss 3rd Rnd	3/4/19	3/4/19	100
2.4	Perform modeling	4/8/19	7/26/19	0
2.5	Prepare GAM Simulation Report	5/24/19	7/26/19	0
2.6	Present GAM Simulation Report and completed DFC checkl..	8/2/19	8/2/19	0
3	Document aquifer uses and conditions	8/12/19	10/31/19	0
4	Document water supply needs & water management strategies	8/12/19	10/31/19	0
5	Document hydrological conditions	11/4/19	2/6/20	0
6	Document environmental conditions	11/4/19	2/6/20	0
7	Document impacts on subsidence	11/4/19	2/6/20	0
8	Document socioeconomic impacts	2/10/20	4/30/20	0
9	Document impacts on private property	5/4/20	8/6/20	0
10	Document DFC feasibility	6/22/20	11/5/20	0
11	Document other relevant information	8/10/20	11/5/20	0
12	Document relevant comments on proposed DFCs	2/8/21	8/5/21	0
13	Explantory Report	8/12/19	8/5/21	0
14	Provide DFC technical support	8/9/21	8/15/22	0
15	Calculate Fresh and Brackish Volumes	11/4/19	2/6/20	0
16	Aquifer Equilibrium Modeling	5/6/19	8/1/19	0
17	Model Data Extraction	7/22/19	7/26/19	0



Tasks

Outline number	Name	Begin date	End date	Completion
1	GMA 15 Meetings	2/1/19	5/6/22	6
1.1	Meeting	2/1/19	2/1/19	100
1.2	Meeting	5/3/19	5/3/19	0
1.3	Meeting	8/2/19	8/2/19	0
1.4	Meeting	11/1/19	11/1/19	0
1.5	Meeting	2/7/20	2/7/20	0
1.6	Meeting	5/1/20	5/1/20	0
1.7	Meeting	8/7/20	8/7/20	0
1.8	Meeting	11/6/20	11/6/20	0
1.9	Meeting	2/5/21	2/5/21	0
1.10	Adopt Proposed DFCs	2/5/21	2/5/21	0
1.11	Meeting	5/7/21	5/7/21	0
1.12	Meeting	8/6/21	8/6/21	0
1.13	Adopt Final DFCs	8/6/21	8/6/21	0
1.14	Meeting	11/5/21	11/5/21	0
1.15	Meeting	2/4/22	2/4/22	0
1.16	Meeting	5/6/22	5/6/22	0
2	Model Groundwater Availability	2/1/19	8/1/19	32
2.1	Kickoff and summarize current MAG distribution	2/1/19	5/3/19	100
2.2	Update pumping distributions	4/8/19	6/21/19	25
2.3	Meet with TWDB to discuss 3rd Rnd	3/4/19	3/4/19	100
2.4	Perform modeling	4/8/19	7/26/19	0
2.5	Prepare GAM Simulation Report	5/24/19	7/26/19	0
2.6	Present GAM Simulation Report and completed DFC checklist	8/2/19	8/2/19	0
3	Document aquifer uses and conditions	8/12/19	10/31/19	0
3.1	Discuss with members	8/12/19	10/11/19	0
3.2	Prepare Tech Memo	9/23/19	10/25/19	0
3.3	Present	11/1/19	11/1/19	0
4	Document water supply needs & water management strategies	8/12/19	10/31/19	0
4.1	Summarize Existing and New WMSs	8/12/19	10/11/19	0
4.2	Review WMSs representation in Pumping File	8/26/19	10/11/19	0
4.3	Prepare Tech Memo	9/23/19	10/25/19	0
4.4	Present	11/1/19	11/1/19	0
5	Document hydrological conditions	11/4/19	2/6/20	0
5.1	Data collection and summary	11/4/19	1/10/20	0
5.2	Prepare Tech Memo	12/23/19	1/31/20	0
5.3	Present	2/7/20	2/7/20	0

Tasks

Outline number	Name	Begin date	End date	Completion
6	Document environmental conditions	11/4/19	2/6/20	0
6.1	Data collection and summary	11/4/19	1/10/20	0
6.2	Prepare Tech Memo	12/23/19	1/31/20	0
6.3	Present	2/7/20	2/7/20	0
7	Document impacts on subsidence	11/4/19	2/6/20	0
7.1	Data collection and summary	11/4/19	1/10/20	0
7.2	Prepare Tech Memo	12/23/19	1/31/20	0
7.3	Present	2/7/20	2/7/20	0
8	Document socioeconomic impacts	2/10/20	4/30/20	0
8.1	Data collection and summary	2/10/20	4/3/20	0
8.2	Calculate change in pumping cost	3/2/20	4/3/20	0
8.3	Prepare Tech Memo	3/16/20	4/24/20	0
8.4	Present	5/1/20	5/1/20	0
9	Document impacts on private property	5/4/20	8/6/20	0
9.1	Data collection and summary	5/4/20	6/26/20	0
9.2	Prepare Tech Memo	6/22/20	7/31/20	0
9.3	Present	8/7/20	8/7/20	0
10	Document DFC feasibility	6/22/20	11/5/20	0
10.1	Data collection for alternatives	6/22/20	7/31/20	0
10.2	Present DFC Feasibility alternatives	8/7/20	8/7/20	0
10.3	DFC Feasibilty Evaluation	8/10/20	10/2/20	0
10.4	Prepare Tech Memo	9/21/20	10/30/20	0
10.5	Present	11/6/20	11/6/20	0
11	Document other relevant information	8/10/20	11/5/20	0
11.1	Data collection and summary	8/10/20	10/2/20	0
11.2	Prepare Tech Memo	9/21/20	10/30/20	0
11.3	Present	11/6/20	11/6/20	0
12	Document relevant comments on proposed DFCs	2/8/21	8/5/21	0
12.1	Support member GCDs	2/8/21	7/23/21	0
12.2	Prepare draft memo of comments	5/10/21	7/2/21	0
12.3	Prepare final memo of comments and proposed revisions	7/19/21	7/30/21	0
12.4	Present	8/6/21	8/6/21	0
13	Explantory Report	8/12/19	8/5/21	0
13.1	Prepare explanatory report	8/12/19	7/30/21	0
13.2	Deliver draft ER text	5/7/21	5/7/21	0

Tasks

Outline number	Name	Begin date	End date	Completion
13.3	Deliver final ER and submit to TWDB	8/6/21	8/6/21	0
14	Provide DFC technical support	8/9/21	8/15/22	0
15	Calculate Fresh and Brackish Volumes	11/4/19	2/6/20	0
15.1	Evaluation	11/4/19	1/31/20	0
15.2	Presentation	2/7/20	2/7/20	0
16	Aquifer Equilibrium Modeling	5/6/19	8/1/19	0
16.1	Evaluation	5/6/19	7/26/19	0
16.2	Presentation	8/2/19	8/2/19	0
17	Model Data Extraction	7/22/19	7/26/19	0

Appendix 4.2 —
May 3, 2019 Presentation of Pumping Inputs for Modeling DFCs

LRE Water, LLC
a Leonard Rice Engineers Company

Discussion of Pumping Inputs for Modeling DFCs

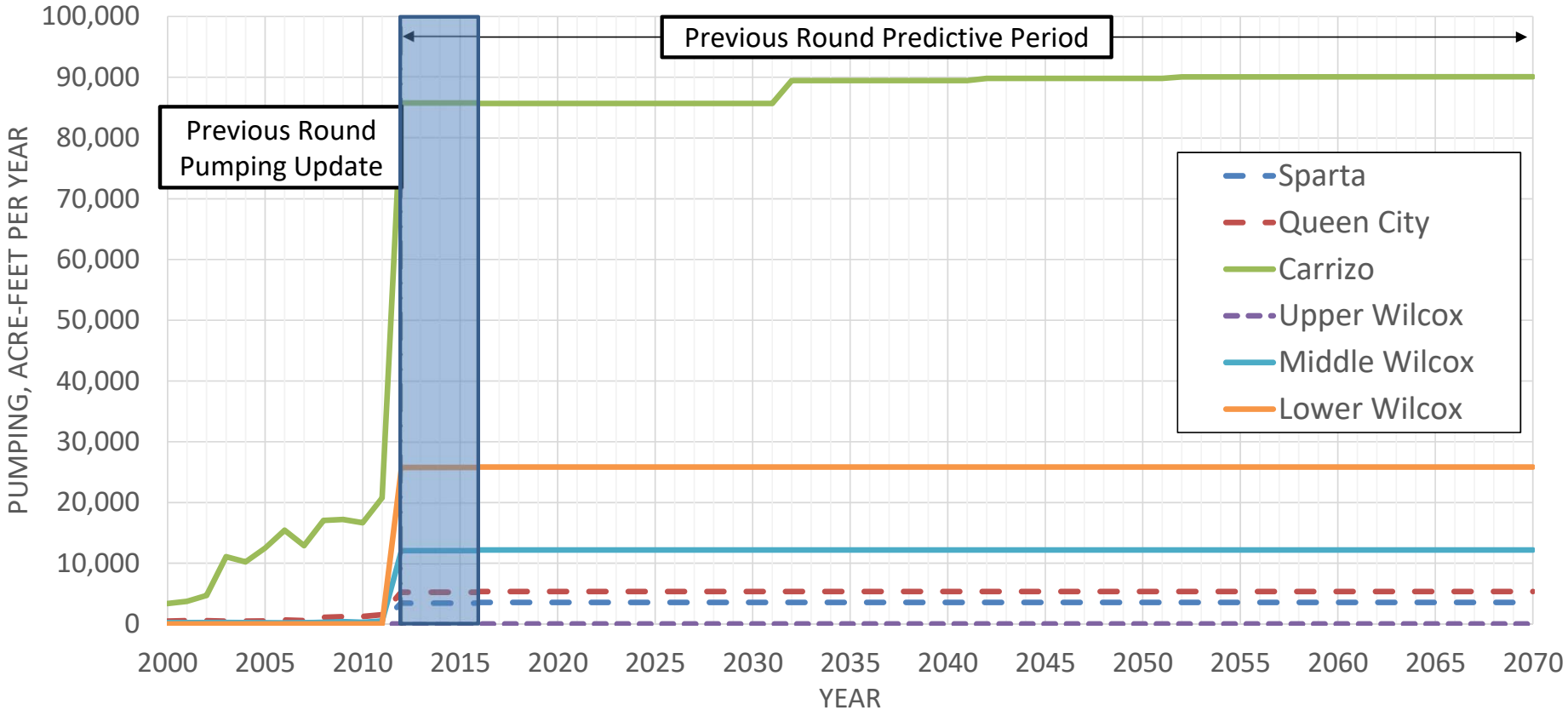
GMA 13 Agenda Item 6

May 3, 2019

Proposed Modifications to the MAG Pumping File

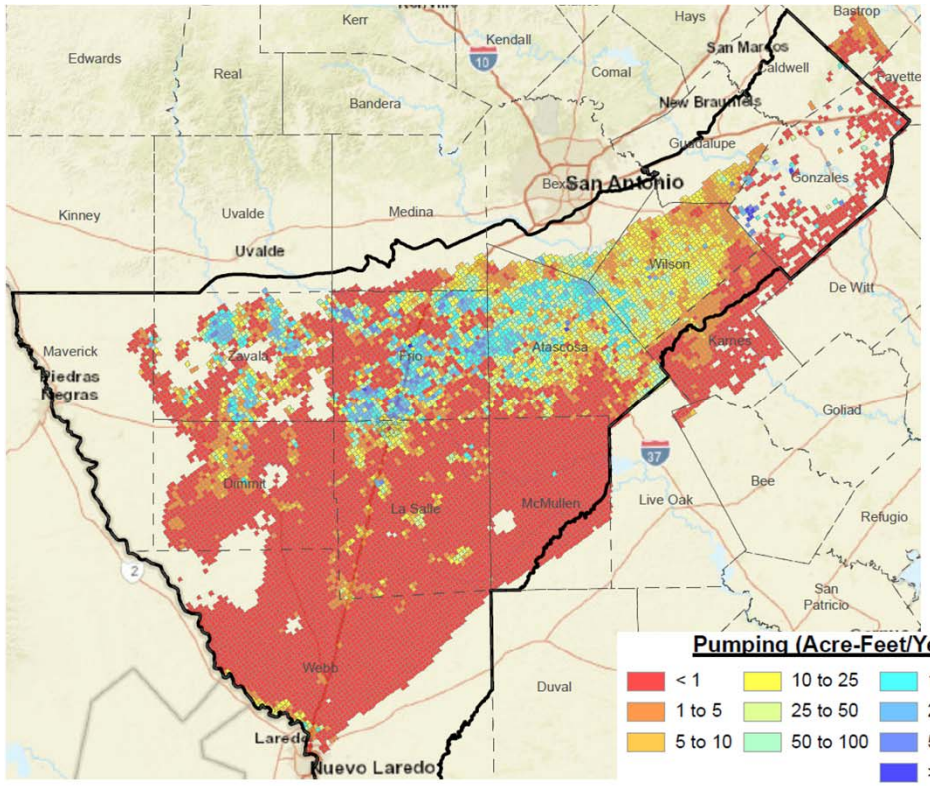
- Extend actual pumping through 2016
  - Build upon updated pumping from 2000 through 2011
  - TWDB WUS data only goes through 2016 – needed to include non-GCD counties
- Clean up the distribution of pumping where necessary
  - Move even distribution to better reflect where pumping will reasonably occur
  - Correct locations of pumping where needed
  - Remove pumping where it is unlikely to occur
- Review RWPG projects and update (if needed)

Extension of Actual Pumping

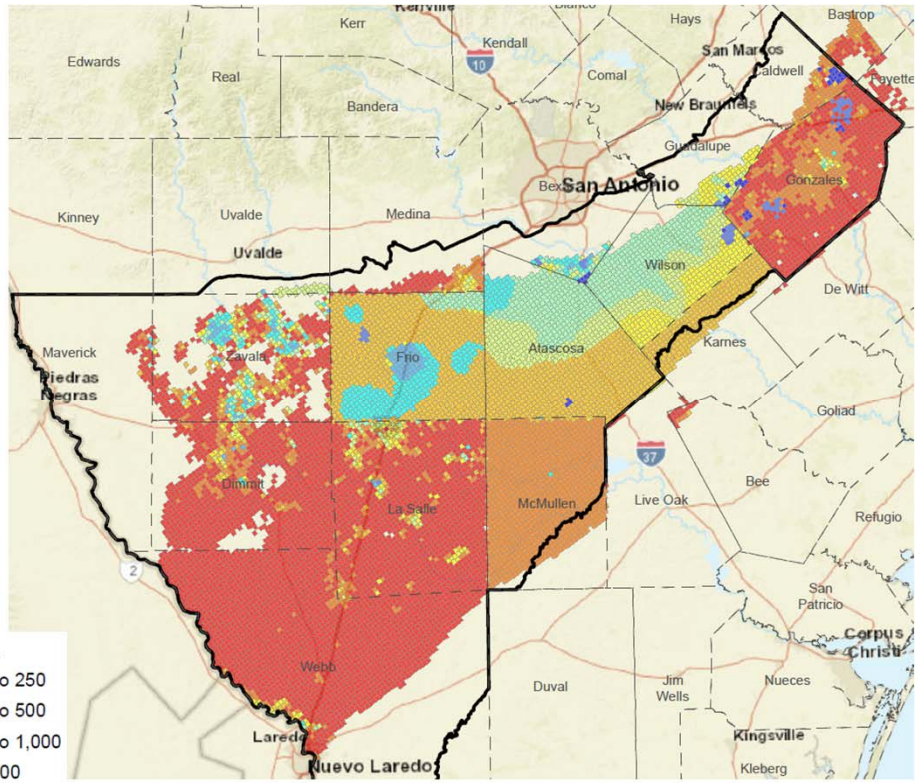


Carrizo Pumping Distribution

Carrizo – 2011

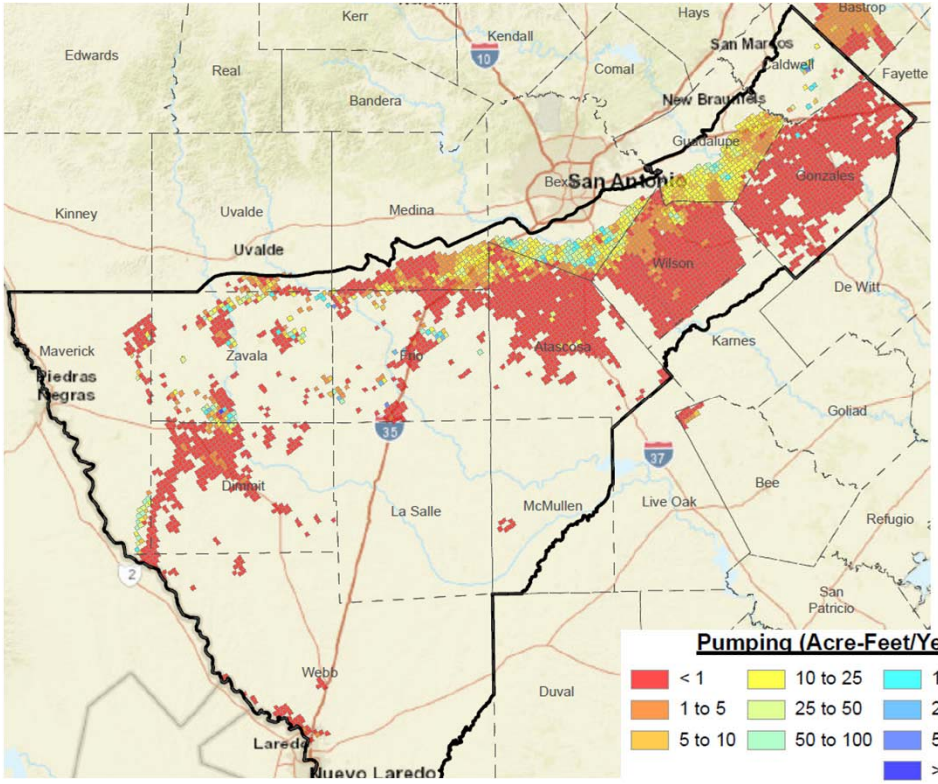


Carrizo – 2070

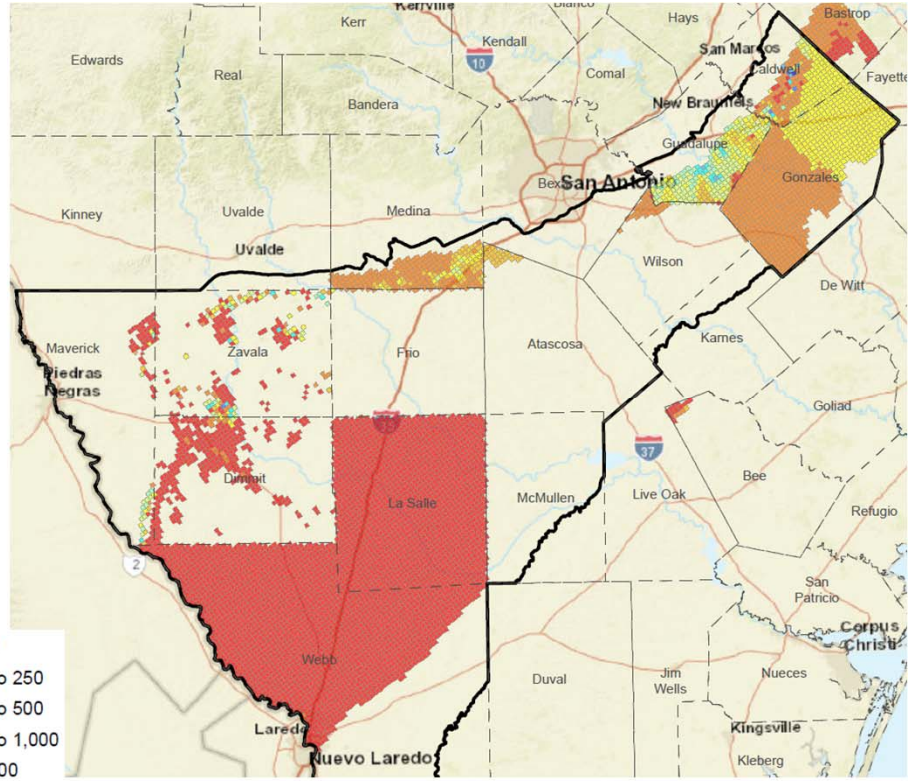


Middle Wilcox Pumping Distribution

Middle Wilcox – 2011

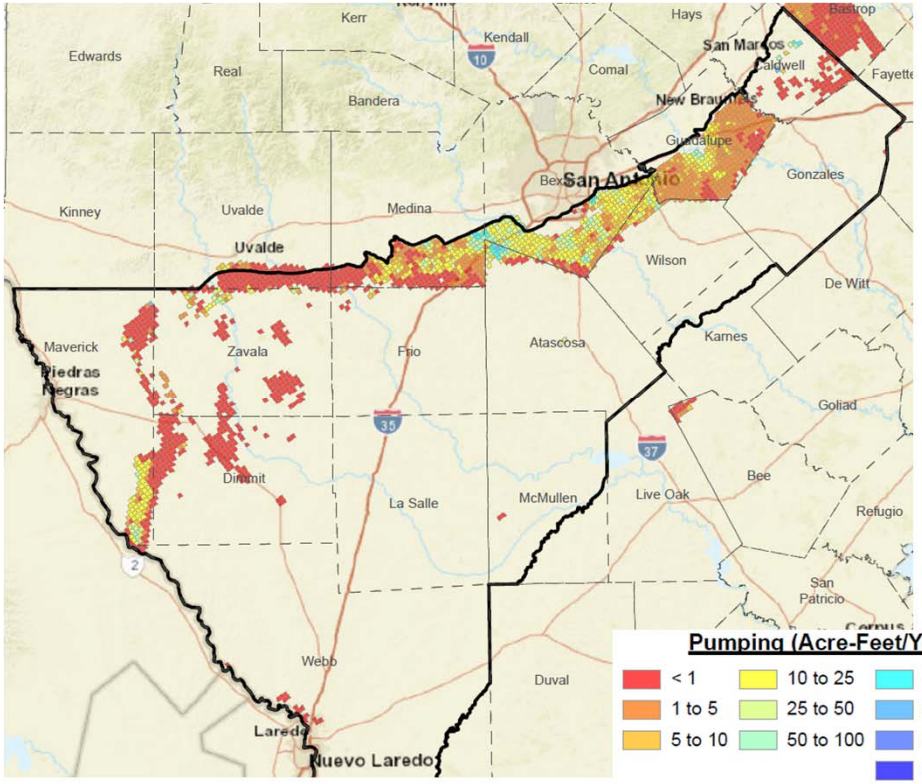


Middle Wilcox – 2070

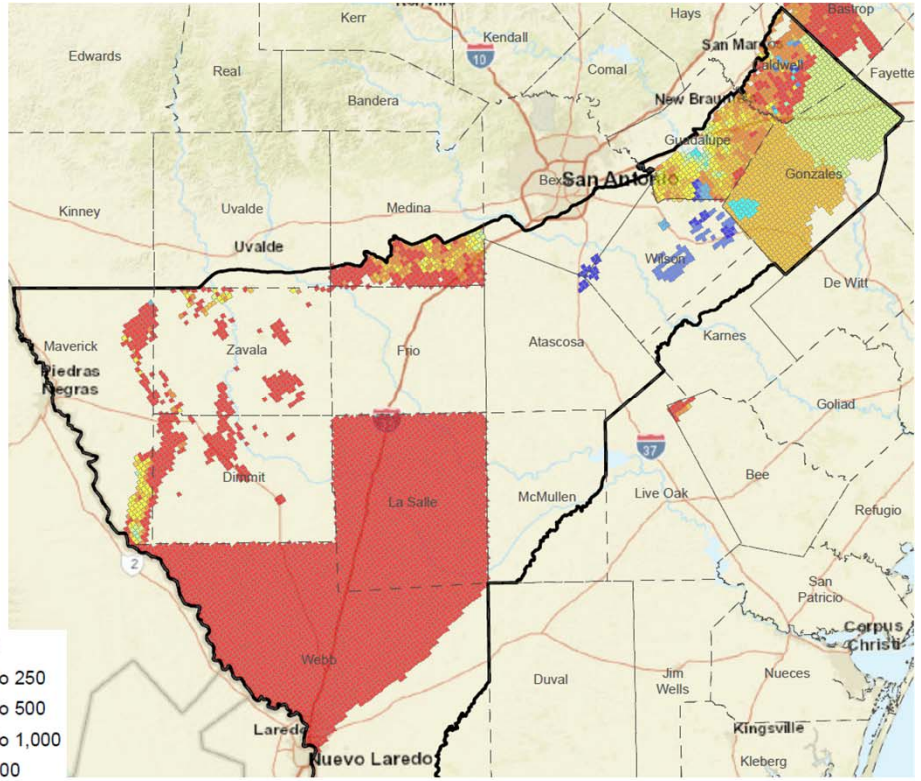


Lower Wilcox Pumping Distribution

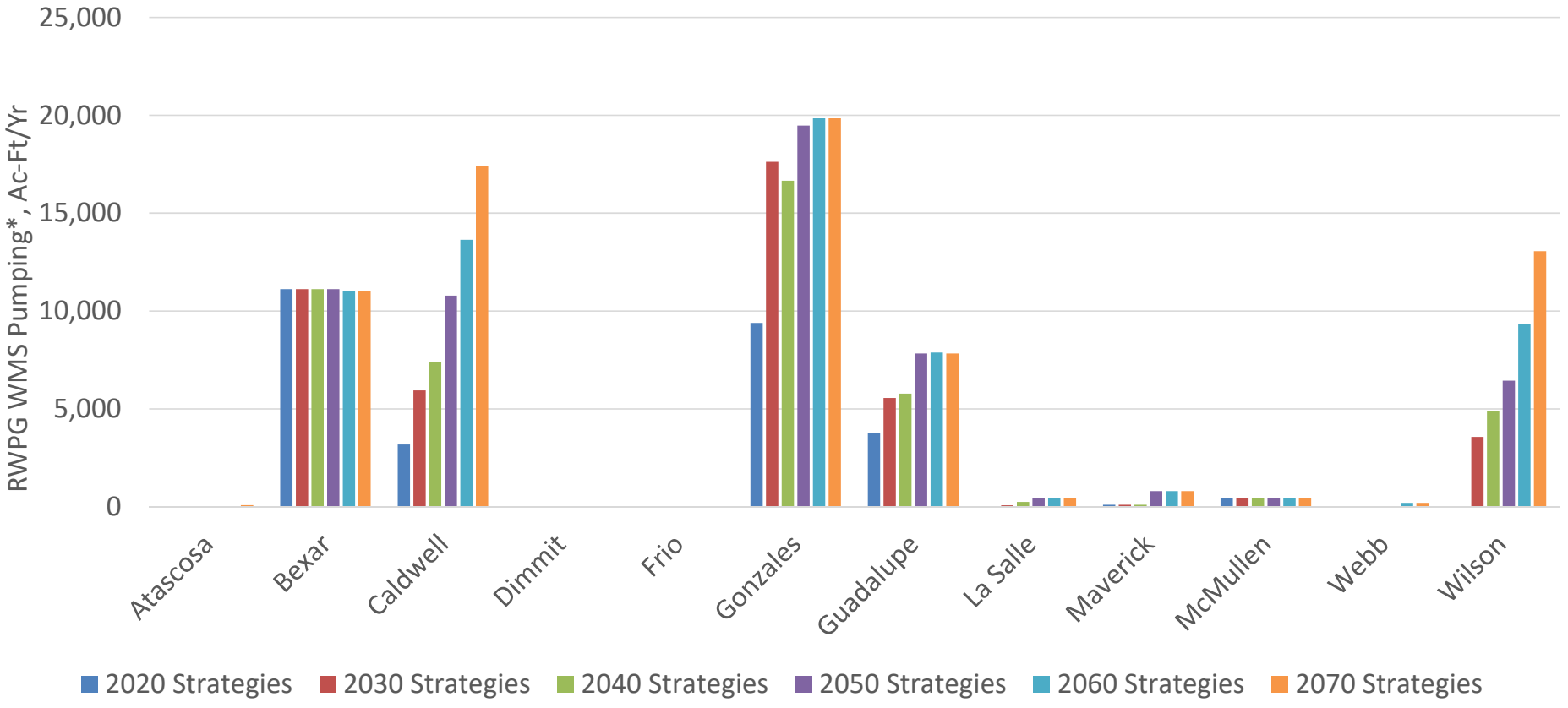
Lower Wilcox – 2011



Lower Wilcox – 2070

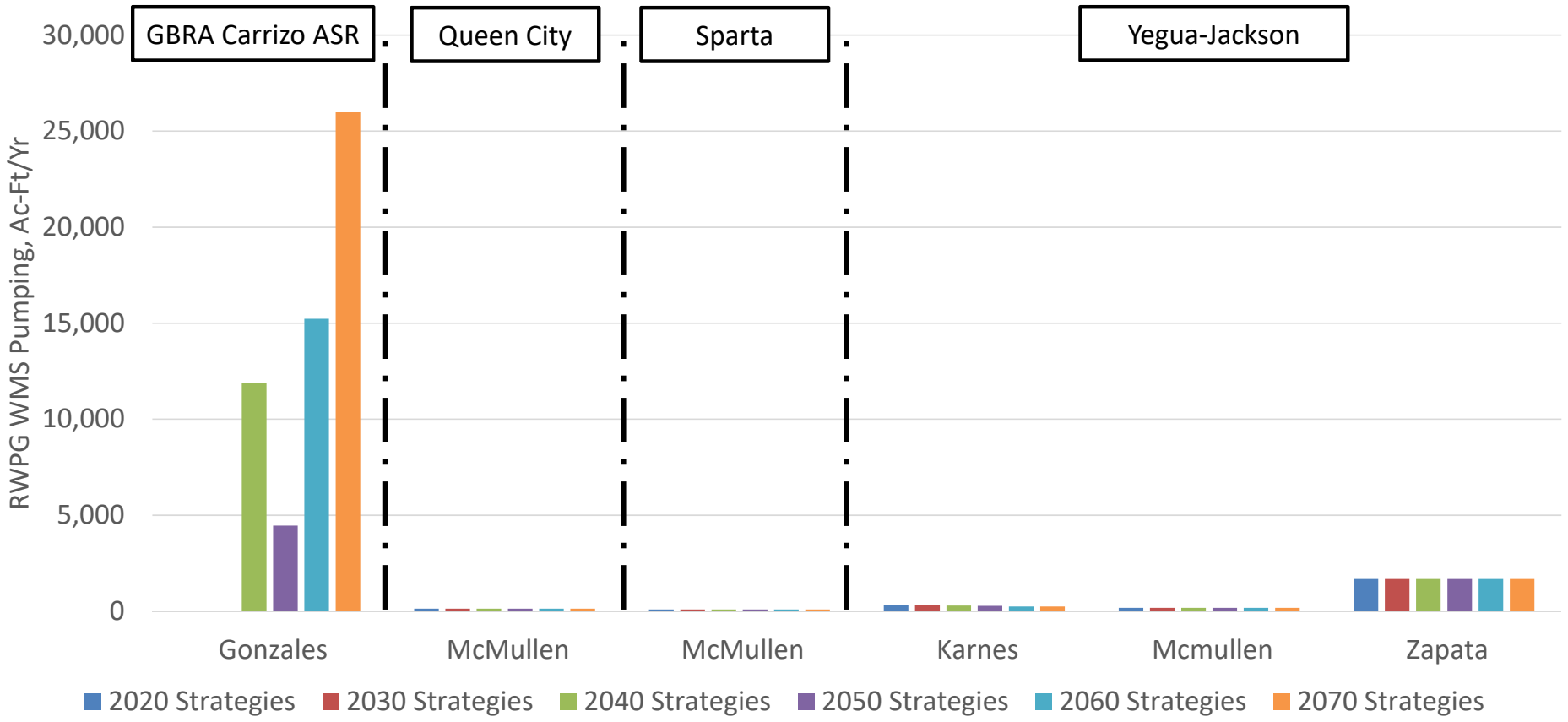


Carrizo-Wilcox Strategies – Regions L, M, & N



*Amounts shown are strategies only and do not include existing supplies

Other Aquifer Strategies – Regions L, M, & N



*Amounts shown are strategies only and do not include existing supplies

Discussion of Pumping Inputs for Modeling DFCs

GMA 13 Agenda Item 6

May 3, 2019

QUESTIONS/DISCUSSION

Mike Keester, P.G.
Mike.Keester@LREWater.com
(512) 962-7660

Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

Appendix 4.3 —
August 2, 2019 Presentation of Pumping Inputs for Modeling DFCs

LRE Water, LLC
a Leonard Rice Engineers Company

Discussion of Pumping Input Updates for Modeling DFCs

GMA 13 Agenda Item 6

August 2, 2019

Modifications to the MAG Pumping File

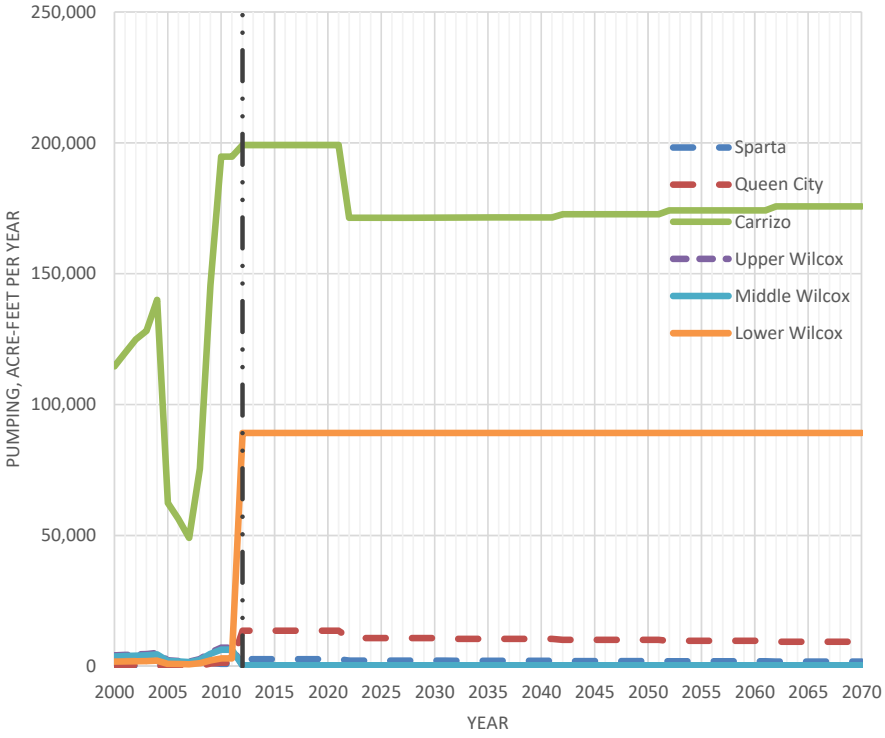
- Extended actual pumping through 2016
  - No changes to updated pumping from 2000 through 2011 (amounts or locations)
  - Modified pumping amounts for 2012 through 2016
- For the 2012 through 2016
  - Used available GCD and stakeholder values and locations
  - Used TWDB WUS data to supplement where needed
- For TWDB Carrizo-Wilcox WUS Data
  - Used TWDB and SDR databases to assess distribution of pumping
  - Well locations and completion intervals dictated amount assigned to an aquifer

Modifications to the MAG Pumping File

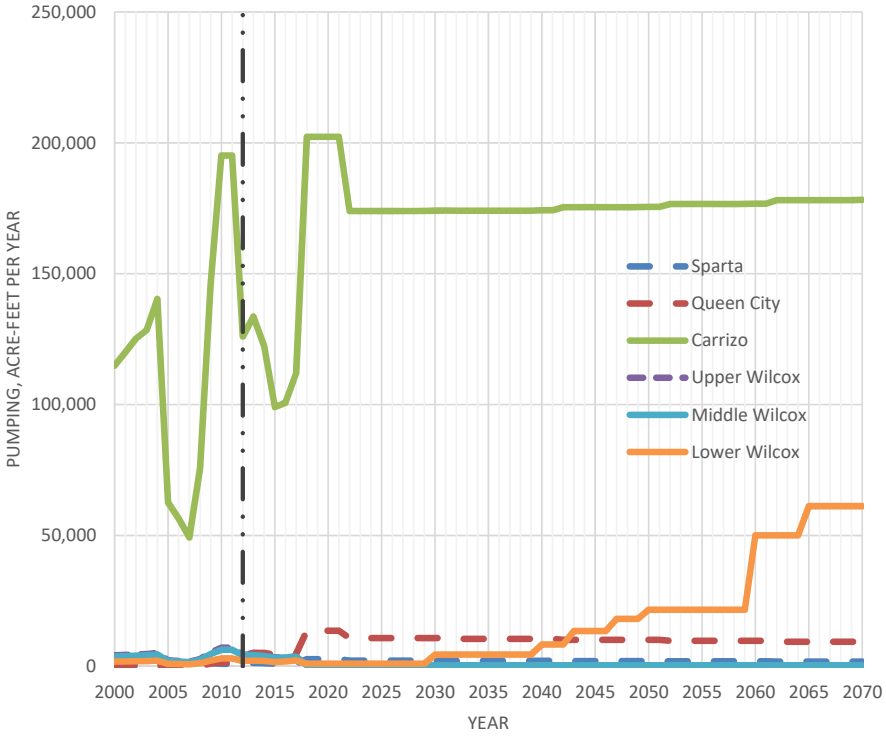
- Updated projections based on GCD and stakeholder input
  - Used well locations or model cells
  - Used amounts per year to ramp up production
- No changes to areas without guidance
  - Kept previous round projected pumping
  - Resulted in some area ramping up and others flat
- Pending
  - Update the evenly distributed low pumping in downdip areas
  - Finalize verification of RWP projects
  - Review distribution and amounts with GCDs

Evergreen UWCD

Second Round

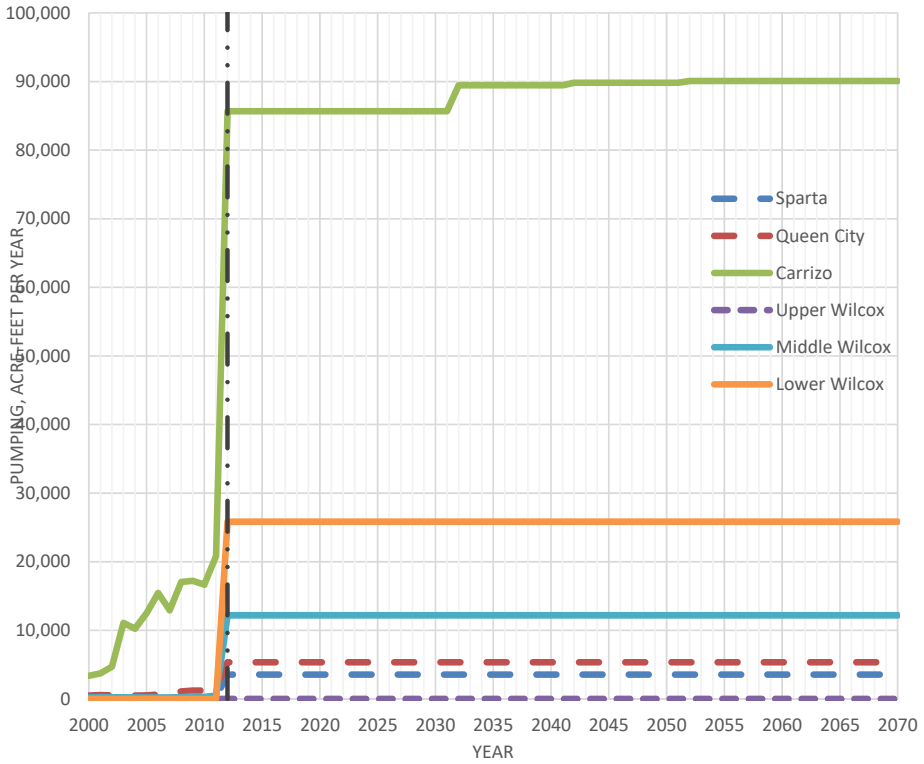


Draft Update



Gonzales County UWCD

Second Round



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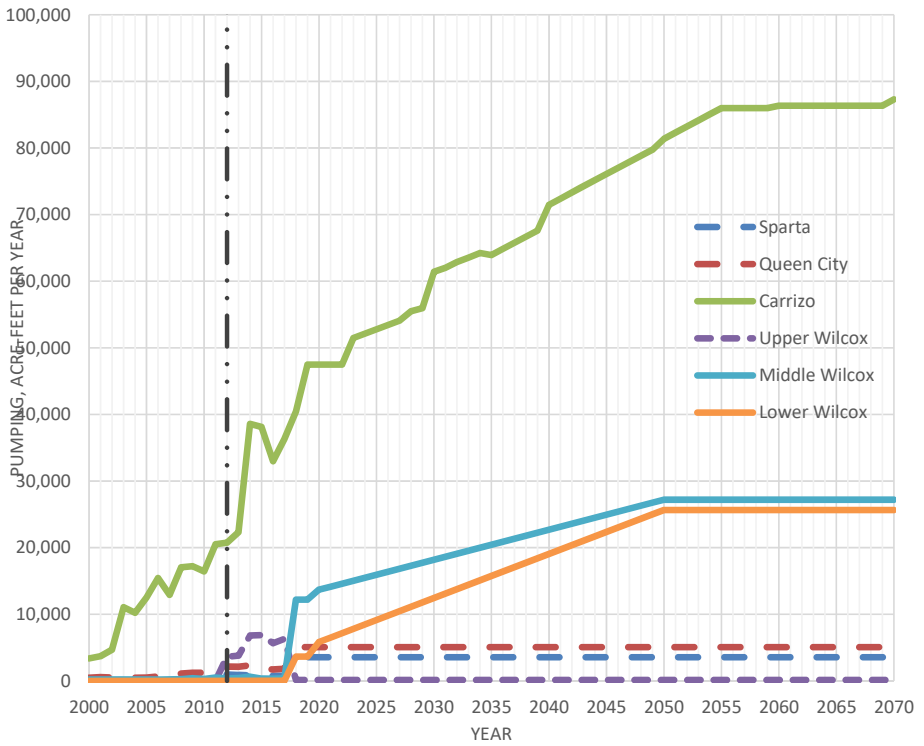
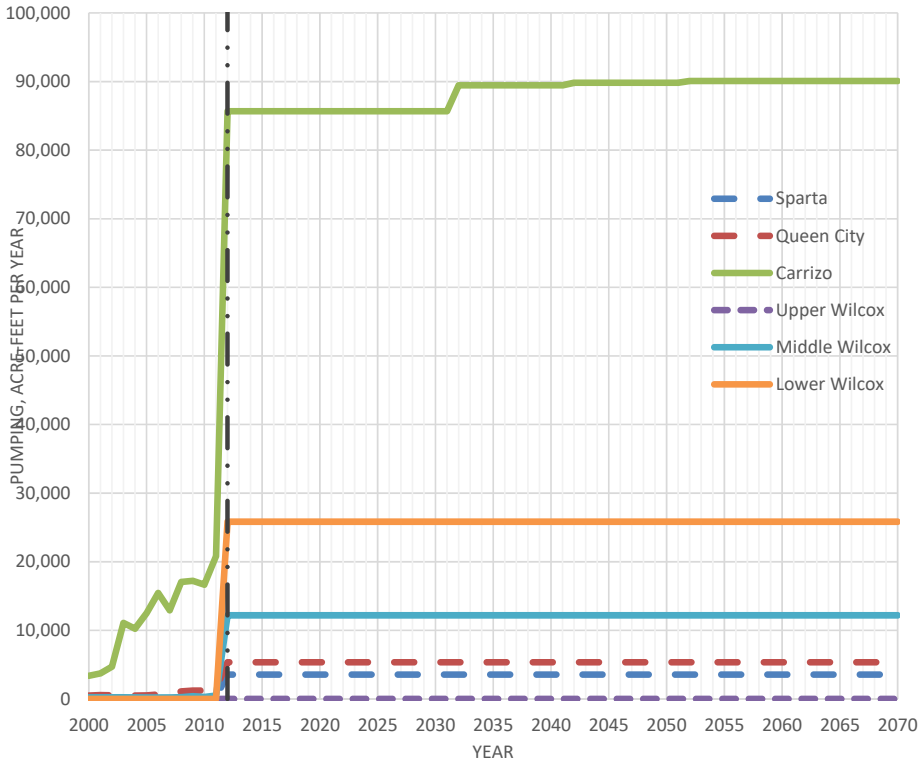


Gonzales County UWCD

Second Round



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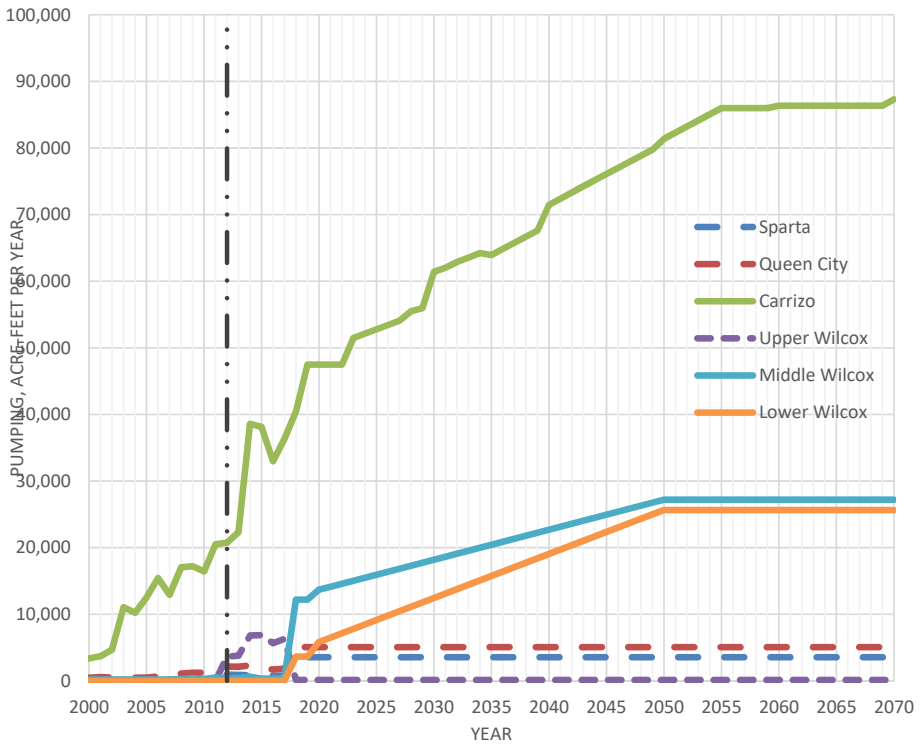
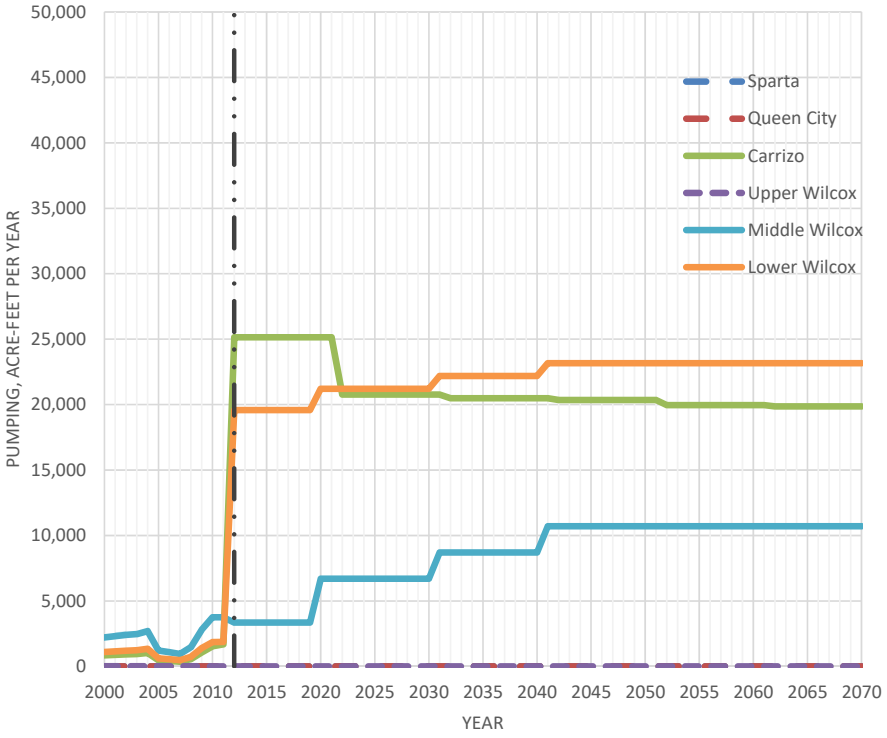


Guadalupe County GCD

Second Round



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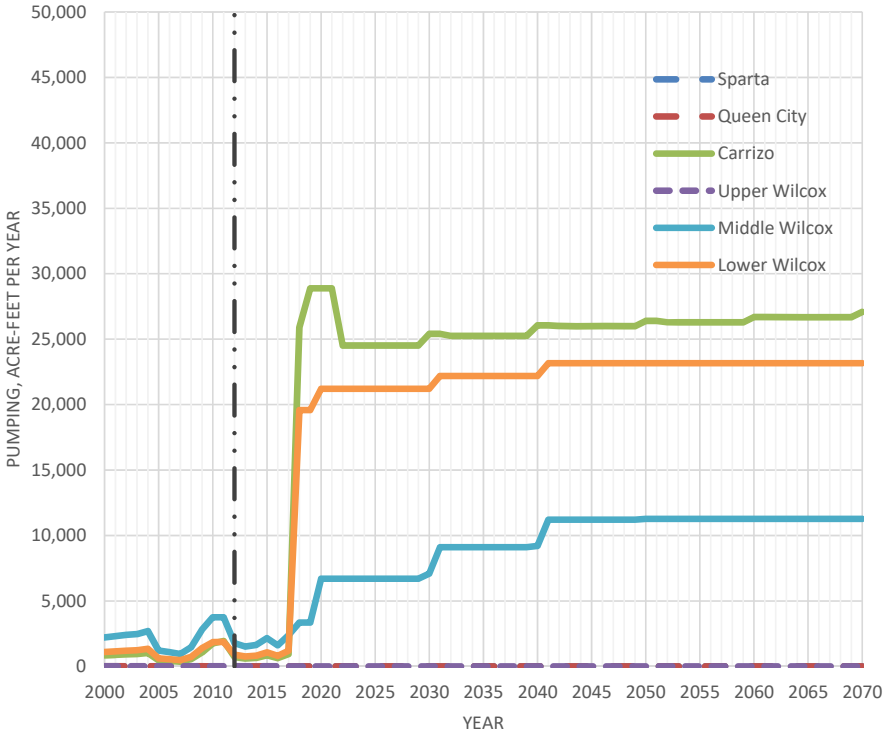
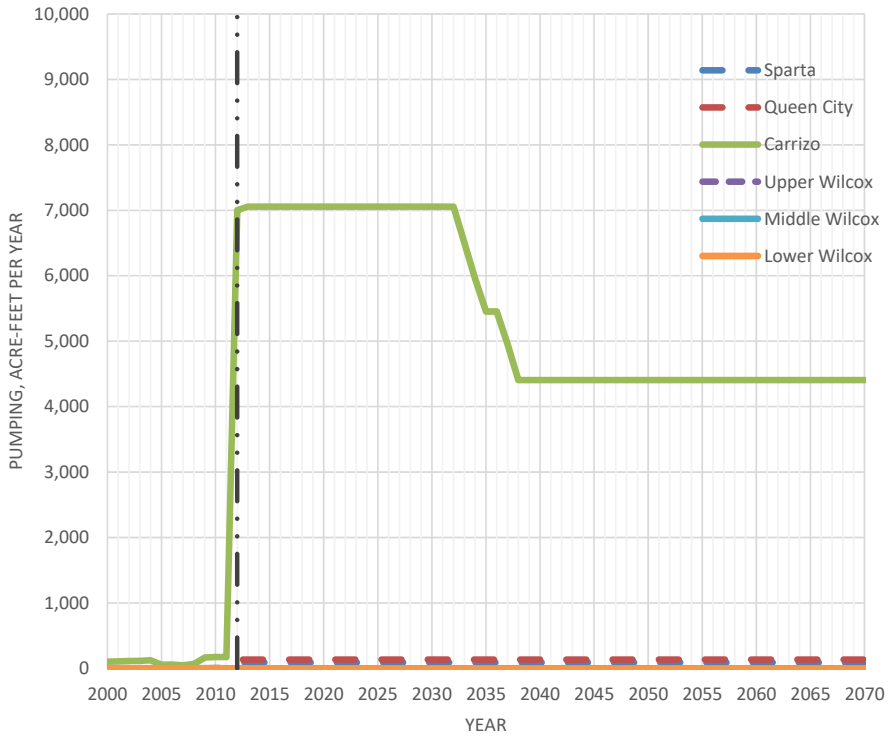


McMullen GCD

Second Round



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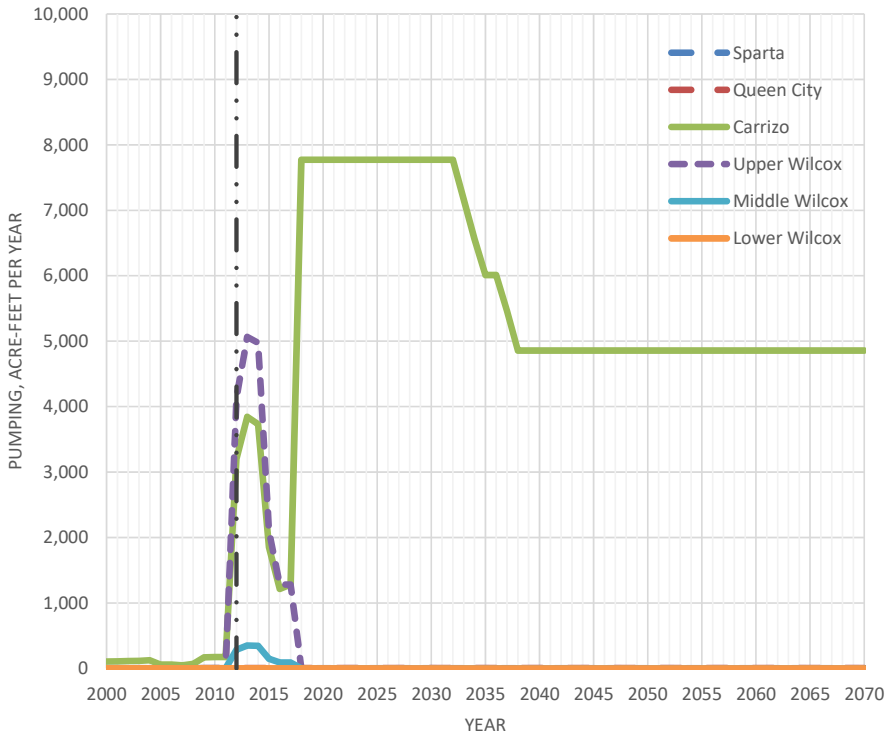
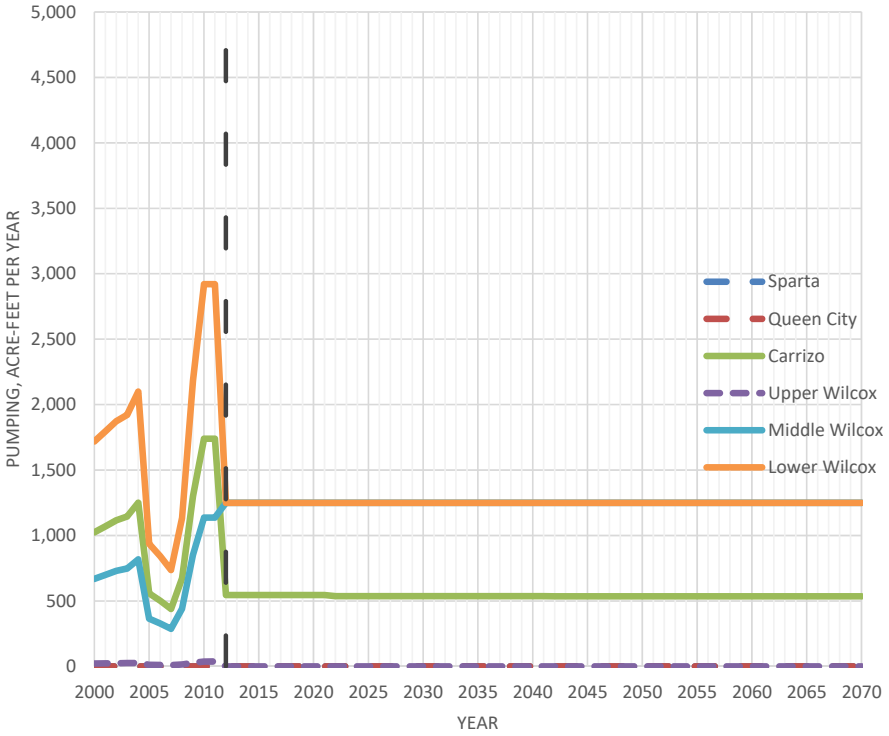
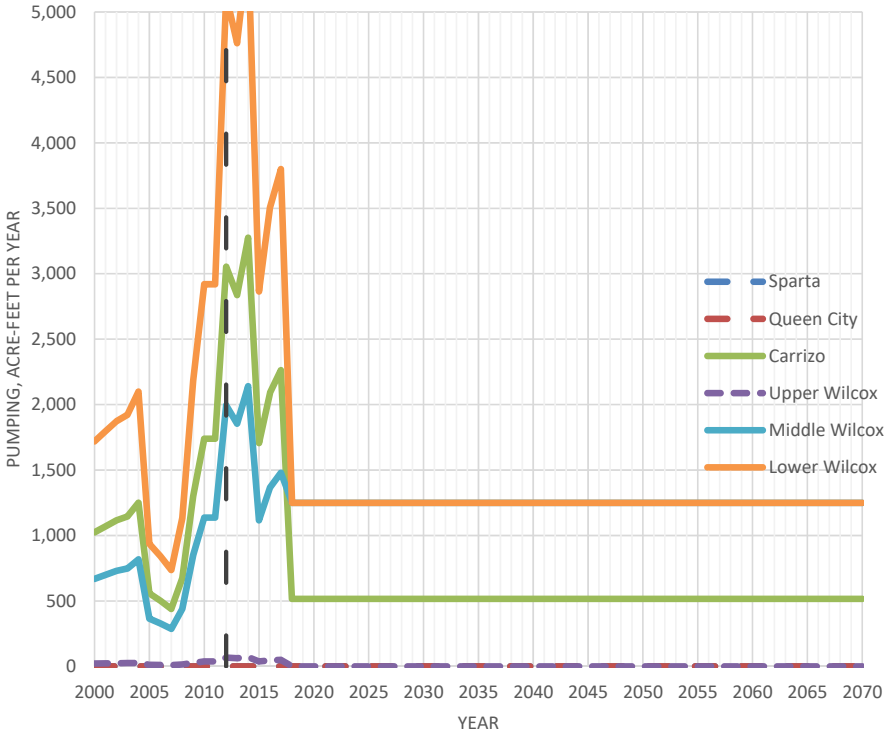


Medina County GCD

Second Round

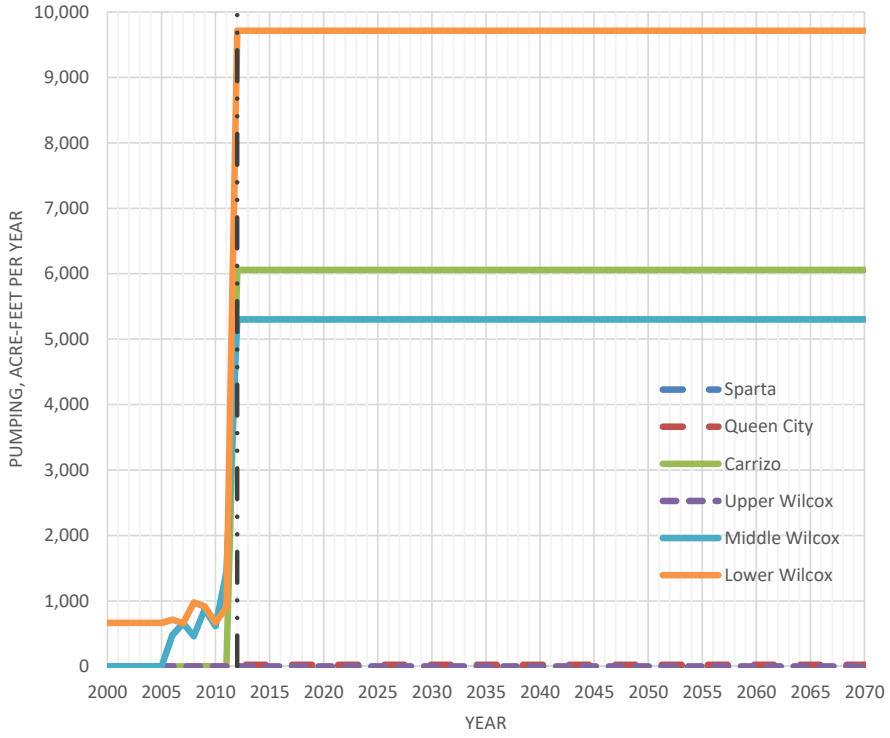


Draft Update

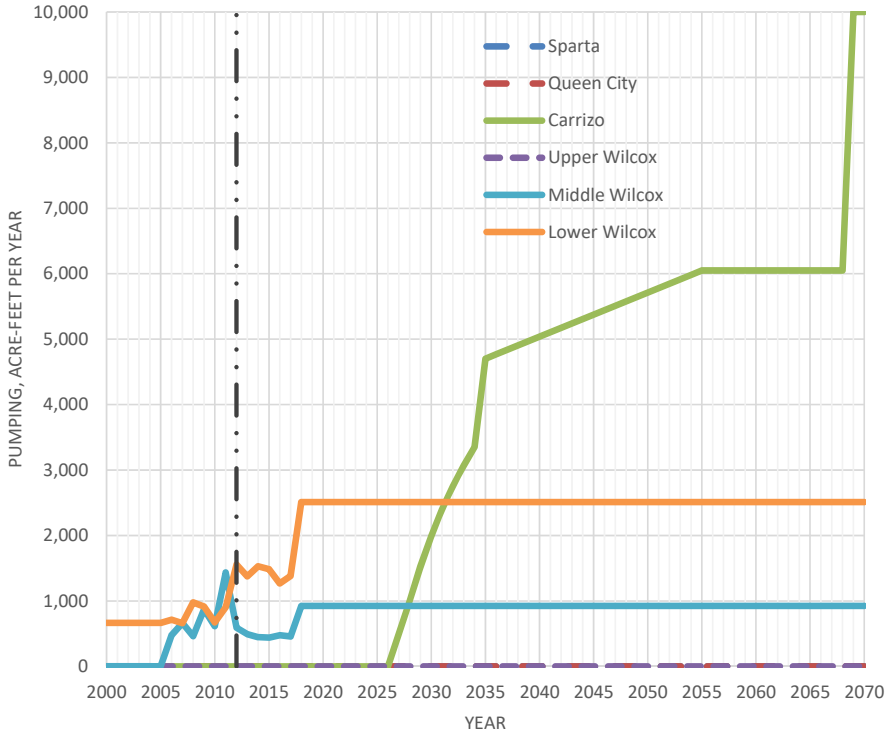


Plum Creek CD

Second Round

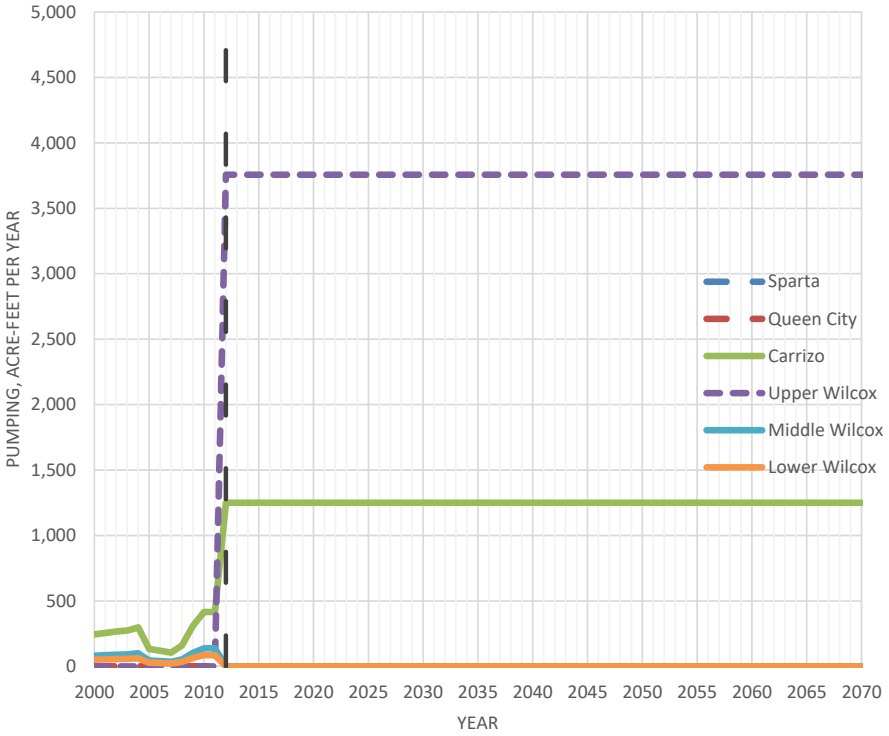


Draft Update



Uvalde County GCD

Second Round



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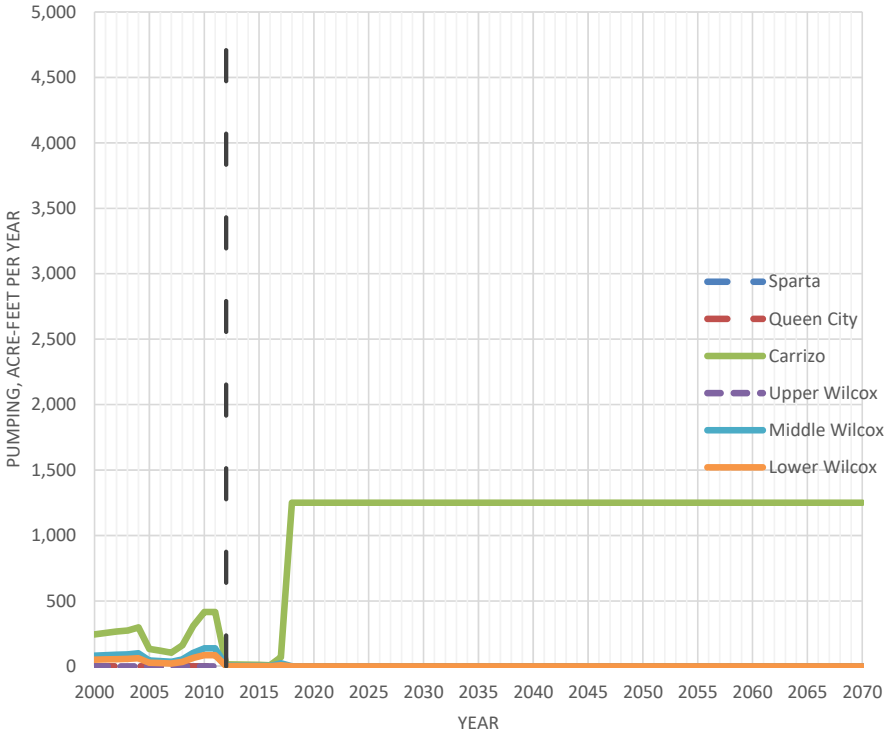
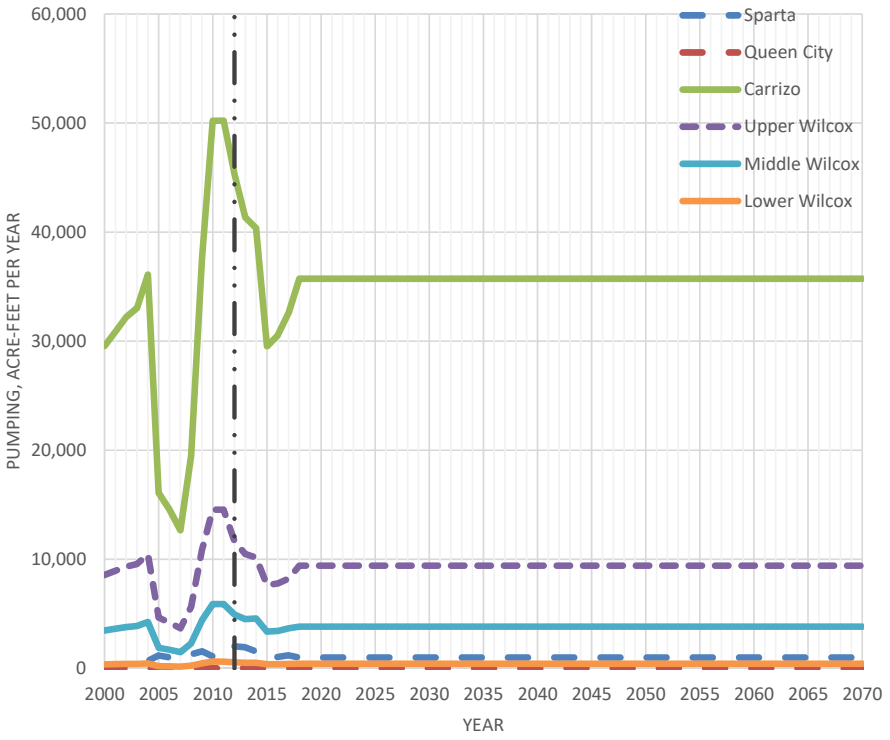


Wintergarden GCD

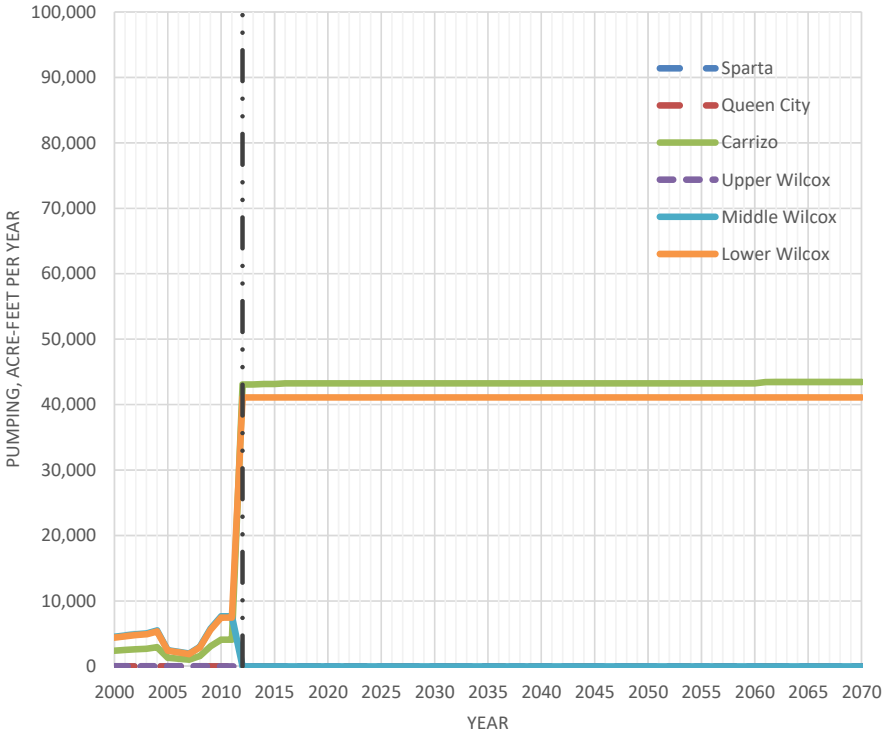
Second Round

Draft Update



Bexar County

Second Round



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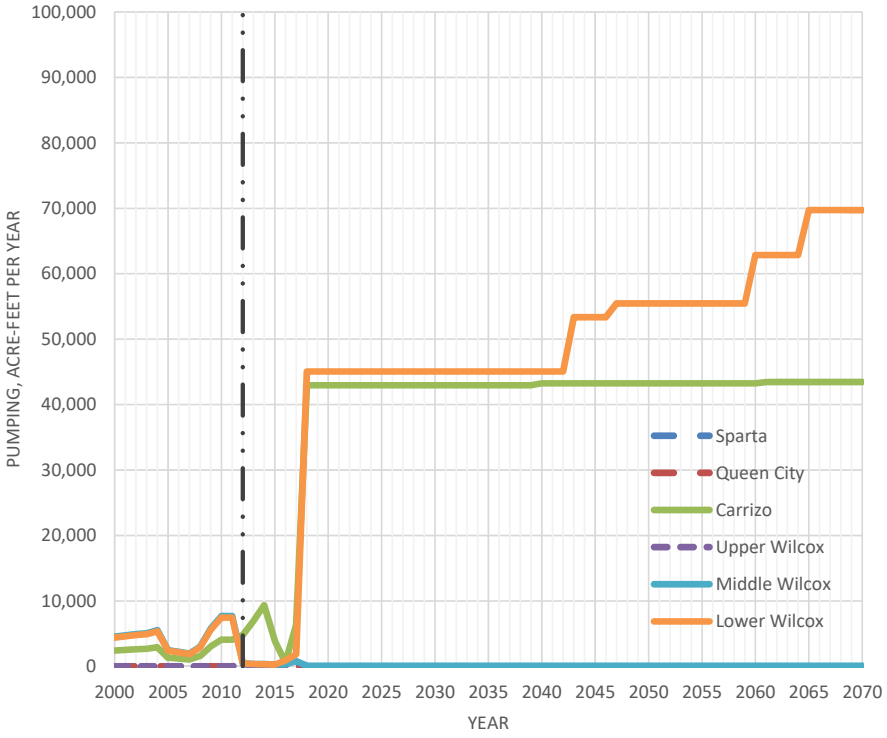
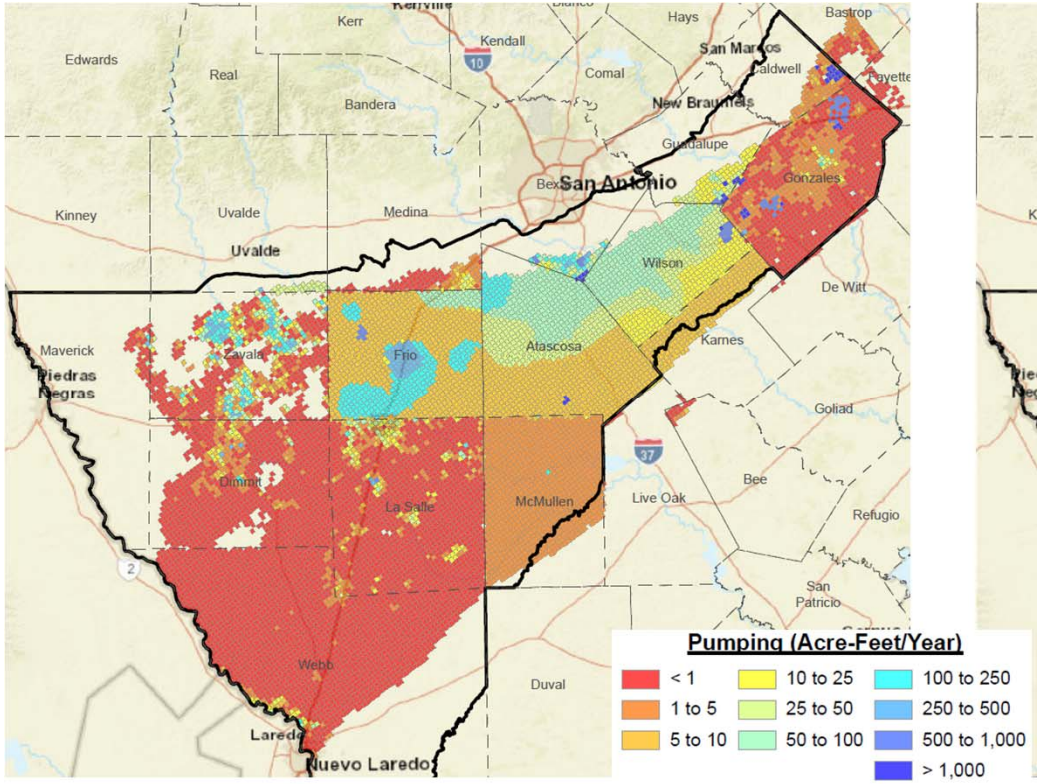
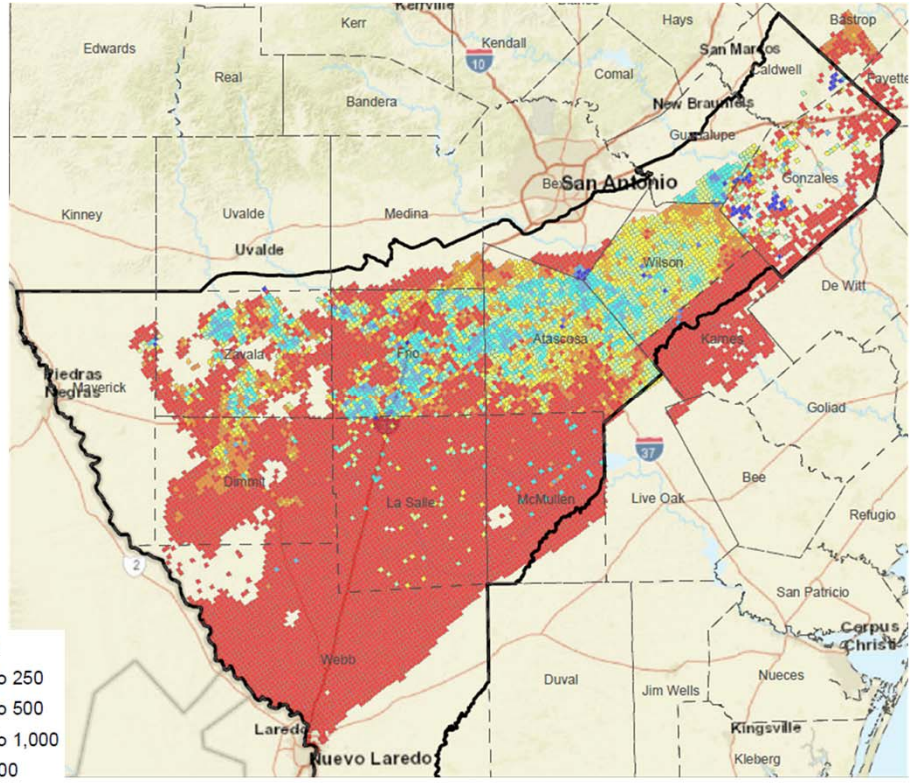


Carrizo Pumping Distribution

Second Round – Carrizo – 2070

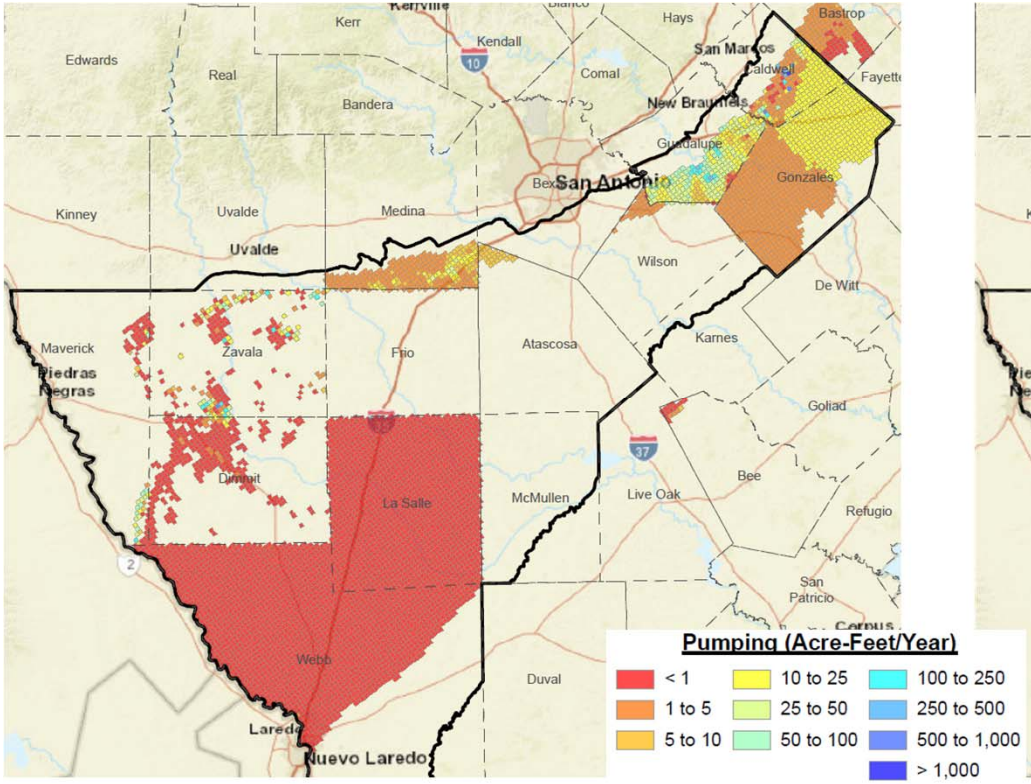


Draft Update – Carrizo – 2070

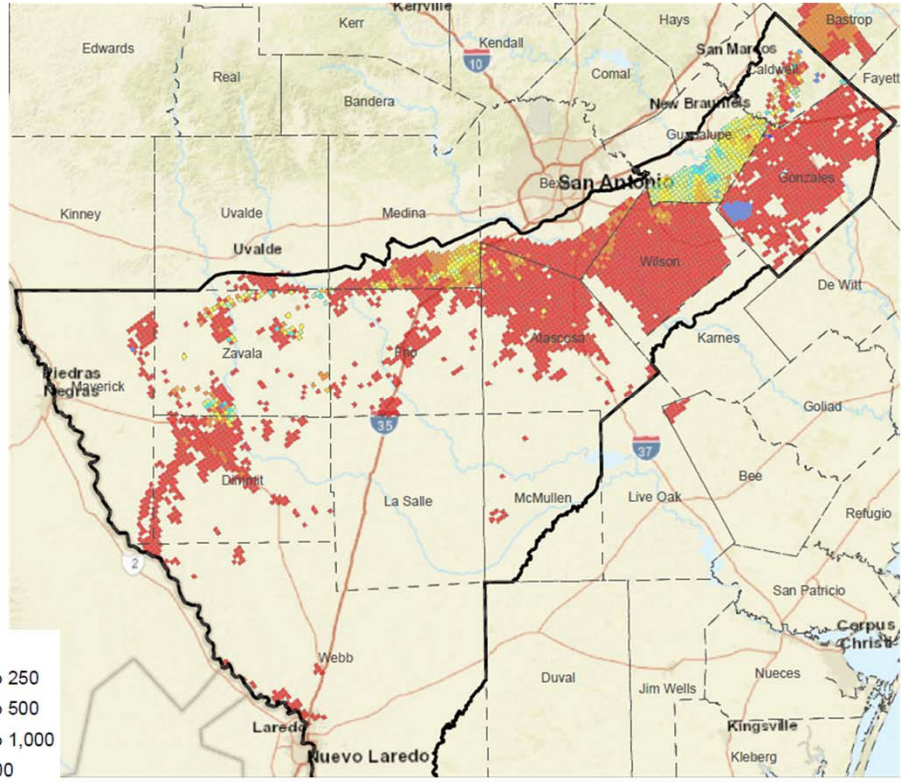


Middle Wilcox Pumping Distribution

Second Round – Middle Wilcox – 2070

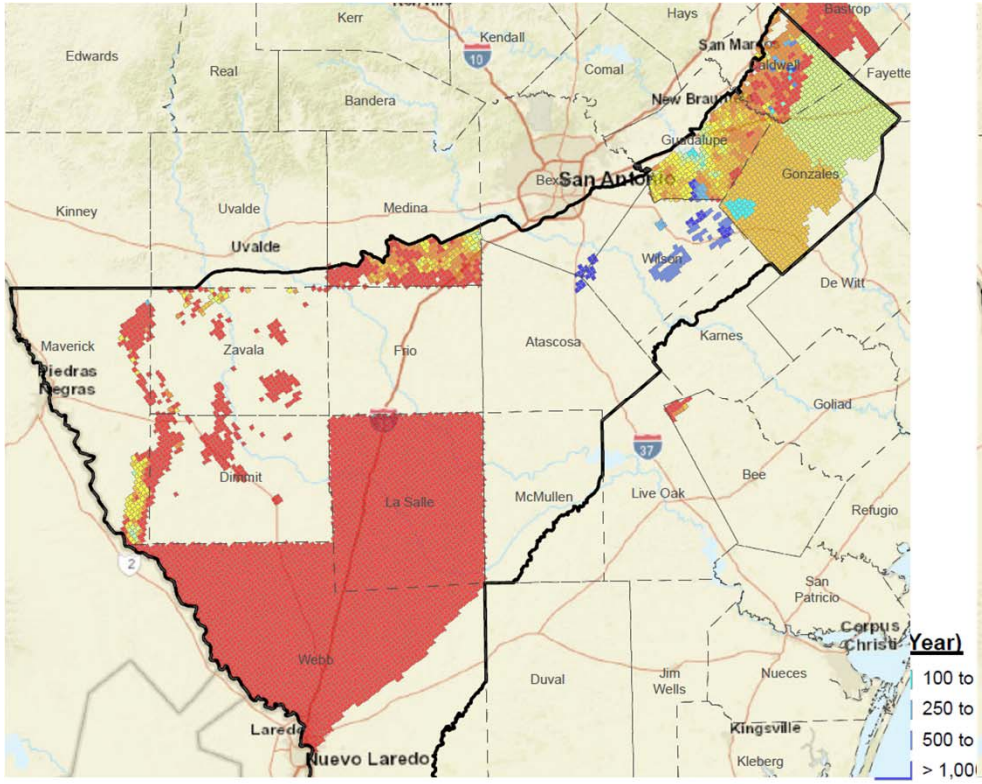


Draft Update – Middle Wilcox – 2070

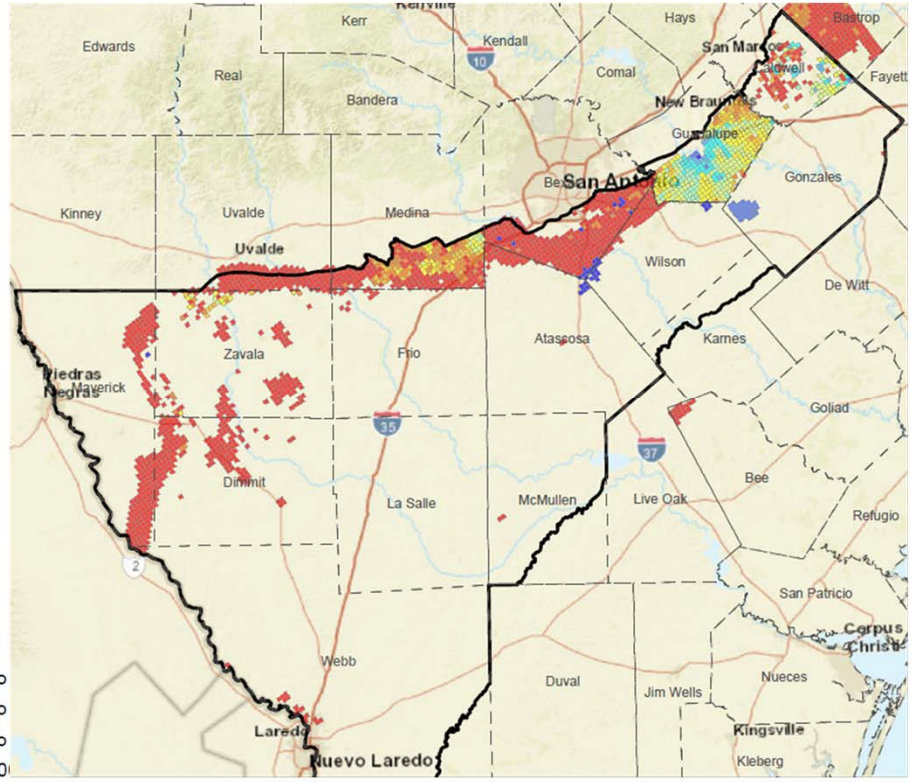


Lower Wilcox Pumping Distribution

Second Round – Lower Wilcox – 2070

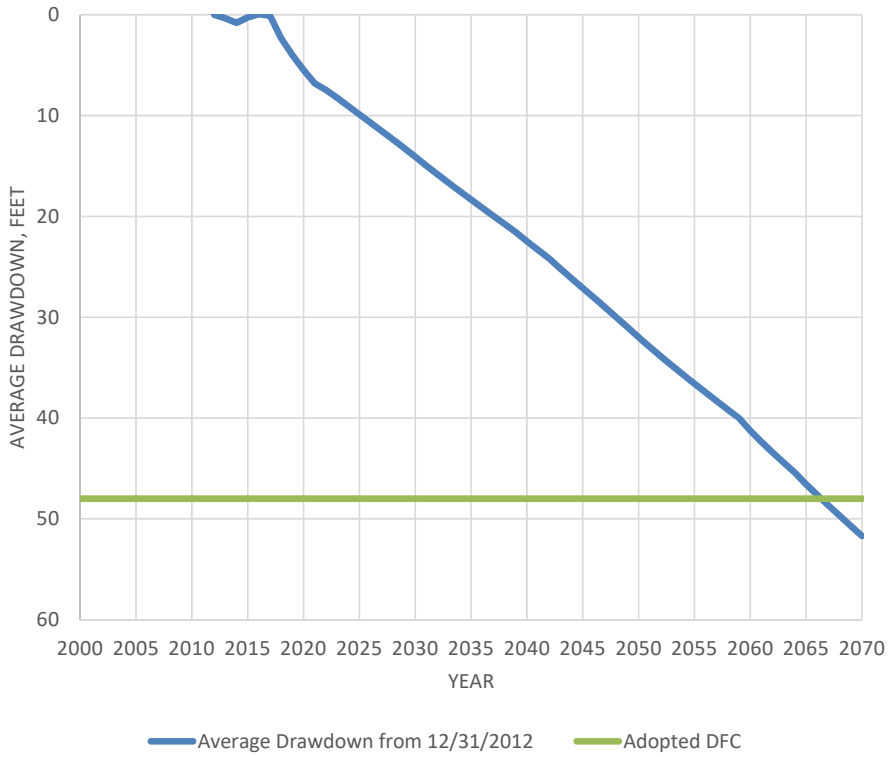


Draft Update – Lower Wilcox – 2070



Carrizo-Wilcox, Queen City, and Sparta Average Drawdown

- Little change with draft update
  - Adopted DFC: 48 feet of average drawdown from end of 2012 to year 2070
  - Draft Update Average Drawdown
    - 12/31/2012 to 1/1/2070 = 51 feet
    - 12/31/2012 to 12/31/2070 = 52 feet
- Extending base year does not change results significantly
  - Difference of less than 0.1 foot



Next Steps

- Finalize pumping file update and prepare results
- Perform aquifer equilibrium model run
- Conduct additional model runs based on baseline, for example
  - Additional brackish production
  - Injection associated with ASR
  - ?????

For Next Meeting

- Present results from modeling
- Present information on aquifer uses and conditions
- Present information on water supply needs and management strategies

Discussion of Pumping Input Updates for Modeling DFCs

GMA 13 Agenda Item 6

August 2, 2019

QUESTIONS/DISCUSSION

Mike Keester, P.G.
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(512) 962-7660

Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

Appendix 4.4 —
November 7, 2019 Summary of Current Modeling for the Third Round of Joint Planning

TECHNICAL MEMORANDUM

TO:	Groundwater Management Area 13
FROM:	Michael R. Keester, P.G.
SUBJECT:	Summary of Current Modeling for the Third Round of Joint Planning
DATE:	November 7, 2019

Modeling to-date has focused on modifications to the previous modeled available groundwater pumping file. Our first modification was to update the actual pumping from 2012 through 2016. These changes are an extension of the update to actual pumping from 2000 through 2011 that was conducted during the previous round of joint planning.

For the 2012 through 2016 actual pumping update, we used available information on the pumping amounts and locations as provided by Districts and Stakeholders. In addition, we used the groundwater pumping estimates from the TWDB Water Use Surveys to supplement the pumping information. Similar to the actual pumping, for the projected pumping, we updated some areas and amounts from the previous round of planning based on information provided by Districts and Stakeholders. The projected pumping amounts were typically set to increase with the anticipated need of the water or initiation of the project. We presented the first draft of the updates during the GMA 13 meeting on August 2, 2019. We then revised the pumping amounts where needed based on feedback from the District representatives and Stakeholders. The resulting pumping file is identified as: GMA13_2019_001.

Simulated Pumping

In the model, the aquifer system is divided into eight layers: layer 1 represents the Sparta Aquifer, layer 3 represents the Queen City Aquifer, layer 5 represents the Carrizo Aquifer, and layers 6, 7, and 8 represent the upper, middle, lower Wilcox, respectively. After developing the pumping file, we examined it to determine the input pumping values per aquifer layer along with the combined Carrizo-Wilcox, Sparta, and Queen City.

Attachment 1 contains several tables with the simulated pumping in each District. The first table is the current MAG values as reflected in Appendix B of GAM Run 17-027 MAG (Wade, 2017). The second table contains the input pumping amounts from the file used to simulate the adopted DFCs. These tables are primarily for reference and comparison with the current draft simulated pumping.

The next two tables reflect the current draft pumping input and difference between the current draft pumping input and the MAG. The most notable difference between the current draft values and the MAG is that pumping increases toward 2070. The difference is reflected in the negative values in early decades. However, in most cases the current draft pumping inputs are higher than the MAG in 2070.

After performing a simulation with the current draft pumping input, we evaluated the model budget file to verify that the pumping input amounts were fully realized in the simulation. The final three tables in Attachment 1 contain the pumping output from the model, the difference between the output and the input, and the difference between the output and the current MAG. We found that the pumping output was less than the pumping input in many cases. The decreases in pumping occur due to model cells going dry and pumping no longer occurring within those dry cells. This dry cell issue with the model typically occurs in the shallower parts of the aquifers. The most significant decreases occur within Guadalupe County GCD with an overall difference between the input and output of more than 20,000 acre-feet per year by 2060. A large difference between the input and output is also observed in Plum Creek CD.

To further investigate the difference between the input and the output, we compared the current draft pumping output to the MAG. We observe in the comparison that the differences are not as great between the pumping output and the MAG indicating that the issue of model cells going dry and shutting off the simulated pumping also occurred during the previous joint planning cycle. The table of MAG values and the table of MAG pumping input illustrate the issue as comparison of the values shows the MAG is less than the MAG pumping input value in some cases. To limit the loss of simulated production, we will look to reasonably redistribute the pumping input (for example, splitting high pumping from one cell into two cells).

Simulation Results

To illustrate the draft modeling results, we prepared tables (Attachment 2) and charts (Attachment 3) of the simulated average drawdown in each district within GMA 13. To calculate the average drawdown, we did not include model cells that went dry. In addition, we did not include model cells that were not considered part of each aquifer as delineated by the TWDB. While there may be model cells that are active in the simulation, if the cells were located outside of GMA 13, were not part of the delineated aquifer footprint, or were dry during the model year of the simulation, then they were not included in the calculation of the average drawdown.

For the average drawdown, we performed the calculation from simulated water levels from 12/31/2012 to be consistent with the previous round of joint planning. The charts in Attachment 3 illustrate the calculated average drawdown in the combined Carrizo-Wilcox, Sparta, and Queen City aquifers, as well as each aquifer individually. Negative average drawdown values, during the 2012 through 2016 period, indicate water level rise from the baseline water level.

The tables in Attachment 2 provide the average drawdown values for each District in GMA 13, the combined value for Districts in GMA 13, and for GMA 13 as a whole. These tables provide an opportunity for direct comparison with the adopted DFC. With the current DFC, based on model results, for GMA 13 being an average drawdown of 48 feet in 2070 for the combined Carrizo-Wilcox, Sparta, and Queen City aquifers, we observe that the current draft modeling results show 53 feet of average drawdown in 2070. However, this increase in average drawdown is expected due to the current draft pumping inputs being generally higher than the MAG.

Recommendations

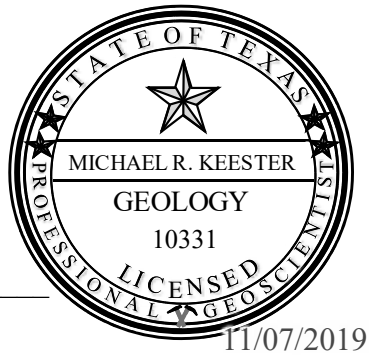
To best represent the projected future pumping, we consider the current draft pumping file to always be subject to revision based on the guidance of the Districts and stakeholders. We recommend each District and stakeholder review the current draft pumping input amounts to verify the amounts are consistent with their expectations. If revisions to the amounts are necessary, we will work to incorporate those revisions based on guidance from GMA 13.

Some re-distribution of the pumping amounts appears to be needed to help alleviate dry cells in the model. The goal of redistributing the pumping will be minimize the number of dry cells so that the pumping output values more closely match the pumping input values. Redistribution of pumping will primarily be the splitting of larger pumping amounts across multiple model cells. However, if it is reasonable to do so, we may also redistribute the pumping amounts across multiple model layers.

If you have any questions, please let us know.

Geoscientist Seal

This report documents the work of the following licensed professional geoscientists with LRE Water, LLC, a licensed professional geoscientist firm in the State of Texas (License No. 50516).



Michael R. Keester, P.G.
Project Manager / Hydrogeologist

11/07/2019

References

Kelley, V.A., Deeds, N.E., Fryar, D.G., and Nicot, J.P., 2004, Final Report: Groundwater Availability Models for the Queen City and Sparta Aquifers: Contract report for the Texas Water Development Board, 867 p.

Wade, S.C., 2017, GAM Run 17-027 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers in Groundwater Management Area 13: TWDB GAM Run Report, 36 p.

Attachment 1 –
Simulated Pumping

Current MAG, Acre-Feet per Year							
GCD/County	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	2,723	2,166	2,056	1,955	1,870	1,792
	Queen City	13,614	10,797	10,455	10,133	9,723	9,359
	Carrizo	199,165	171,394	171,475	172,735	174,186	175,686
	Upper Wilcox	374	374	374	374	374	374
	Middle Wilcox	370	370	370	370	370	370
	Lower Wilcox	89,186	89,186	89,186	89,186	89,186	89,186
	Total	305,432	274,287	273,916	274,753	275,709	276,767
Gonzales County UWCD	Sparta	3,554	3,554	3,554	3,554	3,554	3,554
	Queen City	5,351	5,351	5,351	5,351	5,351	5,351
	Carrizo	83,284	83,284	84,026	84,390	81,607	81,615
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	12,187	12,187	12,187	12,187	12,187	12,187
	Lower Wilcox	25,836	25,836	25,836	25,836	25,836	25,836
	Total	130,212	130,212	130,954	131,318	128,535	128,543
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	25,143	20,771	16,367	16,740	16,783	16,862
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	6,290	5,978	7,377	8,700	8,435	8,224
	Lower Wilcox	21,094	21,094	22,031	22,825	22,747	22,747
	Total	52,527	47,843	45,775	48,265	47,965	47,833
McMullen GCD	Sparta	89	89	89	89	89	89
	Queen City	134	134	134	134	134	134
	Carrizo	7,056	7,056	4,405	4,405	4,405	4,405
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	7,279	7,279	4,628	4,628	4,628	4,628
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	545	537	536	535	535	534
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	1,248	1,248	1,248	1,248	1,248	1,248
	Lower Wilcox	864	864	864	864	864	864
	Total	2,657	2,649	2,648	2,647	2,647	2,646
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	22	22	22	22	22	22
	Carrizo	6,057	6,057	6,057	6,057	6,057	6,057
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	4,838	4,838	4,838	4,838	4,261	4,261
	Lower Wilcox	9,714	9,714	9,306	9,306	9,306	9,306
	Total	20,631	20,631	20,223	20,223	19,646	19,646
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	828	828	828	828	828	828
	Upper Wilcox	2,147	402	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	2,975	1,230	828	828	828	828
Wintergarden GCD	Sparta	983	983	983	983	983	983
	Queen City	2	2	2	2	2	2
	Carrizo	32,962	32,962	32,962	32,962	32,962	32,962
	Upper Wilcox	9,261	9,261	9,261	9,261	9,261	9,261
	Middle Wilcox	4,006	4,006	4,006	4,006	4,006	4,006
	Lower Wilcox	416	416	416	416	416	416
	Total	47,630	47,630	47,630	47,630	47,630	47,630

Current MAG Pumping Input (i.e.,Well File), Acre-Feet per Year							
GCD/County	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	2,738	2,183	2,071	1,974	1,888	1,814
	Queen City	13,614	10,797	10,455	10,133	9,723	9,359
	Carrizo	199,171	171,393	171,350	172,530	173,685	175,084
	Upper Wilcox	374	374	374	374	374	374
	Middle Wilcox	374	374	374	374	374	374
	Lower Wilcox	89,186	89,186	89,186	89,186	89,186	89,186
	Total	305,457	274,306	273,810	274,571	275,231	276,191
Gonzales County UWCD	Sparta	3,554	3,554	3,554	3,554	3,554	3,554
	Queen City	5,351	5,351	5,351	5,351	5,351	5,351
	Carrizo	85,665	85,665	89,442	89,806	90,058	90,067
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	12,182	12,182	12,182	12,182	12,182	12,182
	Lower Wilcox	25,827	25,827	25,827	25,827	25,827	25,827
	Total	132,579	132,579	136,356	136,720	136,972	136,981
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	25,161	20,789	20,630	20,572	20,463	20,462
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	6,690	6,690	8,700	10,708	10,708	10,708
	Lower Wilcox	21,215	21,215	22,188	23,164	23,164	23,164
	Total	53,065	48,693	51,518	54,444	54,334	54,333
McMullen GCD	Sparta	90	90	90	90	90	90
	Queen City	135	135	135	135	135	135
	Carrizo	7,066	7,066	4,416	4,416	4,416	4,416
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	7,292	7,292	4,641	4,641	4,641	4,641
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	515	515	515	515	515	515
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	1,250	1,250	1,250	1,250	1,250	1,250
	Lower Wilcox	1,250	1,250	1,250	1,250	1,250	1,250
	Total	3,015	3,015	3,015	3,015	3,015	3,015
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	22	22	22	22	22	22
	Carrizo	6,057	6,057	6,057	6,057	6,057	6,057
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	5,301	5,301	5,301	5,301	5,301	5,301
	Lower Wilcox	9,714	9,714	9,714	9,714	9,714	9,714
	Total	21,095	21,095	21,095	21,095	21,095	21,095
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	1,250	1,250	1,250	1,250	1,250	1,250
	Upper Wilcox	3,756	3,756	3,756	3,756	3,756	3,756
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	5,007	5,007	5,007	5,007	5,007	5,007
Wintergarden GCD	Sparta	987	987	987	987	987	987
	Queen City	1	1	1	1	1	1
	Carrizo	33,436	33,436	33,436	33,436	33,436	33,436
	Upper Wilcox	9,417	9,417	9,417	9,417	9,417	9,417
	Middle Wilcox	4,006	4,006	4,006	4,006	4,006	4,006
	Lower Wilcox	465	465	465	465	465	465
	Total	48,312	48,312	48,312	48,312	48,312	48,312

Current Draft Pumping Input (i.e.,Well File), Acre-Feet per Year							
GCD/County	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	2,739	2,183	2,071	1,974	1,888	1,814
	Queen City	13,614	10,797	10,455	10,134	9,724	9,358
	Carrizo	201,458	173,264	173,397	174,659	175,888	177,356
	Upper Wilcox	374	374	374	374	374	374
	Middle Wilcox	374	374	374	374	374	374
	Lower Wilcox	3,071	6,571	10,421	34,081	69,931	87,931
	Total	221,630	193,563	197,092	221,596	258,179	277,207
Gonzales County UWCD	Sparta	3,554	3,554	3,554	3,554	3,554	3,554
	Queen City	10,183	10,183	10,183	10,183	10,183	10,183
	Carrizo	47,486	61,408	71,481	81,382	86,337	87,298
	Upper Wilcox	15	15	15	15	15	15
	Middle Wilcox	11,216	15,716	20,216	24,716	24,716	24,716
	Lower Wilcox	2,200	8,800	15,400	22,000	22,000	22,000
	Total	74,654	99,675	120,848	141,850	146,805	147,765
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	28,883	25,411	26,053	26,395	26,685	27,084
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	6,690	7,090	9,200	11,268	11,268	11,268
	Lower Wilcox	21,215	21,215	22,188	23,164	23,164	23,164
	Total	56,788	53,716	57,441	60,826	61,117	61,516
McMullen GCD	Sparta	0	0	0	0	0	0
	Queen City	3	3	3	3	3	3
	Carrizo	7,773	7,773	4,857	4,857	4,857	4,857
	Upper Wilcox	1,280	1,280	1,280	1,280	1,280	1,280
	Middle Wilcox	88	88	88	88	88	88
	Lower Wilcox	0	0	0	0	0	0
	Total	9,144	9,144	6,228	6,228	6,228	6,228
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	515	515	515	515	515	515
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	1,250	1,250	1,250	1,250	1,250	1,250
	Lower Wilcox	1,250	1,250	1,250	1,250	1,250	1,250
	Total	3,015	3,015	3,015	3,015	3,015	3,015
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	0	1,991	5,037	5,712	6,050	10,000
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	5,702	5,702	5,702	5,702	5,702	5,702
	Lower Wilcox	11,916	11,916	11,916	11,916	11,916	11,916
	Total	17,617	19,609	22,655	23,330	23,667	27,617
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	0	1,991	5,037	5,712	6,050	10,000
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	5,702	5,702	5,702	5,702	5,702	5,702
	Lower Wilcox	11,916	11,916	11,916	11,916	11,916	11,916
	Total	17,617	19,609	22,655	23,330	23,667	27,617
Wintergarden GCD	Sparta	987	987	987	987	987	987
	Queen City	11	11	11	11	11	11
	Carrizo	35,724	35,724	35,724	35,724	35,724	35,724
	Upper Wilcox	9,417	9,417	9,417	9,417	9,417	9,417
	Middle Wilcox	3,818	3,818	3,818	3,818	3,818	3,818
	Lower Wilcox	415	415	415	415	415	415
	Total	50,372	50,372	50,372	50,372	50,372	50,372

Difference Between Current Draft Pumping Input (i.e.,Well Files) and MAG, Acre-Feet per Year							
GCD/County	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	16	17	15	19	18	22
	Queen City	0	0	(0)	1	1	(1)
	Carrizo	2,293	1,870	1,922	1,924	1,702	1,670
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	4	4	4	4	4	4
	Lower Wilcox	(86,115)	(82,615)	(78,765)	(55,105)	(19,255)	(1,255)
	Total	(83,802)	(80,724)	(76,824)	(53,157)	(17,530)	440
Gonzales County UWCD	Sparta	(0)	(0)	(0)	(0)	(0)	(0)
	Queen City	4,832	4,832	4,832	4,832	4,832	4,832
	Carrizo	(35,798)	(21,876)	(12,545)	(3,008)	4,730	5,683
	Upper Wilcox	15	15	15	15	15	15
	Middle Wilcox	(971)	3,529	8,029	12,529	12,529	12,529
	Lower Wilcox	(23,636)	(17,036)	(10,436)	(3,836)	(3,836)	(3,836)
	Total	(55,558)	(30,537)	(10,106)	10,532	18,270	19,222
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	3,740	4,640	9,686	9,655	9,902	10,222
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	400	1,112	1,823	2,568	2,833	3,044
	Lower Wilcox	121	121	157	339	417	417
	Total	4,261	5,873	11,666	12,561	13,152	13,683
McMullen GCD	Sparta	(89)	(89)	(89)	(89)	(89)	(89)
	Queen City	(131)	(131)	(131)	(131)	(131)	(131)
	Carrizo	717	717	452	452	452	452
	Upper Wilcox	1,280	1,280	1,280	1,280	1,280	1,280
	Middle Wilcox	88	88	88	88	88	88
	Lower Wilcox	0	0	0	0	0	0
	Total	1,865	1,865	1,600	1,600	1,600	1,600
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	(30)	(22)	(21)	(20)	(20)	(19)
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	2	2	2	2	2	2
	Lower Wilcox	386	386	386	386	386	386
	Total	358	366	367	368	368	369
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	(22)	(22)	(22)	(22)	(22)	(22)
	Carrizo	(6,057)	(4,066)	(1,020)	(345)	(7)	3,943
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	864	864	864	864	1,441	1,441
	Lower Wilcox	2,202	2,202	2,610	2,610	2,610	2,610
	Total	(3,014)	(1,022)	2,432	3,107	4,021	7,971
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	422	422	422	422	422	422
	Upper Wilcox	(2,147)	(402)	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	(1,725)	20	422	422	422	422
Wintergarden GCD	Sparta	4	4	4	4	4	4
	Queen City	9	9	9	9	9	9
	Carrizo	2,762	2,762	2,762	2,762	2,762	2,762
	Upper Wilcox	156	156	156	156	156	156
	Middle Wilcox	(188)	(188)	(188)	(188)	(188)	(188)
	Lower Wilcox	(1)	(1)	(1)	(1)	(1)	(1)
	Total	2,742	2,742	2,742	2,742	2,742	2,742

Current Draft Pumping Output (i.e.,Model Budget File), Acre-Feet per Year							
GCD/County	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	2,590	1,975	1,840	1,748	1,671	1,601
	Queen City	13,614	10,637	10,301	9,984	9,580	9,220
	Carrizo	201,458	173,264	173,397	174,596	175,822	177,287
	Upper Wilcox	374	374	374	374	374	374
	Middle Wilcox	348	348	348	348	348	348
	Lower Wilcox	3,071	6,571	10,421	34,081	69,931	87,931
	Total	221,456	193,170	196,681	221,132	257,726	276,761
Gonzales County UWCD	Sparta	3,554	2,489	2,489	2,489	2,489	2,489
	Queen City	10,183	9,899	9,899	9,899	9,155	8,871
	Carrizo	47,486	61,345	71,418	81,320	86,275	87,235
	Upper Wilcox	15	15	15	15	15	15
	Middle Wilcox	11,216	15,716	20,216	24,716	24,716	24,716
	Lower Wilcox	2,200	8,800	15,400	22,000	22,000	22,000
	Total	74,654	98,264	119,437	140,439	144,650	145,326
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	27,953	14,571	13,828	13,478	13,589	13,202
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	6,439	5,986	7,540	9,225	8,740	8,648
	Lower Wilcox	20,049	18,374	18,636	19,010	18,515	17,901
	Total	54,441	38,931	40,004	41,712	40,844	39,751
McMullen GCD	Sparta	0	0	0	0	0	0
	Queen City	3	3	3	3	3	3
	Carrizo	7,773	7,773	4,857	4,857	4,857	4,857
	Upper Wilcox	1,280	1,280	1,280	1,280	1,280	1,280
	Middle Wilcox	88	88	88	88	88	88
	Lower Wilcox	0	0	0	0	0	0
	Total	9,144	9,144	6,228	6,228	6,228	6,228
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	515	515	515	515	515	515
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	1,250	1,250	1,250	1,250	1,250	1,238
	Lower Wilcox	818	818	818	800	800	794
	Total	2,583	2,583	2,583	2,565	2,565	2,547
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	0	1,991	5,037	5,712	6,050	10,000
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	5,702	5,702	5,702	4,943	3,919	3,919
	Lower Wilcox	11,916	7,665	5,543	5,543	5,543	5,543
	Total	17,617	15,358	16,283	16,199	15,512	19,462
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	0	0	0	0	0	0
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Wintergarden GCD	Sparta	987	987	987	987	987	987
	Queen City	11	11	11	11	11	11
	Carrizo	35,216	32,318	32,044	31,845	31,845	31,554
	Upper Wilcox	9,260	9,260	9,260	9,260	9,260	9,165
	Middle Wilcox	3,818	3,818	3,818	3,818	3,818	3,818
	Lower Wilcox	366	366	366	366	366	366
	Total	49,658	46,761	46,486	46,287	46,287	45,901

Difference btw. Current Draft Pumping Output (i.e.,Model Budget File) and Input (i.e. Well File), Acre-Feet per Year							
GCD/County	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	(149)	(207)	(231)	(226)	(218)	(213)
	Queen City	0	(160)	(154)	(149)	(144)	(139)
	Carrizo	(0)	0	(0)	(63)	(66)	(69)
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	(26)	(26)	(26)	(26)	(26)	(26)
	Lower Wilcox	0	0	0	0	0	(0)
	Total	(174)	(393)	(411)	(464)	(452)	(446)
Gonzales County UWCD	Sparta	0	(1,065)	(1,065)	(1,065)	(1,065)	(1,065)
	Queen City	0	(284)	(284)	(284)	(1,028)	(1,312)
	Carrizo	0	(62)	(62)	(62)	(62)	(62)
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	0	(1,411)	(1,411)	(1,411)	(2,155)	(2,439)
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	(930)	(10,840)	(12,224)	(12,917)	(13,096)	(13,882)
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	(251)	(1,104)	(1,660)	(2,043)	(2,528)	(2,620)
	Lower Wilcox	(1,166)	(2,841)	(3,552)	(4,154)	(4,649)	(5,263)
	Total	(2,346)	(14,785)	(17,437)	(19,114)	(20,273)	(21,765)
McMullen GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	0	0	0	0	0	0
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	0	0	0	0	0	0
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	0	0	(12)
	Lower Wilcox	(432)	(432)	(432)	(449)	(449)	(456)
	Total	(432)	(432)	(432)	(449)	(449)	(468)
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	0	0	0	0	0	0
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	(759)	(1,783)	(1,783)
	Lower Wilcox	0	(4,251)	(6,372)	(6,372)	(6,372)	(6,372)
	Total	0	(4,251)	(6,372)	(7,131)	(8,155)	(8,155)
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)	(1,250)
Wintergarden GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	(508)	(3,406)	(3,681)	(3,879)	(3,879)	(4,170)
	Upper Wilcox	(156)	(156)	(156)	(156)	(156)	(251)
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	(49)	(49)	(49)	(49)	(49)	(49)
	Total	(714)	(3,611)	(3,886)	(4,085)	(4,085)	(4,471)

Difference btw. Current Draft Pumping Output (i.e.,Model Budget File) and MAG, Acre-Feet per Year							
GCD/County	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	(133)	(191)	(216)	(207)	(199)	(191)
	Queen City	0	(160)	(154)	(149)	(143)	(139)
	Carrizo	2,293	1,870	1,922	1,861	1,636	1,601
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	(22)	(22)	(22)	(22)	(22)	(22)
	Lower Wilcox	(86,115)	(82,615)	(78,765)	(55,105)	(19,255)	(1,255)
	Total	(83,976)	(81,117)	(77,235)	(53,621)	(17,983)	(6)
Gonzales County UWCD	Sparta	(0)	(1,065)	(1,065)	(1,065)	(1,065)	(1,065)
	Queen City	4,832	4,548	4,548	4,548	3,804	3,520
	Carrizo	(35,798)	(21,939)	(12,608)	(3,070)	4,668	5,620
	Upper Wilcox	15	15	15	15	15	15
	Middle Wilcox	(971)	3,529	8,029	12,529	12,529	12,529
	Lower Wilcox	(23,636)	(17,036)	(10,436)	(3,836)	(3,836)	(3,836)
	Total	(55,558)	(31,948)	(11,517)	9,121	16,115	16,783
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	2,810	(6,200)	(2,539)	(3,262)	(3,194)	(3,660)
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	149	8	163	525	305	424
	Lower Wilcox	(1,045)	(2,720)	(3,395)	(3,815)	(4,232)	(4,846)
	Total	1,914	(8,912)	(5,771)	(6,553)	(7,121)	(8,082)
McMullen GCD	Sparta	(89)	(89)	(89)	(89)	(89)	(89)
	Queen City	(131)	(131)	(131)	(131)	(131)	(131)
	Carrizo	717	717	452	452	452	452
	Upper Wilcox	1,280	1,280	1,280	1,280	1,280	1,280
	Middle Wilcox	88	88	88	88	88	88
	Lower Wilcox	0	0	0	0	0	0
	Total	1,865	1,865	1,600	1,600	1,600	1,600
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	(30)	(22)	(21)	(20)	(20)	(19)
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	2	2	2	2	2	(10)
	Lower Wilcox	(46)	(46)	(46)	(64)	(64)	(70)
	Total	(74)	(66)	(65)	(82)	(82)	(99)
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	(22)	(22)	(22)	(22)	(22)	(22)
	Carrizo	(6,057)	(4,066)	(1,020)	(345)	(7)	3,943
	Upper Wilcox	0	0	0	0	0	0
	Middle Wilcox	864	864	864	105	(342)	(342)
	Lower Wilcox	2,202	(2,049)	(3,763)	(3,763)	(3,763)	(3,763)
	Total	(3,014)	(5,273)	(3,940)	(4,024)	(4,134)	(184)
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	(828)	(828)	(828)	(828)	(828)	(828)
	Upper Wilcox	(2,147)	(402)	0	0	0	0
	Middle Wilcox	0	0	0	0	0	0
	Lower Wilcox	0	0	0	0	0	0
	Total	(2,975)	(1,230)	(828)	(828)	(828)	(828)
Wintergarden GCD	Sparta	4	4	4	4	4	4
	Queen City	9	9	9	9	9	9
	Carrizo	2,254	(644)	(918)	(1,117)	(1,117)	(1,408)
	Upper Wilcox	(1)	(1)	(1)	(1)	(1)	(96)
	Middle Wilcox	(188)	(188)	(188)	(188)	(188)	(188)
	Lower Wilcox	(50)	(50)	(50)	(50)	(50)	(50)
	Total	2,028	(869)	(1,144)	(1,343)	(1,343)	(1,729)

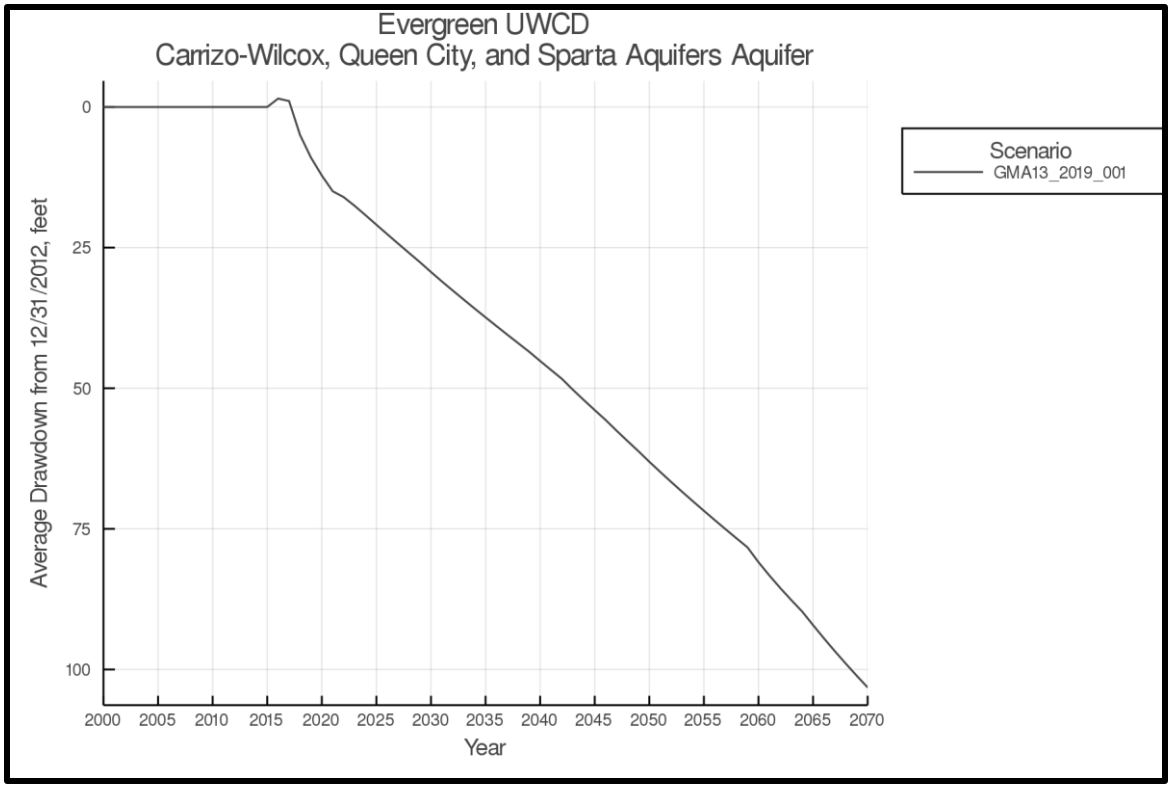
Attachment 2 –
Average Drawdown Tables

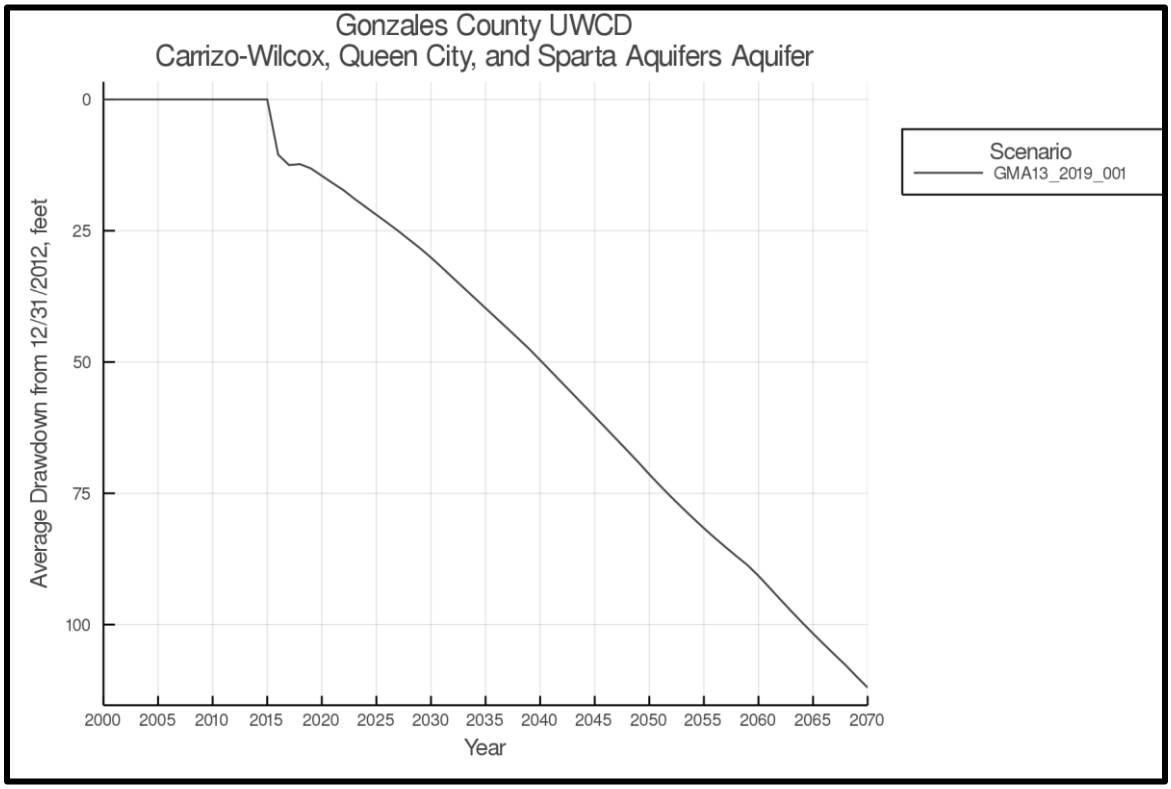
Current Draft Average Drawdown from 12/31/2012, Feet							
GCD	**Layer**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Evergreen UWCD	Sparta	1	4	7	9	11	12
	Queen City	2	5	9	11	14	17
	Carrizo	24	47	67	85	103	120
	Upper Wilcox	23	46	65	84	102	119
	Middle Wilcox	4	21	39	58	79	101
	Lower Wilcox	7	26	43	71	100	150
	Total	12	29	45	63	81	103
Gonzales County UWCD	Sparta	9	13	16	18	21	23
	Queen City	6	12	17	22	27	31
	Carrizo	23	41	62	82	102	120
	Upper Wilcox	23	41	61	82	102	120
	Middle Wilcox	15	28	52	82	108	129
	Lower Wilcox	4	24	50	80	104	145
	Total	15	30	50	71	91	112
Guadalupe County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	1	1	1
	Carrizo	19	43	65	87	109	127
	Upper Wilcox	18	37	51	64	77	82
	Middle Wilcox	7	26	49	72	90	106
	Lower Wilcox	16	42	71	103	132	176
	Total	14	36	61	86	109	137
McMullen GCD	Sparta	2	8	13	17	21	25
	Queen City	3	12	21	27	32	38
	Carrizo	15	37	46	56	66	76
	Upper Wilcox	12	34	45	55	65	75
	Middle Wilcox	1	3	6	9	14	19
	Lower Wilcox	-2	-4	-5	-4	-2	1
	Total	6	17	23	29	35	42
Medina County GCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	7	15	22	27	32	36
	Upper Wilcox	7	15	22	28	33	37
	Middle Wilcox	5	11	17	23	28	34
	Lower Wilcox	3	10	16	23	29	35
	Total	5	12	18	24	30	35
Plum Creek CD	Sparta	0	0	0	0	0	0
	Queen City	1	9	21	33	44	55
	Carrizo	5	24	48	74	98	117
	Upper Wilcox	5	24	48	74	98	118
	Middle Wilcox	3	11	16	20	22	24
	Lower Wilcox	10	21	28	34	40	46
	Total	8	17	24	31	36	41
Uvalde County UWCD	Sparta	0	0	0	0	0	0
	Queen City	0	0	0	0	0	0
	Carrizo	1	1	1	1	1	1
	Upper Wilcox	1	1	1	1	1	1
	Middle Wilcox	2	5	7	9	11	12
	Lower Wilcox	5	11	17	23	28	33
	Total	3	7	10	13	16	19
Wintergarden GCD	Sparta	-2	1	3	4	6	7
	Queen City	-1	4	8	12	15	17
	Carrizo	1	5	8	11	13	16
	Upper Wilcox	1	5	8	11	13	16
	Middle Wilcox	-1	-2	-1	1	3	5
	Lower Wilcox	-1	-3	-2	-1	0	2
	Total	0	1	3	5	7	10

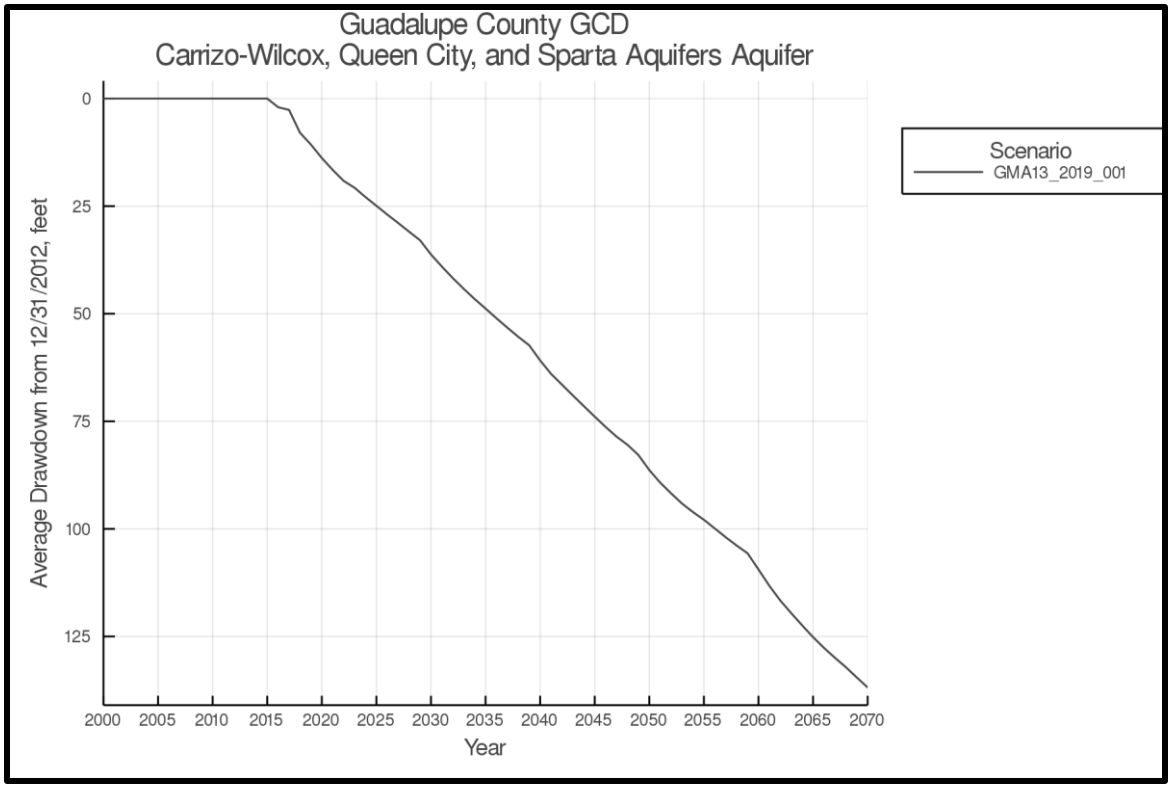
Current Draft Average Drawdown from 12/31/2012, Feet							
	Layer	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Districts in GMA 13	Sparta	3	6	8	11	13	15
	Queen City	3	7	11	15	18	22
	Carrizo	13	27	39	51	61	72
	Upper Wilcox	12	27	38	50	60	71
	Middle Wilcox	3	11	21	32	43	55
	Lower Wilcox	3	12	22	36	50	73
	Total	7	18	28	39	50	63
All of GMA 13	Sparta	3	6	8	11	13	15
	Queen City	3	7	11	15	18	22
	Carrizo	11	22	32	41	50	59
	Upper Wilcox	10	22	31	41	50	58
	Middle Wilcox	2	9	17	27	36	46
	Lower Wilcox	3	11	19	31	43	62
	Total	6	15	23	33	42	53

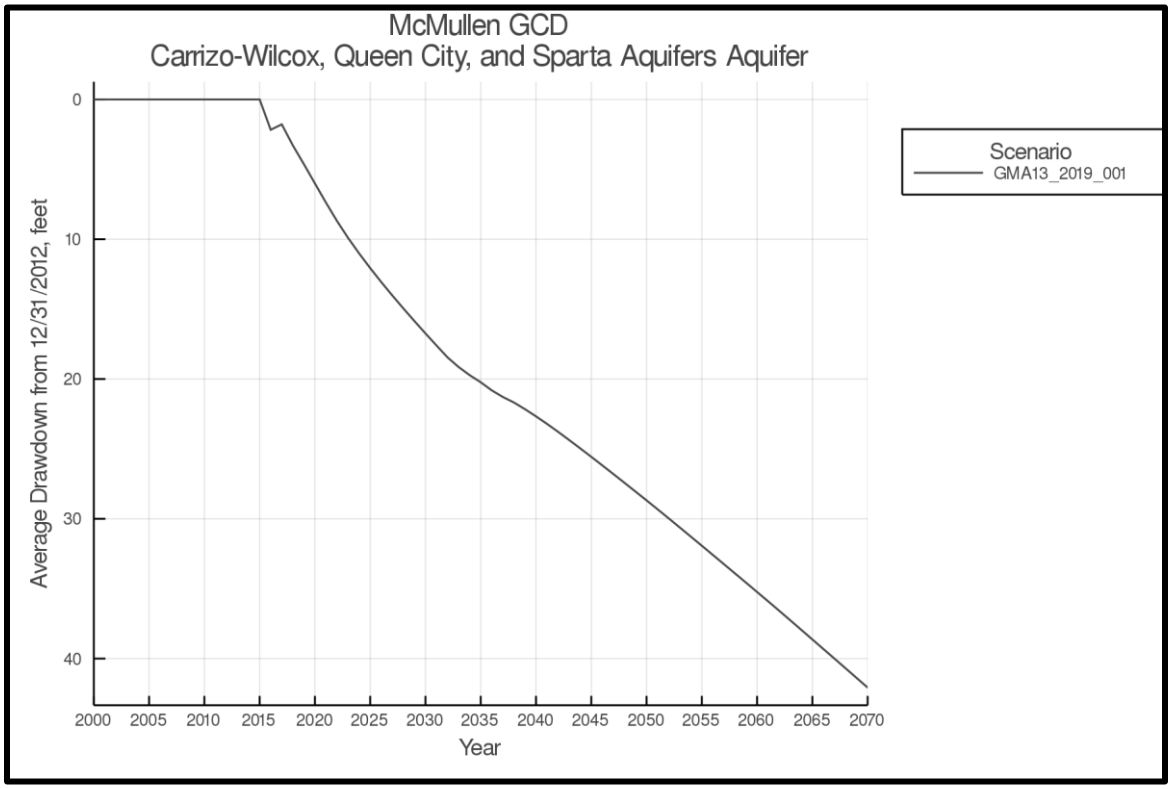
Attachment 3 –
Average Drawdown Charts

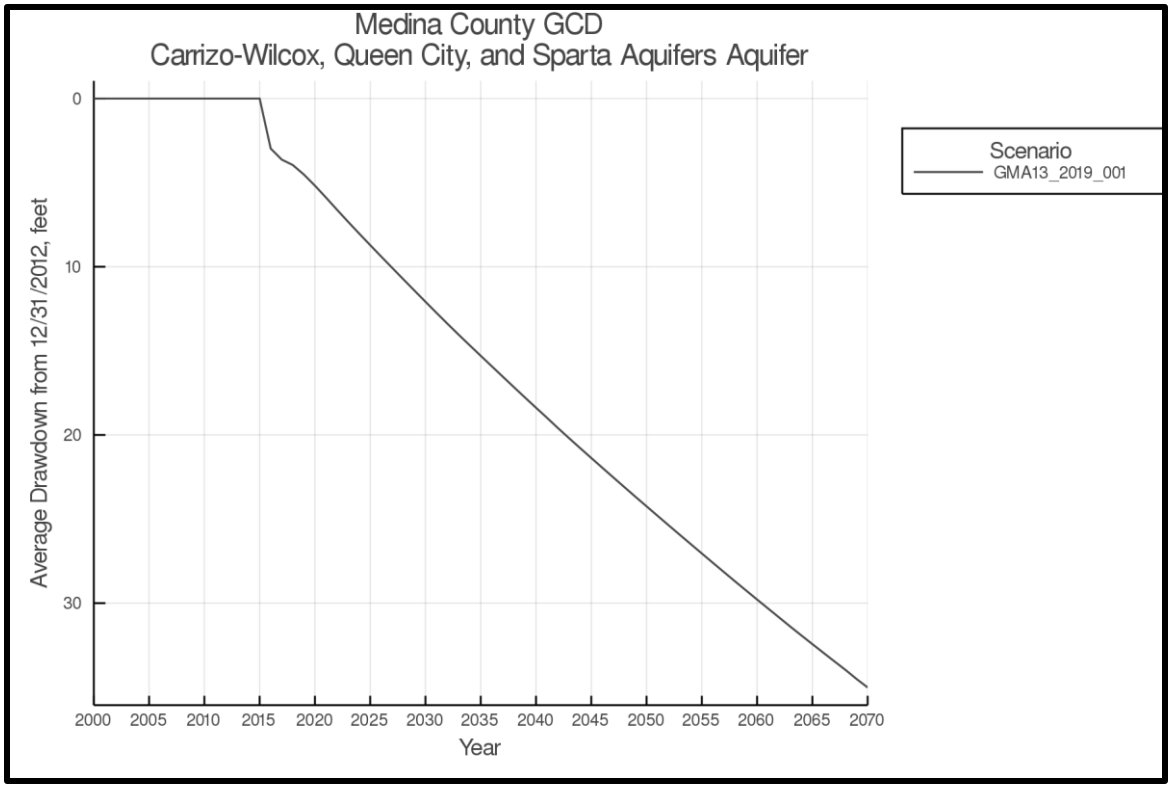
Attachment 3a –
Average Drawdown Charts for the
Carrizo-Wilcox, Sparta, and Queen City Aquifers

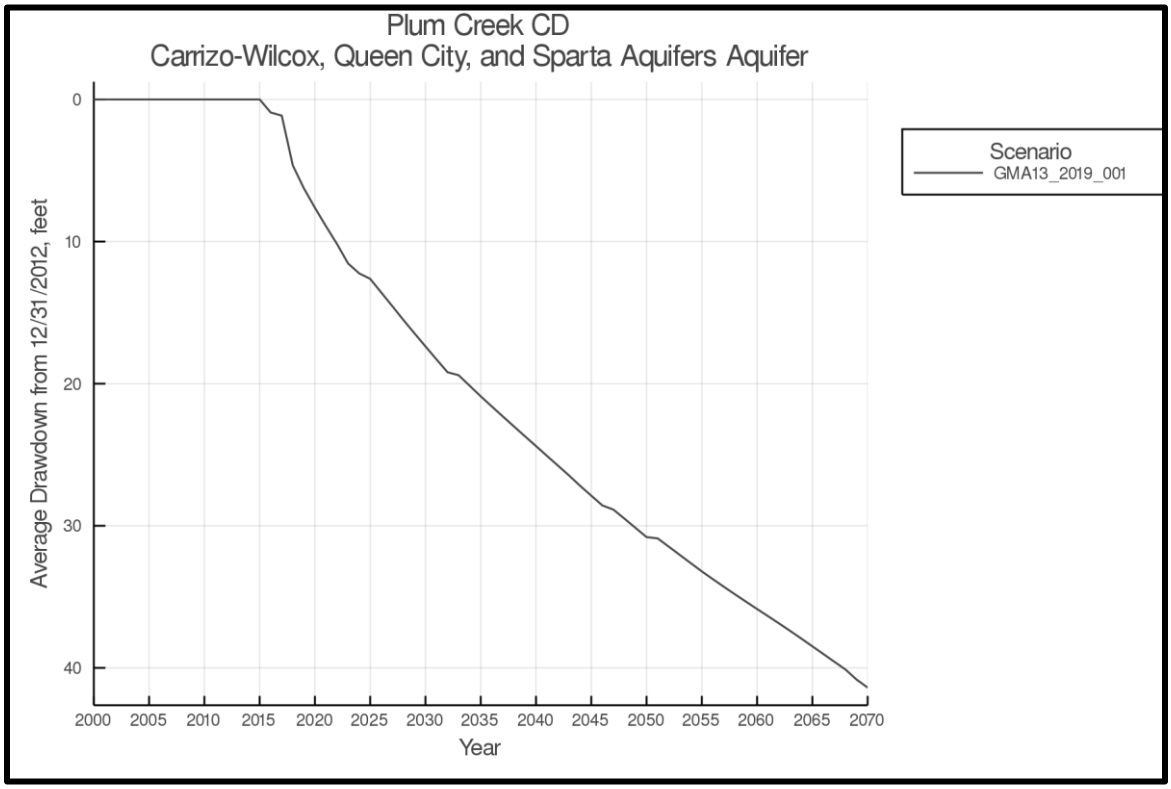

Evergreen UWCD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

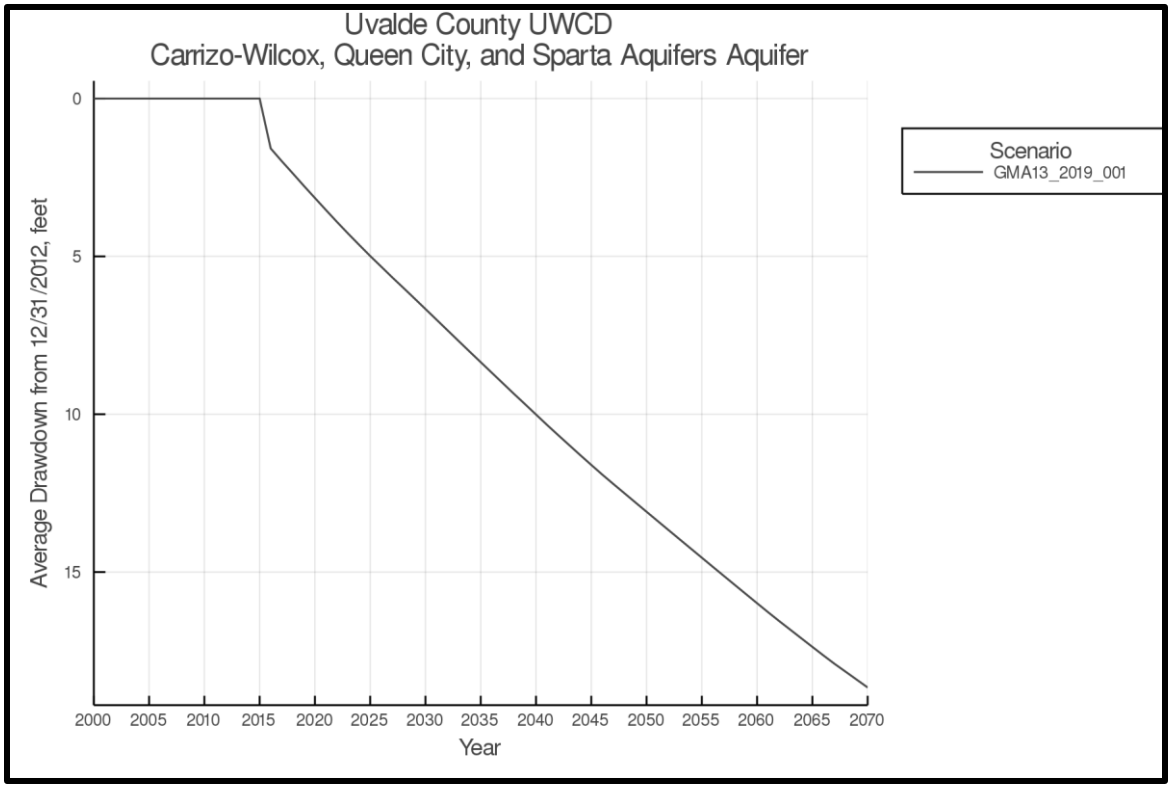

Gonzales County UWCD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

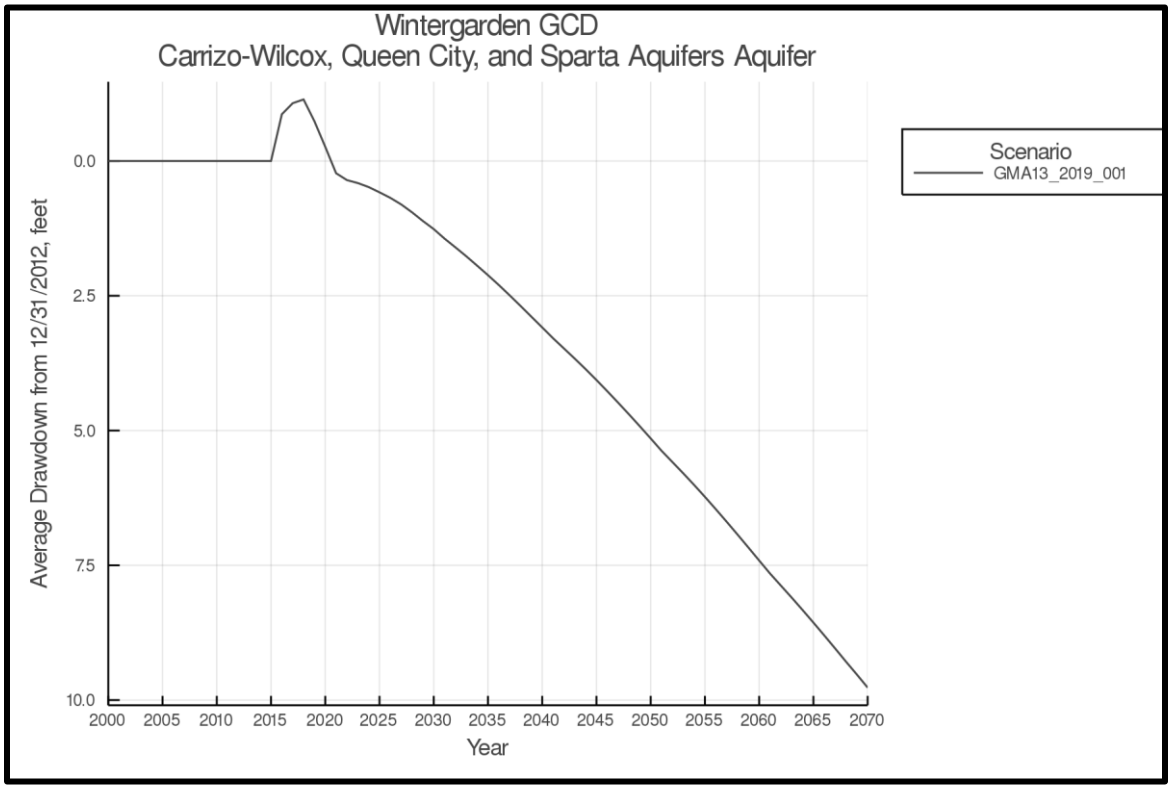

Guadalupe County GCD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
125
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001


McMullen GCD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
40
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

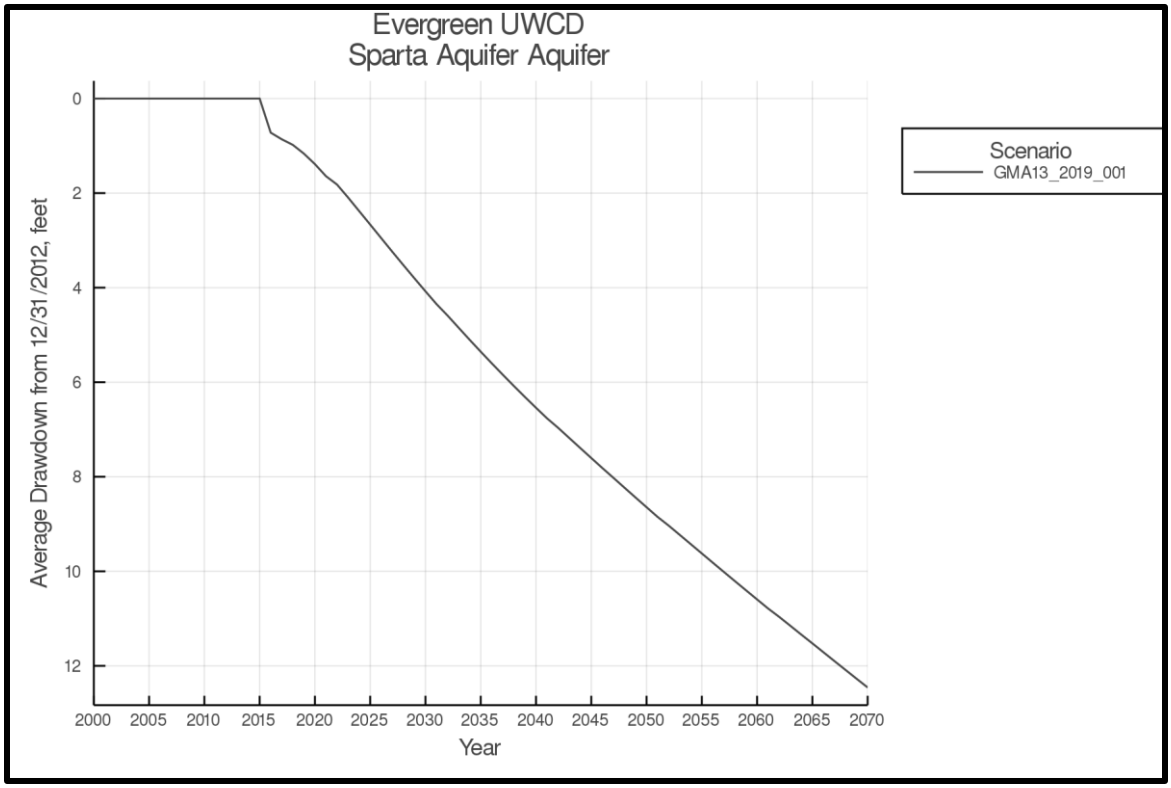

Medina County GCD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

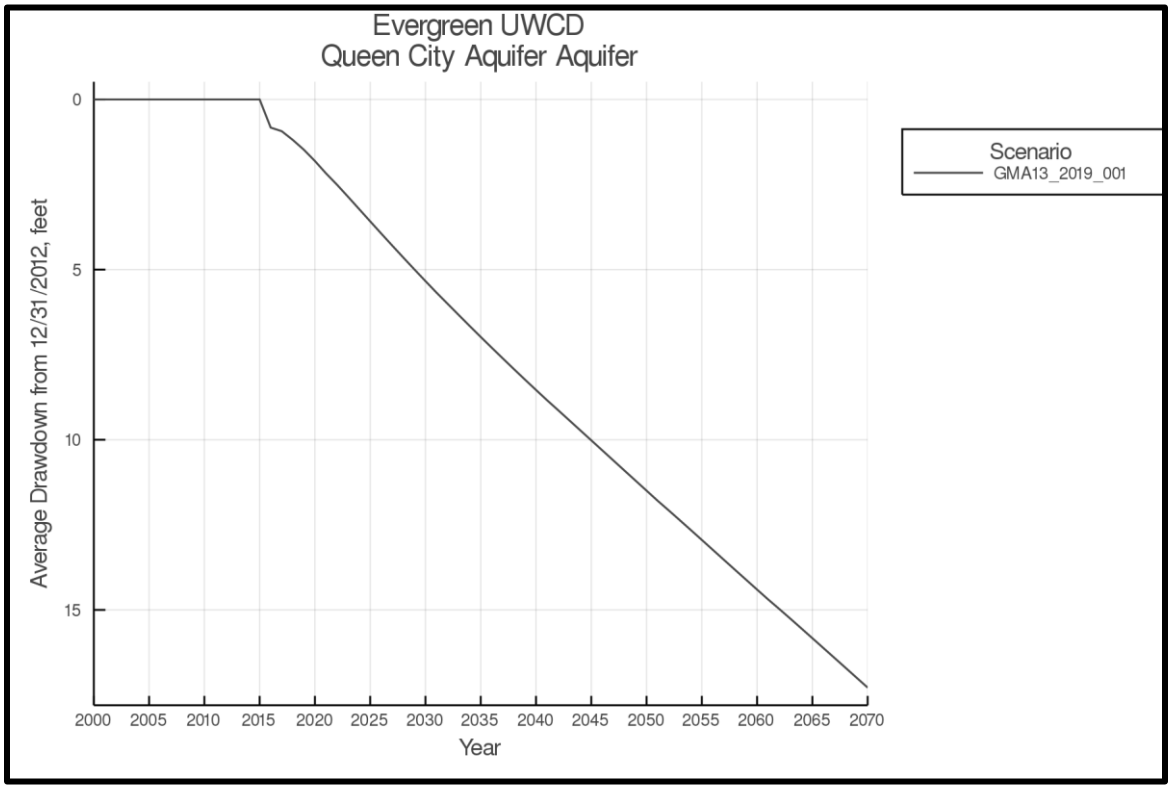

Plum Creek CD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
40
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

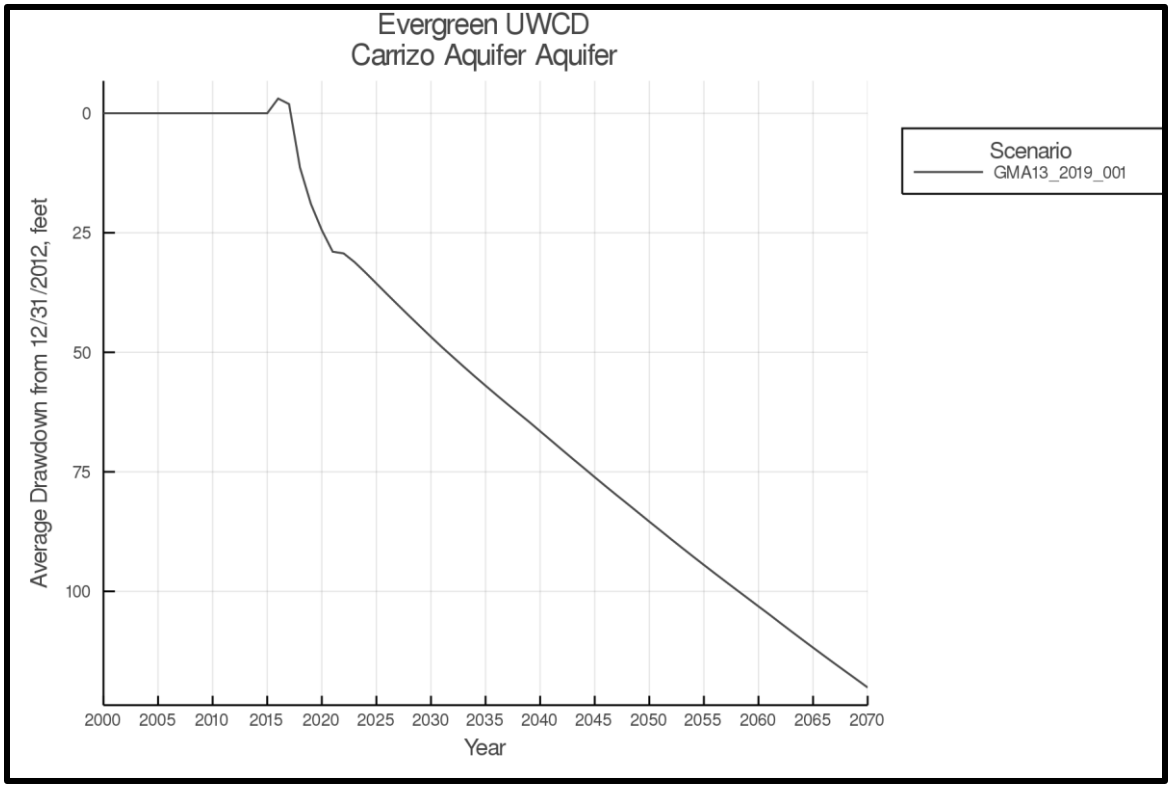

Uvalde County UWCD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0
5
10
15
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

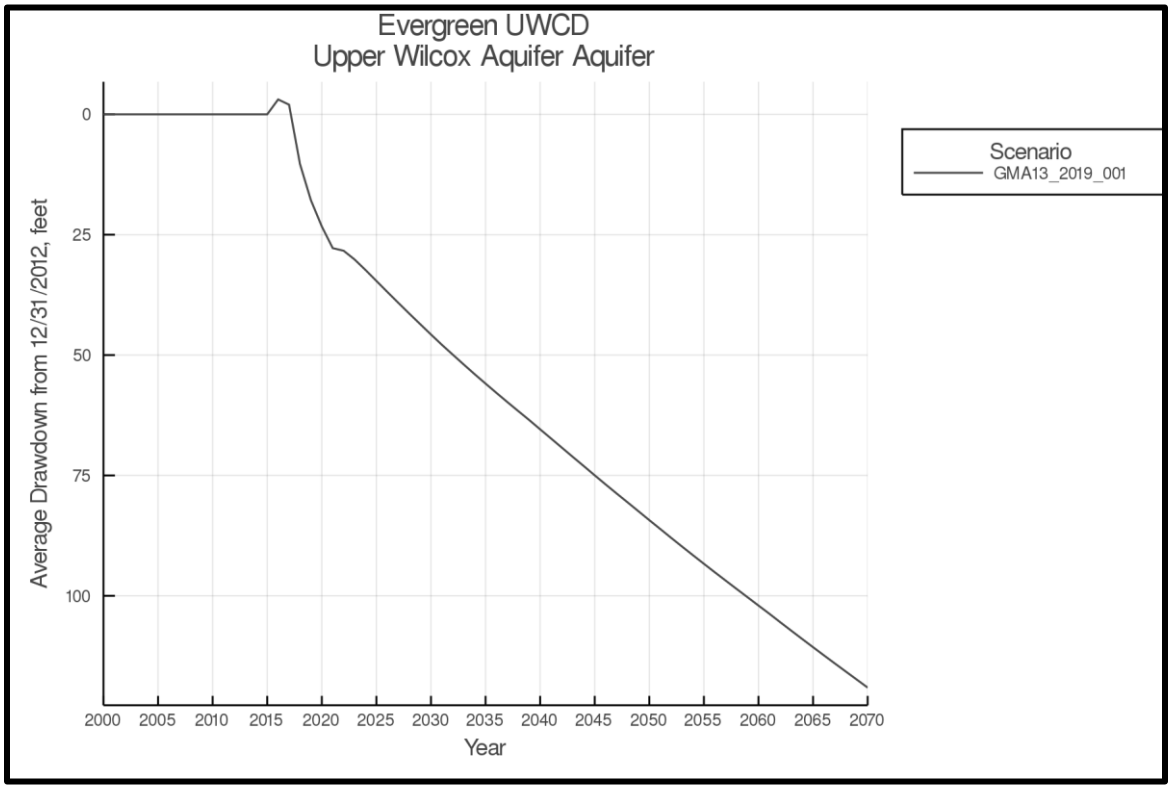

Wintergarden GCD
Carrizo-Wilcox, Queen City, and Sparta Aquifers Aquifer
Average Drawdown from 12/31/2012, feet
0.0
2.5
5.0
7.5
10.0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

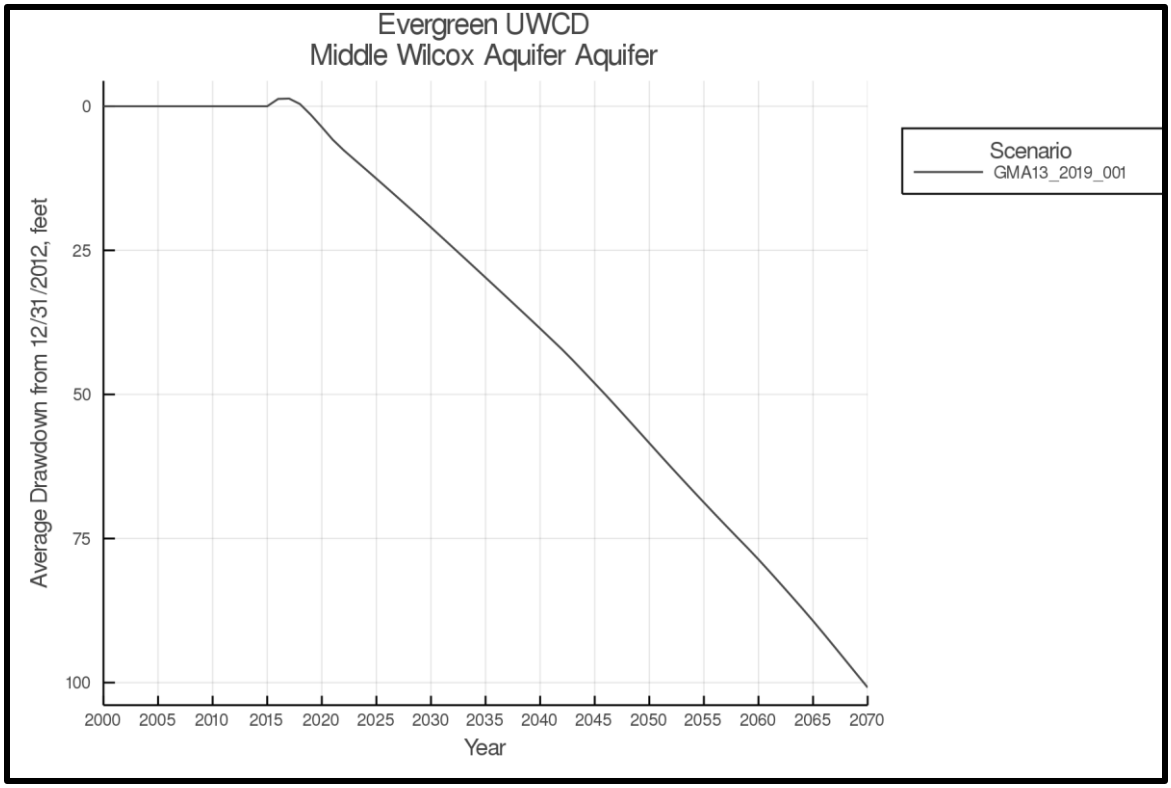
Attachment 3b – Average Drawdown Charts for each Individual Aquifer

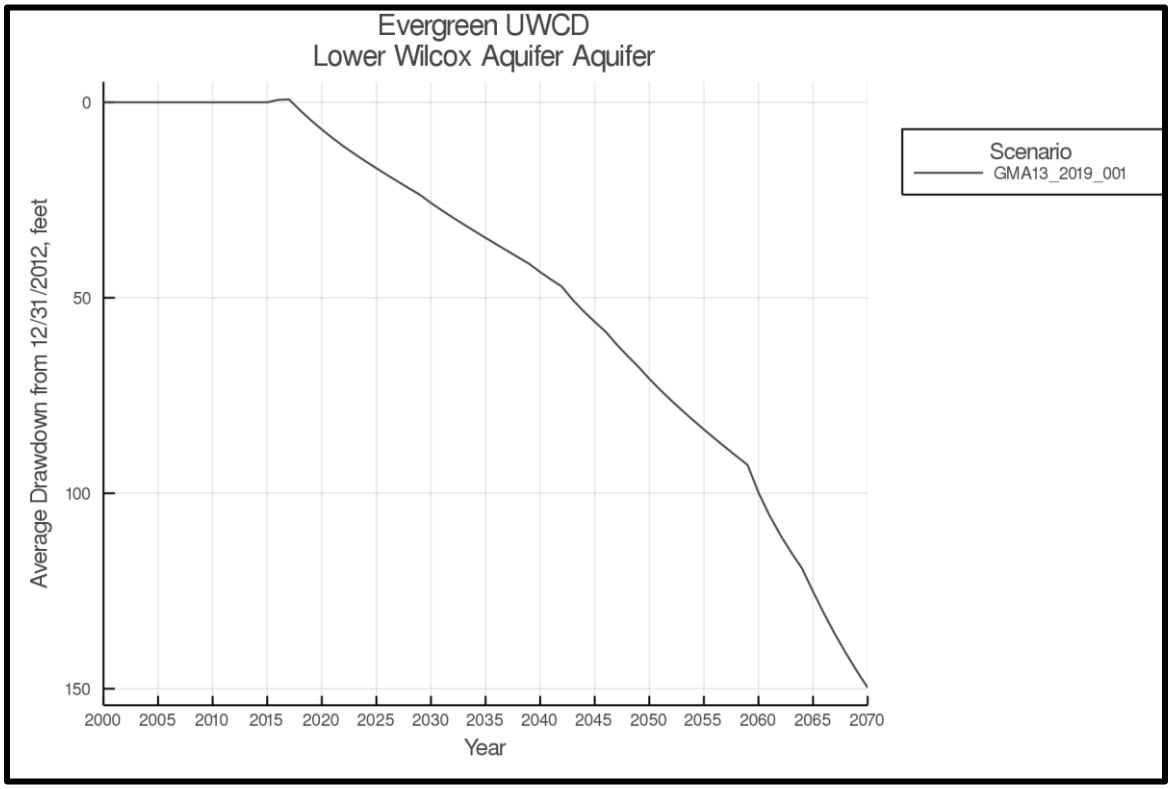

Evergreen UWCD
Sparta Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
2
4
6
8
10
12
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

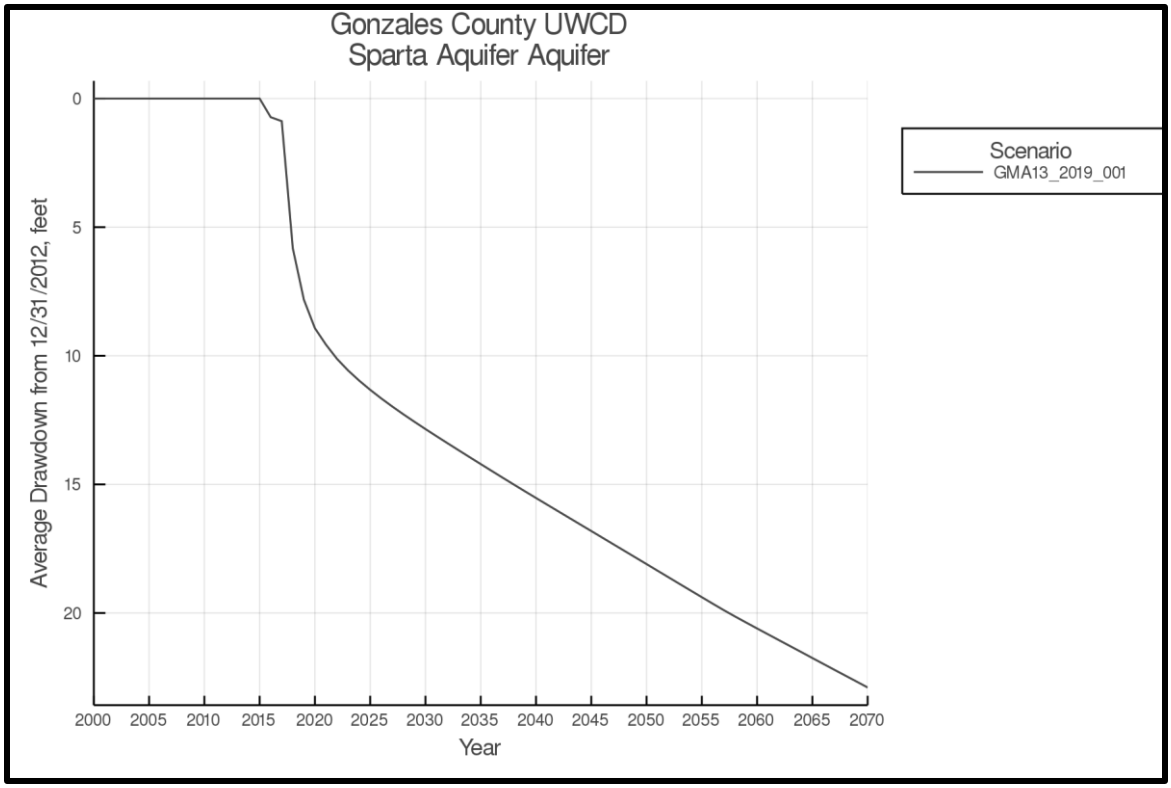

Evergreen UWCD
Queen City Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
5
10
15
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

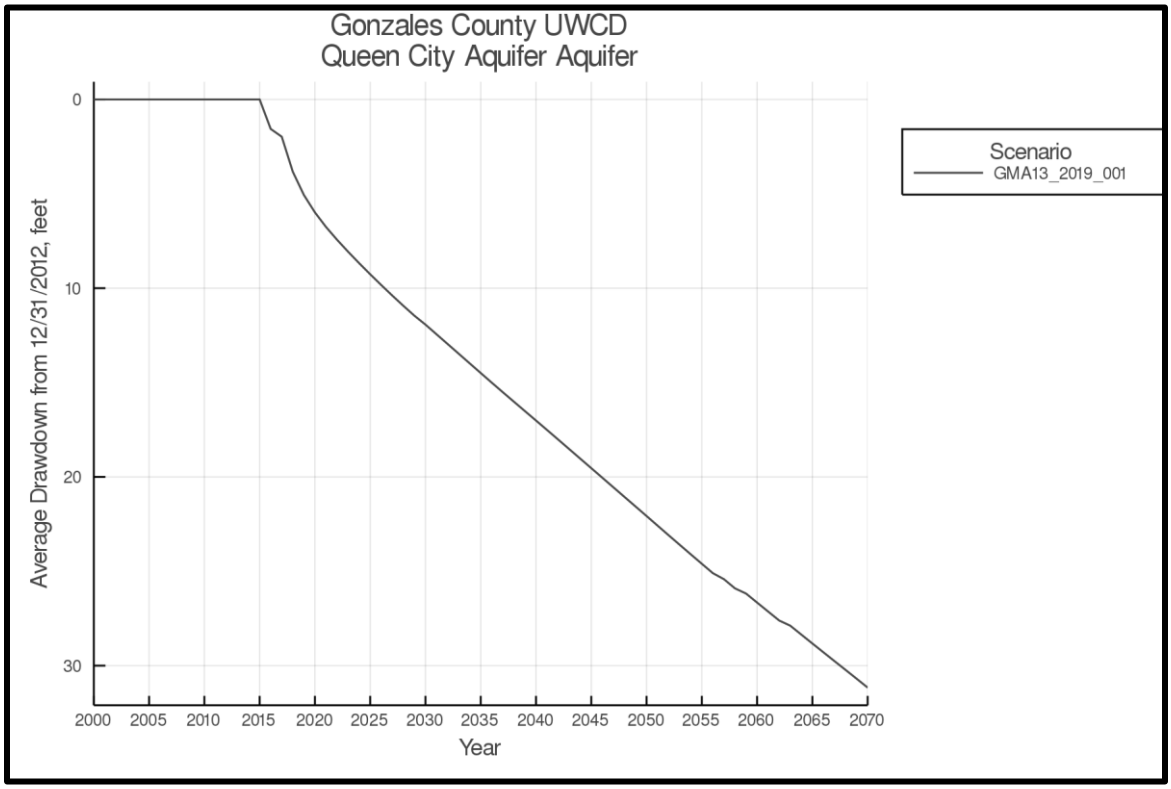

Evergreen UWCD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

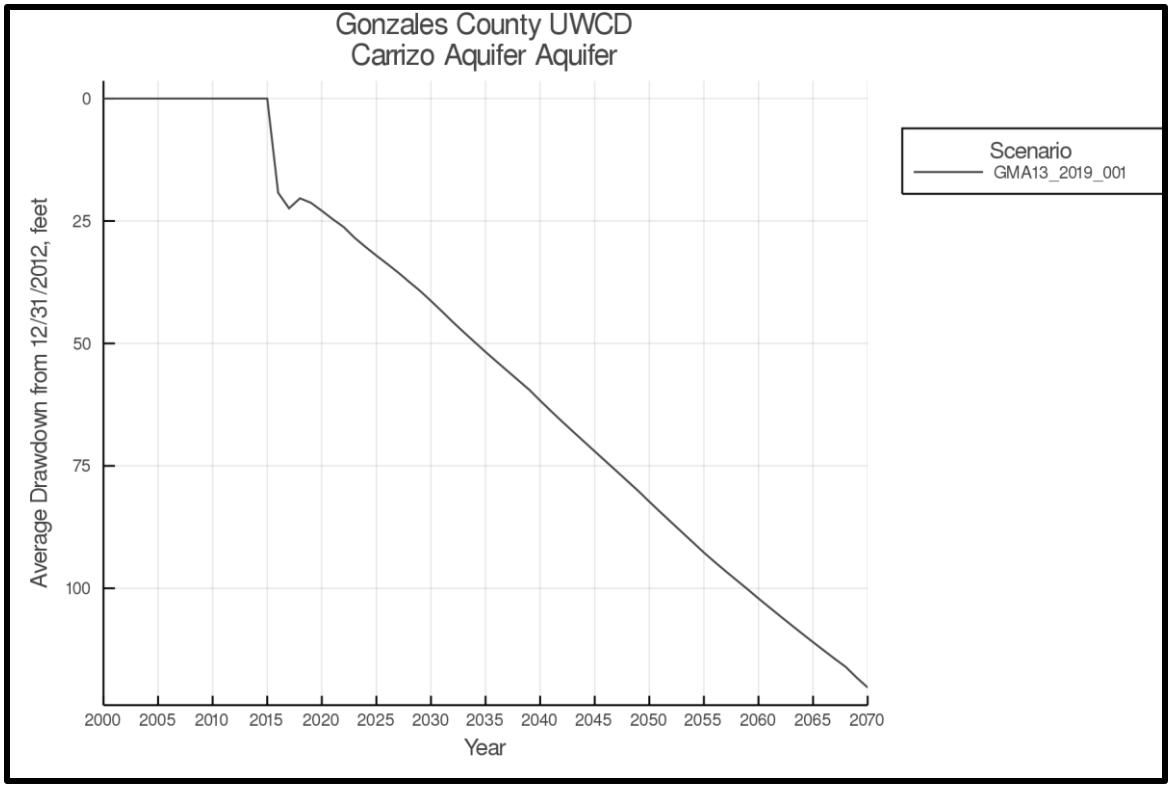

Evergreen UWCD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

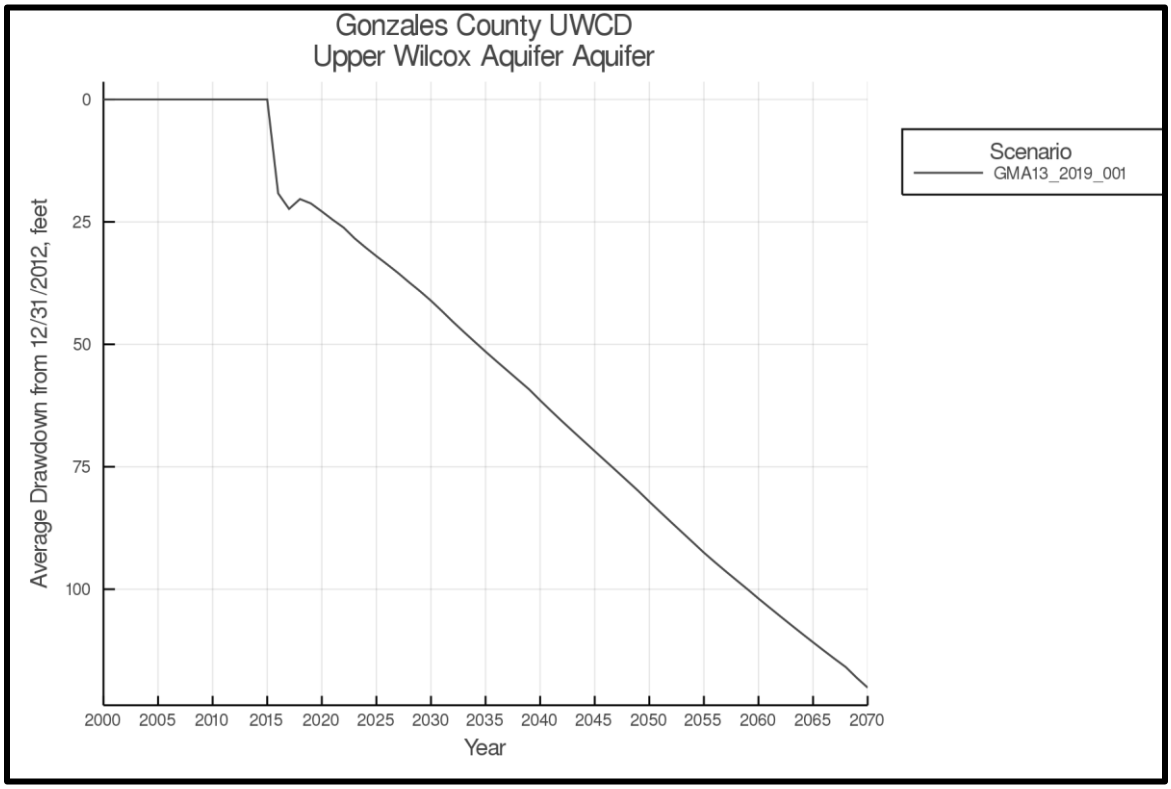

Evergreen UWCD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

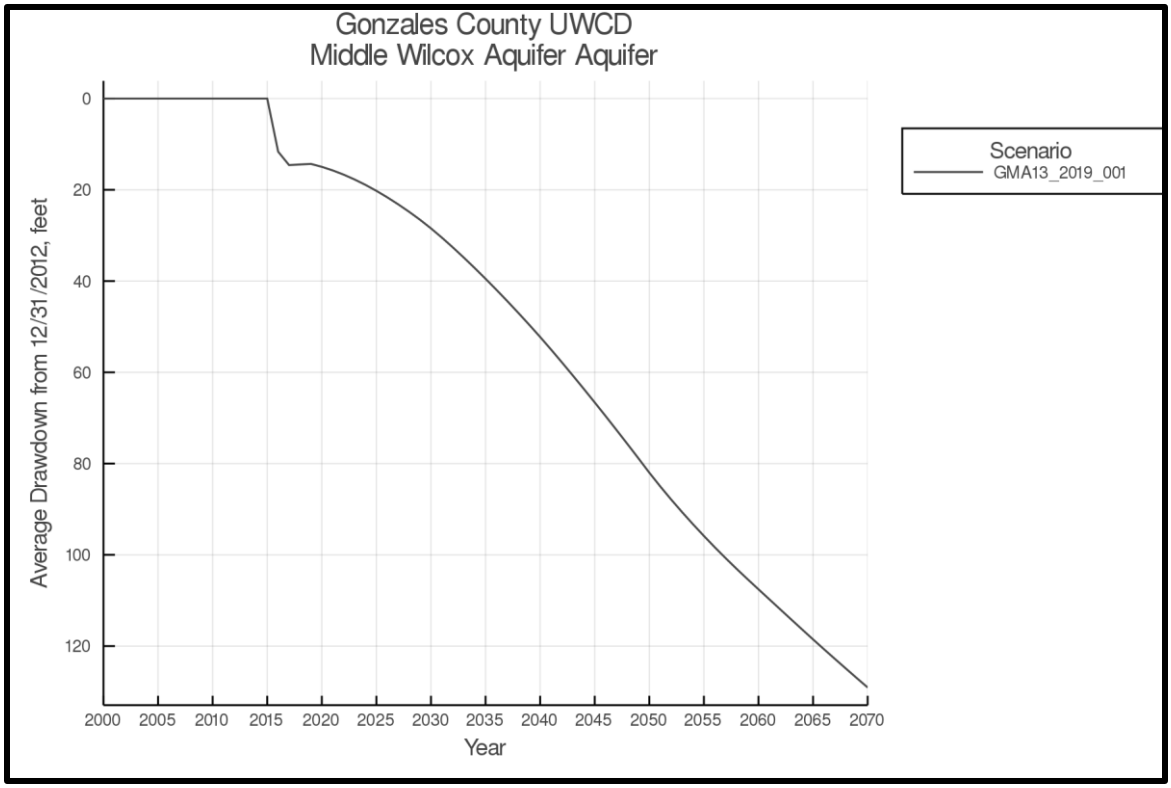

Evergreen UWCD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
50
100
150
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

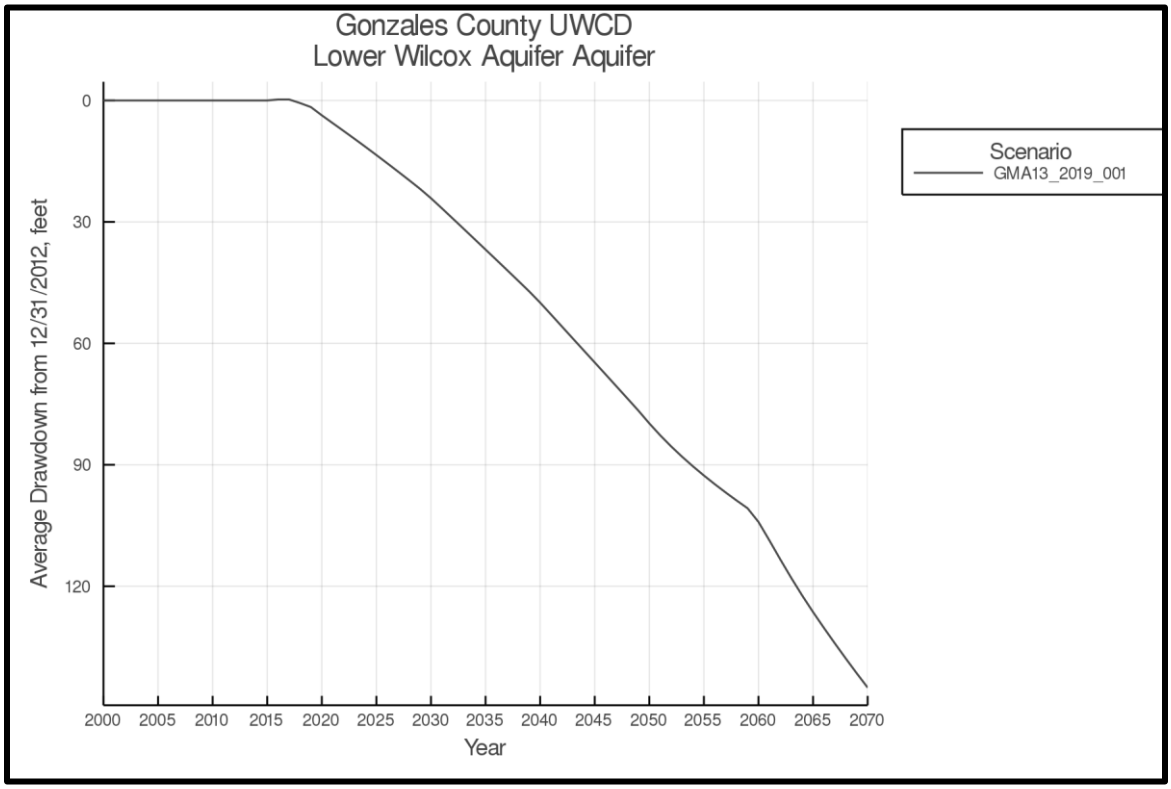

Gonzales County UWCD
Sparta Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
5
10
15
20
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

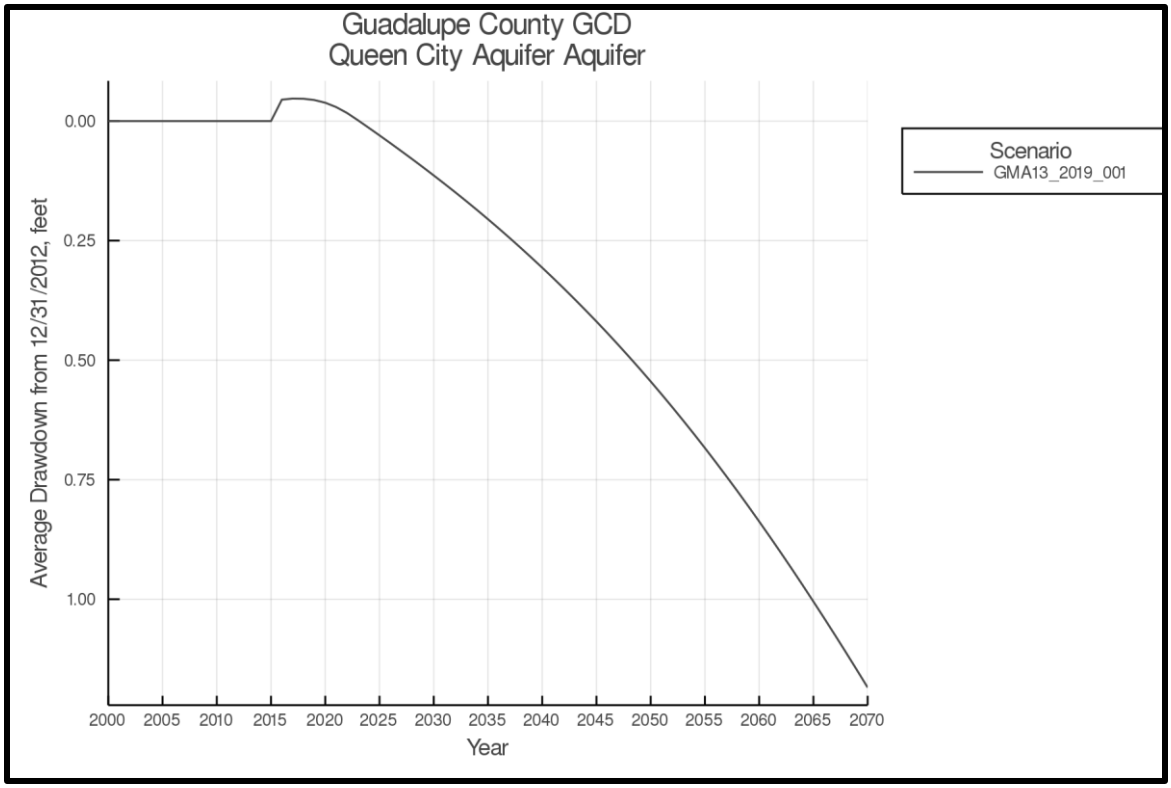

Gonzales County UWCD
Queen City Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

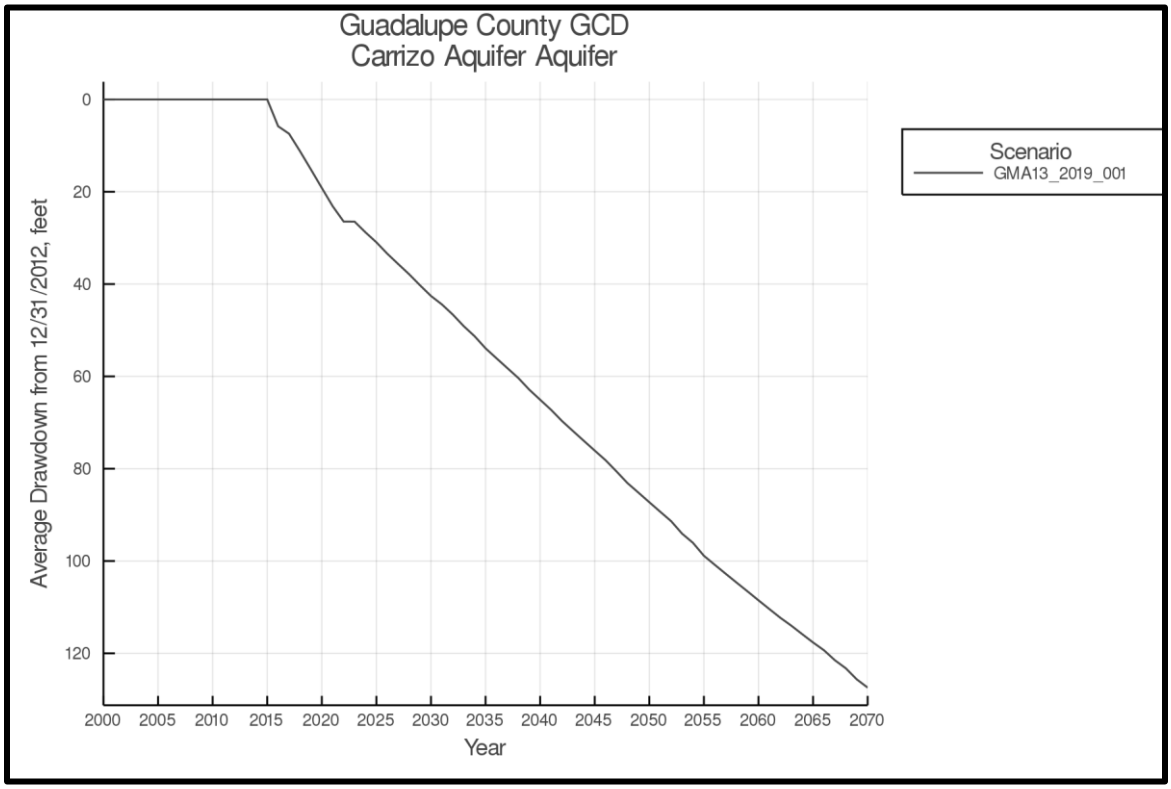

Gonzales County UWCD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

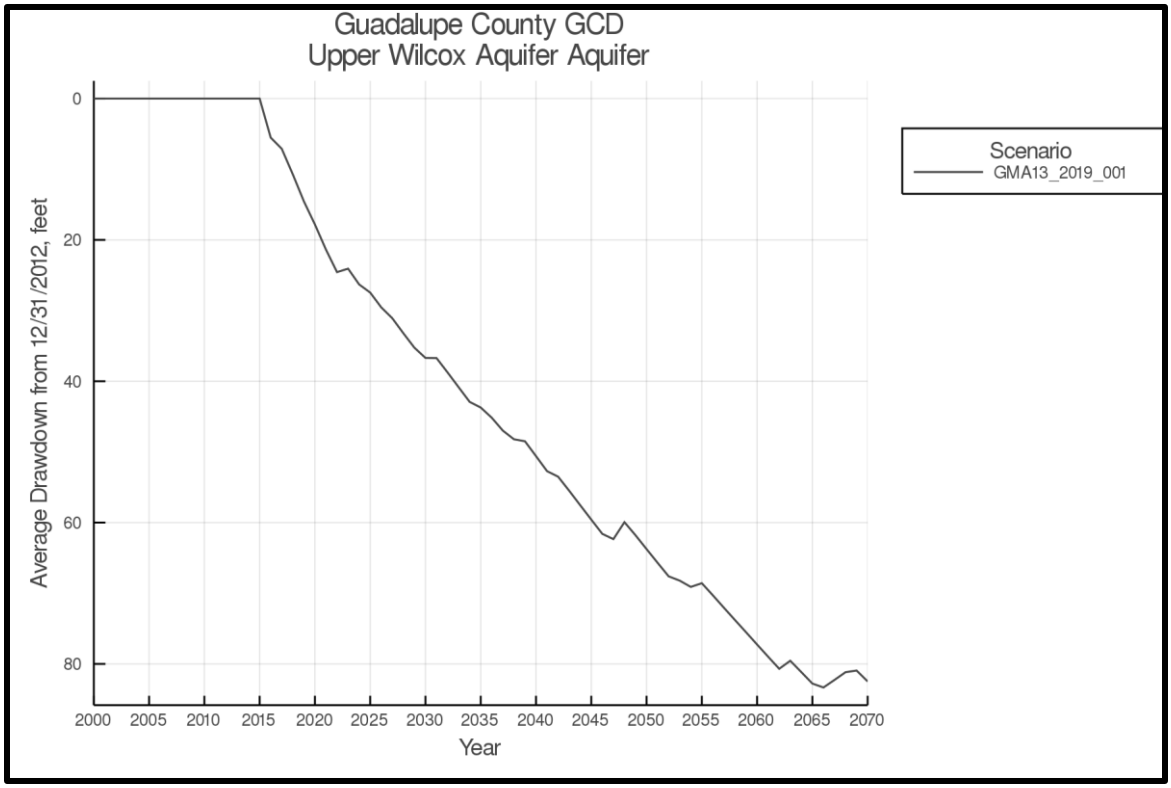

Gonzales County UWCD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

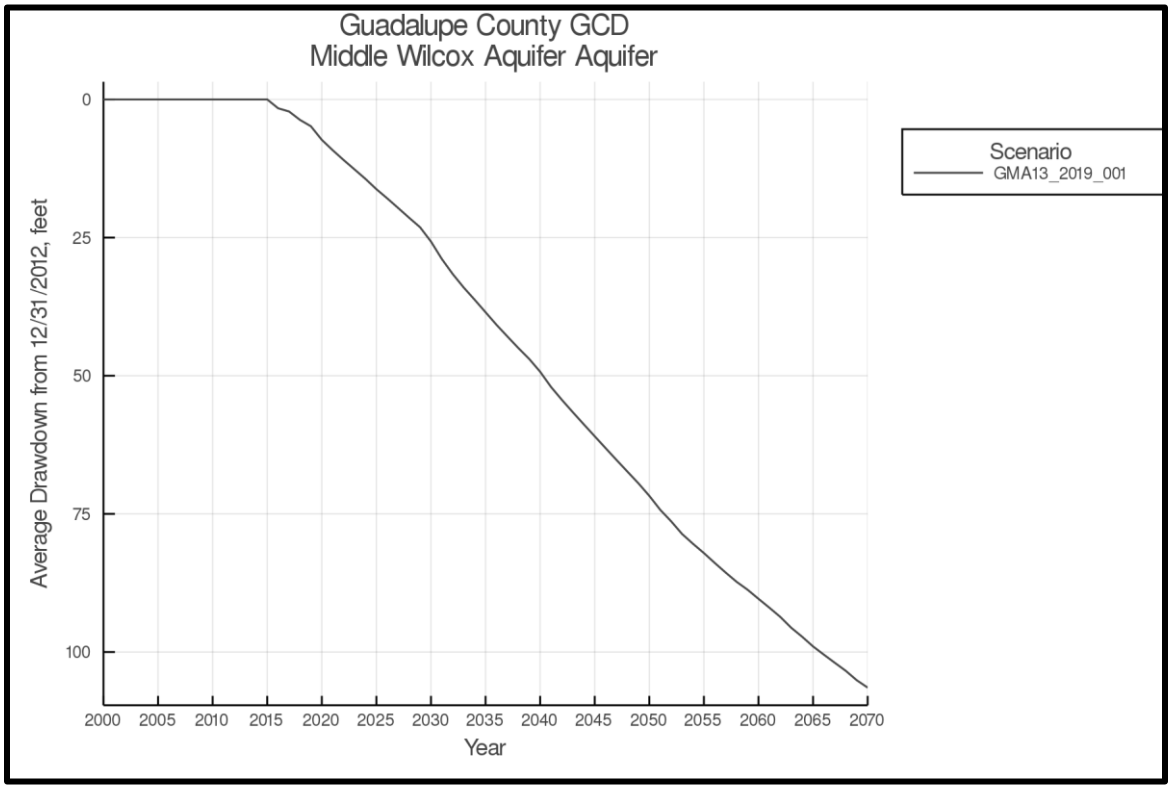

Gonzales County UWCD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
20
40
60
80
100
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

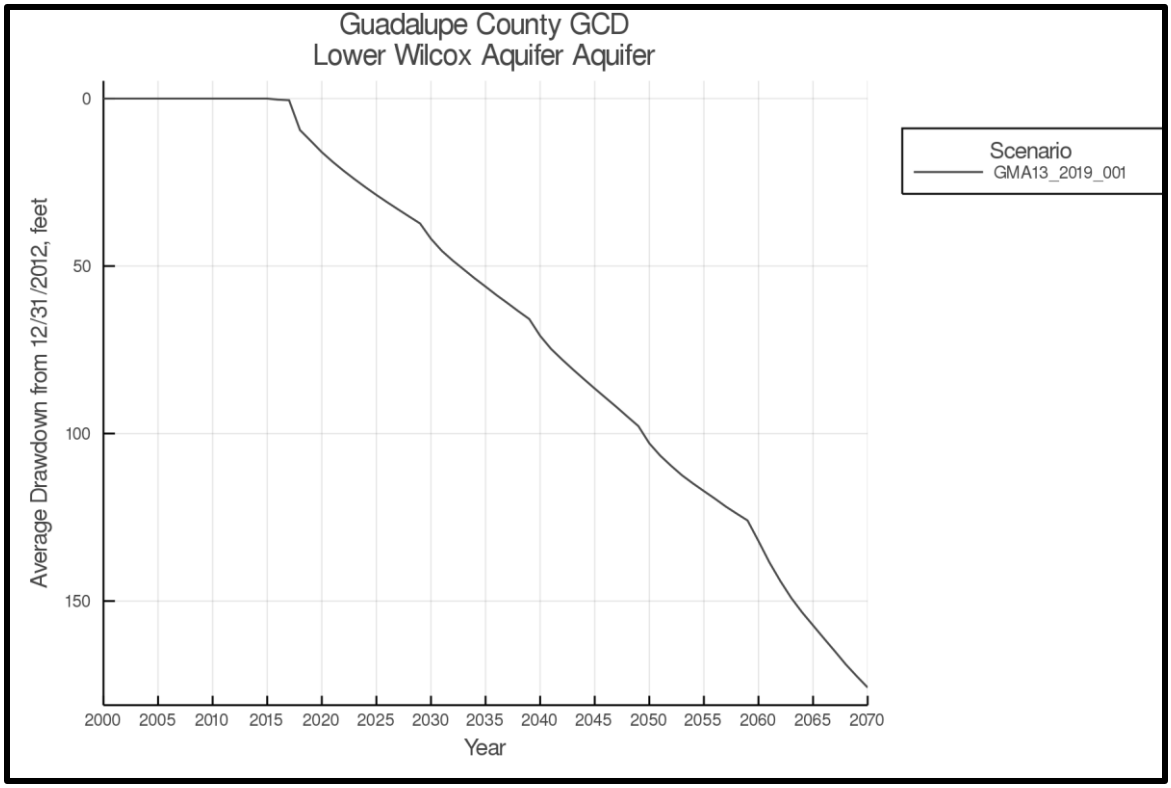

Gonzales County UWCD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
30
60
90
120
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

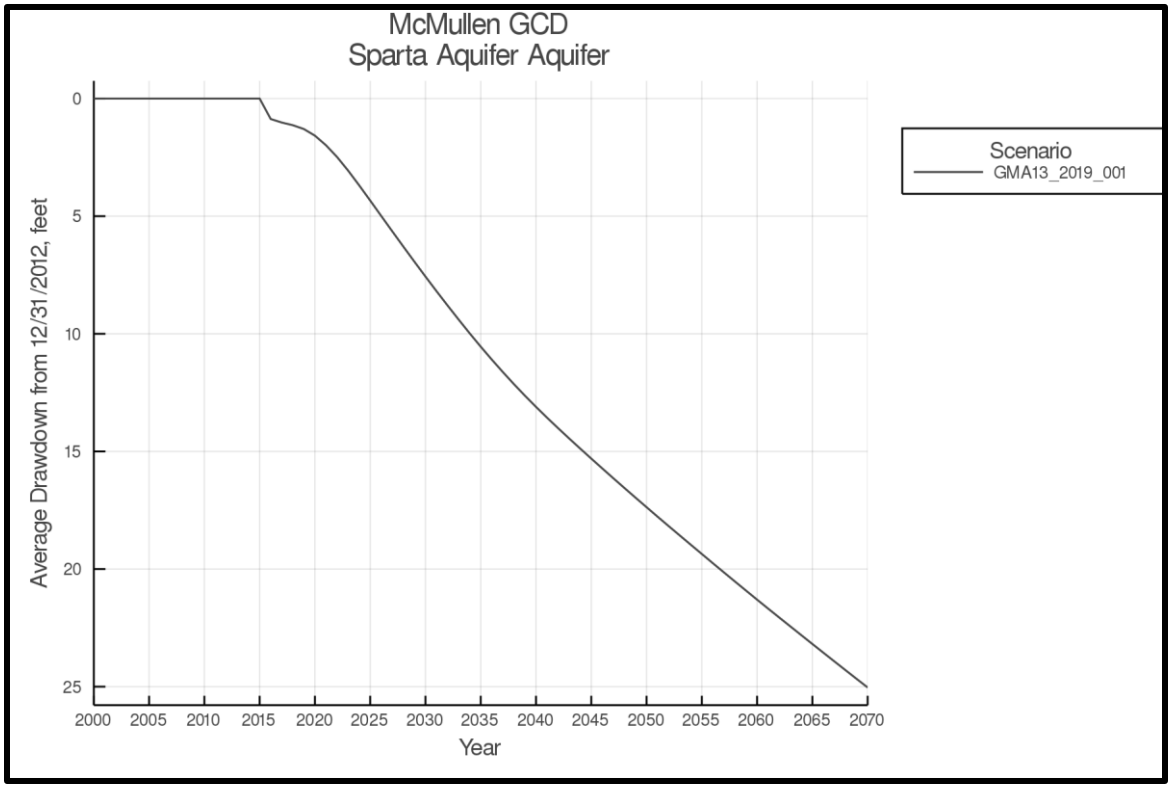

Guadalupe County GCD
Queen City Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0.00
0.25
0.50
0.75
1.00
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

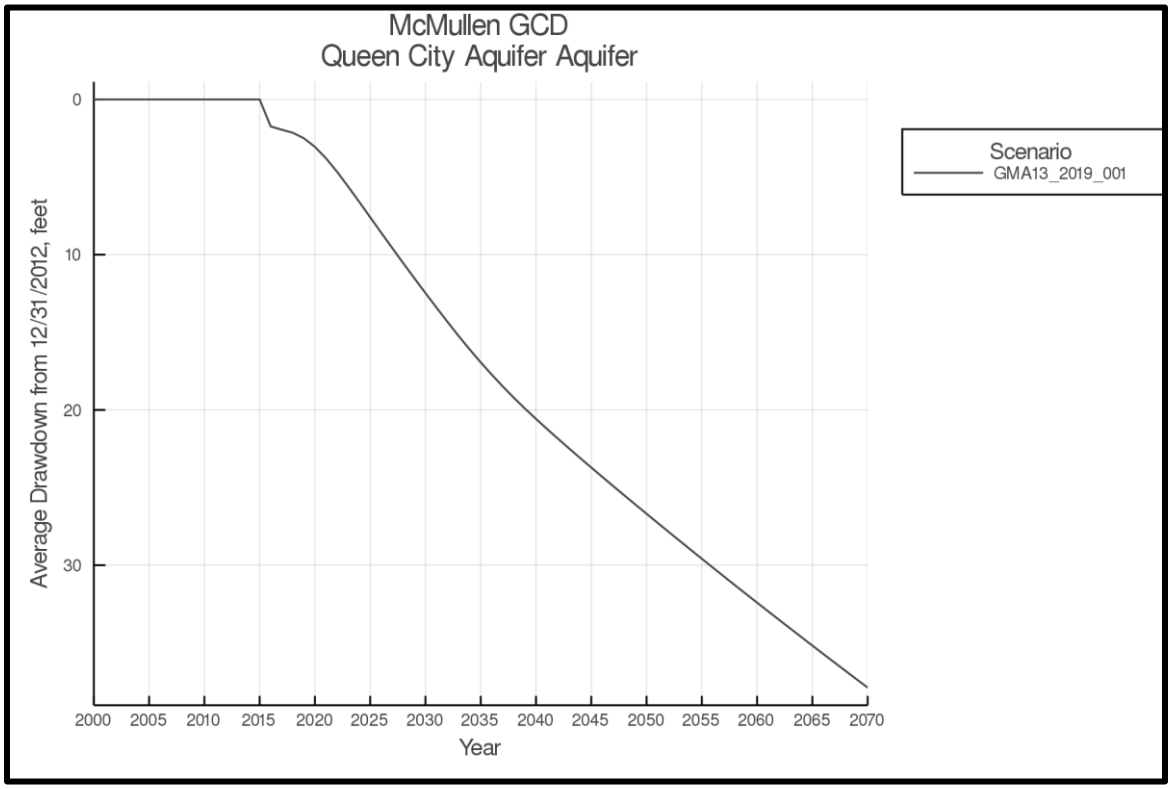

Guadalupe County GCD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
20
40
60
80
100
120
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

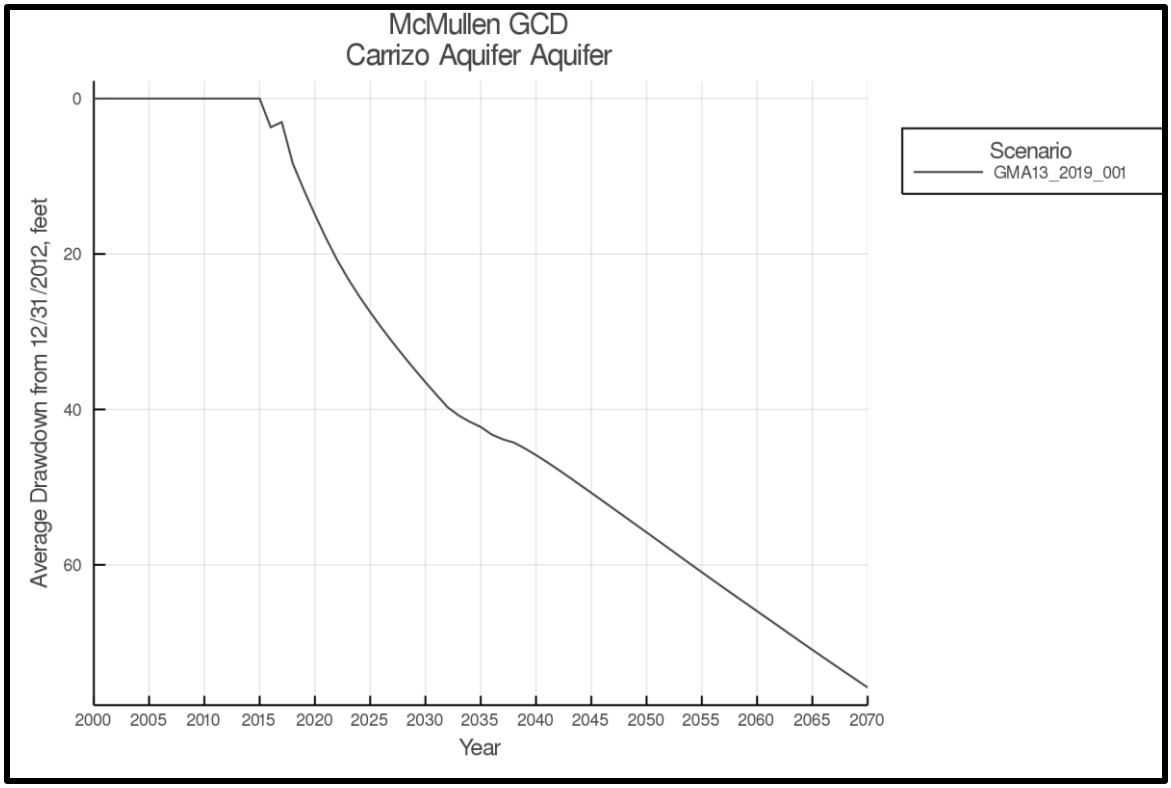

Guadalupe County GCD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
20
40
60
80
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

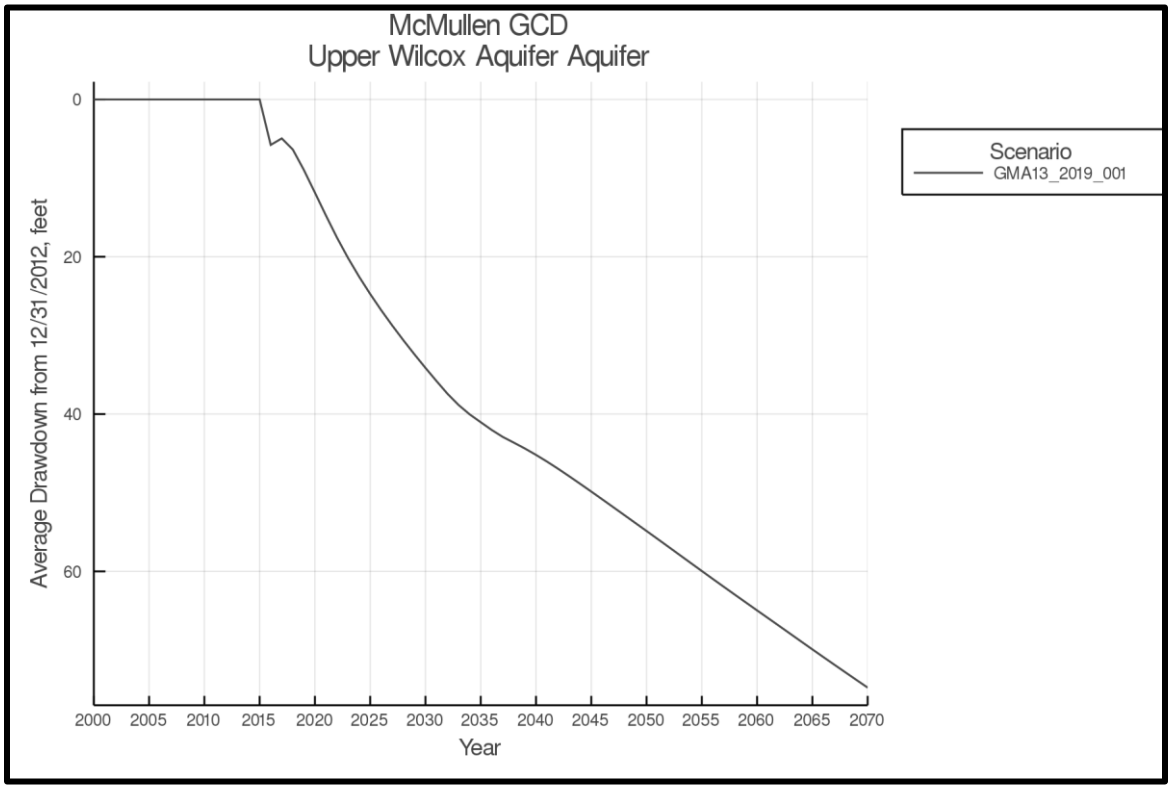

Guadalupe County GCD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

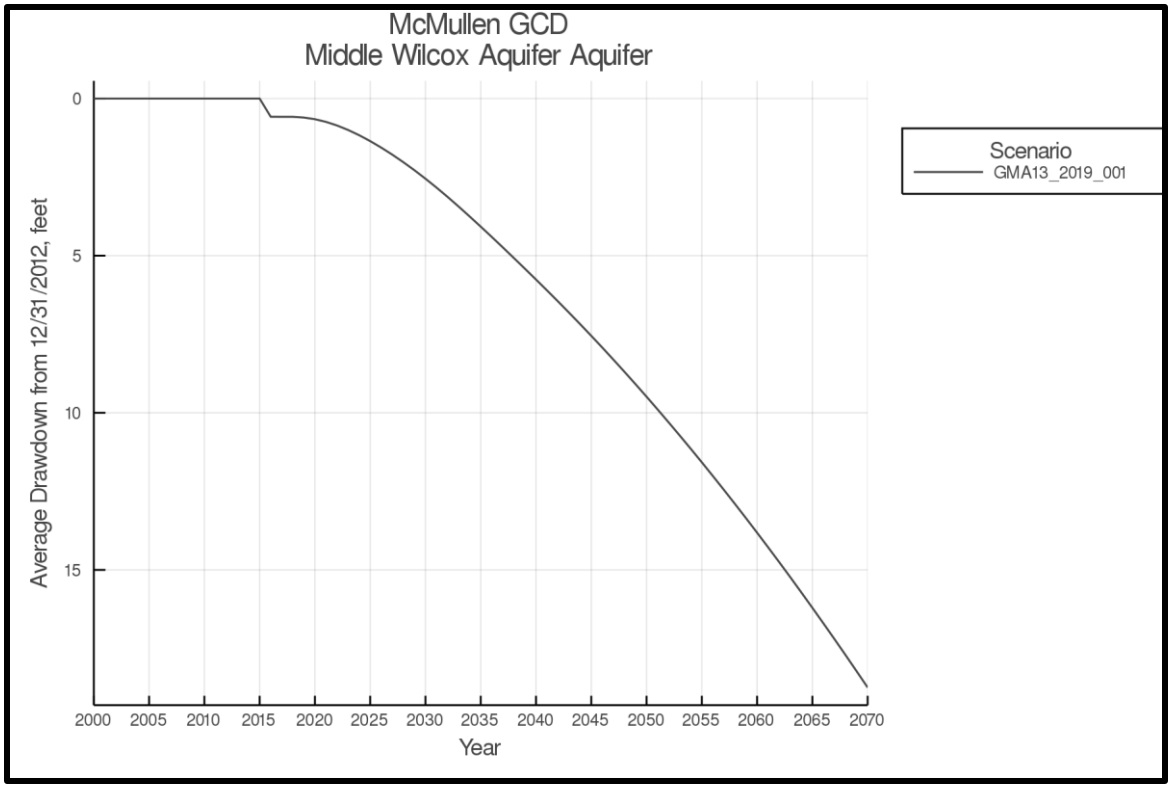

Guadalupe County GCD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
50
100
150
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

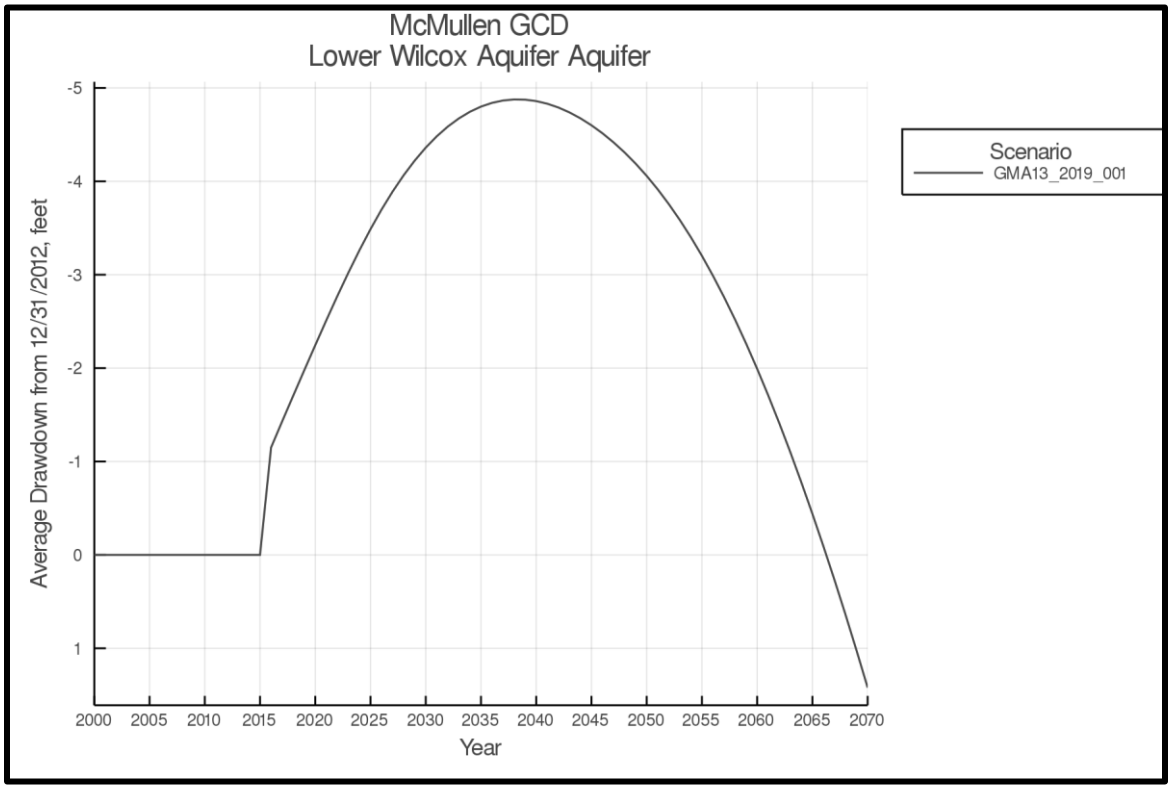

McMullen GCD
Sparta Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
5
10
15
20
25
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

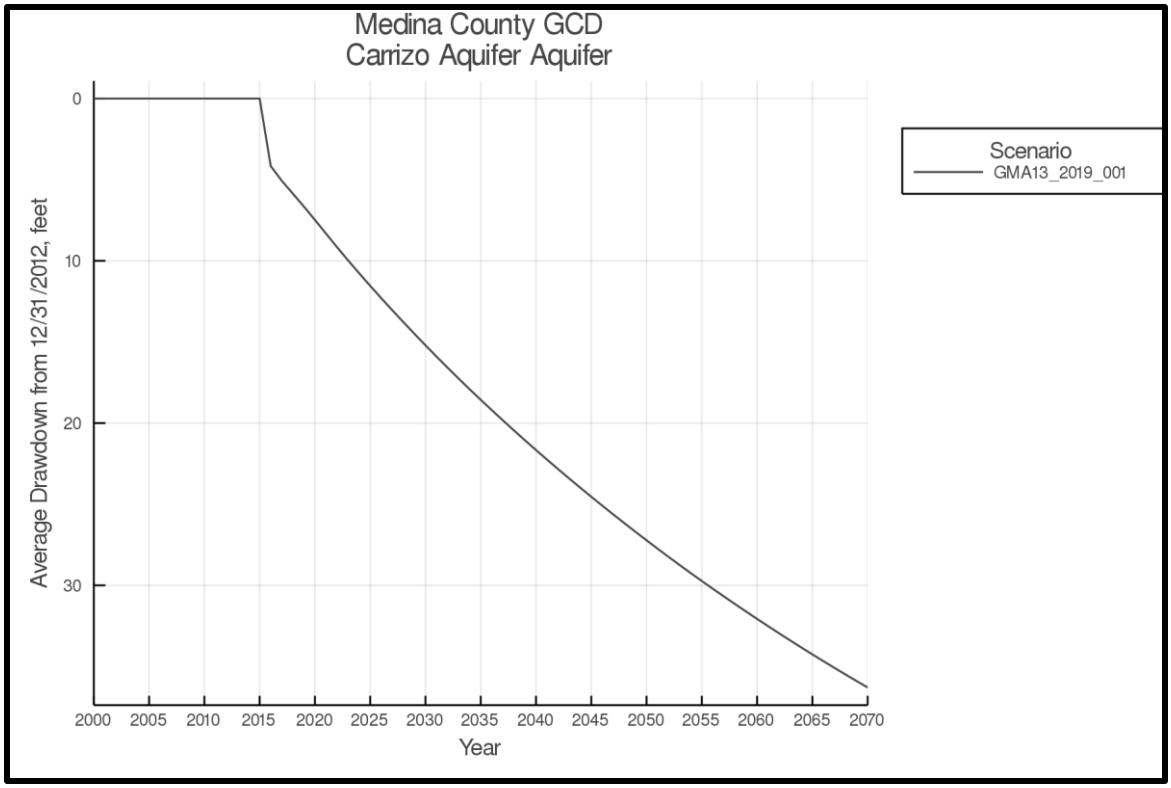

McMullen GCD
Queen City Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

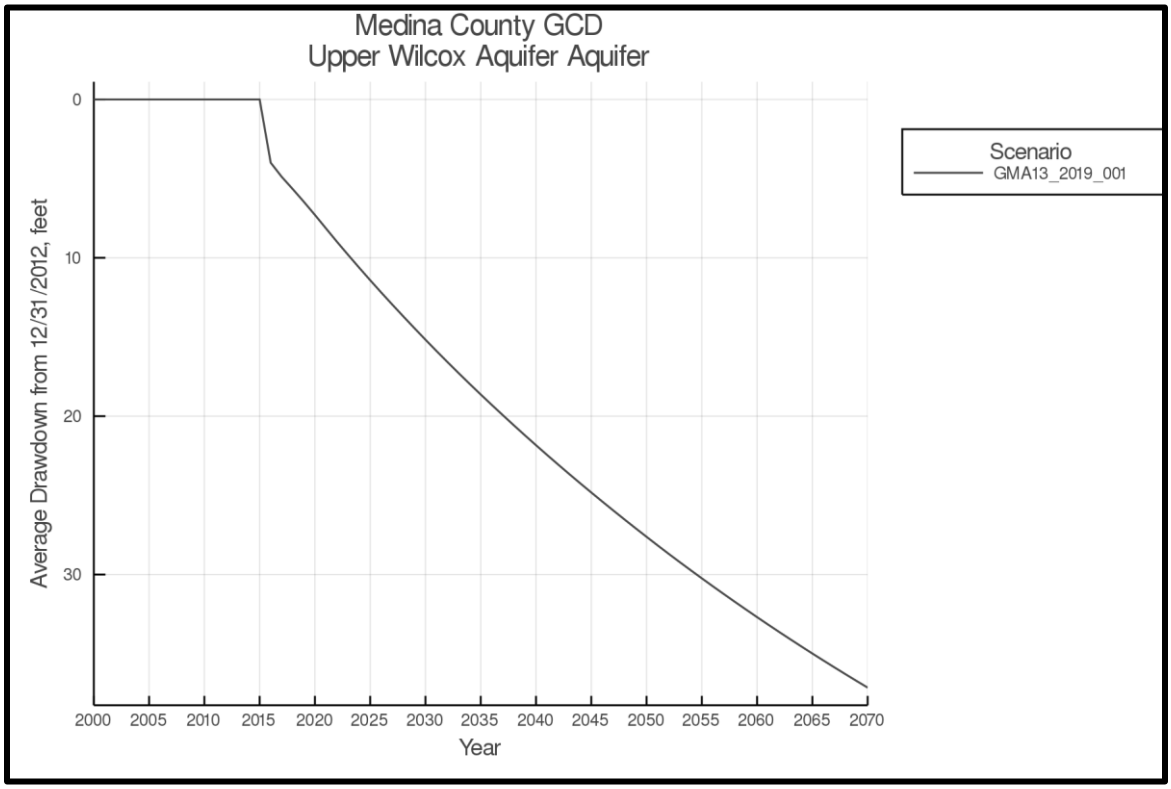

McMullen GCD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
20
40
60
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

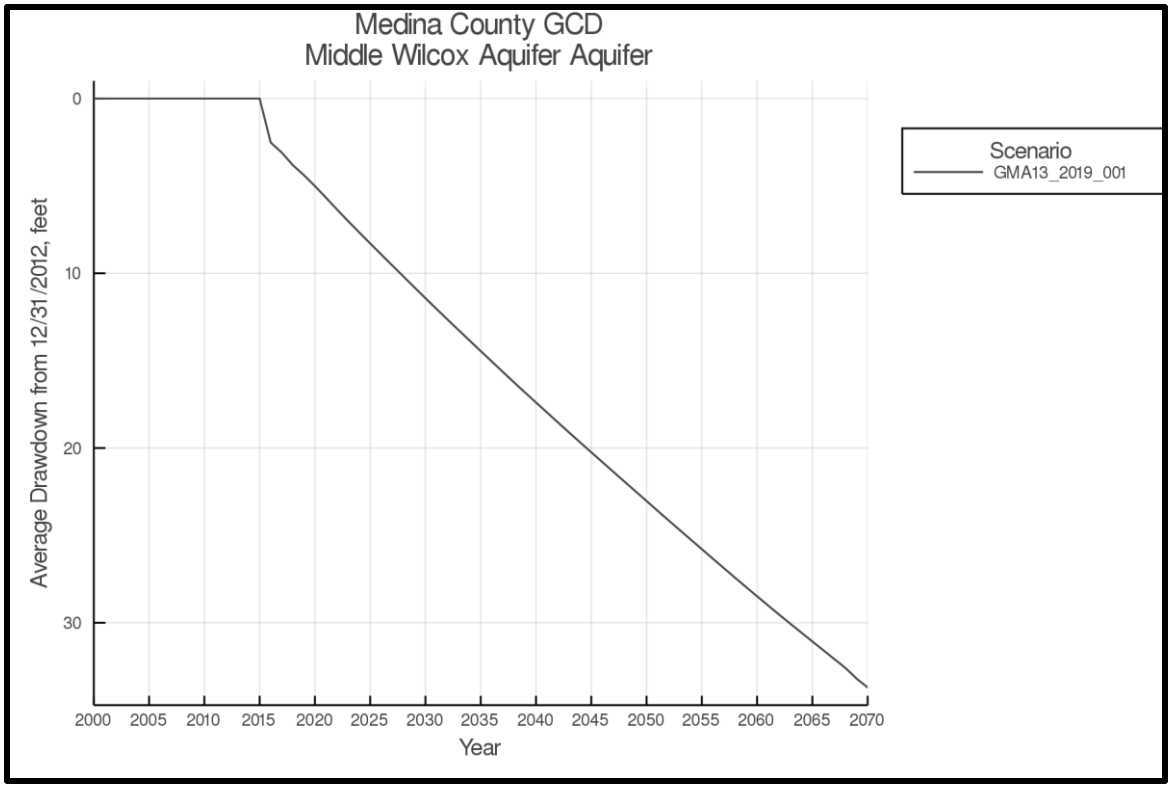

McMullen GCD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
20
40
60
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001

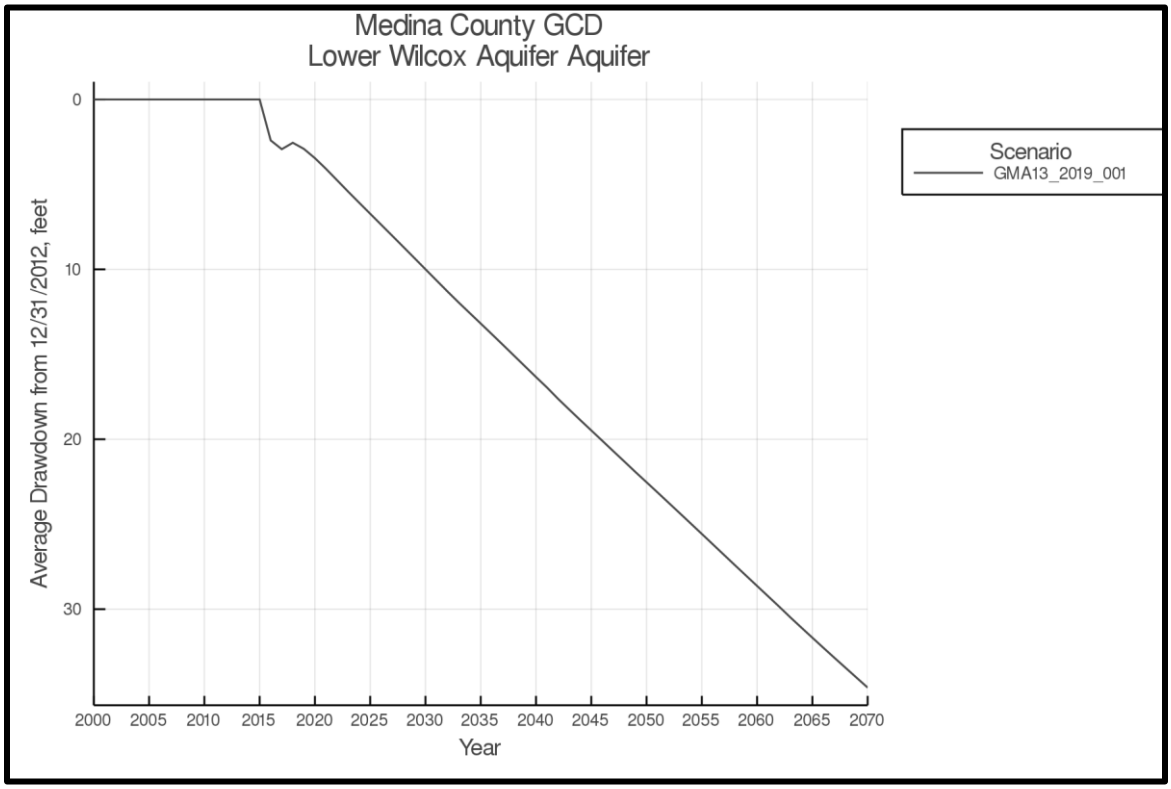

McMullen GCD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
5
10
15
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001

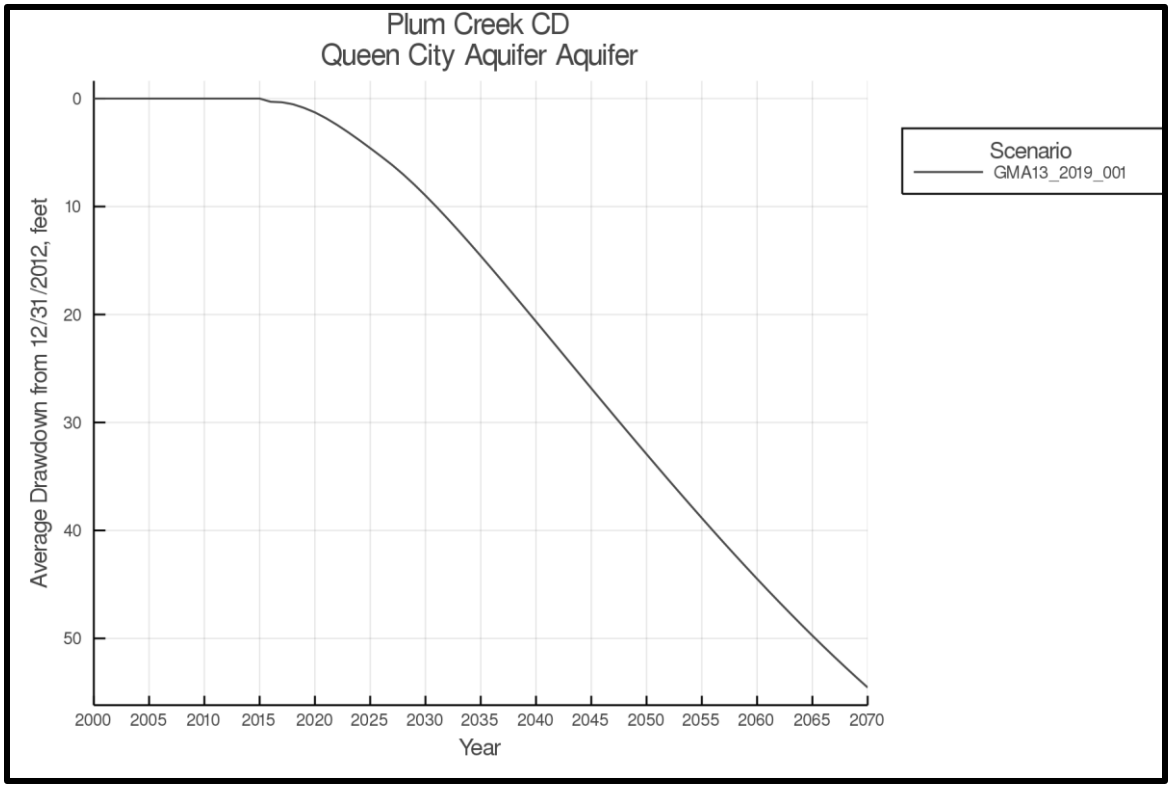

McMullen GCD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
-5
-4
-3
-2
-1
0
1
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001


Medina County GCD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001


Medina County GCD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001


Medina County GCD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001


Medina County GCD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA13_2019_001


Plum Creek CD
Queen City Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
10
20
30
40
50
2000
2005
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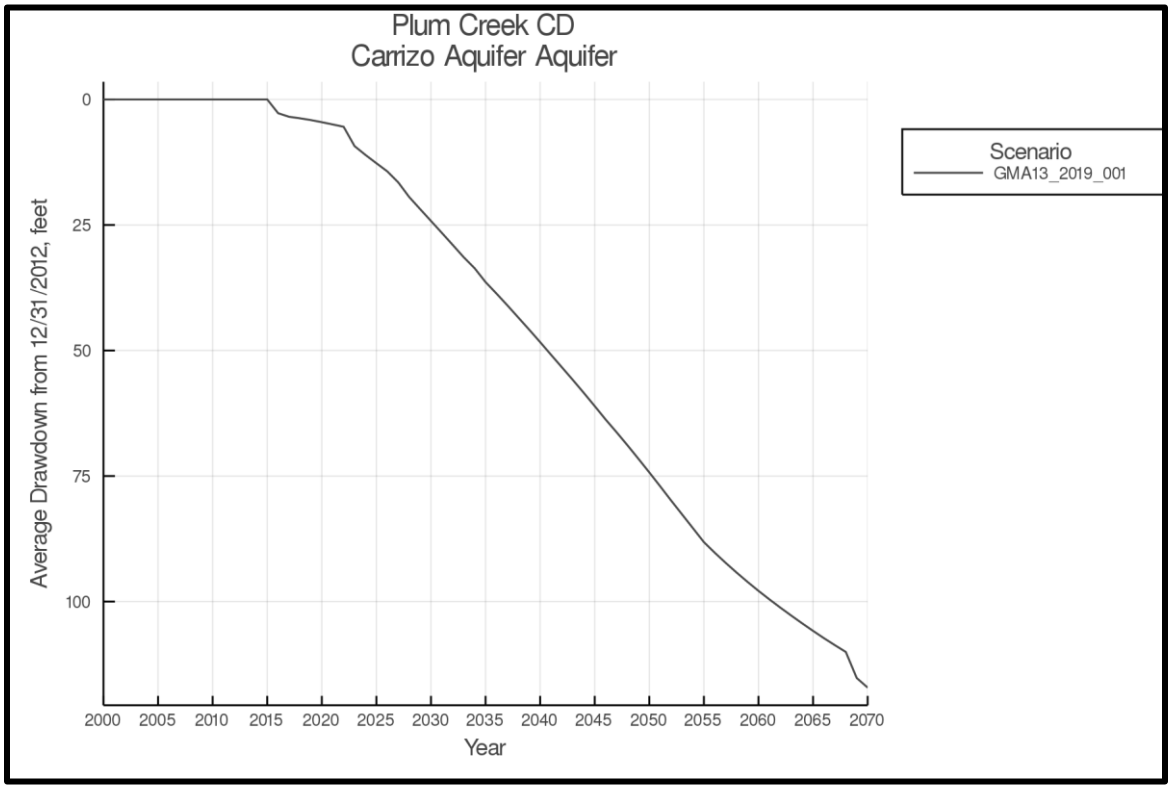
Year
Scenario
GMA13_2019_001


Plum Creek CD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
25
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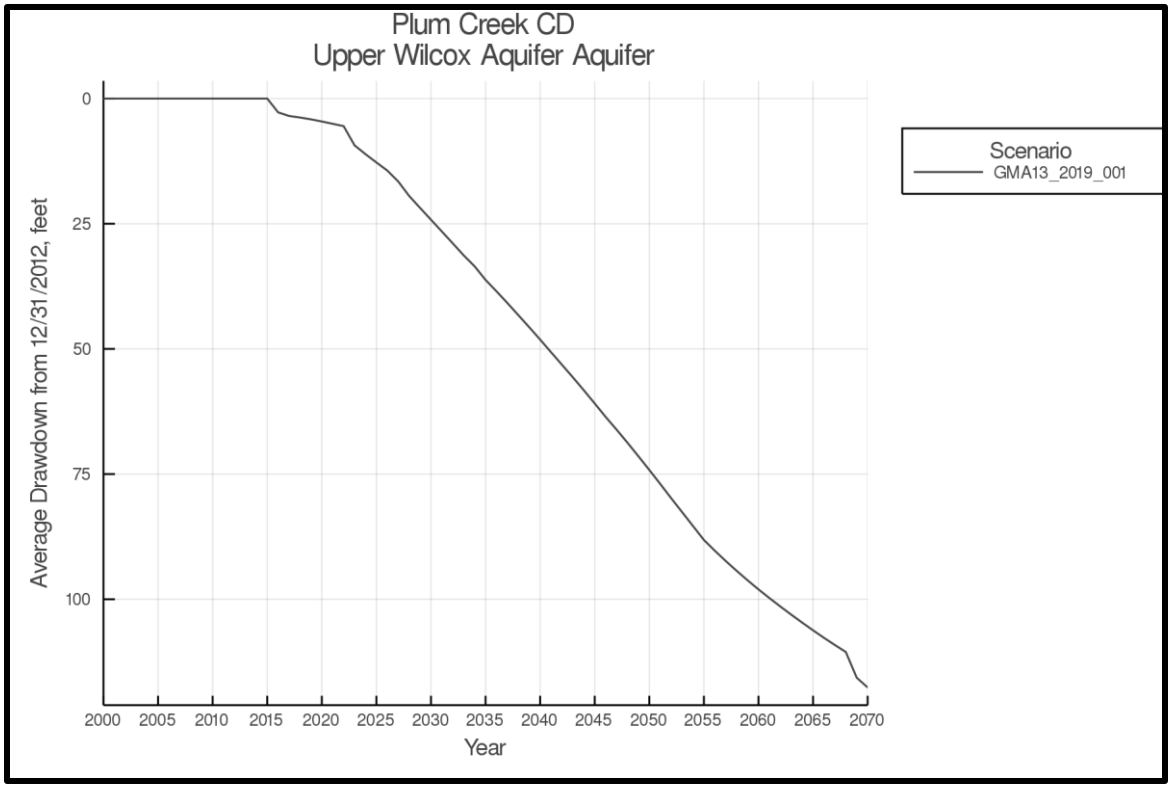
Scenario
GMA13_2019_001


Plum Creek CD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
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25
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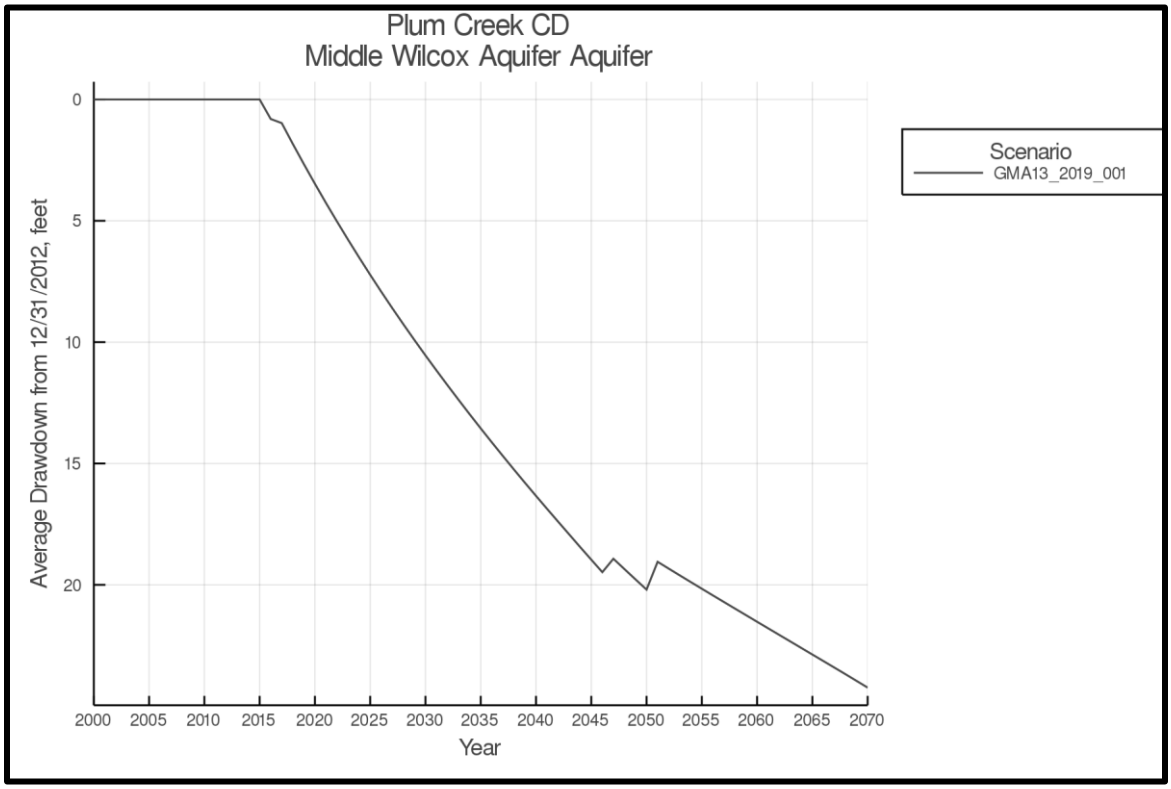
Year
Scenario
GMA13_2019_001


Plum Creek CD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
5
10
15
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2000
2005
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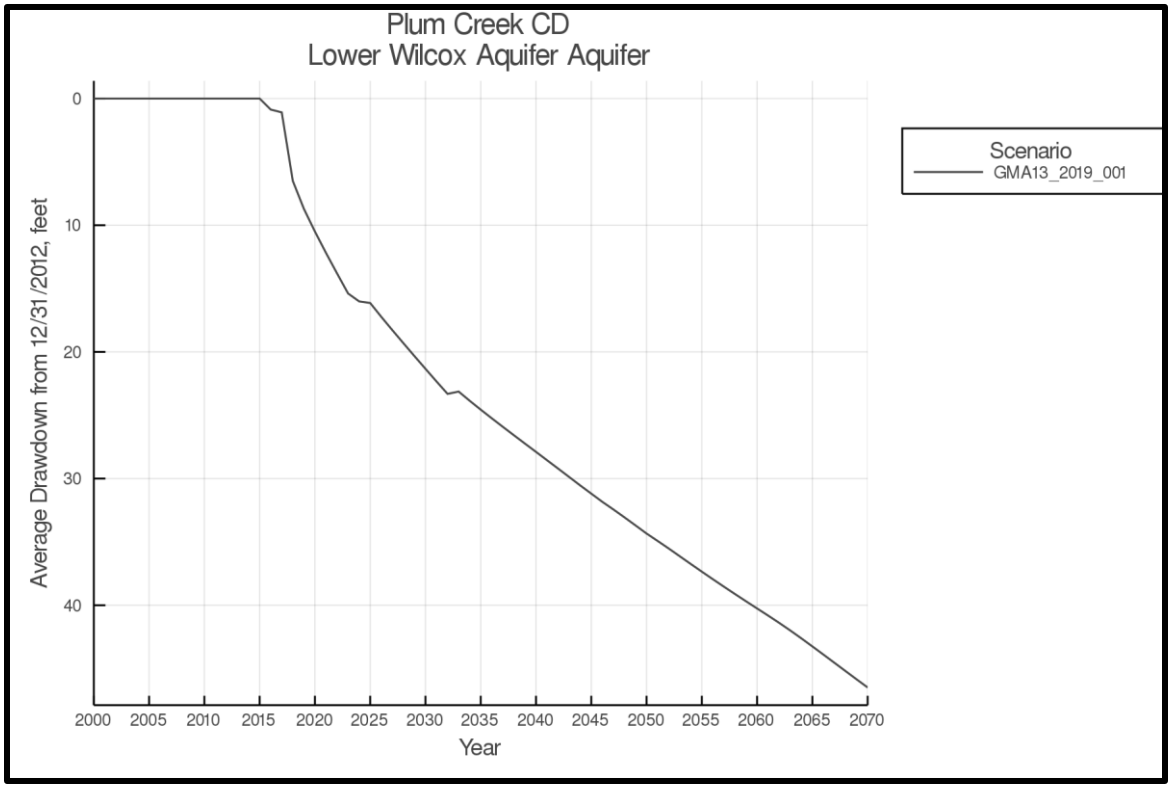
Year
Scenario
GMA13_2019_001


Plum Creek CD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
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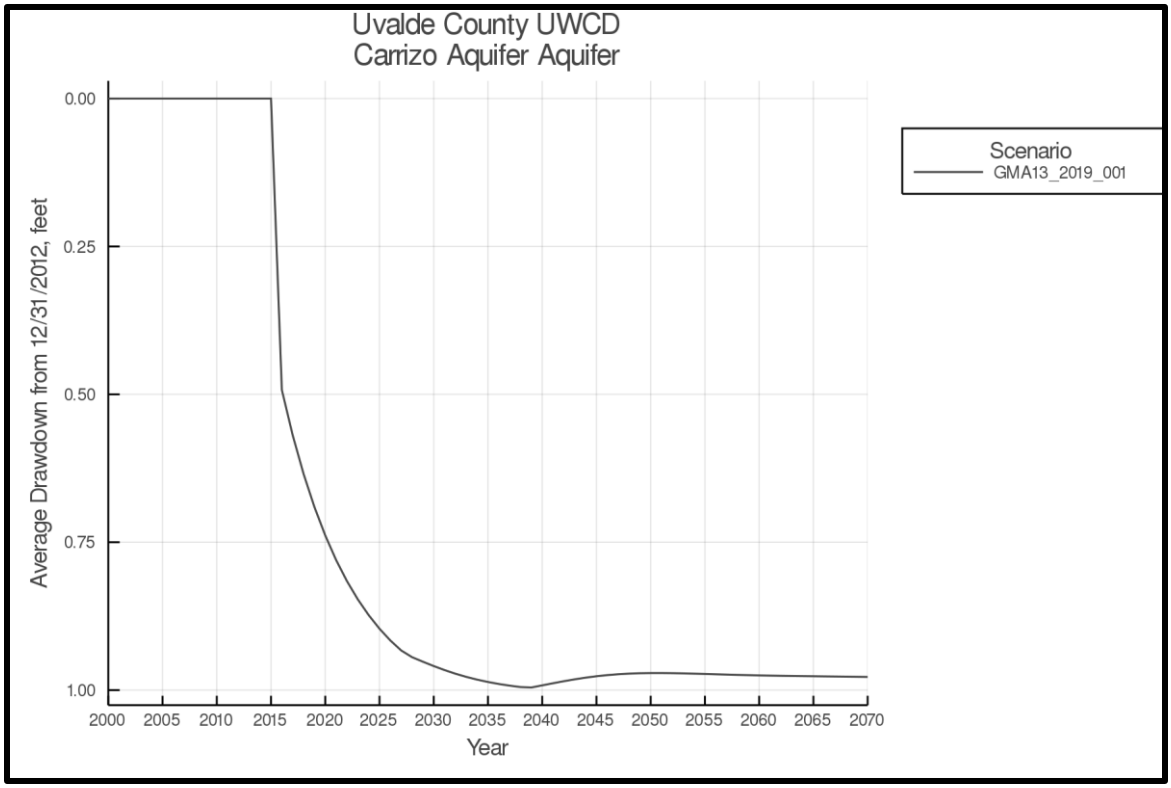
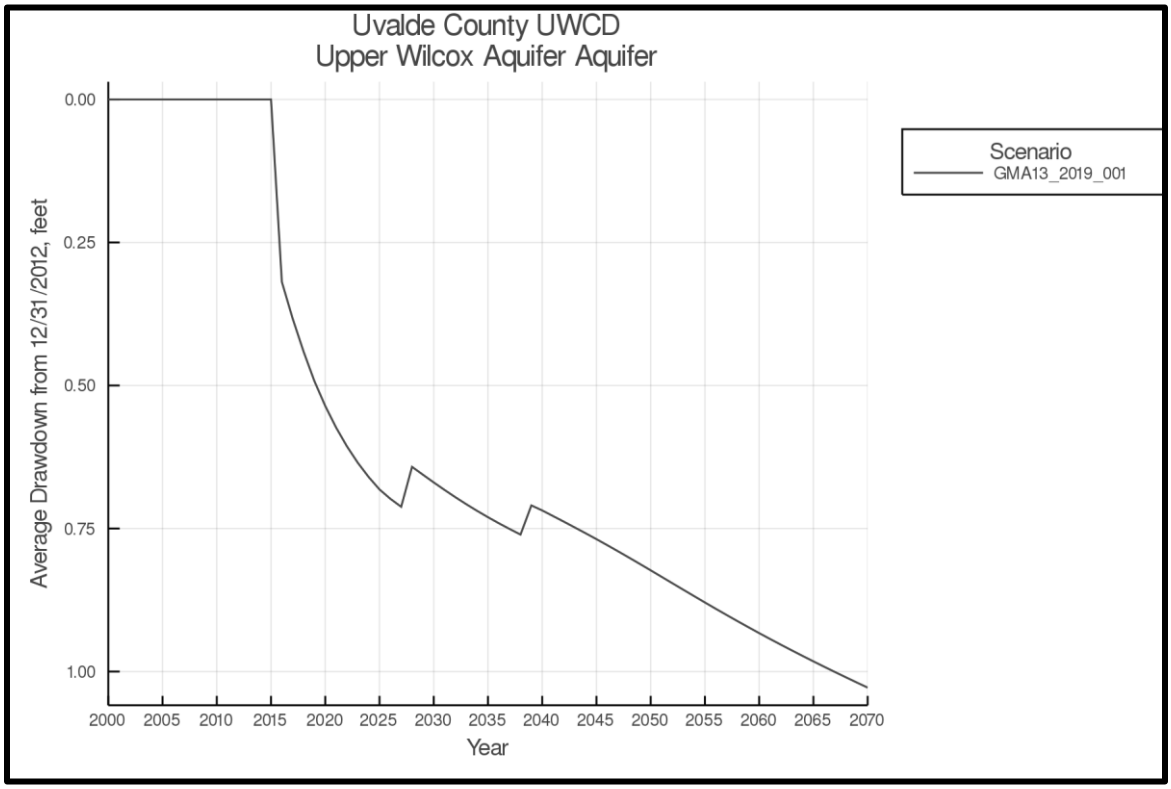
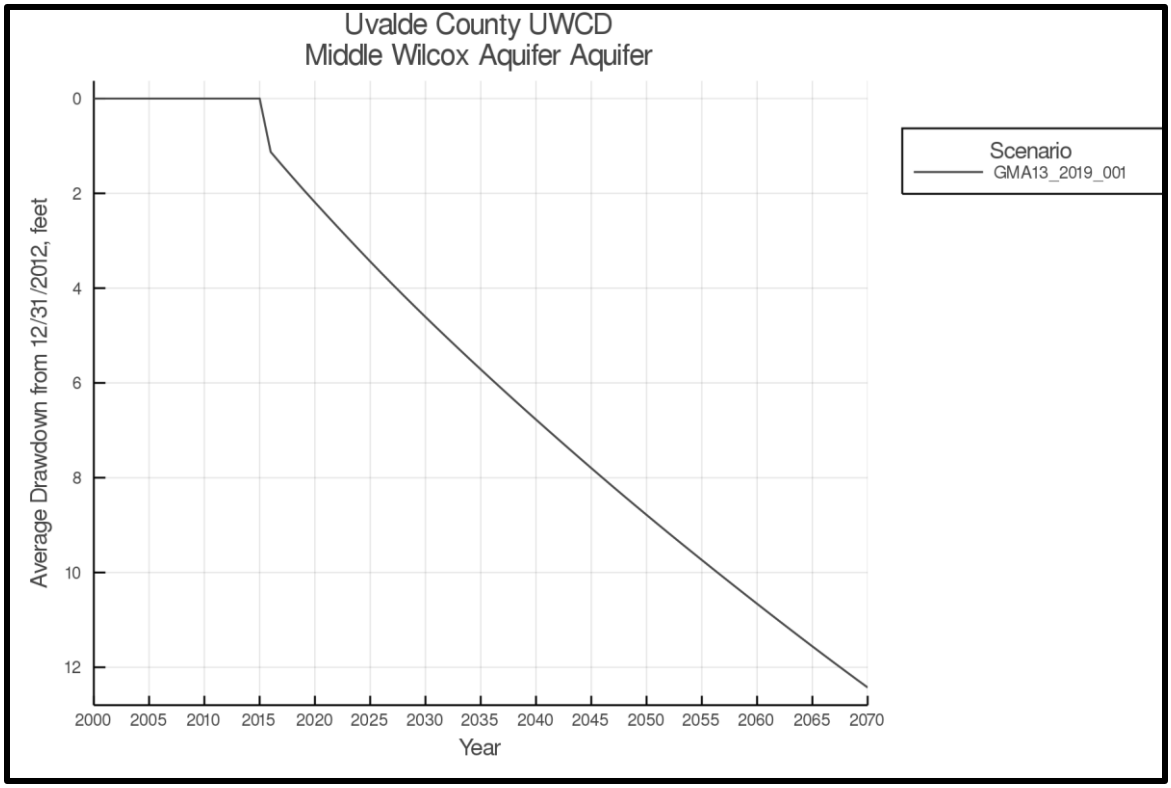
Year
Scenario
GMA13_2019_001


Uvalde County UWCD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0.00
0.25
0.50
0.75
1.00
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001


Uvalde County UWCD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0.00
0.25
0.50
0.75
1.00
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001


Uvalde County UWCD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
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2
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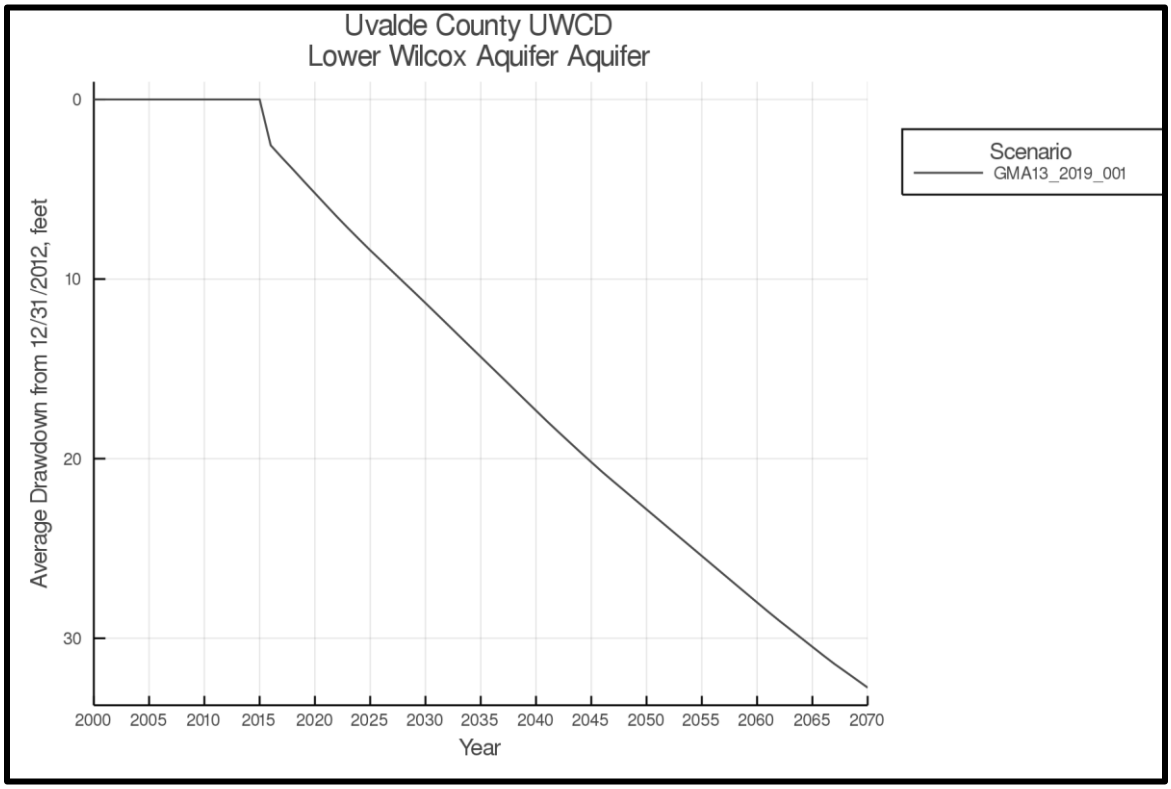
Year
Scenario
GMA13_2019_001


Uvalde County UWCD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
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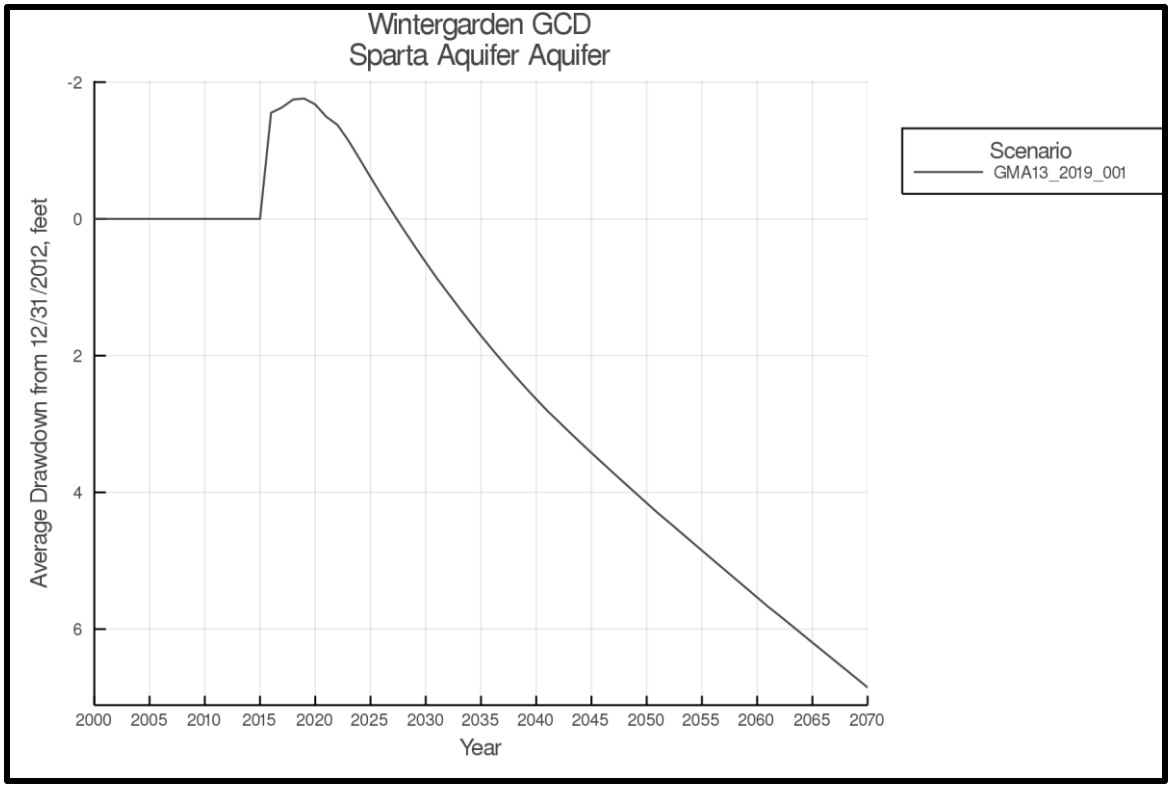
Year
Scenario
GMA13_2019_001


Wintergarden GCD
Sparta Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
-2
0
2
4
6
2000
2005
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2025
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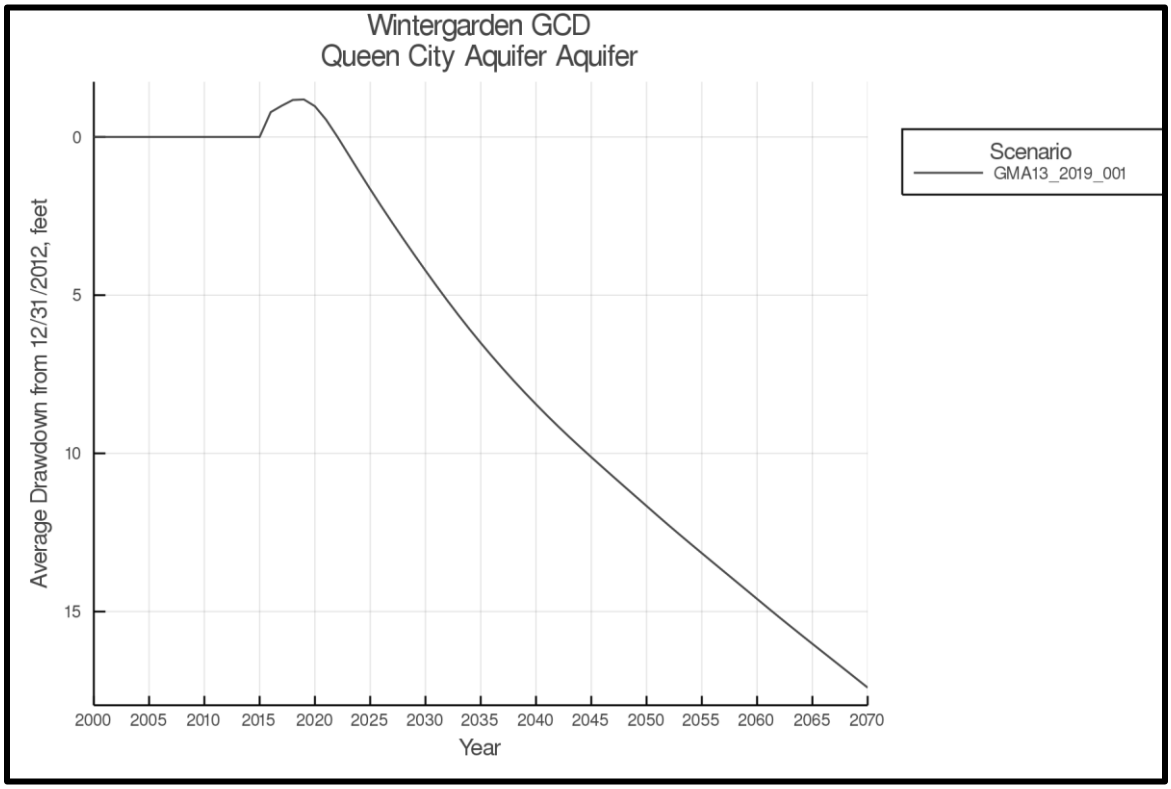
Year
Scenario
GMA13_2019_001


Wintergarden GCD
Queen City Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
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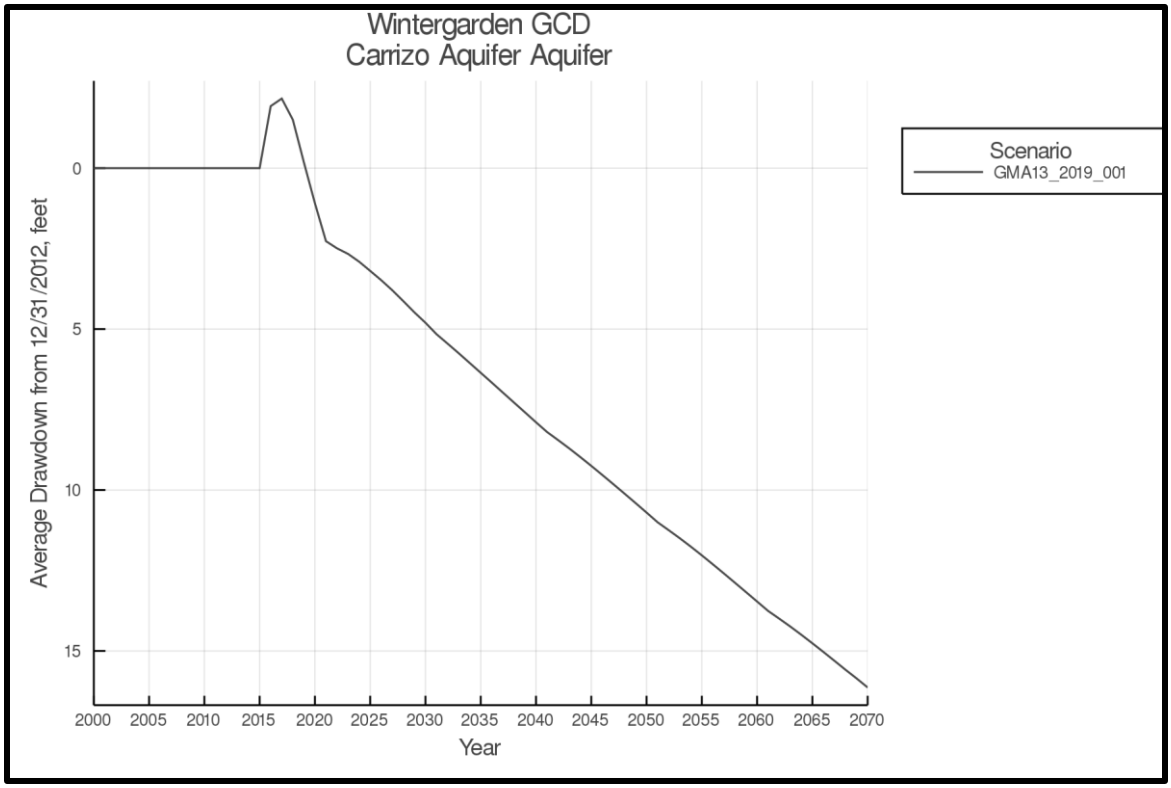
Year
Scenario
GMA13_2019_001


Wintergarden GCD
Carrizo Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
0
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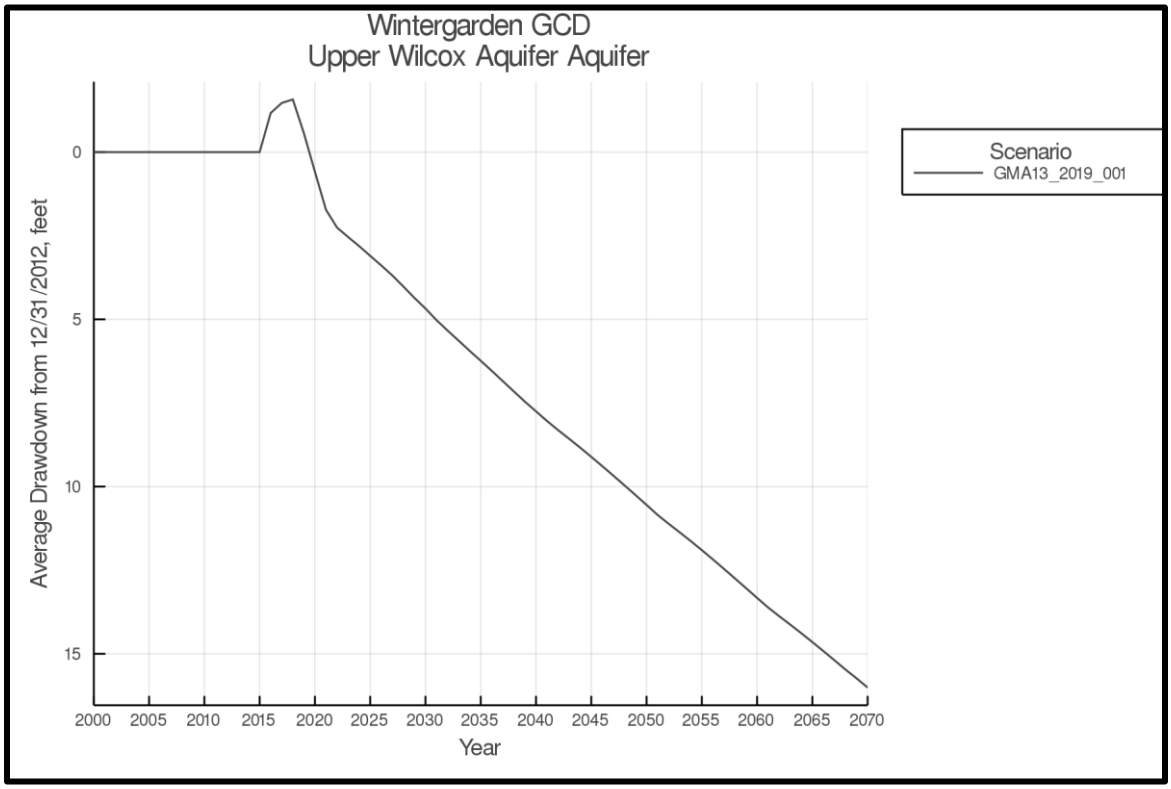
Year
Scenario
GMA13_2019_001


Wintergarden GCD
Upper Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
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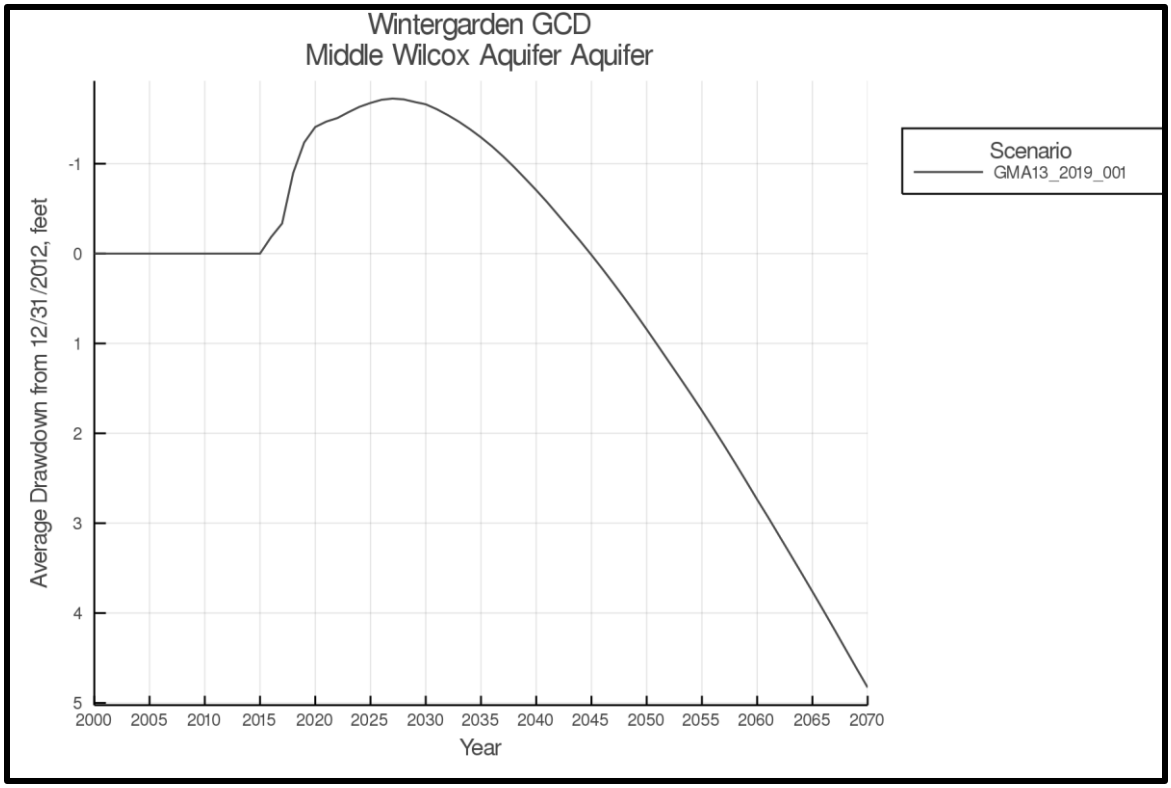
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA13_2019_001


Wintergarden GCD
Middle Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
-1
0
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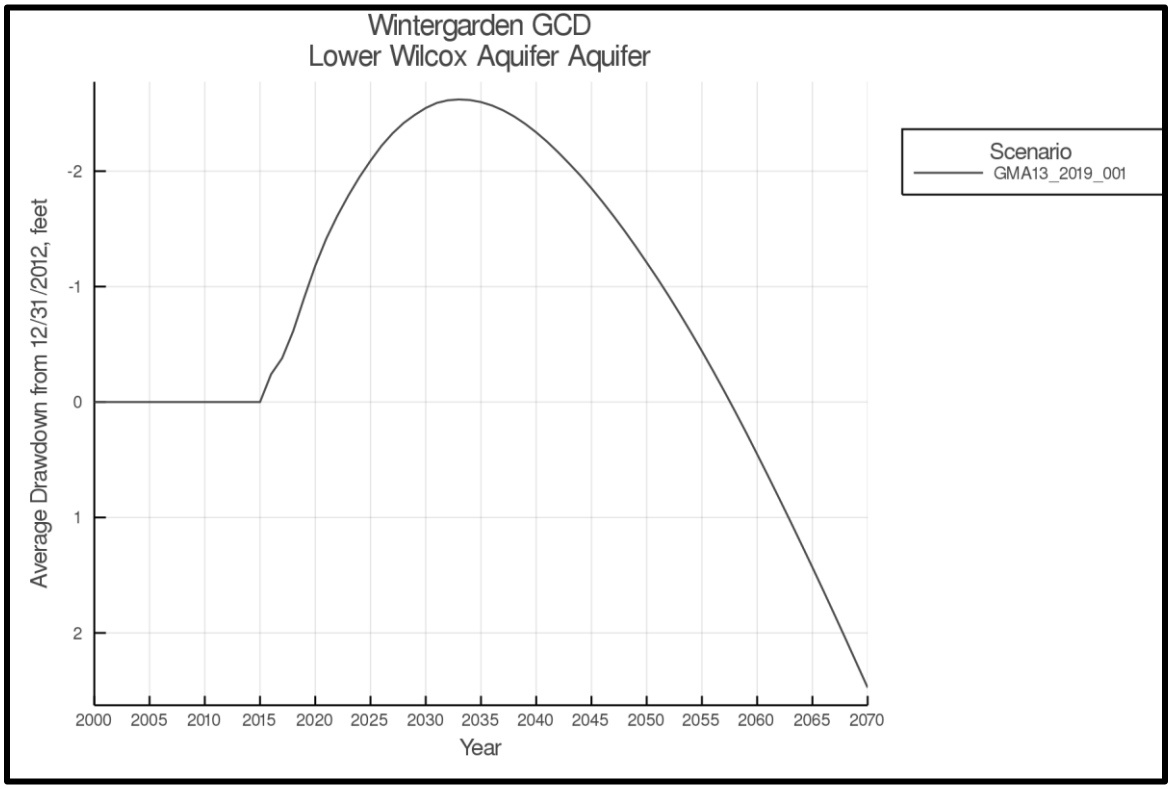
2070
Year
Scenario
GMA13_2019_001


Wintergarden GCD
Lower Wilcox Aquifer Aquifer
Average Drawdown from 12/31/2012, feet
-2
-1
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2020
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Year
Scenario
GMA13_2019_001

Appendix 4.5 —
November 8, 2019 Presentation of Modeling Related to Evaluation of Potential DFCs

LRE Water, LLC
a Leonard Rice Engineers Company

Discussion of Modeling Related to Evaluation of Potential DFCs

GMA 13 Agenda Item 6

November 8, 2019

Modifications to the MAG Pumping File

- Extended actual pumping through 2016
  - No changes to updated pumping from 2000 through 2011 (amounts or locations)
  - Modified pumping amounts for 2012 through 2016
- For the 2012 through 2016
  - Used available GCD and stakeholder values and locations
  - Used TWDB WUS data to supplement where needed
- For TWDB Carrizo-Wilcox WUS Data
  - Used TWDB and SDR databases to assess distribution of pumping
  - Well locations and completion intervals dictated amount assigned to an aquifer

Modifications to the MAG Pumping File

- Updated projections based on GCD and stakeholder input
  - Used well locations or model cells
  - Used amounts per year to ramp up production
- No changes to areas without guidance
  - Kept previous round projected pumping
  - Resulted in some area ramping up and others flat
- Changes since August 2, 2019
  - Verified desalination pumping in Webb County
  - Revised SAWS brackish pumping distribution in Wilson County
  - Revised evenly distributed downdip pumping
  - Reduced Medina County GCD WUS pumping numbers for 2012-2016 period

Carrizo-Wilcox, Sparta, and Queen City Aquifers
2070 Simulated Pumping

Increases in pumping input values in several Districts

District	Previous Input	MAG	Current Input	Current Output
Evergreen UWCD	276,191	276,767	277,207	276,761
Gonzales County UWCD	136,981	128,543	147,765	145,326
Guadalupe County GCD	54,333	47,833	61,516	39,751
McMullen GCD	4,641	4,628	6,228	6,228
Medina County GCD	3,015	2,646	3,015	2,547
Plum Creek CD	21,095	19,646	27,617	19,462
Uvalde County UWCD	5,007	828	1,250	0
Wintergarden GCD	48,312	47,630	50,372	45,901

Carrizo-Wilcox, Sparta, and Queen City Aquifers
2070 Simulated Pumping

Several decreases from previous pumping input values to MAG

District	Previous Input	MAG	Current Input	Current Output
Evergreen UWCD	276,191	276,767	277,207	276,761
Gonzales County UWCD	136,981	128,543	147,765	145,326
Guadalupe County GCD	54,333	47,833	61,516	39,751
McMullen GCD	4,641	4,628	6,228	6,228
Medina County GCD	3,015	2,646	3,015	2,547
Plum Creek CD	21,095	19,646	27,617	19,462
Uvalde County UWCD	5,007	828	1,250	0
Wintergarden GCD	48,312	47,630	50,372	45,901

Carrizo-Wilcox, Sparta, and Queen City Aquifers
2070 Simulated Pumping

Similar decreases in current results

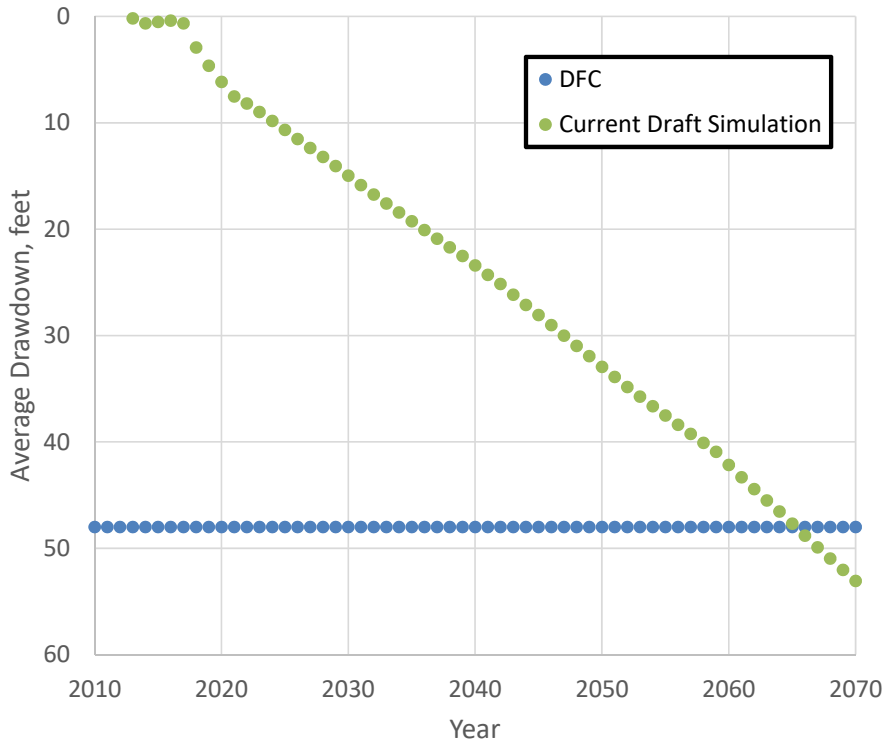
District	Previous Input	MAG	Current Input	Current Output
Evergreen UWCD	276,191	276,767	277,207	276,761
Gonzales County UWCD	136,981	128,543	147,765	145,326
Guadalupe County GCD	54,333	47,833	61,516	39,751
McMullen GCD	4,641	4,628	6,228	6,228
Medina County GCD	3,015	2,646	3,015	2,547
Plum Creek CD	21,095	19,646	27,617	19,462
Uvalde County UWCD	5,007	828	1,250	0
Wintergarden GCD	48,312	47,630	50,372	45,901

Decreases in Simulated Pumping

- Decrease from input to output due to dry cells
- May be able to redistribute pumping to some extent to alleviate the issue
  - Split higher pumping to multiple model cells
  - Move to a different layer if reasonable to do so
- Goal is for input to match output

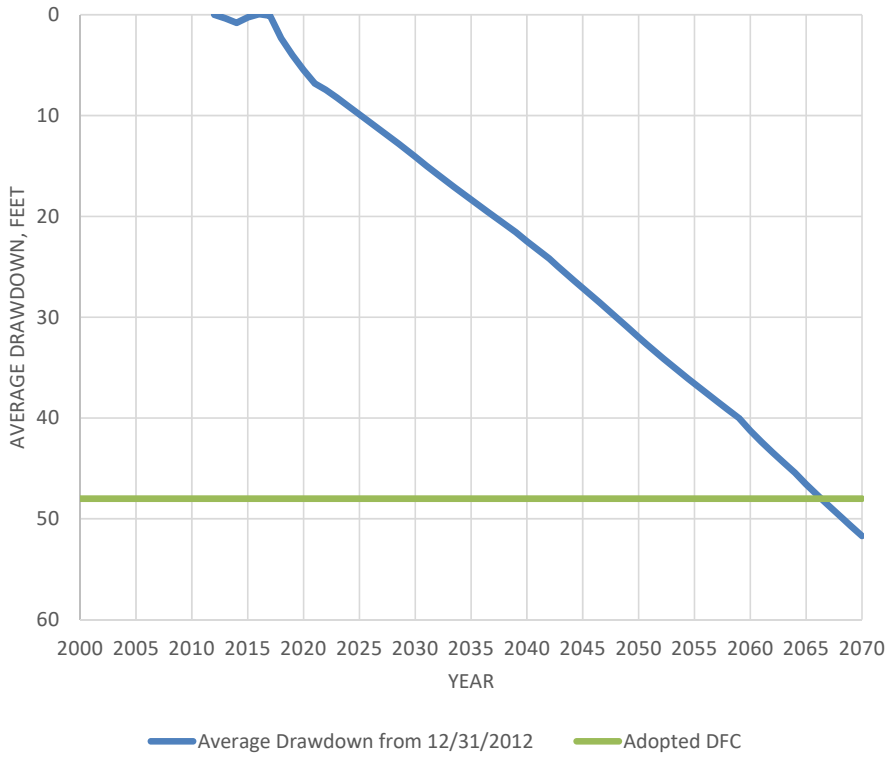
Carrizo-Wilcox, Sparta, and Queen City Aquifers Simulation Results

- Average Drawdown in GMA 13: 53 feet
- Calculation Method
  - Only GMA 13 cells
  - Dry cells not included
  - Only cells designated as part of the aquifer footprint



Carrizo-Wilcox, Queen City, and Sparta Average Drawdown

- Little change with draft update
  - Adopted DFC: 48 feet of average drawdown from end of 2012 to year 2070
  - Draft Update Average Drawdown
    - 12/31/2012 to 1/1/2070 = 51 feet
    - 12/31/2012 to 12/31/2070 = 52 feet
- Extending base year does not change results significantly
  - Difference of less than 0.1 foot



Next Steps

- Continue to revise pumping to address dry cells
  - Redistribute pumping
  - Consider reducing input if unable to eliminate dry cells

- Perform aquifer equilibrium model run

Discussion of Pumping Input Updates for Modeling DFCs

GMA 13 Agenda Item 6

November 8, 2019

QUESTIONS/DISCUSSION

Mike Keester, P.G.
Mike.Keester@LREWater.com
(512) 962-7660

Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

Appendix 4.6 —
February 7, 2020 Presentation of Modeling Related to Evaluation of Potential DFCs

LREWater, LLC
a Leonard Rice Engineers Company

Update of Modeling Related to Evaluation of Potential DFCs

GMA 13 Agenda Item 8

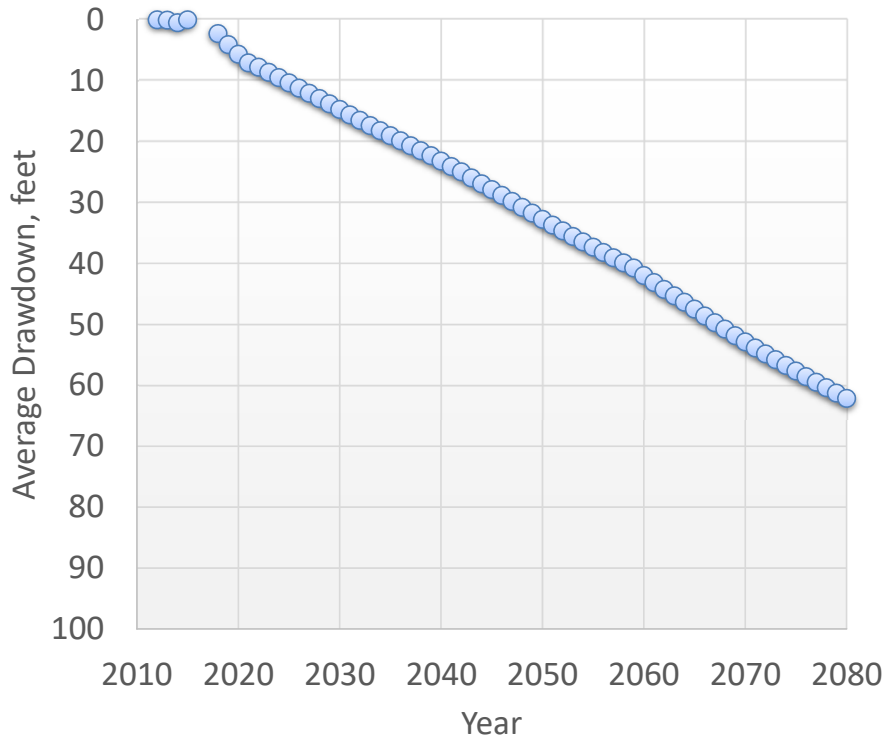
February 7, 2020

Work Conducted

- Attempted to eliminate “dry cells” through pumping redistribution
  - Unsuccessful
  - Limitation of the model
- Extended model through 2080
- Equilibrium run started
  - Revised model to allow pumping to be reduced during the simulation if water levels are within 20 feet of the aquifer base
  - Used current pumping file with constant pumping from 2070 onward
- Extracted model parameters to Excel workbook

Extended Model

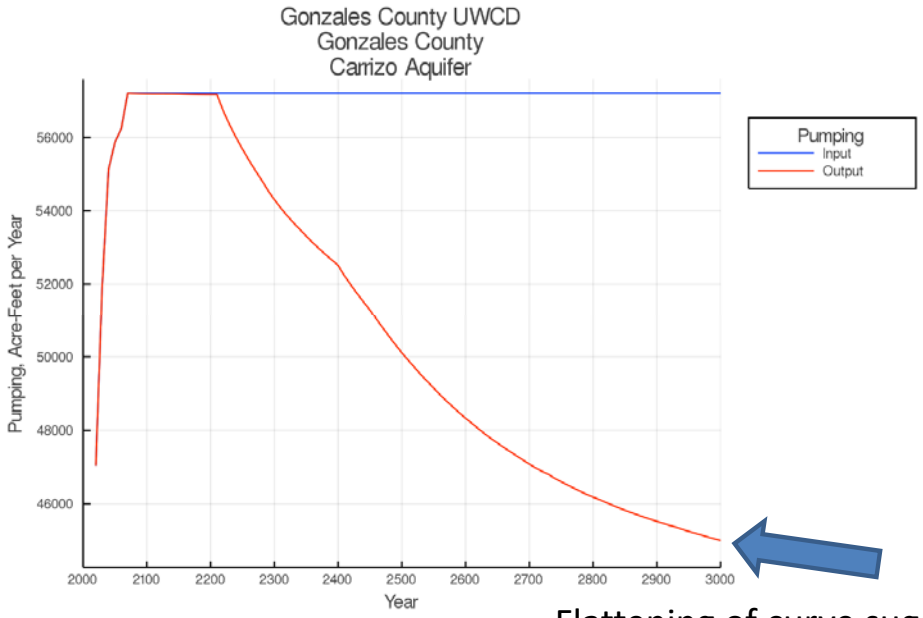
- No change to pumping inputs presented during last meeting
- 2070 pumping extended through 2080
- Linear average drawdown trend
- 62 feet in 2080

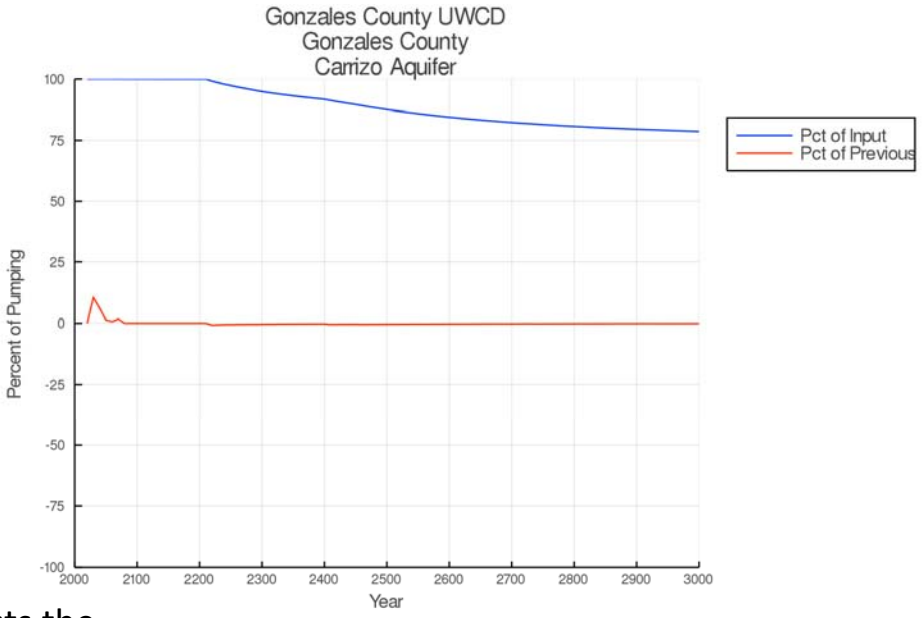


Equilibrium Run

- Allowed simulation to run for 1,000 years
- Results are in progress
- Preliminary results may not be indicating aquifers are reaching equilibrium at MAG pumping rates

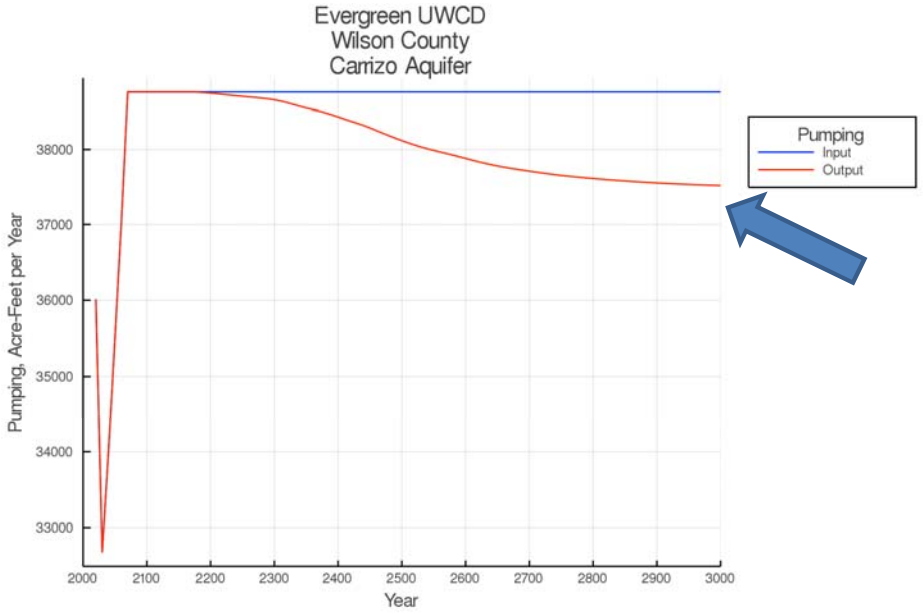
GCUWCD – Carrizo (Preliminary Results)

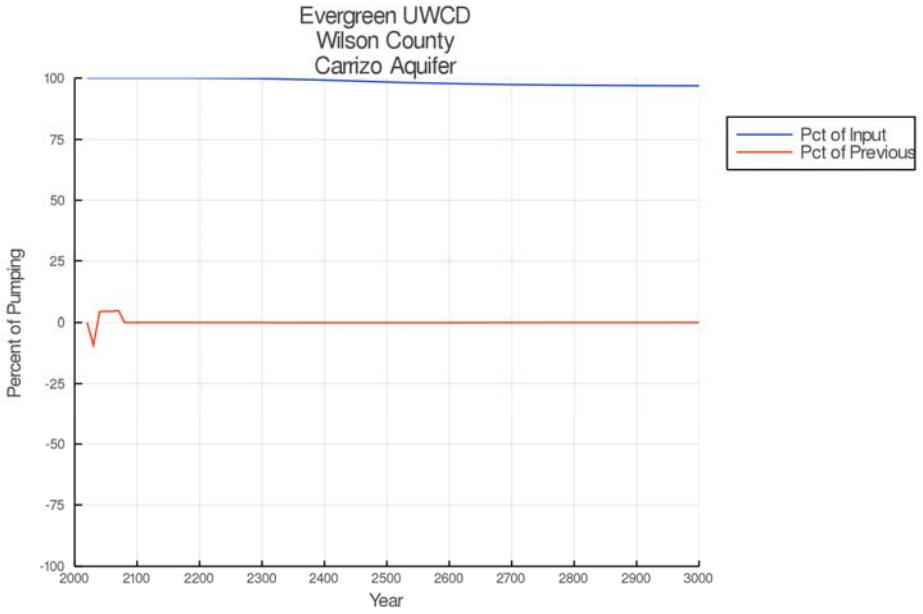




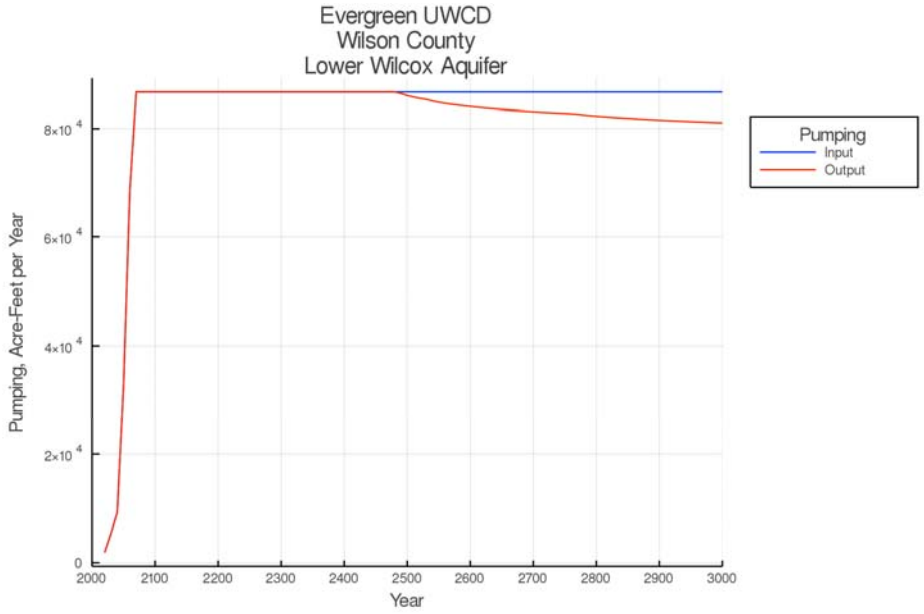
Flattening of curve suggests the pumping may be reaching equilibrium

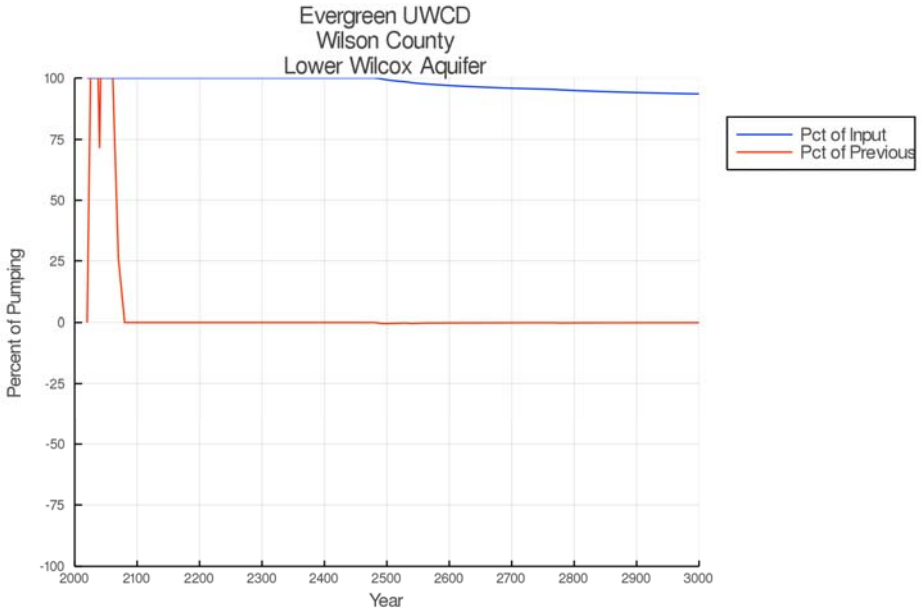
EUWCD – Wilson County – Carrizo (Preliminary Results)





EUWCD – Wilson County – Lower Wilcox (Preliminary Results)





Modeling Next Steps

- Finalize aquifer equilibrium model run
- Conduct additional pumping scenarios (?)

Update of Modeling Related to Evaluation of Potential DFCs

GMA 13 Agenda Item 8

February 7, 2020

QUESTIONS/DISCUSSION

Mike Keester, P.G.
Mike.Keester@LREWater.com
(512) 962-7660

Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

APPENDIX 5 —
TECHNICAL MEMORANDA AND PRESENTATIONS ASSOCIATED WITH CONSIDERATION OF FACTORS ENUMERATED IN TEXAS WATER CODE 36.108(d)

Appendix 5.1 —
Discussion of Aquifer Uses and Conditions

TECHNICAL MEMORANDUM

TO: Groundwater Management Area 13

FROM: Michael R. Keester, P.G.

SUBJECT: Discussion of Aquifer Uses and Conditions

DATE: February 7, 2020

Per Texas Water Code Section 36.108(d)(1) districts within each groundwater management area shall consider "aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another." We began consideration of the aquifer uses and conditions across GMA 13 early in the process through our conversations with district representatives regarding the amount of pumping that has occurred in the past. As with the previous round of joint planning (Hutchison, 2017a; Hutchison, 2017c), we also considered:

- TWDB Groundwater Pumpage Estimates from water use survey data (TWDB, 2019b);
- TWDB Groundwater Database (TWDB, 2019a);
- TWDB Submitted Driller's Report Database (TWDB, 2019c); and,
- Southern Sparta, Queen City, and Carrizo-Wilcox aquifers GAM (Kelley and others, 2004)
- Yegua-Jackson Aquifer GAM (Deeds and others, 2010)

Groundwater pumping data were tabulated from the TWDB pumpage estimates and discussed with district representatives relative to the distribution of pumping in the model. In some cases, districts provided records of pumping amounts and these values were used to update, or in place of, the TWDB estimates for the period from 2012 through 2016. Domestic pumping estimates were based on estimates from the TWDB (TWDB, 2015). No changes were made to estimates of pumping developed for the period from 2000 through 2011 (Hutchison, 2017b) A summary of the historical pumping amounts for the geographical divisions of GMA 13 are provided in Table 1.

Most of the pumping in GMA 13 is from the Carrizo Aquifer followed by the Wilcox. Pumping amounts generally decline across the GMA from the north to south with the lowest pumping volumes coming from the Yegua-Jackson Aquifer along the southeast boundary of GMA 13. Figure 1 illustrates the distribution of the amount of pumping from the relevant aquifers (namely, the Carrizo, Wilcox, Sparta, Queen City, and Yegua-Jackson) in GMA 13 in 2016.

Total groundwater pumping in GMA 13 was just over 350,000 acre-feet in 2011 and declined to about 250,000 acre-feet in 2016. Much of the difference in pumping is due to high pumping in Atascosa and Frio counties where the 2016 estimated pumping is about one-half the estimated 2011 pumping volume. Of the total use, irrigation was the dominant groundwater use within GMA 13 accounting for 54 percent of the estimated total annual use. Municipal or Public Supply was the second most common use followed by exempt use (combined domestic and livestock

use). Table 2 summarizes the estimated annual groundwater use within each county from relevant aquifers in GMA 13 by type for 2016. Table 3 summarizes the percent of each use within each county from relevant aquifers in GMA 13 for 2016.

Based on information from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c), wells identified as domestic or livestock for the proposed use are most common throughout GMA 13. Using the aquifer code, depth, and/or completion data for each well in the databases, we determined the GMA 13 relevant aquifer in which each well was likely producing. We found that most of the irrigation and public supply wells are completed in the Carrizo Aquifer as the total groundwater production information suggests. Figure 2 through Figure 6 illustrate the wells completed in each GMA 13 relevant aquifer. Figure 7 illustrates the distribution of wells completed in a relevant aquifer by type of use in each county within GMA 13. Importantly, these figures only show wells from the two identified databases that are completed in one of the relevant aquifers and do not reflect all wells within GMA 13. However, the distribution of wells and use does reasonably reflect the aquifer uses and conditions within GMA 13

Geoscientist Seal

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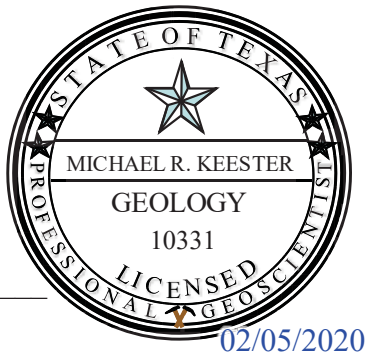

Michael R. Keester, P.G.
Project Manager / Hydrogeologist

02/05/2020

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Kelley, V.A., Deeds, N.E., Fryar, D.G., and Nicot, J.P., 2004, Final Report: Groundwater Availability Models for the Queen City and Sparta Aquifers: Contract report for the Texas Water Development Board, 867 p.

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Texas Water Development Board, 2019c, Submitted Drillers Reports Database Download, http://www.twdb.state.tx.us/groundwater/data/drillersdb.asp, accessed February 2019.

Table 1. Summary of GMA 13 historical pumping from the relevant aquifers.

GMA 13 Historical Pumping, Acre-Feet per Year							
County	Year	Carrizo	Wilcox	Queen City	Sparta	Yegua-Jackson	Total
Atascosa	2000	35,725	1,767	249	64	383	38,188
	2005	19,463	962	135	441	420	21,421
	2010	60,705	3,001	1,114	430	493	65,744
	2011	60,705	3,001	1,115	428	599	65,849
	2012	40,225	1,349	2,978	877	395	45,824
	2013	44,473	1,630	3,717	964	470	51,253
	2014	39,681	1,490	3,560	747	439	45,917
	2015	30,229	1,175	3,156	671	358	35,589
	2016	28,431	1,236	2,868	646	325	33,506
Bexar	2000	2,396	8,906	0	0	0	11,302
	2005	1,305	4,852	0	0	0	6,157
	2010	4,071	15,133	0	0	0	19,204
	2011	4,071	15,133	0	0	0	19,205
	2012	4,808	1,185	0	0	0	5,993
	2013	6,928	931	0	0	0	7,858
	2014	9,373	801	0	0	0	10,173
	2015	3,913	739	0	0	0	4,652
	2016	629	1,338	0	0	0	1,967
Caldwell	2000	0	664	0	0	0	664
	2005	0	665	0	0	0	665
	2010	483	1,341	0	0	0	1,824
	2011	538	2,605	0	0	0	3,143
	2012	814	2,245	0	0	0	3,059
	2013	774	1,970	0	0	0	2,744
	2014	1,125	2,198	0	0	0	3,323
	2015	918	2,044	0	0	0	2,961
	2016	891	1,844	0	0	0	2,735
Dimmit	2000	1,984	1,050	0	0	0	3,034
	2005	1,081	572	0	0	0	1,653
	2010	3,372	1,784	0	0	0	5,156
	2011	3,372	1,784	0	0	0	5,156
	2012	5,584	2,960	0	0	0	8,544
	2013	4,609	2,443	0	0	0	7,052
	2014	4,253	2,253	0	0	0	6,506
	2015	3,626	1,922	0	0	0	5,548
	2016	3,377	1,790	0	0	0	5,166

Table 1. Summary of GMA 13 historical pumping (continued).

GMA 13 Historical Pumping, Acre-Feet per Year							
County	Year	Carrizo	Wilcox	Queen City	Sparta	Yegua-Jackson	Total
Frio	2000	68,043	6,957	17	10	0	75,027
	2005	37,070	3,790	10	69	0	40,939
	2010	115,621	11,820	77	66	0	127,585
	2011	115,621	11,820	77	66	0	127,585
	2012	81,455	540	2,286	1,187	0	85,468
	2013	84,482	556	2,211	1,205	0	88,455
	2014	74,623	502	1,819	1,121	0	78,066
	2015	61,436	426	1,618	997	0	64,478
	2016	64,197	438	1,650	1,024	0	67,309
Gonzales	2000	3,380	221	484	106	167	4,358
	2005	12,506	213	503	125	696	14,044
	2010	15,963	222	1,232	127	1,516	19,060
	2011	20,126	223	1,526	185	1,594	23,654
	2012	32,524	6,419	2,146	951	1,388	43,428
	2013	34,679	6,879	2,131	891	1,421	46,001
	2014	61,471	10,290	2,346	803	1,459	76,369
	2015	61,470	10,482	1,801	799	1,364	75,916
	2016	52,013	9,256	1,734	764	1,405	65,172
Guadalupe	2000	835	3,302	0	0	0	4,137
	2005	455	1,799	0	0	0	2,254
	2010	1,756	5,603	0	0	0	7,360
	2011	1,933	5,611	0	0	0	7,544
	2012	1,085	2,652	0	0	0	3,737
	2013	989	2,251	0	0	0	3,240
	2014	1,337	2,435	0	0	0	3,772
	2015	1,549	3,224	0	0	0	4,773
	2016	1,212	2,406	0	0	0	3,618
Karnes	2000	199	0	0	0	100	299
	2005	108	0	0	0	299	408
	2010	338	0	0	0	417	755
	2011	338	0	0	0	453	792
	2012	112	0	0	0	288	401
	2013	114	1	0	0	244	359
	2014	578	0	0	0	287	865
	2015	1,009	0	0	0	220	1,229
	2016	814	0	0	0	243	1,057

Table 1. Summary of GMA 13 historical pumping (continued).

GMA 13 Historical Pumping, Acre-Feet per Year							
GCD/County	Year	Carrizo	Wilcox	Queen City	Sparta	Yegua-Jackson	Total
La Salle	2000	3,879	1,787	0	168	13	5,848
	2005	2,113	974	0	1,178	51	4,316
	2010	6,590	3,037	2	1,097	60	10,786
	2011	6,590	3,037	2	1,097	62	10,788
	2012	7,282	1,094	17	2,025	54	10,473
	2013	6,883	1,004	14	1,927	43	9,871
	2014	5,682	697	14	1,548	44	7,984
	2015	3,693	476	13	849	43	5,074
	2016	4,489	643	11	1,048	44	6,235
Maverick	2000	406	1,843	0	0	0	2,249
	2005	221	1,004	0	0	0	1,225
	2010	690	3,131	0	0	0	3,821
	2011	690	3,131	0	0	0	3,821
	2012	11	4	0	0	0	15
	2013	9	4	0	0	0	13
	2014	14	4	0	0	0	19
	2015	38	7	0	0	0	45
	2016	46	8	0	0	0	54
McMullen	2000	103	0	1	0	7	111
	2005	56	0	0	1	26	84
	2010	173	1	3	1	36	213
	2011	173	1	3	1	30	207
	2012	3,210	4,423	5	0	29	7,667
	2013	3,845	5,414	5	0	23	9,287
	2014	3,731	5,316	5	0	22	9,074
	2015	1,847	2,239	5	0	23	4,113
	2016	1,215	1,369	4	0	22	2,611
Medina	2000	1,024	2,409	0	0	0	3,432
	2005	558	1,312	0	0	0	1,870
	2010	1,739	4,093	0	0	0	5,832
	2011	1,739	4,093	0	0	0	5,832
	2012	1,938	3,597	0	0	0	5,535
	2013	1,847	3,343	0	0	0	5,190
	2014	2,012	3,858	0	0	0	5,870
	2015	1,159	2,012	0	0	0	3,170
	2016	1,366	2,463	0	0	0	3,829

Table 1. Summary of GMA 13 historical pumping (continued).

GMA 13 Historical Pumping, Acre-Feet per Year							
GCD/County	Year	Carrizo	Wilcox	Queen City	Sparta	Yegua-Jackson	Total
Uvalde	2000	244	131	0	0	0	375
	2005	133	71	0	0	0	204
	2010	415	223	0	0	0	637
	2011	415	223	0	0	0	637
	2012	15	6	0	0	0	21
	2013	14	6	0	0	0	20
	2014	13	6	0	0	0	19
	2015	12	5	0	0	0	17
	2016	8	3	0	0	0	11
Webb	2000	613	14	0	0	3	630
	2005	329	6	0	0	0	336
	2010	1,038	25	0	0	4	1,067
	2011	1,038	23	0	0	4	1,065
	2012	18	409	53	44	4	528
	2013	23	144	53	44	4	268
	2014	18	37	53	44	4	156
	2015	17	40	53	44	4	159
	2016	18	36	53	44	4	156
Wilson	2000	10,899	947	44	61	112	12,063
	2005	5,938	516	23	452	235	7,164
	2010	18,519	1,609	197	421	288	21,034
	2011	18,519	1,609	196	421	317	21,063
	2012	20,446	3,758	2,449	585	180	27,418
	2013	18,826	3,470	2,093	571	174	25,135
	2014	19,385	3,434	1,969	571	182	25,541
	2015	16,018	2,948	1,597	500	170	21,232
	2016	16,254	3,285	1,615	500	174	21,828
Zapata	2000	0	0	0	0	67	67
	2005	0	0	0	0	218	218
	2010	0	0	0	0	185	185
	2011	0	0	0	0	183	183
	2012	0	0	0	0	158	158
	2013	0	0	0	0	182	182
	2014	0	0	0	0	184	184
	2015	0	0	0	0	154	154
	2000	0	0	0	0	161	161

Table 1. Summary of GMA 13 historical pumping (continued).

GMA 13 Historical Pumping, Acre-Feet per Year							
GCD/County	Year	Carrizo	Wilcox	Queen City	Sparta	Yegua-Jackson	Total
Zavala	2000	23,685	9,556	0	0	0	33,241
	2005	12,904	5,205	0	0	0	18,109
	2010	40,246	16,237	0	0	0	56,483
	2011	40,246	16,237	0	0	0	56,483
	2012	32,423	13,084	0	0	0	45,507
	2013	29,861	12,050	0	0	0	41,912
	2014	30,430	12,279	0	0	0	42,709
	2015	22,219	8,965	0	0	0	31,184
	2016	22,664	9,144	0	0	0	31,808
Total	2000	153,416	39,552	794	410	852	195,025
	2005	94,241	21,942	672	2,266	1,946	121,066
	2010	271,720	67,259	2,625	2,143	3,000	346,747
	2011	276,115	68,531	2,919	2,199	3,243	353,007
	2012	231,951	43,725	9,933	5,669	2,496	293,774
	2013	238,356	42,094	10,226	5,603	2,563	298,841
	2014	253,726	45,601	9,765	4,836	2,620	316,548
	2015	209,152	36,703	8,242	3,861	2,337	260,294
	2016	197,623	35,258	7,935	4,026	2,379	247,221

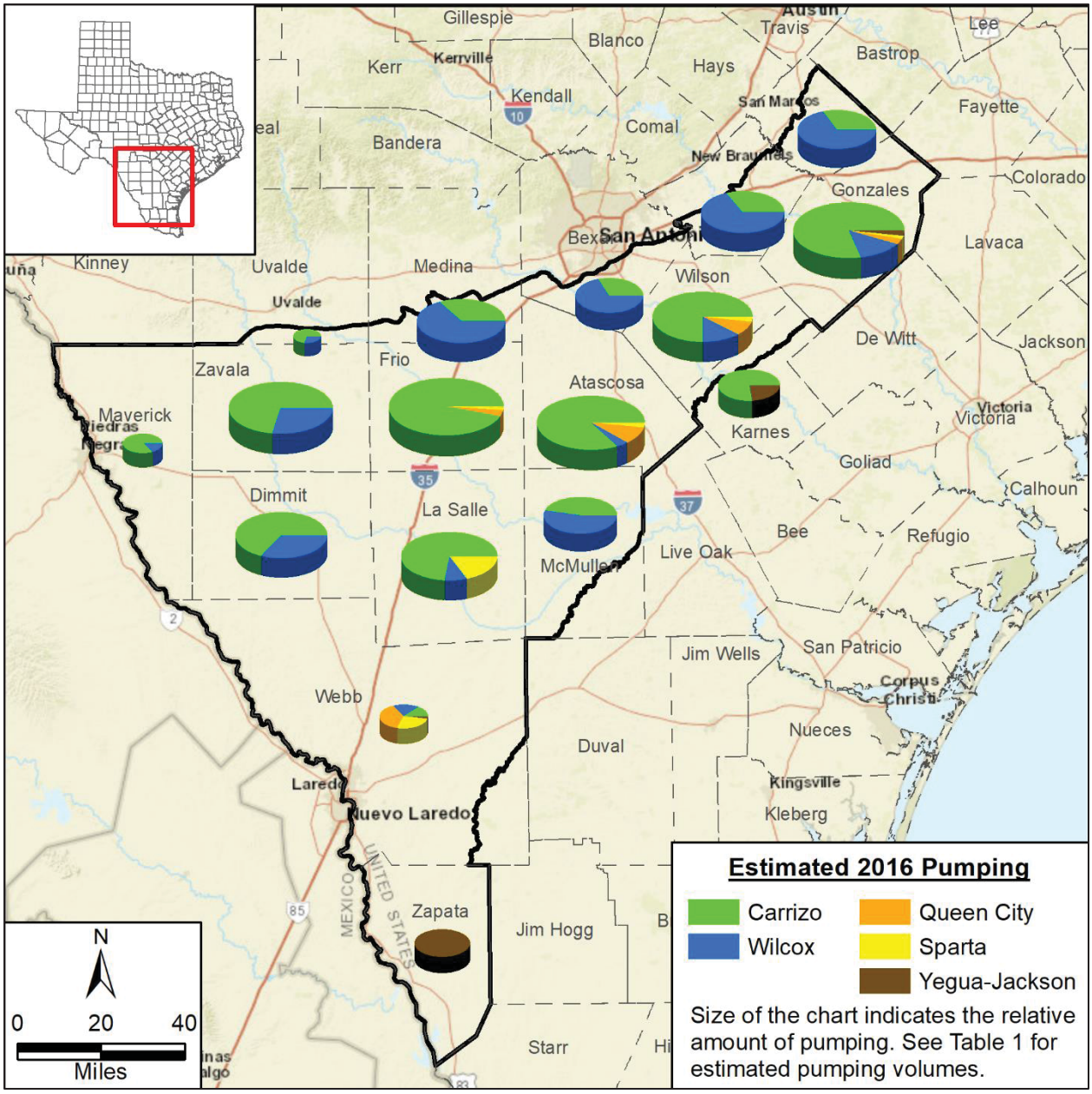


Figure 1. Estimated 2016 pumping from the relevant aquifers within GMA 13.

Table 2. Summary of GMA 13 estimated groundwater use in acre-feet in 2016.

County	Irrigation	Municipal	Livestock	Man./Pwr	Mining	Domestic	Total
Atascosa	19,193	6,238	1,156	5,317	293	1,310	33,506
Bexar	1,089	347	37	7	356	130	1,967
Caldwell	134	2,242	26	111	0	222	2,735
Dimmit	2,705	1,786	133	0	0	543	5,166
Frio	61,924	3,260	794	41	0	1,290	67,309
Gonzales	3,069	51,701	9,395	767	0	240	65,172
Guadalupe	282	2,727	363	2	11	233	3,618
Karnes	30	146	27	0	0	854	1,057
La Salle	3,200	2,143	219	0	0	673	6,235
Maverick	7	19	25	0	0	4	54
McMullen	0	955	150	1,494	0	12	2,611
Medina	3,025	502	88	5	0	208	3,829
Uvalde	0	0	0	0	0	11	11
Webb	1	21	49	6	0	79	156
Wilson	11,919	7,599	949	62	0	1,299	21,828
Zapata	0	14	50	0	0	97	161
Zavala	28,149	2,146	301	651	0	562	31,808
Total	**134,726**	**81,844**	**13,761**	**8,463**	**661**	**7,767**	**247,221**

Table 3. Summary of GMA 13 percentage by type of groundwater use in 2016.

County	Irrigation	Municipal	Livestock	Man./Pwr	Mining	Domestic
Atascosa	57%	19%	3%	16%	1%	4%
Bexar	55%	18%	2%	0%	18%	7%
Caldwell	5%	82%	1%	4%	0%	8%
Dimmit	52%	35%	3%	0%	0%	11%
Frio	92%	5%	1%	0%	0%	2%
Gonzales	5%	79%	14%	1%	0%	0%
Guadalupe	8%	75%	10%	0%	0%	6%
Karnes	3%	14%	3%	0%	0%	81%
La Salle	51%	34%	4%	0%	0%	11%
Maverick	13%	34%	47%	0%	0%	6%
McMullen	0%	37%	6%	57%	0%	0%
Medina	79%	13%	2%	0%	0%	5%
Uvalde	0%	0%	0%	0%	0%	100%
Webb	0%	13%	31%	4%	0%	51%
Wilson	55%	35%	4%	0%	0%	6%
Zapata	0%	9%	31%	0%	0%	60%
Zavala	88%	7%	1%	2%	0%	2%
Total	**54%**	**33%**	**6%**	**3%**	**0%**	**3%**

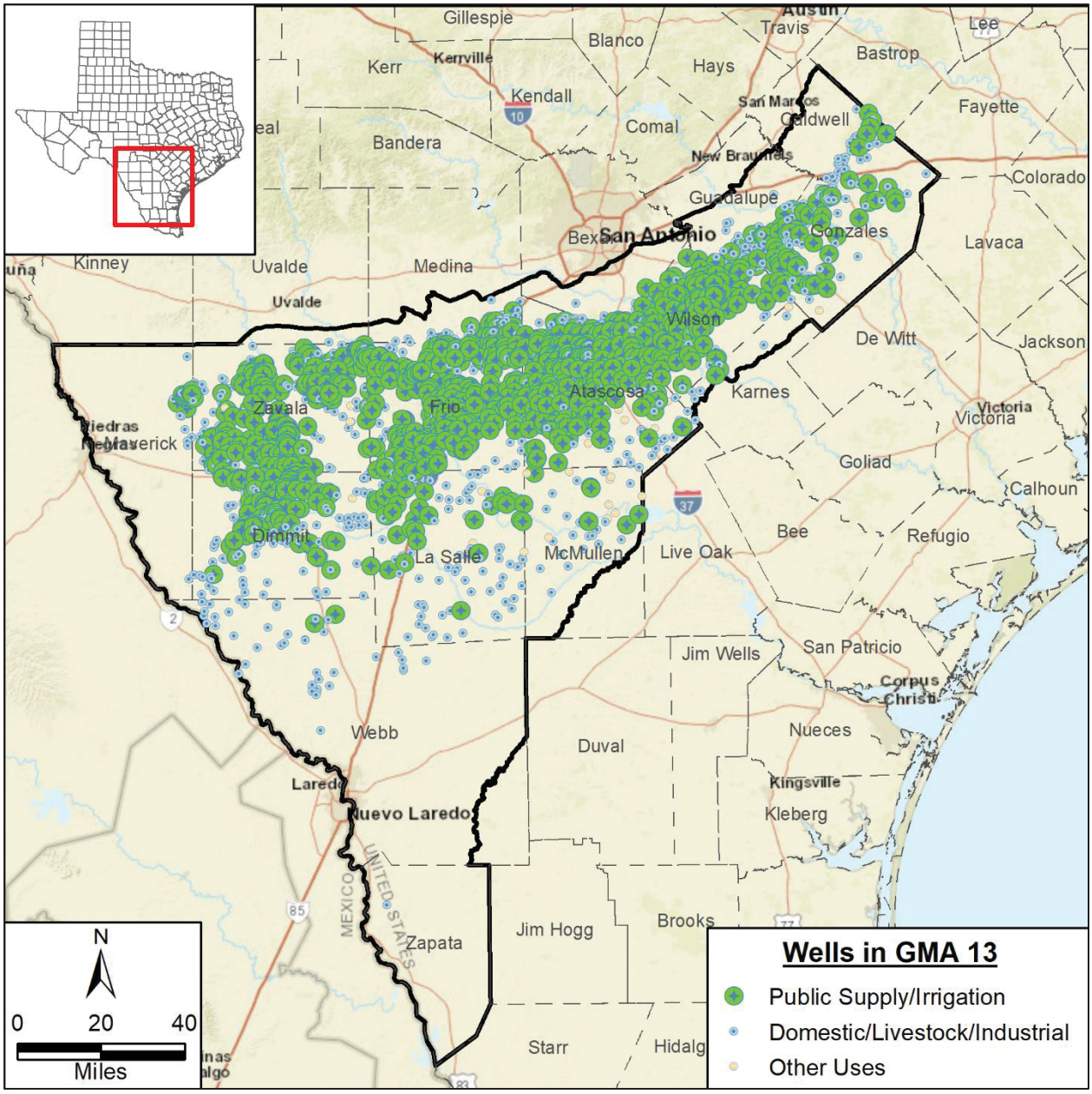


Figure 2. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Carrizo Aquifer. Figure only shows wells from the two identified databases that are completed in the aquifer and does not reflect all wells within GMA 13.

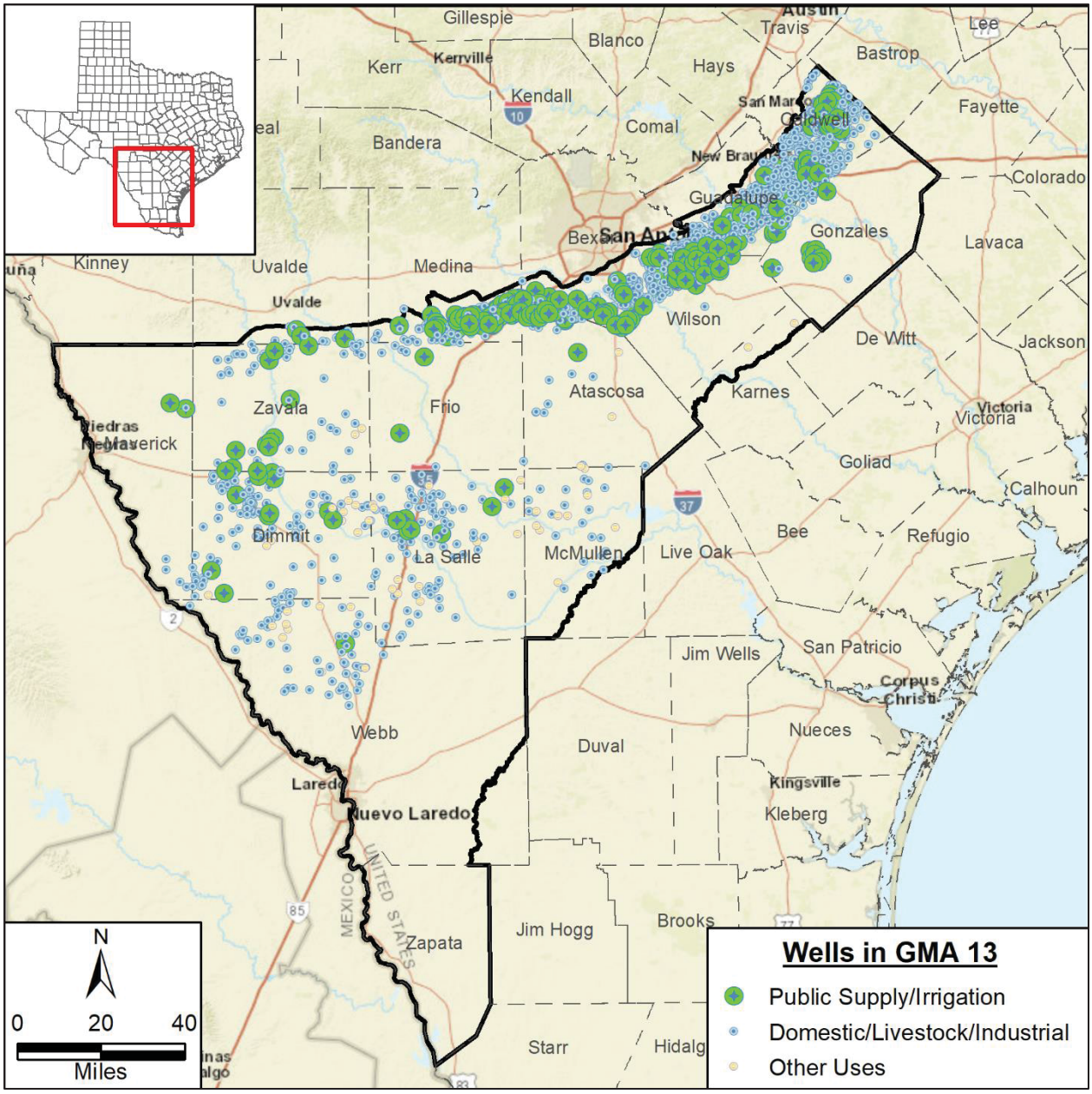


Figure 3. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Wilcox. Figure only shows wells from the two identified databases that are completed in the aquifer and does not reflect all wells within GMA 13.

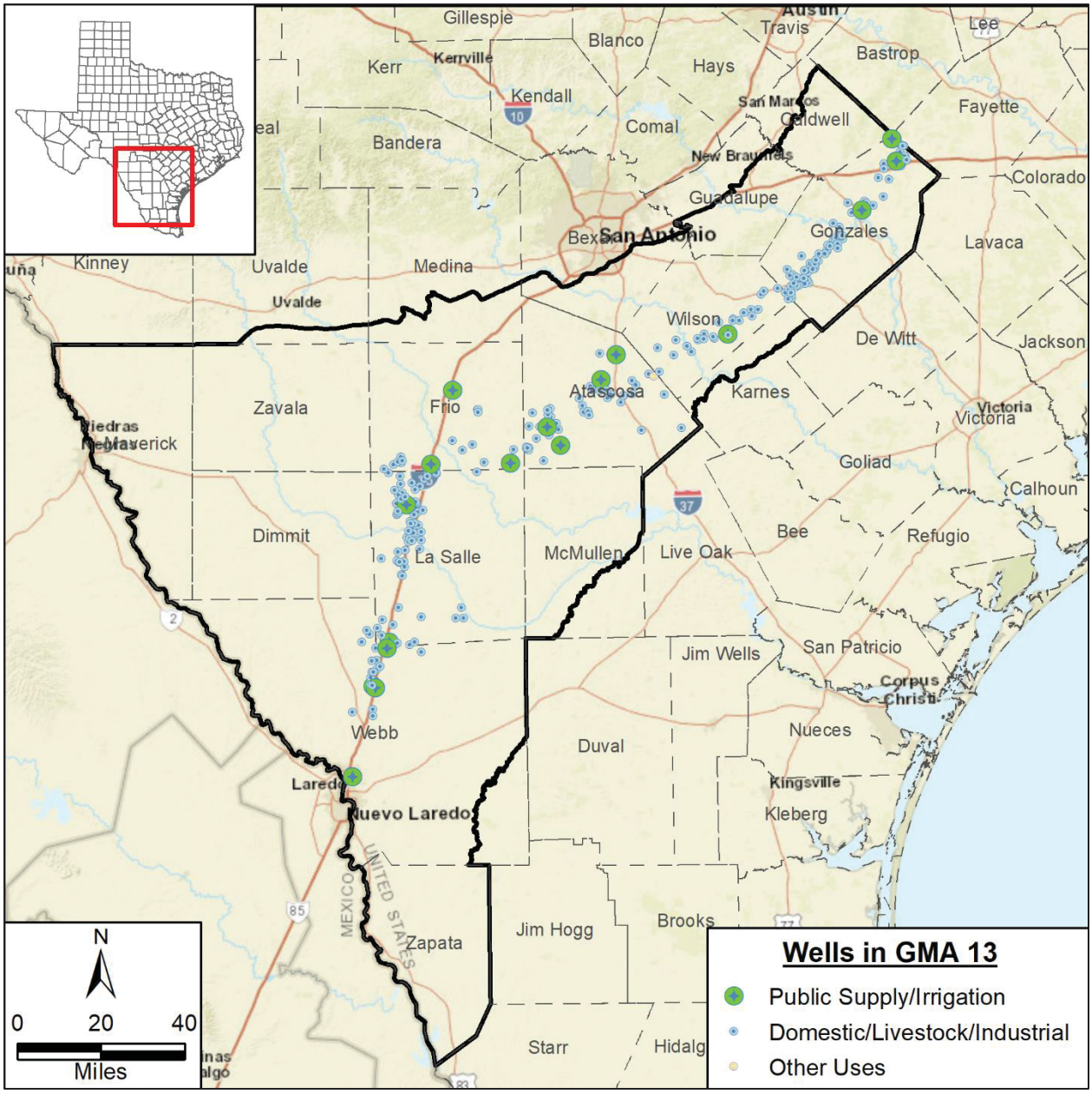


Figure 4. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Sparta. Figure only shows wells from the two identified databases that are completed in the aquifer and does not reflect all wells within GMA 13.

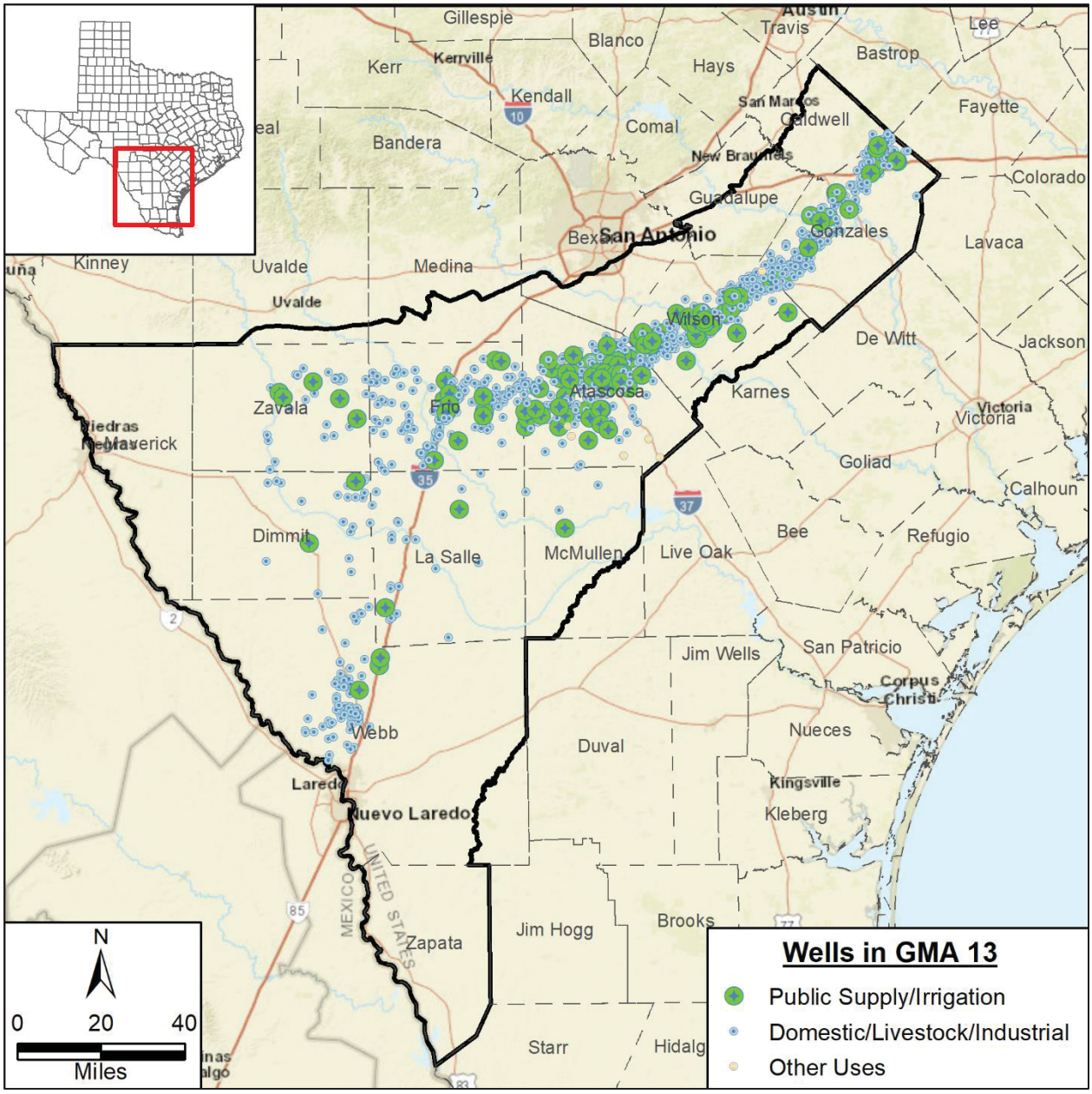


Figure 5. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Queen City. Figure only shows wells from the two identified databases that are completed in the aquifer and does not reflect all wells within GMA 13.

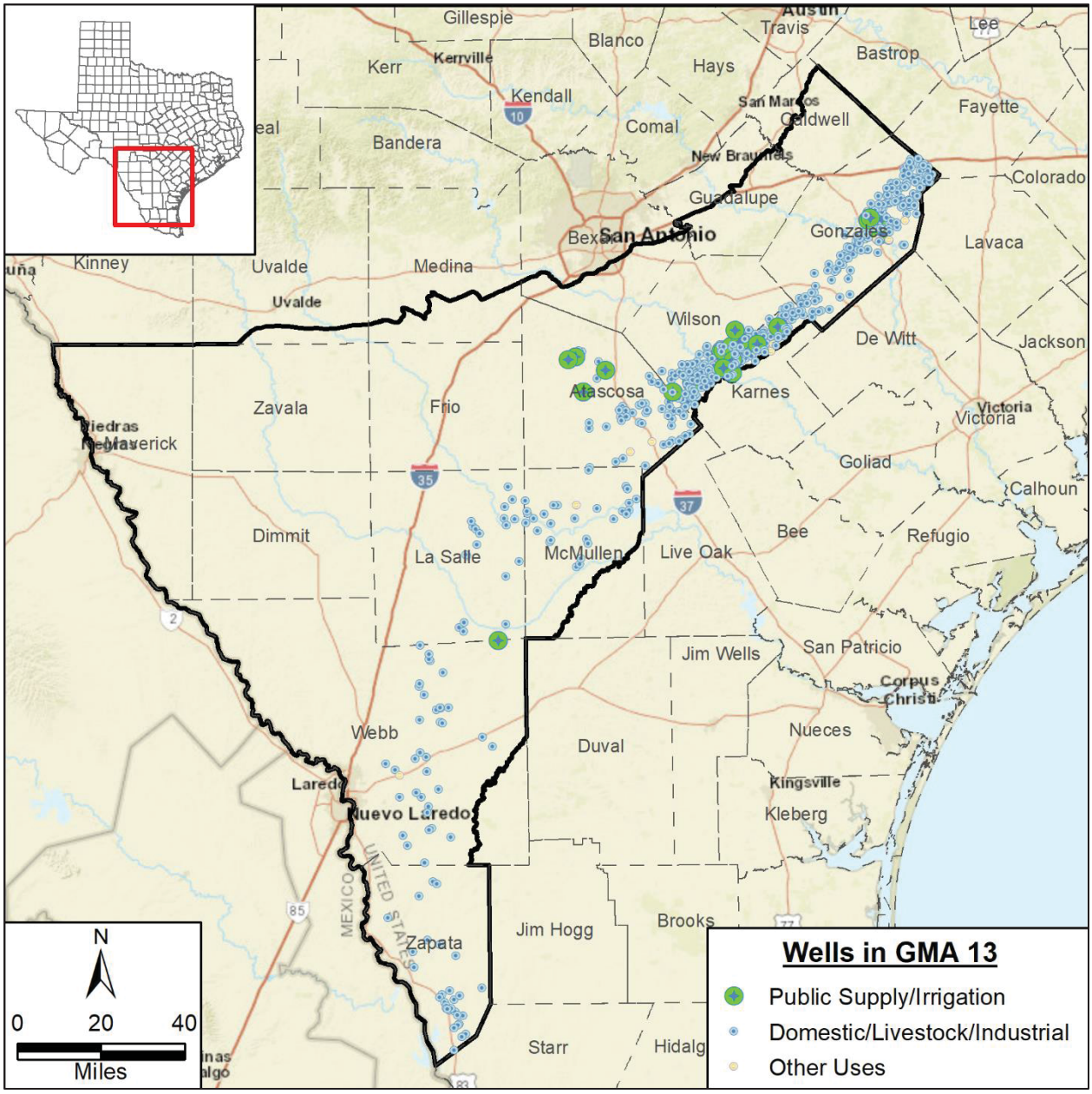


Figure 6. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Yegua-Jackson. Figure only shows wells from the two identified databases that are completed in the aquifer and does not reflect all wells within GMA 13.

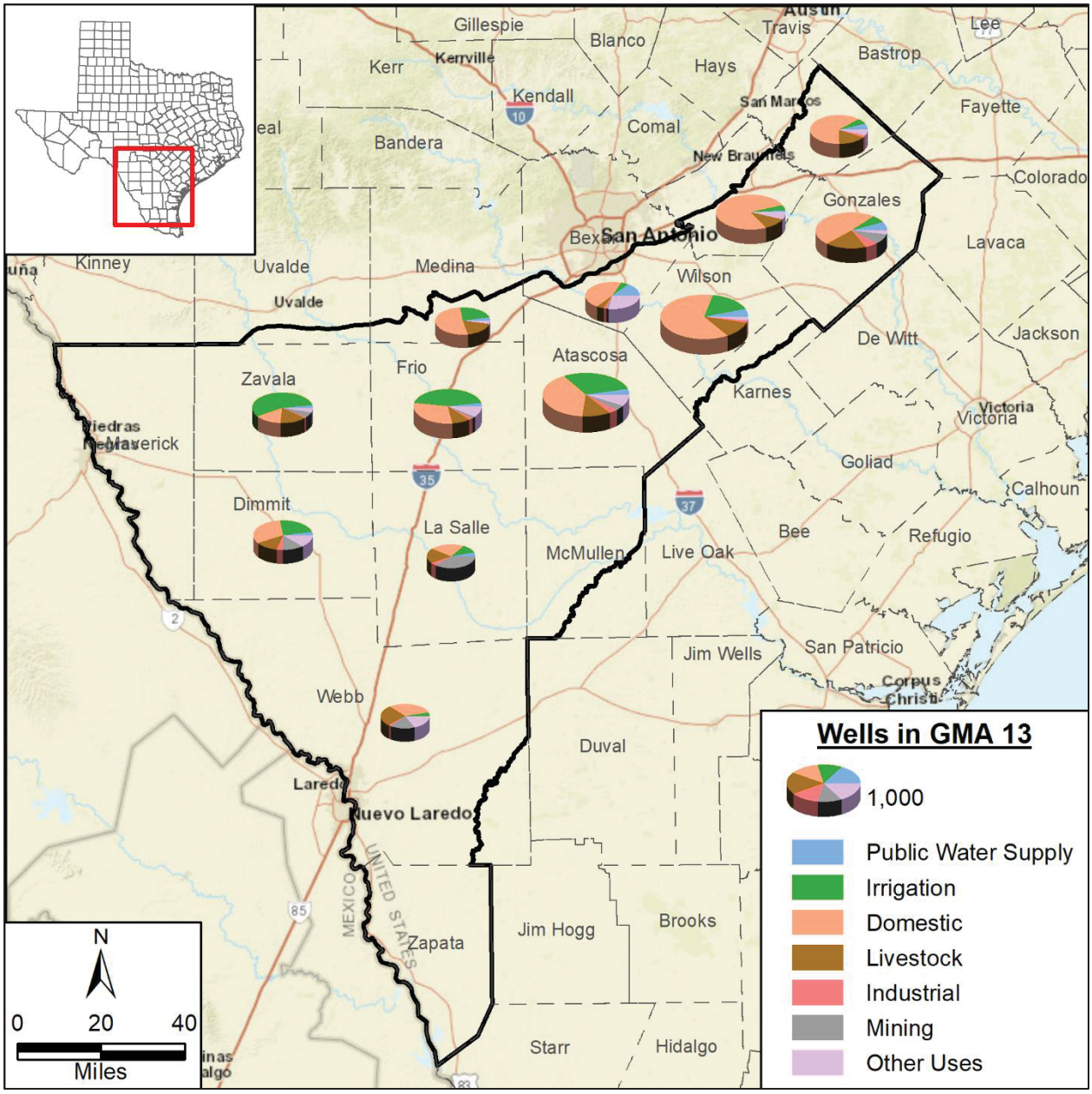


Figure 7. Distribution of wells in each county completed in the relevant aquifers in GMA 13 by type of use from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c). Figure only shows distribution of wells from the two identified databases that are completed in a relevant aquifer and does not reflect all wells within GMA 13.

Appendix 5.2 —
Presentation Regarding Aquifer Uses and Conditions

LRE Water, LLC
a Leonard Rice Engineers Company

Discussion of Aquifer Uses and Conditions

GMA 13 Agenda Item 8

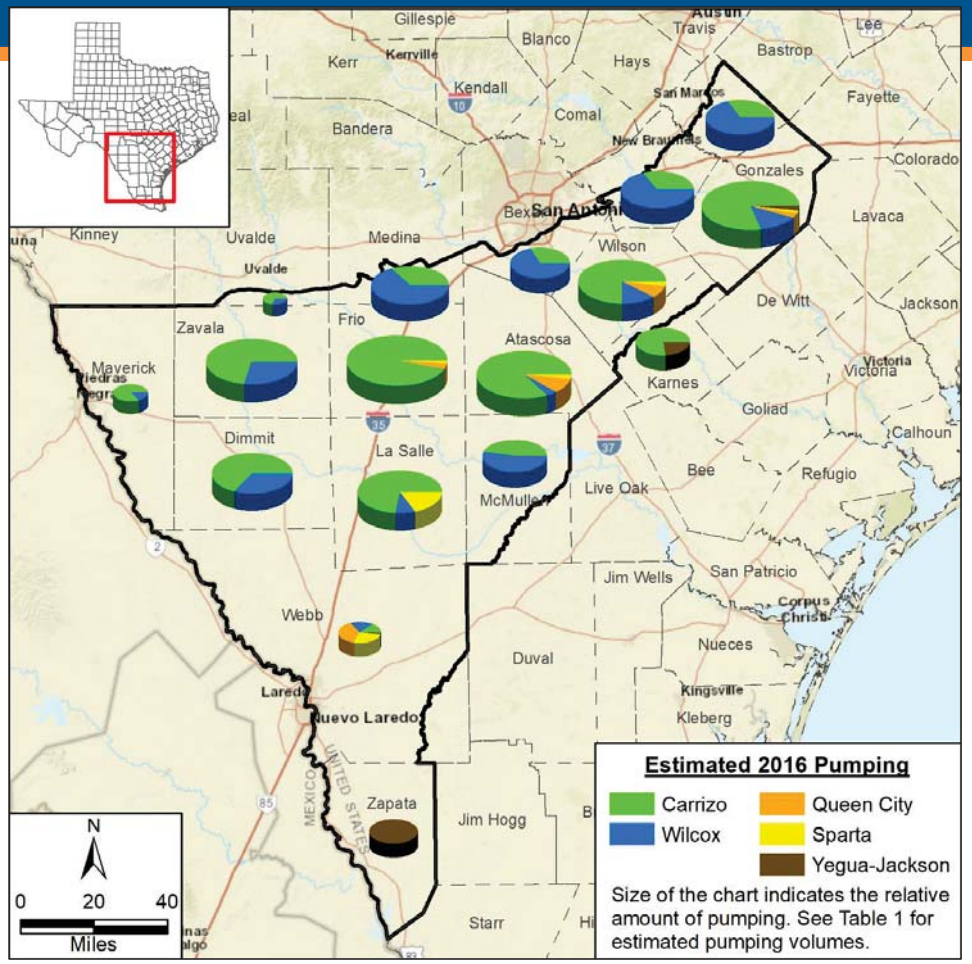
February 7, 2020

Considerations

- Texas Water Code Section 36.108(d)(1)
- Began through discussions with Districts
- Additional resources
  - Previous Explanatory Report
  - TWDB Groundwater Pumpage Estimates
  - TWDB Groundwater Database
  - TWDB Submitted Driller's Report Database
  - GAM Reports

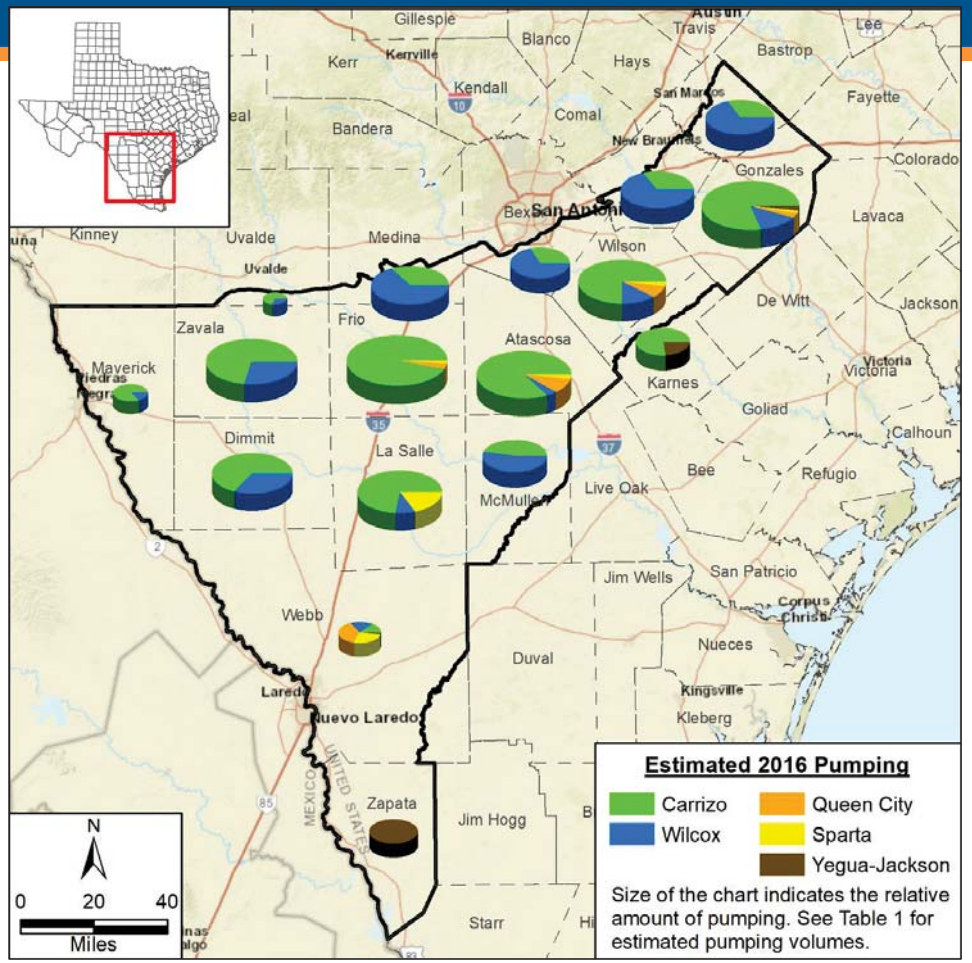
Groundwater Use

- No significant changes to use and conditions from previous round
- Use is primarily in north GMA 13
- Updated distribution based in available data (2012 – 2016)

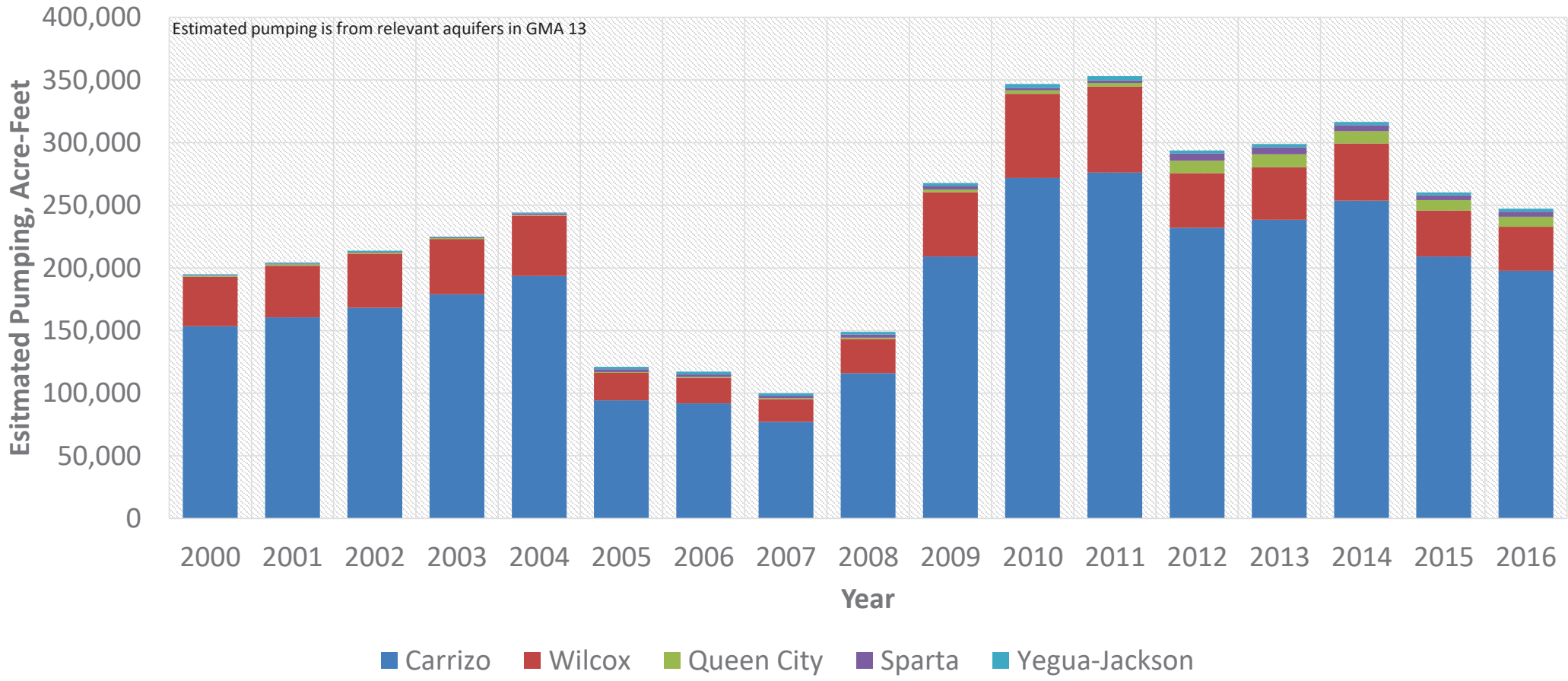


Groundwater Use

- Total estimated use in 2016 was about 250,000 ac-ft/yr
  - 54% for irrigation
  - 33% for municipal
  - 9% for domestic and livestock
  - 3% for manufacturing and power
  - <1% for mining (primarily O&G related)
- Pumping is primarily from the Carrizo



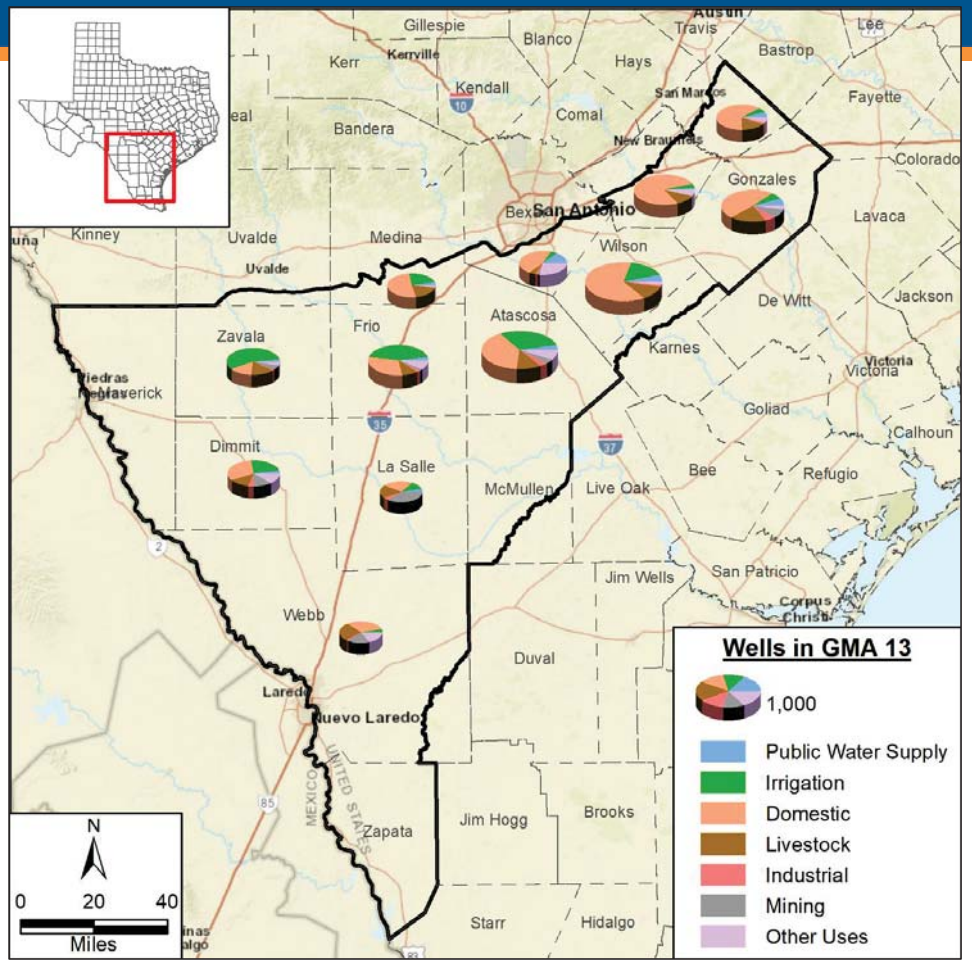
Groundwater Use



Production Wells

- Domestic and livestock wells are most common throughout GMA
- Irrigation wells are common in Atascosa, Frio, and Zavala counties
- Public supply and other uses* are common in Bexar County

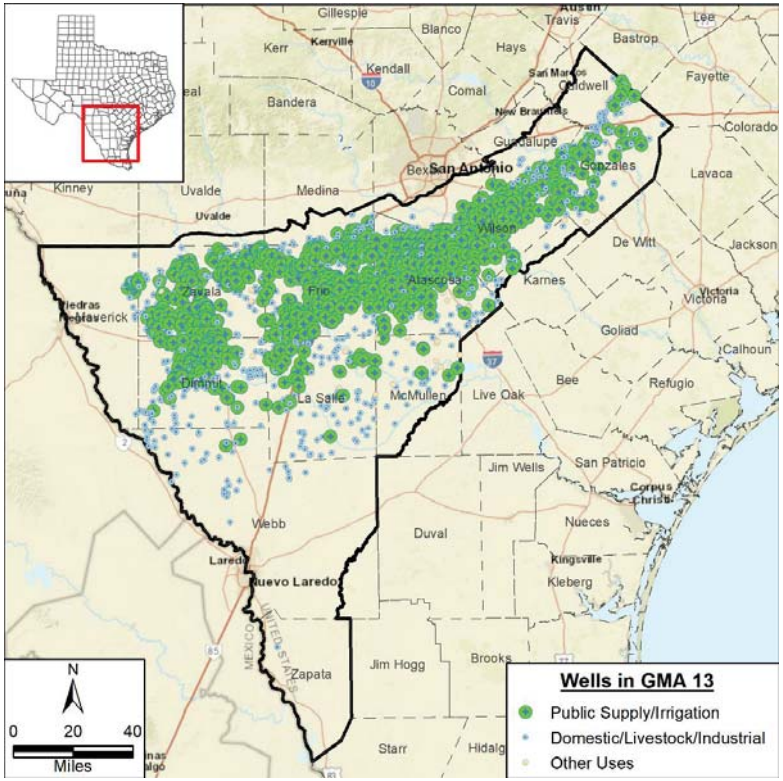
*Other uses include: fracking supply, dewatering, commercial, fire, medicinal, institution, recreation, power, bottling, "other", Industrial (cooling), and aquaculture.



Production Wells by Aquifer

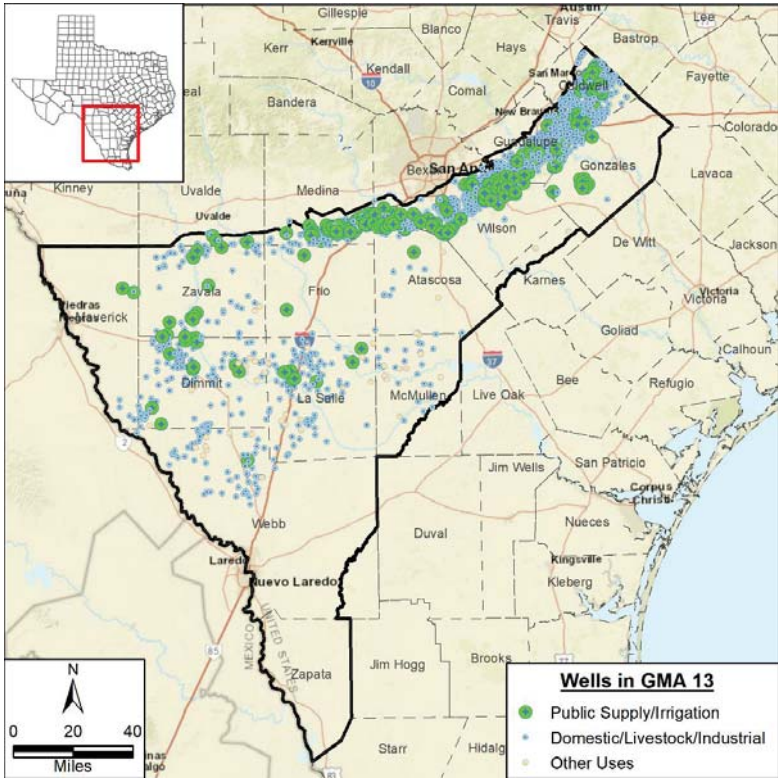
- Well locations from:
  - TWDB GWDB
  - SDR Database
- Does not reflect all wells in GMA 13
- Reasonable reflection of well distribution and density

Carrizo Aquifer Wells

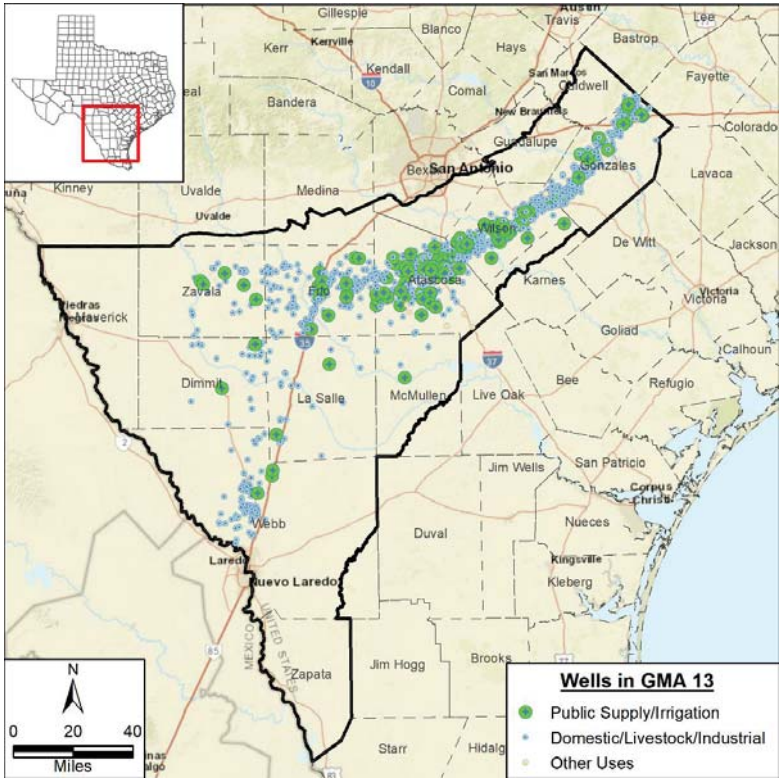


Production Wells by Aquifer

Wilcox Aquifer Wells

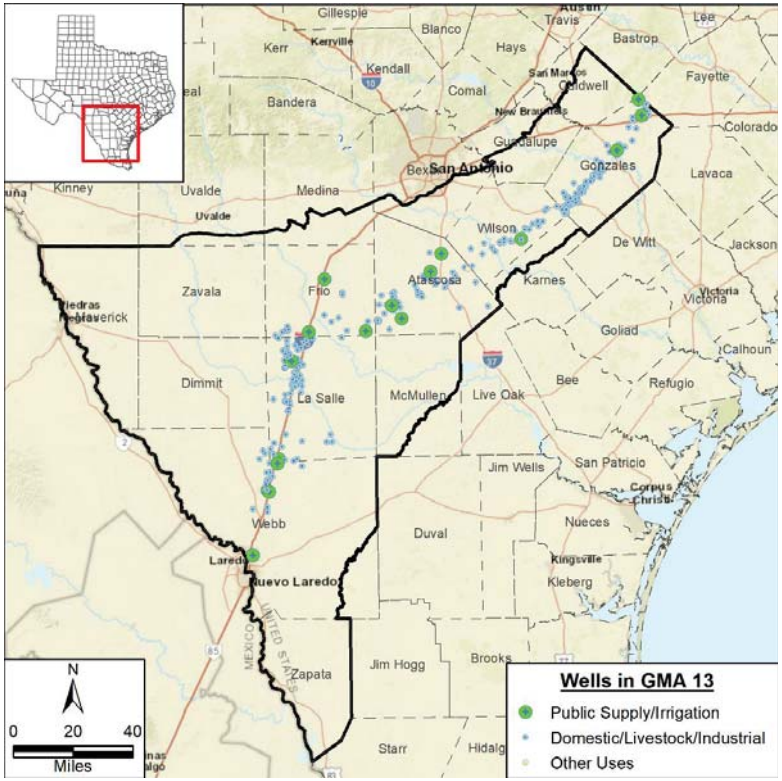


Queen City Aquifer Wells

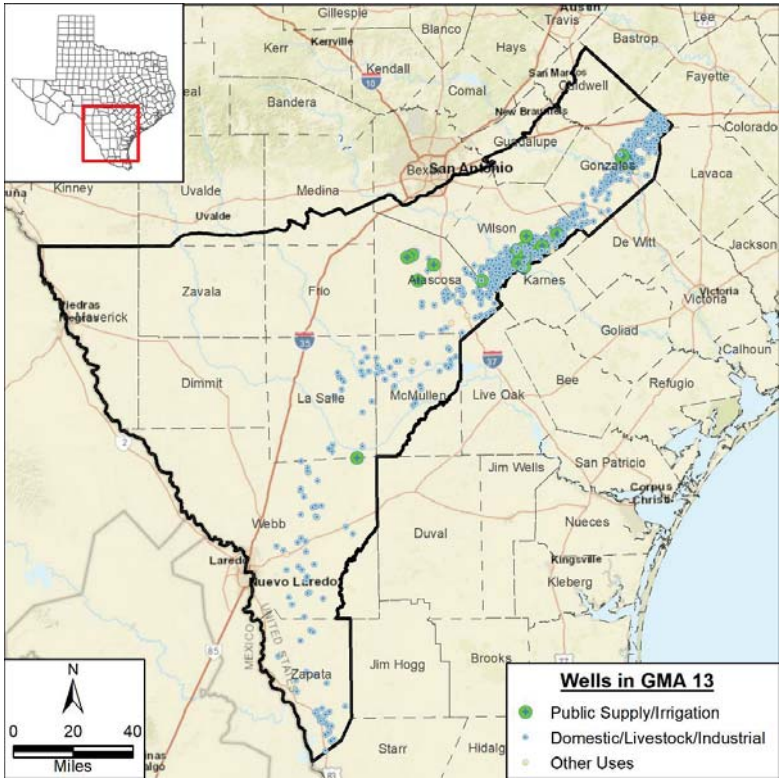


Production Wells by Aquifer

Sparta Aquifer Wells



Yegua-Jackson Aquifer Wells



Summary

- Production from the GMA 13relevant aquifers:
  - More than 350,000 ac-ft/yr in 2011
  - Just under 250,000 ac-ft/yr in 2016
- Carrizo is the primary aquifer used for production
  - Highly productive
  - Good quality water
- Domestic and livestock wells are most prevalent
- Irrigation is the highest type of use

Discussion of Aquifer Uses and Conditions

GMA 13 Agenda Item 8

February 7, 2020

QUESTIONS/DISCUSSION

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Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

Appendix 5.3 —
Discussion of Water Supply Needs and Water Management Strategies

TECHNICAL MEMORANDUM

TO:	Groundwater Management Area 13
FROM:	Michael R. Keester, P.G.
SUBJECT:	Discussion of Water Supply Needs and Water Management Strategies
DATE:	February 7, 2020

Per Texas Water Code Section 36.108(d)(2) districts within each groundwater management area shall consider "the water supply needs and water management strategies included in the state water plan." GMA 13 covers parts of Regional Water Planning Areas L, M, and N. Representatives from GMA 13 regularly attend and contribute to the planning meetings for each of the planning areas that are part of the GMA and report back on the regional water planning activities.

We began consideration of the needs and strategies across GMA 13 early in the process through our conversations with district representatives and stakeholders regarding the projected amount and locations of pumping. Through consultation with the regional and state water plans, district representatives and stakeholders provided guidance regarding the groundwater pumping that should be included in the model simulations. The goal of the process was to represent existing supplies and potential strategies based on the best available information within the pumping files used to evaluate potential DFCs.

According to the 2017 State Water Plan the projected demand for the counties within GMA 13 is 948,828 acre-feet in 2020 and increases to 1,149,496 acre-feet in 2070. Review of the adopted demand projections for the 2021 regional plans and 2022 State Water Plan shows a projected demand for the counties within GMA 13 is 970,054 acre-feet in 2020 and increases to 1,160,829 acre-feet in 2070. That is, revised projections for the current planning cycle indicate an increase in the projected demand of 11,333 acre-feet in 2070 with the largest increase in demand in Frio County and the largest demand reduction in Bexar County. Table 1 summarizes the projected water demand in 2070 for each county in GMA 13.

Most of the projected water demand is in Bexar County where the 2070 demand is expected to be 471,297 acre-feet according to the adopted values for the 2022 State Water Plan. Projected 2070 demands in other counties in GMA 13 are significantly less and range from 1,978 acre-feet in McMullen County to 96,389 acre-feet in Webb County. Figure 1 illustrates the relative demands for each county.

Much of the water demand will be met with existing surface water and groundwater supplies. Total existing surface water and groundwater supplies (according to the 2017 State Water Plan) are projected to be 869,129 acre-feet in 2070 within the counties in GMA 13 with 266,527 (31%) of the total supplies coming from the primary GMA 13 aquifers (namely, the Sparta, Queen City, Carrizo-Wilcox, and Yegua-Jackson). In several counties in GMA 13, the existing primary

groundwater supplies make up a significant portion of the total supplies (see Figure 2). The portion of water demand that cannot be met with existing supplies (that is, water supply need) is projected to be 330,005 acre-feet in 2070 within the counties in GMA 13 according to the 2017 State Water Plan. To meet the projected water supply need, strategies that will utilize groundwater from Sparta, Queen City, Carrizo-Wilcox, or Yegua-Jackson total 65,656 acre-feet in 2070. Table 2 summarizes the 2070 supplies, demands, needs, and strategies.

Table 1. Projected 2070 water demands (acre-feet) from the 2017 State Water Plan and adopted amounts for the 2021 regional plans and 2022 State Water Plan.

County	2017 SWP	2021 RWPs, 2022 SWP	Difference
Atascosa	46,695	55,263	8,568
Bexar*	543,989	471,297	-72,692
Caldwell*	13,557	13,415	-142
Dimmit	8,798	9,484	686
Frio	65,913	84,626	18,713
Gonzales	15,247	24,336	9,089
Guadalupe*	68,632	67,827	-805
Karnes*	5,247	5,829	582
La Salle	7,719	9,469	1,750
Maverick	67,651	70,294	2,643
McMullen*	1,801	1,978	177
Medina*	61,252	74,822	13,570
Uvalde*	67,179	76,818	9,639
Webb*	97,438	96,389	-1,049
Wilson	25,080	36,116	11,036
Zapata	10,249	10,733	484
Zavala	43,049	52,133	9,084
Total	1,149,496	1,160,829	11,333

*Projected demands are for the entire county and not just the portion within GMA 13

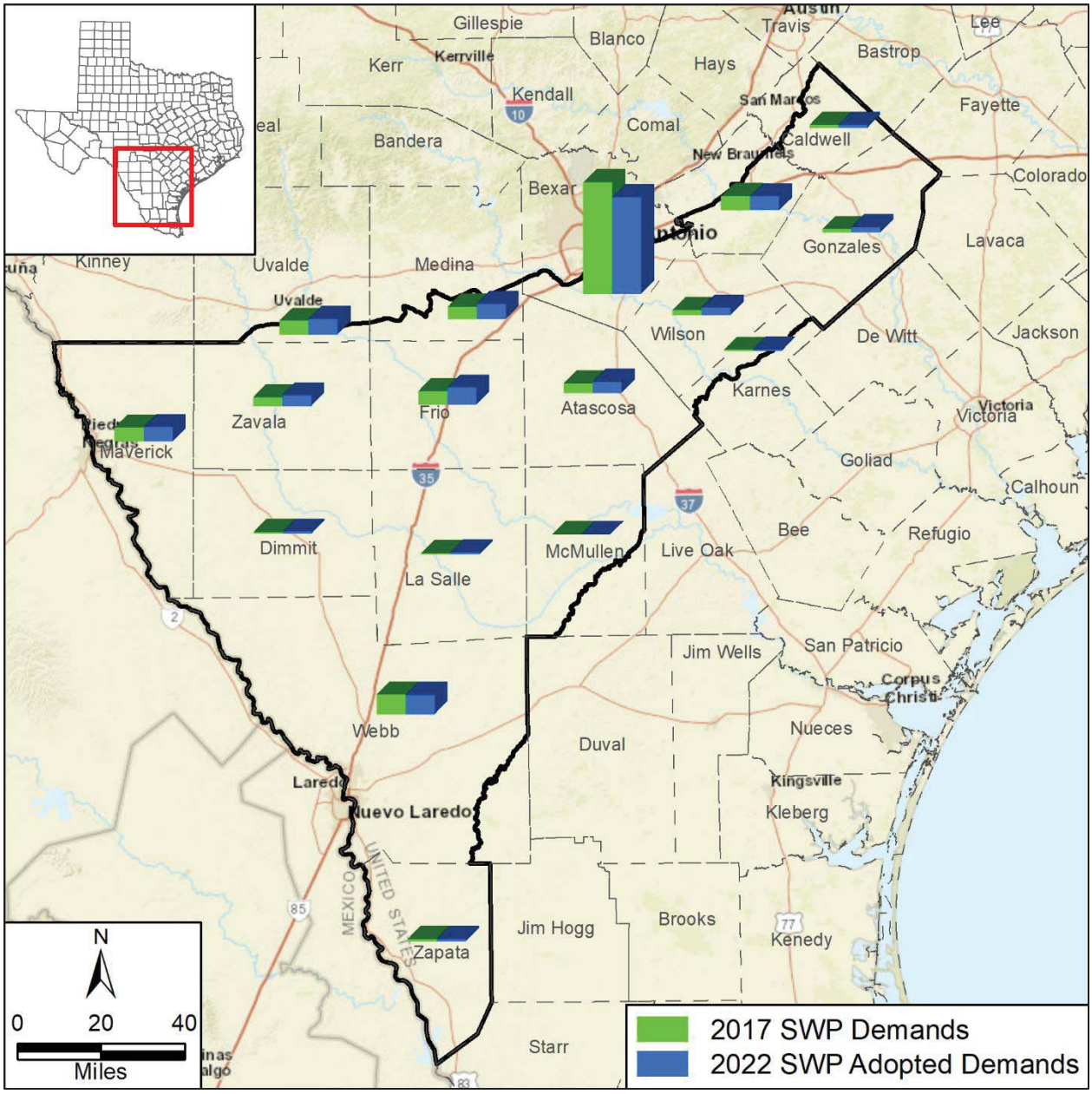


Figure 1. Relative demands from the 2017 State Water Plan and adopted demands for the 2021 regional plans and 2022 State Water Plan.

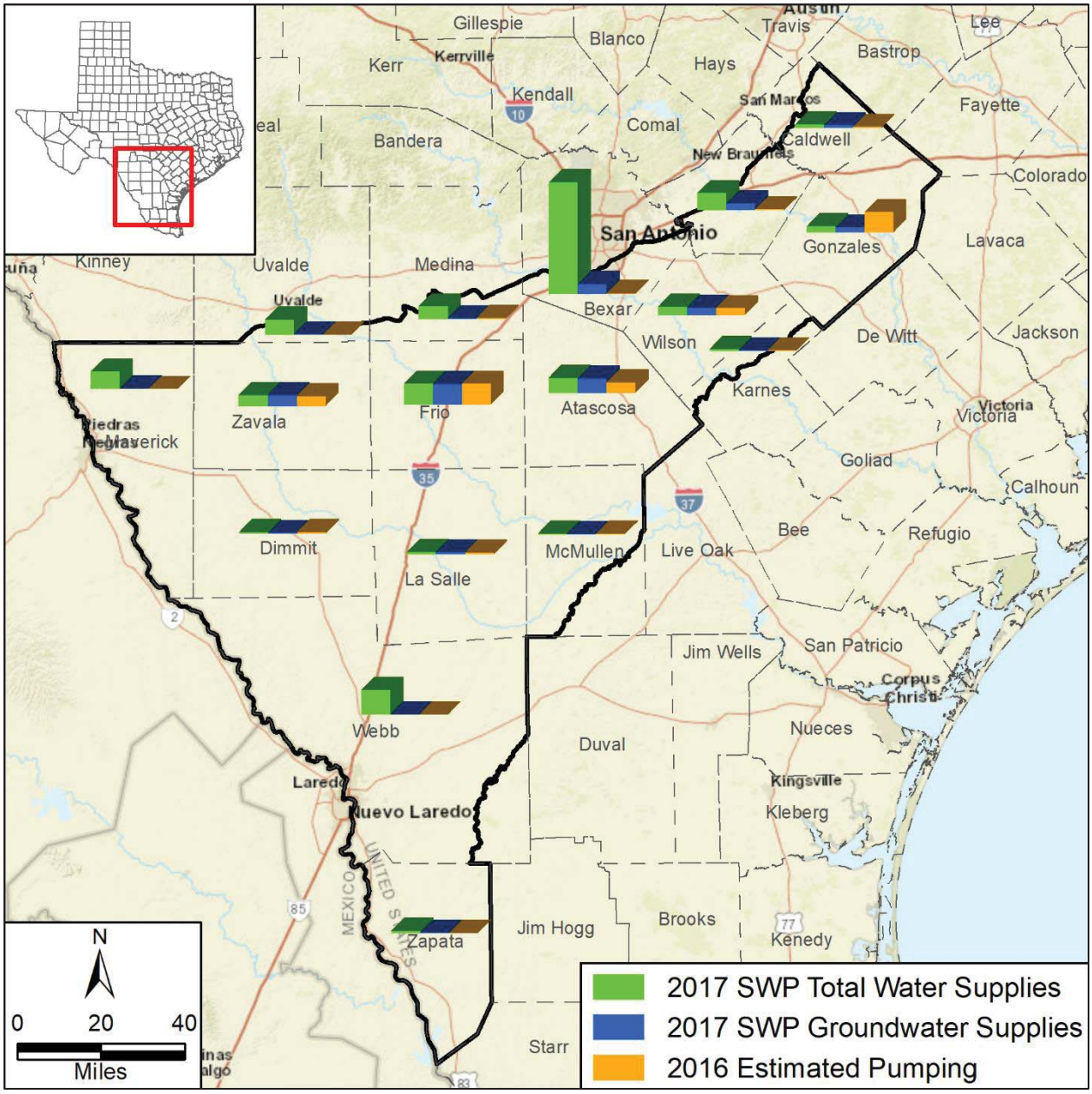


Figure 2. **Relative total and groundwater supplies from the 2017 State Water Plan along with the estimated actual groundwater pumping in 2016. Groundwater pumping values only include pumping from the Sparta, Queen City, Carrizo-Wilcox, and Yegua-Jackson.**

Table 2. 2017 State Water Plan year 2070 identified projected demands, total existing supplies, projected needs, and strategies using groundwater (all values in acre-feet).

County	Projected Demands	Total Supplies	Reported Needs**	Groundwater Strategies
Atascosa	46,695	48,008	1,063	541
Bexar*	543,989	354,936	199,085	33,570
Caldwell*	13,557	10,660	4,080	864
Dimmit	8,798	5,865	3,169	0
Frio	65,913	67,292	20	23
Gonzales	15,247	19,807	367	378
Guadalupe*	68,632	54,696	22,356	23,671
Karnes*	5,247	5,721	402	252
La Salle	7,719	8,543	147	456
Maverick	67,651	54,777	13,709	800
McMullen*	1,801	2,436	51	854
Medina*	61,252	40,768	23,445	475
Uvalde*	67,179	47,742	21,744	0
Webb*	97,438	78,701	25,450	200
Wilson	25,080	26,186	1,885	1,892
Zapata	10,249	7,428	3,589	1,680
Zavala	43,049	35,563	9,443	0
Total	1,149,496	869,129	330,005	65,656

*Projected demands are for the entire county and not just the portion within GMA 13
**Need values as reported in the 2017 SWP datasets. Values do not necessarily reflect the difference between the demands and total supplies. See the 2017 SWP and applicable regional water plans for more details.

Proposed strategies from 2017 State Water Plan will result in additional groundwater production from the relevant aquifers in GMA 13 coming from Atascosa, Bexar, Caldwell, Frio, Gonzales, Guadalupe, Karnes, La Salle, Maverick, McMullen, Medina, Webb, Wilson, and Zapata counties. Table 3 compares the current MAG based on the adopted DFCs, 2016 estimated pumping, and the 2070 strategies for the relevant aquifers. As Table 3 shows, the 2016 pumping plus the strategies is below the MAG in most cases. However, estimated 2016 pumping from relevant aquifers in Dimmit and Medina counties appears to already exceed the MAG. Dimmit County does not have any strategies identified that utilize the relevant aquifers, but the strategy in Medina County may not be feasible with the current MAG.

Table 3. Current MAG values for all relevant aquifers for counties within GMA 13, estimated 2016 pumping, and year 2070 strategies using groundwater from the relevant aquifers in GMA 13.

County	Current MAG (All Aquifers)	2016 Pumping (All Aquifers)	2070 Groundwater Strategies
Atascosa	81,189	33,506	541
Bexar*	78,807	1,967	33,570
Caldwell*	54,496	2,735	864
Dimmit	4,129	5,166	0
Frio	82,090	67,309	23
Gonzales	99,389	65,172	378
Guadalupe*	47,833	3,618	23,671
Karnes*	3,354	1,057	252
La Salle	7,848	6,438	456
Maverick	1,531	54	800
McMullen*	4,628	2,611	854
Medina*	2,646	3,829	475
Uvalde*	828	11	0
Webb*	916	156	200
Wilson	112,194	21,828	1,892
Zapata	Not Relevant	161	1,680
Zavala	34,695	31,808	0
Total	616,573	247,424	65,656

As shown in Table 1, there is a small overall increase in the projected demand from the 2017 to the 2022 State Water Plan for GMA 13. The largest increases are in Frio and Medina counties which may result in increases in the 2070 water management strategies in those counties. While 2016 pumping in two counties exceeds the current MAG, overall the combined pumping and strategies are well below the total MAG for GMA 13. With minimal changes expected for the pumping scenario during this third round of joint planning, it appears there is groundwater available under potential DFCs to help meet the identified demands in the Regional and State Water Plans.

Appendix 5.4 —
Presentation Regarding Water Supply Needs and Water Management Strategies

LRE Water, LLC
a Leonard Rice Engineers Company

Discussion of Water Supply Needs and Water Management Strategies

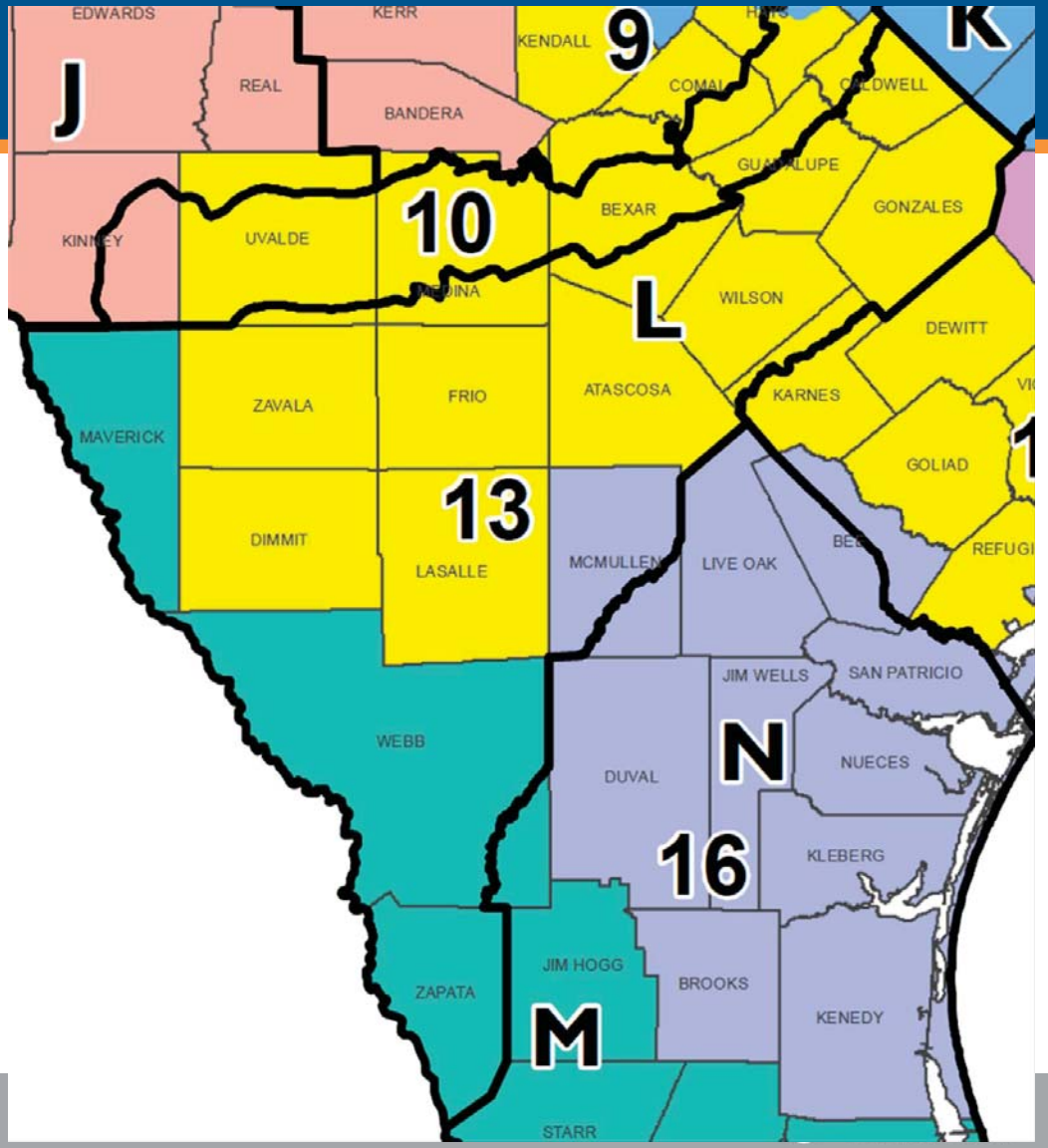
GMA 13 Agenda Item 8

February 7, 2020

Considerations

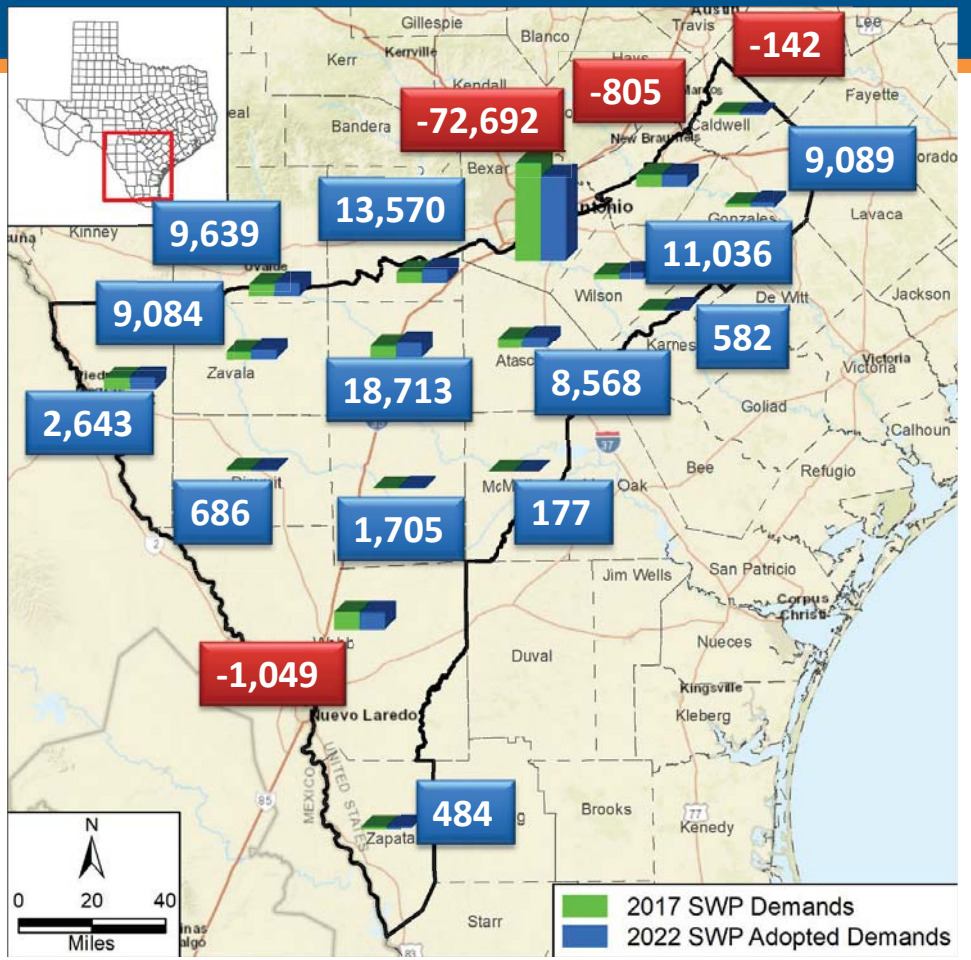
- Texas Water Code Section 36.108(d)(2)

- Parts of 3 Regional Water Planning Areas (L, M, & N)



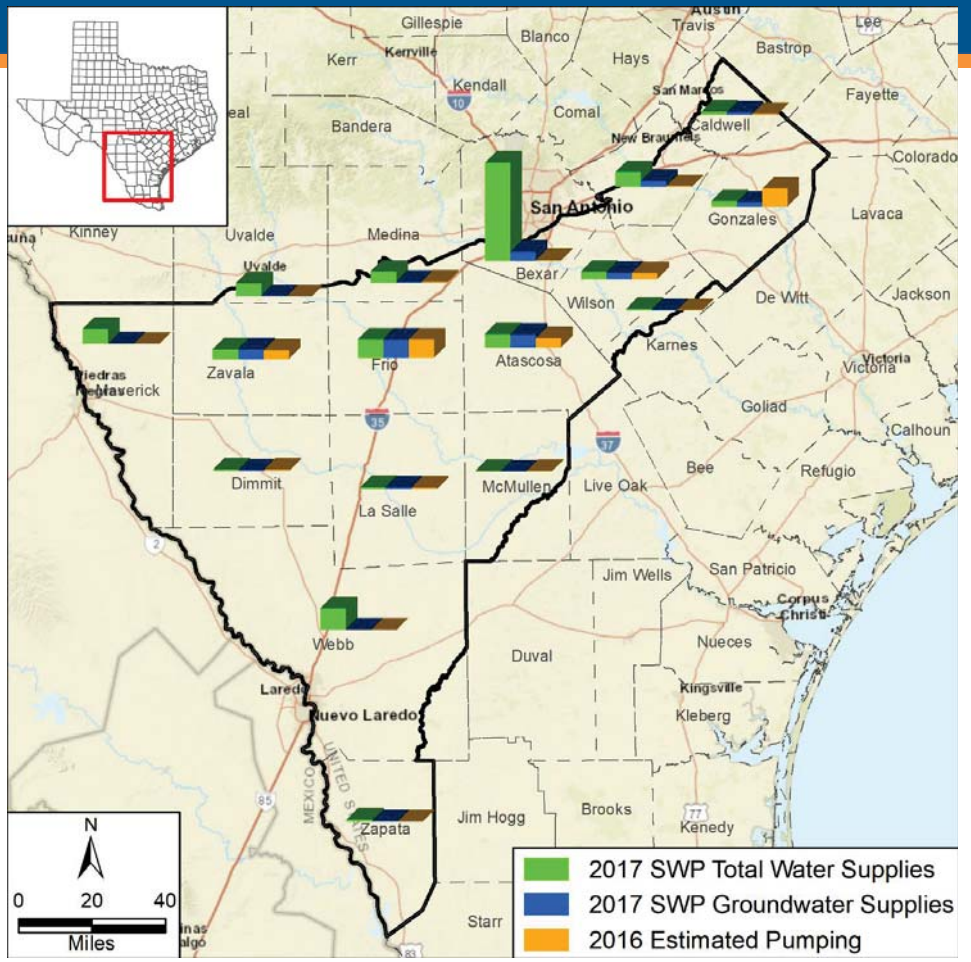
Water Demand

- Demand is highest in Bexar County
- Overall increase in projected 2070 demand from 2017 to 2022 plans
  - Decrease in 4 counties
  - Increase in 13 counties
- Total increase in projected 2070 demand is 11,333 acre-feet



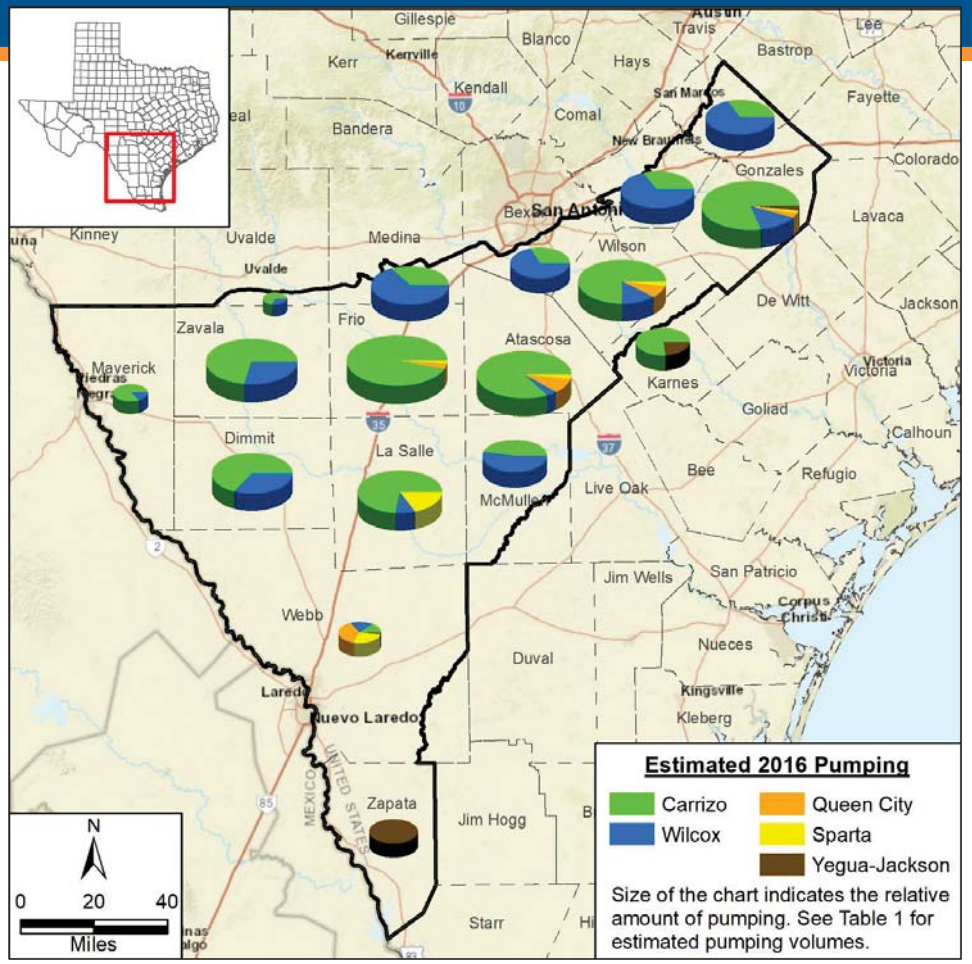
2017 State Water Plan

- 2070 projected water supplies: 869,129 acre-feet
  - 266,527 acre-feet from GMA 13 relevant aquifers
  - Remainder is surface water or other groundwater sources
- 2070 projected water need: 330,005 acre-feet
- 2070 projected GMA 13 GW strategies: 65,656 acre-feet



Current Groundwater Use

- Recent total use range:
  - 2011: 353,007 acre-feet
  - 2016: 247,424 acre-feet
- 2017 SWP 2070 projections
  - Supplies: 266,527 acre-feet
  - Strategies: 65,656 acre-feet
  - Total: 332,183 acre-feet
- 2017 SWP future GW production similar to recent range



MAG and 2017 State Water Plan Strategies

County	Current MAG (All Aquifers)	2016 Estimated Pumping	2070 GW Strategies
Atascosa	81,189	33,506	541
Bexar	78,807	1,967	33,570
Caldwell	54,496	2,735	864
Dimmit	4,129	5,166	0
Frio	82,090	67,309	23
Gonzales	99,389	65,172	378
Guadalupe	47,833	3,618	23,671
Karnes	3,354	1,057	252
La Salle	7,848	6,438	456
Maverick	1,531	54	800
McMullen	4,628	2,611	854
Medina	2,646	3,829	475
Uvalde	828	11	0
Webb	916	156	200
Wilson	112,194	21,828	1,892
Zapata	Not Relevant	161	1,680
Zavala	34,695	31,808	0
Total	**616,573**	**247,424**	**65,656**

Summary

- Projected overall increase in long-term water demand from the 2017 to the 2022 water plans
- Changing demands will likely not change strategies
- Generally groundwater is available for planning under the current MAG values for the relevant aquifers
- Do not expect significant changes in MAG values for use in planning

Discussion of Water Supply Needs and Water Management Strategies

GMA 13 Agenda Item 8

February 7, 2020

QUESTIONS/DISCUSSION

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Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

Appendix 5.5 —
Discussion of Hydrological Conditions

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 13
From:	Michael R. Keester, P.G.
Date:	July 6, 2020
Project:	2021 Joint Planning
Subject:	Discussion of Hydrological Conditions

Per Texas Water Code Section 36.108(d)(3) districts within each groundwater management area shall consider "hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge." Much of the information regarding the hydrological conditions is provided from the adopted GAM for the southern portion of the Sparta, Queen City, and Carrizo-Wilcox aquifers (Kelley and others, 2004).

The total estimated recoverable storage (TERS) is the "estimated amount of groundwater within an aquifer that accounts for recovery scenarios that range between 25% and 75% of the porosity-adjusted aquifer volume" (31.10 TAC §356.10(23)). Wade and Bradley (2013) discuss the methods for calculating the TERS and note that the "values may include a mixture of water quality types, including fresh, brackish, and saline groundwater" because the amounts are calculated using GAM results which do not take into account the quality of the water. The calculation is simply the volume of water estimated to be stored within the aquifer. Tables providing the reported TERS values from Wade and Bradley (2013) are provided in Attachment A.

The values presented in Attachment A are unchanged from the values discussed in the explanatory report from the previous planning round (Hutchison, 2017a). Unless very large water level declines occur within the outcrop areas or confined portions of the aquifer become unsaturated, we would not expect the storage volumes to change significantly. However, when the updated model is completed for the southern portion of the Sparta, Queen City, and Carrizo-Wilcox aquifers, we anticipate the TERS values will be recalculated.

Regarding the average annual recharge, inflows, and discharge, we are able to extract the water budget for specific times from simulations using the adopted GAM. We focused our review of the water budget on 2000, the beginning of the Hutchison (2017b) recalibration period, 2012, the end of recalibration period, and every 10 years from 2020 onward. Table 1 provides the water budget values for the Sparta, Queen City, and Carrizo-Wilcox aquifers within GMA 13. Water budgets for the Sparta, Queen City, and Carrizo-Wilcox aquifers for each county/GCD in GMA 13 are provided in Attachment B.

Table 1. Modeled water budgets for the Sparta, Queen City, and Carrizo-Wilcox aquifers in GMA 13. All values in acre-feet.

Inflows									
Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	173,285	203,355	347,268	279,333	269,839	287,771	302,268	298,195	274,165
River Leakage	1,637	1,594	1,587	1,614	1,643	1,691	1,736	1,785	1,831
General Head Boundary	23,272	24,219	24,672	26,030	27,358	28,568	29,798	31,058	32,389
Recharge	184,017	205,615	205,367	204,904	204,815	204,606	204,480	204,398	204,230
Stream Leakage	115,955	120,015	124,818	129,835	132,838	137,363	139,752	141,316	142,295
In from Mexico	159	158	157	155	154	153	153	152	152
In from GMA 10	1,256	1,234	1,309	1,340	1,354	1,356	1,353	1,349	1,347
In from GMA 12	2,617	3,016	4,079	9,189	14,956	21,074	25,630	29,693	31,919
In from GMA 15	2,941	3,133	5,601	7,817	12,410	17,706	22,232	34,596	38,631
In from GMA 16	1,158	1,420	3,299	3,893	3,607	4,078	4,633	5,187	5,761
Total Inflows	506,297	563,759	718,156	664,112	668,975	704,366	732,033	747,731	732,720
Outflows									
Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	178,532	159,009	114,275	98,658	88,944	81,774	75,848	70,456	65,540
Pumping	190,681	289,553	500,052	475,028	498,270	546,089	583,727	606,462	598,044
Springs	1,474	1,360	1,221	1,065	937	839	765	737	702
Evapotranspiration	9,440	8,983	8,619	8,396	8,243	8,152	8,031	8,133	8,068
General Head Boundary	31,257	29,197	27,654	24,971	22,679	20,790	19,152	17,682	16,380
Stream Leakage	82,306	66,682	59,778	52,594	46,933	43,081	40,056	37,887	36,054
Out to Mexico	141	141	141	140	140	140	140	140	140
Out to GMA 10	87	88	107	118	125	131	139	145	150
Out to GMA 12	2,360	1,710	1,455	965	1,105	1,639	2,098	2,541	2,778
Out to GMA 15	9,225	6,236	4,077	1,608	1,211	1,243	1,418	2,652	3,662
Out to GMA 16	800	809	786	574	395	494	664	905	1,209
Total Outflows	506,305	563,768	718,164	664,119	668,983	704,373	732,039	747,738	732,728
Storage Increase(+)/Decrease(-)	5,247	-44,346	-232,993	-180,894	-180,894	-205,997	-226,420	-227,740	-208,624

When reviewing the water budget information, it is important to remember that the values are from the perspective of the aquifer. Inflow amounts are from sources into the aquifer and outflow amounts are from the aquifer to the source.

For GMA 13, the modeled recharge in 2000 is slightly less than the average value of about 205,000 acre-feet per year used in 2012 and all subsequent years. As shown in Table 1, the recharge volume decreases slightly each decade from 2020 onward. The decrease is recharge volume is due to dry cells in the model and does not reflect a change in the input values.

The most significant source of outflow from the aquifer is pumping. The budget values for years 2000 and 2012 represent estimates of actual pumping while 2020 through 2080 represent the estimates of predicted pumping. As discussed related to aquifer uses and conditions during the GMA 13 meeting on February 7, 2020, pumping from relevant aquifers in GMA 13 peaked at more than 350,000 acre-feet in 2011. Since 2011, estimated pumping in GMA 13 generally decrease to about 250,000 acre-feet in 2016. Predicted pumping exceeds 475,000 acre-feet per year during the planning period ending in 2080.

Comparison of the leakage to and from streams shows a significant increase in the amount of water captured from streamflow. That is, stream leakage inflows are greater than stream leakage outflows. However, the values should be viewed as relative amounts at best. The GAM is not designed to provide a robust simulation of the stream/aquifer interaction and the contributions to the aquifer from stream leakage do not accurately reflect recent evaluations by the TWDB indicating streams are generally gaining water from the aquifers in GMA 13 (Anaya and others, 2016).

Inflows from neighboring GMAs are generally more than outflow from GMA 13 to other areas. Most of the inflow to the Sparta, Queen City, and Carrizo-Wilcox aquifers in GMA 13 comes from GMA 15 in the later years of the planning period. Like the stream leakage, the lateral flows should be considered as relative amounts that reflect the gradient of flow in the aquifers due to predicted changes in the potentiometric surface (that is, water levels).

Estimated storage declines in the Sparta, Queen City, and Carrizo-Wilcox aquifers in GMA 13 are between approximately 180,000 to 230,000 acre-feet per year during the period from 2020 through 2080. Comparison with the tables in Attachment A indicates a reduction in TERS of less than one percent and a reduction in the 25 percent storage value of less the three percent. Modeling results indicate the amount of water stored in the Sparta, Queen City, and Carrizo-Wilcox aquifers in GMA 13 will not be reduced significantly due to the predicted production.

With the ongoing revision of the GAM for GMA 13, the hydrological conditions are being re-conceptualized and will likely change, possibly significantly, from the current GAM results. In particular, recharge and the simulation of the interaction between groundwater and surface water will likely be re-evaluated in light of additional information developed since completion of the current GAM (Kelley and others, 2004). However,

in the updated GAM we anticipate the primary impact of predicted pumping will continue to be a reduction in water levels in the aquifers and impacts to other hydrological conditions will remain minimal.

If you have any questions, please let us know.

Geoscientist Seal

This report documents the work of the following licensed professional geoscientists with LRE Water, LLC, a licensed professional geoscientist firm in the State of Texas (License No. 50516).

Michael R. Keester, P.G. 07/06/2020
Project Manager / Hydrogeologist

References

Anaya, R., Boghici, R., French, L.N., Jones, I., Petrossian, R., Ridgeway, C.K., Shi, J., Wade, S., and Weinberg, A., 2016, Texas Aquifers Study - Groundwater Quantity, Quality, Flow, and Contributions to Surface Water: Report to the Texas Water Development Board Members, 304 p.

Hutchison, W.R., 2017a, Desired Future Condition Explanatory Report (Final) Carrizo-Wilcox/Queen City/Sparta Aquifers for Groundwater Management Area 13: DFC Explanatory Report, 23 p.

Hutchison, W.R., 2017b, Extension of GAM Calibration Period for Carrizo-Wilcox, Queen City, and Sparta Aquifers: GMA 13 Technical Memorandum 17-01, 10 p.

Kelley, V.A., Deeds, N.E., Fryar, D.G., and Nicot, J.P., 2004, Final Report: Groundwater Availability Models for the Queen City and Sparta Aquifers: Contract report for the Texas Water Development Board, 867 p.

Wade, S. and Bradley, R., 2013, GAM Task 13-036 (Revised): Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 13: Texas Water Development Board GAM Task, 30 p.

Attachment A –
Total Estimated Recoverable Storage

Table 2. TERS by county for the Carrizo-Wilcox Aquifer within GMA 13 (Wade and Bradley, 2013). All values in acre-feet.

County	Total Storage	25% Total Storage	75% Total Storage
Atascosa	230,000,000	57,500,000	172,500,000
Bexar	9,000,000	2,250,000	6,750,000
Caldwell	22,000,000	5,500,000	16,500,000
Dimmit	130,000,000	32,500,000	97,500,000
Frio	120,000,000	30,000,000	90,000,000
Gonzales	200,000,000	50,000,000	150,000,000
Guadalupe	18,000,000	4,500,000	13,500,000
Karnes	46,000,000	11,500,000	34,500,000
La Salle	320,000,000	80,000,000	240,000,000
Maverick	1,700,000	425,000	1,275,000
McMullen	250,000,000	62,500,000	187,500,000
Medina	6,200,000	1,550,000	4,650,000
Uvalde	820,000	205,000	615,000
Webb	380,000,000	95,000,000	285,000,000
Wilson	150,000,000	37,500,000	112,500,000
Zapata	—	—	—
Zavala	68,000,000	17,000,000	51,000,000
Total	1,951,720,000	487,930,000	1,463,790,000

Table 3. TERS by district for the Carrizo-Wilcox Aquifer within GMA 13 (Wade and Bradley, 2013). All values in acre-feet.

County	Total Storage	25% Total Storage	75% Total Storage
Evergreen UWCD	540,000,000	135,000,000	405,000,000
Gonzales County UWCD	200,000,000	50,000,000	150,000,000
Guadalupe County GCD	18,000,000	4,500,000	13,500,000
McMullen GCD	250,000,000	62,500,000	187,500,000
Medina County GCD	6,200,000	1,550,000	4,650,000
Plum Creek CD	7,000,000	1,750,000	5,250,000
Uvalde County UWCD	820,000	205,000	615,000
Wintergarden GCD	520,000,000	130,000,000	390,000,000
No District	400,000,000	100,000,000	300,000,000
Total	1,942,020,000	485,505,000	1,456,515,000

Table 4. TERS by county for the Queen City Aquifer within GMA 13 (Wade and Bradley, 2013). All values in acre-feet.

County	Total Storage	25% Total Storage	75% Total Storage
Atascosa	83,000,000	20,750,000	62,250,000
Bexar	—	—	—
Caldwell	430,000	107,500	322,500
Dimmit	—	—	—
Frio	45,000,000	11,250,000	33,750,000
Gonzales	26,000,000	6,500,000	19,500,000
Guadalupe	2,800	700	2,100
Karnes	—	—	—
La Salle	15,000,000	3,750,000	11,250,000
Maverick	—	—	—
McMullen	33,000,000	8,250,000	24,750,000
Medina	—	—	—
Uvalde	—	—	—
Webb	—	—	—
Wilson	24,000,000	6,000,000	18,000,000
Zapata	—	—	—
Zavala	—	—	—
Total	226,432,800	56,608,200	169,824,600

Table 5. TERS by district for the Queen City Aquifer within GMA 13 (Wade and Bradley, 2013). All values in acre-feet.

County	Total Storage	25% Total Storage	75% Total Storage
Evergreen UWCD	150,000,000	37,500,000	112,500,000
Gonzales County UWCD	26,000,000	6,500,000	19,500,000
Guadalupe County GCD	2,800	700	2,100
McMullen GCD	33,000,000	8,250,000	24,750,000
Medina County GCD	—	—	—
Plum Creek CD	50,000	12,500	37,500
Uvalde County UWCD	—	—	—
Wintergarden GCD	15,000,000	3,750,000	11,250,000
No District	—	—	—
Total	224,052,800	56,013,200	168,039,600

Table 6. TERS by county for the Sparta Aquifer within GMA 13 (Wade and Bradley, 2013). All values in acre-feet.

County	Total Storage	25% Total Storage	75% Total Storage
Atascosa	12,000,000	3,000,000	9,000,000
Bexar	—	—	—
Caldwell	—	—	—
Dimmit	—	—	—
Frio	2,600,000	650,000	1,950,000
Gonzales	5,600,000	1,400,000	4,200,000
Guadalupe	—	—	—
Karnes	—	—	—
La Salle	1,600,000	400,000	1,200,000
Maverick	—	—	—
McMullen	1,700,000	425,000	1,275,000
Medina	—	—	—
Uvalde	—	—	—
Webb	—	—	—
Wilson	2,500,000	625,000	1,875,000
Zapata	—	—	—
Zavala	—	—	—
Total	26,000,000	6,500,000	19,500,000

Table 7. TERS by district for the Sparta Aquifer within GMA 13 (Wade and Bradley, 2013). All values in acre-feet.

County	Total Storage	25% Total Storage	75% Total Storage
Evergreen UWCD	17,000,000	4,250,000	12,750,000
Gonzales County UWCD	5,600,000	1,400,000	4,200,000
Guadalupe County GCD	—	—	—
McMullen GCD	1,700,000	425,000	1,275,000
Medina County GCD	—	—	—
Plum Creek CD	—	—	—
Uvalde County UWCD	—	—	—
Wintergarden GCD	1,600,000	400,000	1,200,000
No District	—	—	—
Total	25,900,000	6,475,000	19,425,000

Table 8. TERS by county for the Sparta, Queen City, and Carrizo-Wilcox aquifers within GMA 13. All values in acre-feet are reflect the sum from the individual aquifers as presented by Wade and Bradley (2013).

County	Total Storage	25% Total Storage	75% Total Storage
Atascosa	325,000,000	81,250,000	243,750,000
Bexar	9,000,000	2,250,000	6,750,000
Caldwell	22,430,000	5,607,500	16,822,500
Dimmit	130,000,000	32,500,000	97,500,000
Frio	167,600,000	41,900,000	125,700,000
Gonzales	231,600,000	57,900,000	173,700,000
Guadalupe	18,002,800	4,500,700	13,502,100
Karnes	46,000,000	11,500,000	34,500,000
La Salle	336,600,000	84,150,000	252,450,000
Maverick	1,700,000	425,000	1,275,000
McMullen	284,700,000	71,175,000	213,525,000
Medina	6,200,000	1,550,000	4,650,000
Uvalde	820,000	205,000	615,000
Webb	380,000,000	95,000,000	285,000,000
Wilson	176,500,000	44,125,000	132,375,000
Zapata	—	—	—
Zavala	68,000,000	17,000,000	51,000,000
Total	2,204,152,800	551,038,200	1,653,114,600

Table 9. TERS by district for the Sparta, Queen City, and Carrizo-Wilcox aquifers within GMA 13. All values in acre-feet are reflect the sum from the individual aquifers as presented by Wade and Bradley (2013).

County	Total Storage	25% Total Storage	75% Total Storage
Evergreen UWCD	540,000,000	135,000,000	405,000,000
Gonzales County UWCD	200,000,000	50,000,000	150,000,000
Guadalupe County GCD	18,000,000	4,500,000	13,500,000
McMullen GCD	250,000,000	62,500,000	187,500,000
Medina County GCD	6,200,000	1,550,000	4,650,000
Plum Creek CD	7,000,000	1,750,000	5,250,000
Uvalde County UWCD	820,000	205,000	615,000
Wintergarden GCD	520,000,000	130,000,000	390,000,000
No District	400,000,000	100,000,000	300,000,000
Total	1,942,020,000	485,505,000	1,456,515,000

Attachment B –
Water budgets for the Sparta, Queen City, and Carrizo-Wilcox aquifers for each county/GCD in GMA 13

Water budget data provided in tabular format. An electronic copy in Microsoft Excel format is also provided as part of this attachment.

Atascosa County – Evergreen UWCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	19,242	28,325	49,558	44,555	41,362	42,874	40,960	41,001	40,177
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	3,135	3,249	3,418	3,897	4,338	4,739	5,146	5,562	5,992
Recharge	15,368	17,176	17,176	17,176	17,176	17,176	17,176	17,176	17,176
Stream Leakage	6,097	5,981	5,985	6,001	6,100	6,228	6,332	6,415	6,491
Sparta - In from Frio County - Evergreen UWCD - GMA 13	407	420	395	420	433	444	455	465	474
Sparta - In from Karnes County - Evergreen UWCD - GMA 13	35	36	36	35	35	34	34	33	33
Sparta - In from Karnes County - Evergreen UWCD - GMA 15	3	3	3	3	2	2	2	2	2
Sparta - In from Live Oak County - Live Oak UWCD - GMA 16	6	4	3	3	3	2	1	1	1
Sparta - In from McMullen County - McMullen GCD - GMA 13	98	95	96	95	93	94	94	95	95
Sparta - In from Wilson County - Evergreen UWCD - GMA 13	192	185	186	186	183	180	178	175	172
Weches - In from Frio County - Evergreen UWCD - GMA 13	21	22	21	23	24	25	25	26	26
Weches - In from Karnes County - Evergreen UWCD - GMA 13	18	19	19	18	17	17	16	15	15
Weches - In from Karnes County - Evergreen UWCD - GMA 15	7	8	8	7	7	6	6	6	5
Weches - In from Live Oak County - Live Oak UWCD - GMA 16	16	13	12	11	9	6	3	2	2
Weches - In from McMullen County - McMullen GCD - GMA 13	15	14	14	12	11	10	10	11	11
Weches - In from Wilson County - Evergreen UWCD - GMA 13	30	29	30	29	29	28	28	27	27
Queen City - In from Frio County - Evergreen UWCD - GMA 13	952	1,110	1,091	1,374	1,537	1,665	1,780	1,895	1,990
Queen City - In from Karnes County - Evergreen UWCD - GMA 13	64	65	66	61	57	54	51	49	47
Queen City - In from Karnes County - Evergreen UWCD - GMA 15	12	12	12	11	10	10	9	8	8
Queen City - In from Live Oak County - Live Oak UWCD - GMA 16	36	29	29	24	18	10	4	3	3
Queen City - In from McMullen County - McMullen GCD - GMA 13	100	91	100	95	95	102	110	116	122
Queen City - In from Wilson County - Evergreen UWCD - GMA 13	535	491	538	605	616	607	598	584	569
Reklaw - In from Bexar County - Edwards Aquifer Authority - GMA 13	21	24	35	29	33	40	46	50	52
Reklaw - In from Frio County - Evergreen UWCD - GMA 13	140	139	153	161	167	178	190	200	210
Reklaw - In from Karnes County - Evergreen UWCD - GMA 13	35	35	28	26	25	24	21	18	16
Reklaw - In from Karnes County - Evergreen UWCD - GMA 15	16	17	14	12	12	11	10	8	7
Reklaw - In from Live Oak County - Live Oak UWCD - GMA 16	33	24	27	43	42	38	30	22	12
Reklaw - In from McMullen County - McMullen GCD - GMA 13	6	1	2	8	13	16	20	24	29
Reklaw - In from Wilson County - Evergreen UWCD - GMA 13	80	80	57	65	74	79	83	82	89
Carrizo - In from Bexar County - Edwards Aquifer Authority - GMA 13	5,150	4,665	6,613	6,651	6,009	5,606	5,223	4,910	4,572
Carrizo - In from Frio County - Evergreen UWCD - GMA 13	7,519	5,073	6,802	7,173	7,580	8,137	8,734	9,422	9,874
Carrizo - In from Karnes County - Evergreen UWCD - GMA 13	1,109	883	572	846	839	787	717	631	543
Carrizo - In from Karnes County - Evergreen UWCD - GMA 15	591	445	418	545	542	517	483	442	393
Carrizo - In from Live Oak County - Live Oak UWCD - GMA 16	282	200	1,571	2,017	2,202	2,482	2,694	2,897	3,007
Carrizo - In from McMullen County - McMullen GCD - GMA 13	511	364	695	929	1,913	2,669	3,283	3,851	4,308
Carrizo - In from Medina County - Medina County GCD - GMA 13	947	903	909	948	948	947	943	935	925
Carrizo - In from Wilson County - Evergreen UWCD - GMA 13	5,265	4,888	2,074	3,734	3,979	3,628	3,418	3,182	3,053
Upper Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	29	39	46	55	62	69	75	80	86
Upper Wilcox - In from Frio County - Evergreen UWCD - GMA 13	6	4	5	7	14	21	27	33	38
Upper Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	6	5	6	7	7	7	6	6	5
Upper Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	7	6	2	5	5	5	5	4	3
Upper Wilcox - In from Live Oak County - Live Oak UWCD - GMA 16	19	18	29	65	73	84	93	100	105
Upper Wilcox - In from McMullen County - McMullen GCD - GMA 13	65	126	142	167	272	374	452	524	582
Upper Wilcox - In from Medina County - Medina County GCD - GMA 13	23	24	27	28	29	30	31	33	34
Upper Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	4	4	2	3	3	3	3	3	3
Middle Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	335	361	431	569	653	744	823	873	920
Middle Wilcox - In from Frio County - Evergreen UWCD - GMA 13	88	78	75	80	92	125	162	198	230
Middle Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	12	12	12	10	8	5	2	0	0
Middle Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	4	4	4	3	2	0	0	0	0
Middle Wilcox - In from Live Oak County - Live Oak UWCD - GMA 16	2	2	2	2	1	7	23	40	57
Middle Wilcox - In from McMullen County - McMullen GCD - GMA 13	2	2	2	4	11	30	54	79	104
Middle Wilcox - In from Medina County - Medina County GCD - GMA 13	218	211	214	223	233	243	254	265	275
Middle Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	56	67	54	72	84	53	36	16	1
Lower Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	1,695	1,616	2,930	3,468	3,690	4,453	4,877	5,222	5,616
Lower Wilcox - In from Frio County - Evergreen UWCD - GMA 13	578	513	486	447	443	530	700	864	1,043
Lower Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	100	114	111	116	114	41	11	0	0
Lower Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	44	47	47	31	13	0	0	0	0
Lower Wilcox - In from Live Oak County - Live Oak UWCD - GMA 16	15	15	15	12	96	303	603	875	1,232
Lower Wilcox - In from McMullen County - McMullen GCD - GMA 13	21	19	18	12	16	236	569	882	1,209
Lower Wilcox - In from Medina County - Medina County GCD - GMA 13	571	545	550	603	638	674	713	747	782
Lower Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	603	670	158	102	83	0	0	0	0
Total Inflows	72,598	79,618	104,135	103,916	103,177	107,510	108,432	111,185	112,849

Atascosa County – Evergreen UWCD

Outflows									
Source	**2000**	**2012**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
In to Storage	10,711	9,724	2,876	1,635	1,213	932	725	570	457
Pumping	37,779	45,398	57,072	60,128	60,760	62,340	63,775	65,217	65,217
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	107	59	47	35	17	0	0	0	0
General Head Boundary	5,524	5,200	4,855	4,234	3,677	3,233	2,855	2,529	2,242
Stream Leakage	2,929	2,973	2,826	2,659	2,437	2,254	2,059	1,851	1,635
Sparta - Out to Frio County - Evergreen UWCD - GMA 13	1	0	1	0	0	0	0	0	0
Sparta - Out to Karnes County - Evergreen UWCD - GMA 13	5	5	5	4	4	3	3	2	2
Sparta - Out to Live Oak County - Live Oak UWCD - GMA 16	9	10	10	10	10	11	13	15	18
Sparta - Out to McMullen County - McMullen GCD - GMA 13	178	178	180	188	200	210	219	228	237
Sparta - Out to Wilson County - Evergreen UWCD - GMA 13	0	0	1	1	1	1	1	1	1
Weches - Out to Karnes County - Evergreen UWCD - GMA 13	2	2	2	2	2	1	1	1	0
Weches - Out to Live Oak County - Live Oak UWCD - GMA 16	4	4	4	4	4	6	8	14	20
Weches - Out to McMullen County - McMullen GCD - GMA 13	20	20	20	21	23	24	26	29	31
Queen City - Out to Frio County - Evergreen UWCD - GMA 13	120	112	121	88	79	72	67	62	58
Queen City - Out to Karnes County - Evergreen UWCD - GMA 13	4	4	4	5	3	2	1	0	0
Queen City - Out to Live Oak County - Live Oak UWCD - GMA 16	1	1	1	0	0	2	6	16	28
Queen City - Out to McMullen County - McMullen GCD - GMA 13	467	489	482	511	552	587	623	657	690
Queen City - Out to Wilson County - Evergreen UWCD - GMA 13	0	2	0	0	0	0	0	0	0
Reklaw - Out to Bexar County - Edwards Aquifer Authority - GMA 13	0	0	1	0	0	0	0	0	0
Reklaw - Out to Frio County - Evergreen UWCD - GMA 13	88	78	79	82	85	84	81	77	73
Reklaw - Out to Karnes County - Evergreen UWCD - GMA 13	0	0	1	2	2	2	2	2	1
Reklaw - Out to Live Oak County - Live Oak UWCD - GMA 16	0	1	0	0	0	0	0	1	3
Reklaw - Out to McMullen County - McMullen GCD - GMA 13	45	48	54	57	52	50	49	51	53
Carrizo - Out to Bexar County - Edwards Aquifer Authority - GMA 13	2	246	12,109	16,300	17,542	17,743	17,776	18,030	18,235
Carrizo - Out to Frio County - Evergreen UWCD - GMA 13	9,865	10,094	12,536	7,831	6,687	5,686	4,764	4,007	3,675
Carrizo - Out to Karnes County - Evergreen UWCD - GMA 13	0	0	140	167	197	233	258	281	295
Carrizo - Out to Live Oak County - Live Oak UWCD - GMA 16	3	19	0	0	0	0	4	19	32
Carrizo - Out to McMullen County - McMullen GCD - GMA 13	762	1,150	615	218	63	73	80	86	90
Carrizo - Out to Medina County - Medina County GCD - GMA 13	678	750	797	848	871	880	881	875	863
Carrizo - Out to Wilson County - Evergreen UWCD - GMA 13	0	0	379	636	970	1,617	1,785	1,866	1,832
Upper Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 13	7	5	12	15	15	14	14	14	15
Upper Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	38	37	44	21	20	20	19	19	19
Upper Wilcox - Out to Karnes County - Evergreen UWCD - GMA 13	0	0	0	0	0	0	0	0	0
Upper Wilcox - Out to Live Oak County - Live Oak UWCD - GMA 16	0	0	2	0	0	0	0	0	0
Upper Wilcox - Out to McMullen County - McMullen GCD - GMA 13	105	91	72	21	11	13	15	16	17
Upper Wilcox - Out to Medina County - Medina County GCD - GMA 13	19	23	25	28	31	33	35	36	38
Upper Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	0	0	0	0	1	1	1	1	1
Middle Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 13	215	153	117	98	82	85	74	62	52
Middle Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	233	217	200	165	138	138	139	140	142
Middle Wilcox - Out to Karnes County - Evergreen UWCD - GMA 13	0	0	0	0	2	4	6	11	22
Middle Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	0	0	0	0	0	0	1	4	8
Middle Wilcox - Out to Live Oak County - Live Oak UWCD - GMA 16	34	32	29	21	9	0	0	0	1
Middle Wilcox - Out to McMullen County - McMullen GCD - GMA 13	81	61	55	40	18	8	5	3	3
Middle Wilcox - Out to Medina County - Medina County GCD - GMA 13	194	232	242	265	285	301	315	326	337
Middle Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	0	0	6	12	12	23	24	28	55
Lower Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 13	221	113	4,766	4,826	4,928	6,449	6,710	7,098	7,441
Lower Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	699	671	631	379	226	178	159	154	146
Lower Wilcox - Out to Karnes County - Evergreen UWCD - GMA 13	0	0	0	33	55	101	198	543	999
Lower Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	0	0	0	0	0	20	67	155	295
Lower Wilcox - Out to Live Oak County - Live Oak UWCD - GMA 16	419	403	385	172	5	0	12	26	55
Lower Wilcox - Out to McMullen County - McMullen GCD - GMA 13	814	714	669	389	56	13	18	29	39
Lower Wilcox - Out to Medina County - Medina County GCD - GMA 13	219	302	302	352	391	417	448	475	499
Lower Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	0	0	1,361	1,414	1,440	3,647	4,112	5,558	6,881
Total Outflows from the GCAS	72,598	79,619	104,135	103,916	103,177	107,510	108,432	111,184	112,848
Total Increase(+)/Decrease(-) in Storage	-8,532	-18,601	-46,682	-42,920	-40,149	-41,942	-40,235	-40,431	-39,720

Bexar County – Edwards Aquifer Authority

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	7,749	6,668	37,143	26,966	22,489	29,049	27,265	30,005	29,338
River Leakage	1,637	1,594	1,587	1,614	1,643	1,691	1,736	1,785	1,831
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	11,610	12,975	12,810	12,778	12,778	12,778	12,778	12,778	12,778
Stream Leakage	6,060	5,226	5,570	7,283	8,307	9,268	10,041	10,649	11,173
Reklaw - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	1	0	0	0	0	0	0
Reklaw - In from Wilson County - Evergreen UWCD - GMA 13	0	1	2	2	4	6	8	9	10
Carrizo - In from Atascosa County - Evergreen UWCD - GMA 13	2	246	12,109	16,300	17,542	17,743	17,776	18,030	18,235
Carrizo - In from Wilson County - Evergreen UWCD - GMA 13	506	996	7,873	12,104	14,481	16,682	17,089	17,590	18,126
Upper Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	7	5	12	15	15	14	14	14	15
Upper Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	1	2	9	14	18	22	25	27	29
Middle Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	215	153	117	98	82	85	74	62	52
Middle Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	206	146	131	171	183	195	207	201	190
Lower Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	221	113	4,766	4,826	4,928	6,449	6,710	7,098	7,441
Lower Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 10	51	51	68	82	92	95	95	95	95
Lower Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	64	64	63	63	63	62	62	56	47
Lower Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	325	318	12,161	12,133	12,150	10,922	10,961	10,435	10,198
Total Inflows	28,652	28,558	94,421	94,449	94,774	105,061	104,839	108,834	109,558

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	2,592	7,060	2,405	1,469	1,155	1,296	1,156	775	539
Pumping	9,868	5,989	69,537	68,452	68,740	68,740	67,654	67,849	67,849
Springs	123	190	232	279	284	278	276	306	306
Evapotranspiration	71	157	204	218	230	263	287	372	411
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	1,289	1,787	1,988	1,446	1,070	666	527	504	489
Reklaw - Out to Atascosa County - Evergreen UWCD - GMA 13	21	24	35	29	33	40	46	50	52
Reklaw - Out to Wilson County - Evergreen UWCD - GMA 13	47	47	58	72	77	80	82	84	79
Carrizo - Out to Atascosa County - Evergreen UWCD - GMA 13	5,150	4,665	6,613	6,651	6,009	5,606	5,223	4,910	4,572
Carrizo - Out to Wilson County - Evergreen UWCD - GMA 13	3,563	2,735	2,378	2,599	2,892	3,038	3,135	3,190	3,208
Upper Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	29	39	46	55	62	69	75	80	86
Upper Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	29	43	38	52	65	77	88	100	111
Middle Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	335	361	431	569	653	744	823	873	920
Middle Wilcox - Out to Medina County - Medina County GCD - GMA 13	2	2	2	2	2	3	3	3	3
Middle Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	588	591	771	1,034	1,161	1,490	1,670	1,878	2,090
Lower Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	1,695	1,616	2,930	3,468	3,690	4,453	4,877	5,222	5,616
Lower Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 10	57	55	71	80	86	90	96	102	106
Lower Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	56	59	63	84	112	146	184	226	266
Lower Wilcox - Out to Medina County - Medina County GCD - GMA 13	2	2	3	4	4	5	5	6	6
Lower Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	3,135	3,138	6,614	7,888	8,446	17,977	18,632	22,303	22,847
Total Outflows from the GCAS	28,651	28,558	94,421	94,449	94,774	105,061	104,839	108,834	109,557

Total Increase(+)/Decrease(-) in Storage	-5,157	391	-34,738	-25,497	-21,334	-27,754	-26,109	-29,230	-28,799

Caldwell County – Edwards Aquifer Authority

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	11	26	587	378	402	457	449	530	620
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	1,390	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554
Stream Leakage	54	33	29	25	213	454	686	932	1,073
Middle Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	447	445	272	176	103	64	56	49	43
Middle Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	2,273	2,157	2,030	1,922	1,820	1,695	1,484	1,272	1,069
Middle Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	1,136	1,080	1,232	1,340	1,362	1,377	1,380	1,370	1,365
Lower Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	55	49	76	158	283	448	585	783	952
Lower Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	127	145	98	0	0	0	0	0	0
Lower Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	592	563	339	307	284	330	399	465	551
Total Inflows	6,085	6,053	6,216	5,859	6,021	6,379	6,592	6,955	7,227

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	772	493	323	223	163	113	77	50	37
Pumping	0	0	39	39	39	39	39	39	39
Springs	0	43	44	45	46	55	58	61	62
Evapotranspiration	2	4	7	9	11	12	12	13	13
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	4,132	4,185	3,575	2,912	2,585	2,284	1,908	1,519	1,138
Middle Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	379	431	1,072	1,106	1,122	1,165	1,220	1,269	1,319
Middle Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	0	0	95	128	153	178	204	228	251
Middle Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	389	412	368	304	279	259	240	222	202
Lower Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	295	360	422	523	585	633	663	728	792
Lower Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	65	272	516	727	1,000	1,239
Lower Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	117	125	271	504	765	1,124	1,445	1,826	2,135
Total Outflows from the GCAS	6,085	6,053	6,216	5,859	6,021	6,379	6,592	6,955	7,227

Total Increase(+)/Decrease(-) in Storage	761	466	-265	-155	-240	-343	-372	-479	-583

Caldwell County – Gonzales County UWCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	1,588	2,298	6,044	9,604	11,190	13,030	12,501	11,367	9,354
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	7,076	7,909	7,909	7,909	7,909	7,909	7,909	7,909	7,909
Stream Leakage	1,022	764	877	998	1,114	1,257	1,389	1,472	1,533
Queen City - In from Bastrop County - Lost Pines GCD - GMA 12	33	34	114	291	374	435	479	512	534
Queen City - In from Caldwell County - Plum Creek CD - GMA 13	159	158	274	454	496	496	484	464	435
Queen City - In from Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	37	145	265	348	404	438
Reklaw - In from Bastrop County - Lost Pines GCD - GMA 12	2	1	1	1	1	3	9	14	18
Reklaw - In from Caldwell County - Plum Creek CD - GMA 13	73	78	82	86	89	95	104	113	119
Reklaw - In from Gonzales County - Gonzales County UWCD - GMA 13	6	6	6	6	6	5	5	5	5
Carrizo - In from Bastrop County - Lost Pines GCD - GMA 12	494	615	657	3,925	7,555	11,094	13,323	15,225	15,735
Carrizo - In from Caldwell County - Plum Creek CD - GMA 13	1,628	1,742	1,684	2,670	3,797	5,568	6,439	5,211	5,318
Carrizo - In from Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	643	3,891	7,469	10,059	12,098	13,080
Upper Wilcox - In from Bastrop County - Lost Pines GCD - GMA 12	1	1	1	4	7	11	13	15	16
Upper Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	16	20	22	27	35	45	54	59	61
Upper Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	1	4	9	14	19	23
Middle Wilcox - In from Bastrop County - Lost Pines GCD - GMA 12	96	91	93	97	107	126	153	187	221
Middle Wilcox - In from Caldwell County - ND Caldwell - GMA 13	3	1	2	2	2	1	1	2	2
Middle Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	567	618	579	464	449	481	566	671	761
Middle Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	57	53	0	0	0	0	0	3	10
Lower Wilcox - In from Bastrop County - Lost Pines GCD - GMA 12	114	93	196	392	551	678	789	896	1,003
Lower Wilcox - In from Caldwell County - ND Caldwell - GMA 13	156	165	243	375	409	424	444	459	472
Lower Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	466	331	193	206	378	647	934	1,287	1,659
Lower Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	4	25	120	86	76	42	9	0	0
Total Inflows	13,560	15,004	19,096	28,276	38,583	50,092	56,025	58,391	58,704

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	1,058	714	210	130	82	63	51	70	49
Pumping	1	913	5,599	14,605	21,204	30,358	34,935	34,367	34,367
Springs	0	24	23	19	14	11	8	5	2
Evapotranspiration	25	29	30	28	24	21	18	17	17
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	259	344	125	97	52	41	32	24	17
Queen City - Out to Bastrop County - Lost Pines GCD - GMA 12	62	70	10	0	0	0	0	0	0
Queen City - Out to Caldwell County - Plum Creek CD - GMA 13	84	94	64	24	4	0	0	0	0
Queen City - Out to Gonzales County - Gonzales County UWCD - GMA 13	652	705	540	257	141	113	95	61	45
Reklaw - Out to Bastrop County - Lost Pines GCD - GMA 12	34	40	41	39	49	55	58	59	58
Reklaw - Out to Caldwell County - Plum Creek CD - GMA 13	64	64	67	75	84	91	97	107	112
Reklaw - Out to Gonzales County - Gonzales County UWCD - GMA 13	203	217	231	249	268	285	300	319	334
Carrizo - Out to Bastrop County - Lost Pines GCD - GMA 12	1,390	1,048	1,023	632	529	436	409	397	414
Carrizo - Out to Caldwell County - Plum Creek CD - GMA 13	1,308	1,363	1,317	4,050	7,820	10,182	11,543	14,220	14,492
Carrizo - Out to Gonzales County - Gonzales County UWCD - GMA 13	6,209	7,112	7,042	4,917	4,732	4,396	4,052	3,801	3,325
Upper Wilcox - Out to Bastrop County - Lost Pines GCD - GMA 12	13	13	14	15	17	19	22	24	26
Upper Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	8	8	8	13	18	22	26	30	33
Upper Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	11	12	12	9	9	8	7	7	7
Middle Wilcox - Out to Bastrop County - Lost Pines GCD - GMA 12	207	213	205	176	138	102	73	56	45
Middle Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	998	991	990	1,081	1,125	1,136	1,107	1,064	1,027
Middle Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	178	176	217	283	340	404	475	552	634
Lower Wilcox - Out to Bastrop County - Lost Pines GCD - GMA 12	132	116	33	0	0	0	0	0	0
Lower Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	449	549	1,222	1,488	1,662	1,826	1,933	2,080	2,211
Lower Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	216	188	72	89	271	522	782	1,128	1,488
Total Outflows from the GCAS	13,560	15,004	19,096	28,275	38,583	50,092	56,025	58,390	58,704

Total Increase(+)/Decrease(-) in Storage	-530	-1,584	-5,834	-9,475	-11,108	-12,967	-12,450	-11,297	-9,305

Caldwell County – ND Caldwell

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	106	80	582	293	225	169	133	105	80
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	893	998	998	998	998	998	998	998	998
Stream Leakage	21	29	36	81	81	81	81	96	110
Lower Wilcox - In from Bastrop County - Lost Pines GCD - GMA 12	2	32	42	72	92	101	111	121	131
Lower Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	7	11	14	13	19	27	34	39	43
Total Inflows	1,028	1,149	1,671	1,456	1,414	1,376	1,357	1,359	1,363

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	237	64	10	74	54	44	36	29	18
Pumping	0	0	0	0	0	0	0	0	0
Springs	1	157	187	187	187	187	187	187	187
Evapotranspiration	91	170	170	168	165	163	162	163	169
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	238	229	229	174	119	80	52	46	42
Middle Wilcox - Out to Bastrop County - Lost Pines GCD - GMA 12	4	4	4	4	4	3	3	3	3
Middle Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	3	1	2	2	2	1	1	2	2
Lower Wilcox - Out to Bastrop County - Lost Pines GCD - GMA 12	113	106	104	93	84	81	77	74	74
Lower Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	156	165	243	375	409	424	444	459	472
Lower Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	186	252	724	380	390	392	394	397	395
Total Outflows from the GCAS	1,028	1,149	1,671	1,456	1,414	1,376	1,357	1,359	1,363

Total Increase(+)/Decrease(-) in Storage	131	-16	-572	-218	-171	-125	-97	-76	-62

Caldwell County – Plum Creek CD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	1,203	1,234	12,973	7,394	5,040	4,947	3,038	3,047	2,937
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	5,374	6,006	6,006	5,864	5,817	5,817	5,817	5,817	5,817
Stream Leakage	1,456	1,135	1,370	2,124	2,513	2,471	2,517	2,748	3,000
Queen City - In from Caldwell County - Gonzales County UWCD - GMA 13	84	94	64	24	4	0	0	0	0
Reklaw - In from Caldwell County - Gonzales County UWCD - GMA 13	64	64	67	75	84	91	97	107	112
Carrizo - In from Caldwell County - Gonzales County UWCD - GMA 13	1,308	1,363	1,317	4,050	7,820	10,182	11,543	14,220	14,492
Upper Wilcox - In from Caldwell County - Gonzales County UWCD - GMA 13	8	8	8	13	18	22	26	30	33
Middle Wilcox - In from Caldwell County - Edwards Aquifer Authority - GMA 13	379	431	1,072	1,106	1,122	1,165	1,220	1,269	1,319
Middle Wilcox - In from Caldwell County - Gonzales County UWCD - GMA 13	998	991	990	1,081	1,125	1,136	1,107	1,064	1,027
Middle Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	103	50	0	0	0	0	0	0	0
Lower Wilcox - In from Caldwell County - Edwards Aquifer Authority - GMA 13	295	360	422	523	585	633	663	728	792
Lower Wilcox - In from Caldwell County - Gonzales County UWCD - GMA 13	449	549	1,222	1,488	1,662	1,826	1,933	2,080	2,211
Lower Wilcox - In from Caldwell County - ND Caldwell - GMA 13	186	252	724	380	390	392	394	397	395
Lower Wilcox - In from Caldwell County - Plum Creek CD - GMA 10	87	104	113	118	120	121	122	122	123
Lower Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	42	67	87	0	0	0	0	0	0
Total Inflows	12,035	12,707	26,434	24,239	26,299	28,805	28,478	31,630	32,257

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	2,255	930	244	294	473	407	334	172	134
Pumping	662	2,145	17,605	15,347	16,271	16,946	15,543	19,490	19,449
Springs	0	0	2	2	2	2	2	2	2
Evapotranspiration	107	163	191	198	207	216	227	235	240
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	5,591	6,014	5,093	3,958	3,313	2,749	2,286	1,970	1,715
Queen City - Out to Caldwell County - Gonzales County UWCD - GMA 13	159	158	274	454	496	496	484	464	435
Reklaw - Out to Caldwell County - Gonzales County UWCD - GMA 13	73	78	82	86	89	95	104	113	119
Carrizo - Out to Caldwell County - Gonzales County UWCD - GMA 13	1,628	1,742	1,684	2,670	3,797	5,568	6,439	5,211	5,318
Upper Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	16	20	22	27	35	45	54	59	61
Middle Wilcox - Out to Caldwell County - Edwards Aquifer Authority - GMA 13	447	445	272	176	103	64	56	49	43
Middle Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	567	618	579	464	449	481	566	671	761
Middle Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	0	0	101	162	210	258	310	359	406
Lower Wilcox - Out to Caldwell County - Edwards Aquifer Authority - GMA 13	55	49	76	158	283	448	585	783	952
Lower Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	466	331	193	206	378	647	934	1,287	1,659
Lower Wilcox - Out to Caldwell County - ND Caldwell - GMA 13	7	11	14	13	19	27	34	39	43
Lower Wilcox - Out to Caldwell County - Plum Creek CD - GMA 10	2	2	2	2	2	2	2	2	2
Lower Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	23	172	352	519	724	918
Total Outflows from the GCAS	12,035	12,707	26,434	24,239	26,299	28,805	28,478	31,630	32,257

Total Increase(+)/Decrease(-) in Storage	1,051	-304	-12,729	-7,100	-4,567	-4,541	-2,704	-2,875	-2,803

Dimmit County – Wintergarden GCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	17,679	13,874	9,624	7,169	5,996	5,104	4,357	3,812	3,325
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	266	259	256	254	252	251	250	250	250
Recharge	19,472	21,762	21,762	21,762	21,762	21,762	21,762	21,762	21,762
Stream Leakage	12,902	12,902	12,605	12,127	11,735	11,358	11,025	10,725	10,450
Sparta - In from Frio County - Evergreen UWCD - GMA 13	1	1	1	0	0	0	0	0	0
Sparta - In from La Salle County - Wintergarden GCD - GMA 13	121	116	113	110	105	100	96	91	87
Sparta - In from Webb County - ND Webb - GMA 13	23	22	20	18	18	18	18	18	18
Sparta - In from Zavala County - Wintergarden GCD - GMA 13	37	42	46	50	53	56	59	61	63
Weches - In from Frio County - Evergreen UWCD - GMA 13	1	1	1	0	0	0	0	0	0
Weches - In from La Salle County - Wintergarden GCD - GMA 13	38	36	35	33	32	30	29	28	27
Weches - In from Webb County - ND Webb - GMA 13	20	18	18	17	16	16	15	15	15
Weches - In from Zavala County - Wintergarden GCD - GMA 13	5	6	6	7	8	8	9	10	11
Queen City - In from La Salle County - Wintergarden GCD - GMA 13	114	114	108	96	86	77	71	67	63
Queen City - In from Webb County - ND Webb - GMA 13	688	769	823	886	944	998	1,048	1,100	1,162
Queen City - In from Zavala County - Wintergarden GCD - GMA 13	322	346	368	400	445	492	538	601	646
Reklaw - In from La Salle County - Wintergarden GCD - GMA 13	6	3	3	7	6	6	5	5	5
Reklaw - In from Webb County - ND Webb - GMA 13	278	279	278	280	291	302	312	320	328
Reklaw - In from Zavala County - Wintergarden GCD - GMA 13	45	62	66	70	91	57	57	56	62
Carrizo - In from La Salle County - Wintergarden GCD - GMA 13	162	79	92	53	46	44	43	42	44
Carrizo - In from Webb County - ND Webb - GMA 13	266	259	226	233	240	247	254	260	267
Carrizo - In from Zavala County - Wintergarden GCD - GMA 13	639	658	798	812	820	820	823	826	839
Upper Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	78	33	17	17	12	10	9	8	9
Upper Wilcox - In from Maverick County - ND Maverick - GMA 13	123	100	90	80	72	65	59	55	51
Upper Wilcox - In from Webb County - ND Webb - GMA 13	891	852	822	840	860	878	895	911	927
Upper Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	113	123	117	127	127	126	127	127	128
Middle Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	6	2	1	0	0	0	0	0	1
Middle Wilcox - In from Maverick County - ND Maverick - GMA 13	454	533	549	563	574	583	591	597	603
Middle Wilcox - In from Webb County - ND Webb - GMA 13	135	118	111	107	105	104	104	104	105
Middle Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	14	30	11	11	10	10	9	9	9
Lower Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	94	7	0	25	46	64	78	90	103
Lower Wilcox - In from Maverick County - ND Maverick - GMA 13	836	862	890	915	938	961	984	1,004	1,023
Lower Wilcox - In from Webb County - ND Webb - GMA 13	1,306	1,145	1,081	1,039	1,023	1,019	1,023	1,031	1,041
Lower Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	55	155	100	69	55	47	43	40	39
Total Inflows	57,192	55,568	51,042	48,174	46,766	45,613	44,691	44,025	43,460

Dimmit County – Wintergarden GCD

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	25,715	19,141	19,142	16,550	15,110	13,967	13,097	12,397	11,754
Pumping	3,032	8,538	3,886	3,886	3,886	3,886	3,886	3,886	3,886
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	555	354	320	225	220	206	152	152	90
General Head Boundary	84	41	40	17	13	14	14	14	14
Stream Leakage	10,368	8,856	8,514	8,114	7,792	7,537	7,323	7,149	7,041
Sparta - Out to Frio County - Evergreen UWCD - GMA 13	0	0	0	0	0	1	1	1	2
Sparta - Out to La Salle County - Wintergarden GCD - GMA 13	438	466	473	482	488	492	495	496	482
Sparta - Out to Webb County - ND Webb - GMA 13	33	32	31	29	28	27	26	25	24
Sparta - Out to Zavala County - Wintergarden GCD - GMA 13	14	19	22	24	25	26	27	27	27
Weches - Out to Frio County - Evergreen UWCD - GMA 13	0	0	0	0	0	0	0	0	0
Weches - Out to La Salle County - Wintergarden GCD - GMA 13	106	109	111	113	114	115	115	116	116
Weches - Out to Webb County - ND Webb - GMA 13	23	21	19	18	16	15	14	13	12
Weches - Out to Zavala County - Wintergarden GCD - GMA 13	2	2	2	2	2	3	3	3	3
Queen City - Out to Frio County - Evergreen UWCD - GMA 13	6	5	6	9	10	11	11	12	12
Queen City - Out to La Salle County - Wintergarden GCD - GMA 13	1,437	1,394	1,388	1,441	1,469	1,490	1,508	1,525	1,543
Queen City - Out to Webb County - ND Webb - GMA 13	656	638	630	589	549	511	478	445	417
Queen City - Out to Zavala County - Wintergarden GCD - GMA 13	691	744	773	793	810	795	769	759	743
Reklaw - Out to Frio County - Evergreen UWCD - GMA 13	5	6	6	6	6	6	7	7	7
Reklaw - Out to La Salle County - Wintergarden GCD - GMA 13	319	341	351	379	391	401	409	417	425
Reklaw - Out to Webb County - ND Webb - GMA 13	242	252	256	259	251	251	252	252	252
Reklaw - Out to Zavala County - Wintergarden GCD - GMA 13	108	113	104	111	113	112	112	114	115
Carrizo - Out to Frio County - Evergreen UWCD - GMA 13	240	208	365	303	307	311	314	317	324
Carrizo - Out to La Salle County - Wintergarden GCD - GMA 13	2,282	2,590	2,971	2,890	2,951	2,997	3,039	3,076	3,141
Carrizo - Out to Webb County - ND Webb - GMA 13	89	96	142	146	148	148	149	149	149
Carrizo - Out to Zavala County - Wintergarden GCD - GMA 13	3,228	3,751	3,651	3,747	3,905	4,041	4,159	4,263	4,374
Upper Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	54	36	59	49	50	51	51	52	53
Upper Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	1,137	1,163	1,232	1,307	1,346	1,376	1,403	1,428	1,460
Upper Wilcox - Out to Maverick County - ND Maverick - GMA 13	0	2	3	5	6	7	8	8	9
Upper Wilcox - Out to Webb County - ND Webb - GMA 13	640	672	751	781	788	790	789	787	784
Upper Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	425	473	461	455	471	486	500	513	527
Middle Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	6	6	6	6	6	6	6	7	7
Middle Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	187	210	208	222	227	231	235	239	244
Middle Wilcox - Out to Maverick County - ND Maverick - GMA 13	131	164	173	185	195	203	211	217	222
Middle Wilcox - Out to Webb County - ND Webb - GMA 13	191	208	217	226	232	236	239	241	243
Middle Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	1,145	1,216	1,036	1,029	1,018	1,007	998	990	984
Lower Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	18	27	25	27	30	32	34	37	39
Lower Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	966	1,053	1,048	1,069	1,098	1,130	1,164	1,202	1,244
Lower Wilcox - Out to Maverick County - ND Maverick - GMA 13	1	1	1	1	1	1	1	1	1
Lower Wilcox - Out to Webb County - ND Webb - GMA 13	1,276	1,358	1,389	1,400	1,391	1,377	1,364	1,353	1,343
Lower Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	1,342	1,265	1,231	1,281	1,301	1,317	1,329	1,337	1,347
Total Outflows from the GCAS	57,192	55,568	51,042	48,174	46,765	45,612	44,691	44,024	43,460
Total Increase(+)/Decrease(-) in Storage	8,036	5,267	9,518	9,381	9,114	8,863	8,740	8,586	8,429

Frio County – Evergreen UWCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	27,009	37,642	46,361	26,338	24,329	22,595	21,123	19,780	19,287
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	5,094	5,479	5,647	5,856	6,050	6,198	6,333	6,456	6,580
Recharge	19,143	21,395	21,395	21,395	21,395	21,395	21,395	21,395	21,395
Stream Leakage	9,553	9,329	9,321	9,310	9,291	9,287	9,278	9,265	9,260
Sparta - In from Atascosa County - Evergreen UWCD - GMA 13	1	0	1	0	0	0	0	0	0
Sparta - In from Dimmit County - Wintergarden GCD - GMA 13	0	0	0	0	0	1	1	1	2
Sparta - In from La Salle County - Wintergarden GCD - GMA 13	236	239	242	241	240	240	240	240	240
Sparta - In from Zavala County - Wintergarden GCD - GMA 13	59	65	70	75	80	83	88	92	96
Weches - In from Dimmit County - Wintergarden GCD - GMA 13	0	0	0	0	0	0	0	0	0
Weches - In from La Salle County - Wintergarden GCD - GMA 13	8	8	8	8	8	8	8	8	8
Weches - In from Zavala County - Wintergarden GCD - GMA 13	7	8	8	9	9	10	11	12	13
Queen City - In from Atascosa County - Evergreen UWCD - GMA 13	120	112	121	88	79	72	67	62	58
Queen City - In from Dimmit County - Wintergarden GCD - GMA 13	6	5	6	9	10	11	11	12	12
Queen City - In from La Salle County - Wintergarden GCD - GMA 13	110	129	129	105	103	103	104	105	106
Queen City - In from Zavala County - Wintergarden GCD - GMA 13	408	406	406	408	411	413	416	418	421
Reklaw - In from Atascosa County - Evergreen UWCD - GMA 13	88	78	79	82	85	84	81	77	73
Reklaw - In from Dimmit County - Wintergarden GCD - GMA 13	5	6	6	6	6	6	7	7	7
Reklaw - In from La Salle County - Wintergarden GCD - GMA 13	33	31	39	45	48	52	55	60	64
Reklaw - In from Medina County - Medina County GCD - GMA 13	3	3	3	3	3	3	4	4	4
Reklaw - In from Zavala County - Wintergarden GCD - GMA 13	157	153	155	155	154	155	155	155	156
Carrizo - In from Atascosa County - Evergreen UWCD - GMA 13	9,865	10,094	12,536	7,831	6,687	5,686	4,764	4,007	3,675
Carrizo - In from Dimmit County - Wintergarden GCD - GMA 13	240	208	365	303	307	311	314	317	324
Carrizo - In from La Salle County - Wintergarden GCD - GMA 13	7,627	6,352	14,753	10,751	10,930	11,136	11,302	11,440	11,808
Carrizo - In from McMullen County - McMullen GCD - GMA 13	64	46	87	51	62	63	64	64	66
Carrizo - In from Medina County - Medina County GCD - GMA 13	20,359	18,067	17,238	16,180	15,178	14,437	13,787	13,219	12,753
Carrizo - In from Zavala County - Wintergarden GCD - GMA 13	8,559	8,075	10,651	9,151	9,200	9,292	9,388	9,499	9,891
Upper Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	38	37	44	21	20	20	19	19	19
Upper Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	54	36	59	49	50	51	51	52	53
Upper Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	683	495	1,114	787	803	821	836	848	877
Upper Wilcox - In from McMullen County - McMullen GCD - GMA 13	6	7	11	7	7	8	8	8	8
Upper Wilcox - In from Medina County - Medina County GCD - GMA 13	281	309	332	354	372	387	399	409	419
Upper Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	320	246	384	336	338	339	340	339	345
Middle Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	233	217	200	165	138	138	139	140	142
Middle Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	6	6	6	6	6	6	6	7	7
Middle Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	269	229	120	146	169	198	227	253	280
Middle Wilcox - In from McMullen County - McMullen GCD - GMA 13	0	0	0	1	3	4	4	5	5
Middle Wilcox - In from Medina County - Medina County GCD - GMA 13	1,615	1,700	1,681	1,766	1,833	1,891	1,951	1,998	2,045
Middle Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	527	323	294	303	308	312	316	319	326
Lower Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	699	671	631	379	226	178	159	154	146
Lower Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	18	27	25	27	30	32	34	37	39
Lower Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	49	106	112	157	282	429	570	698	819
Lower Wilcox - In from McMullen County - McMullen GCD - GMA 13	0	0	0	0	1	4	7	9	11
Lower Wilcox - In from Medina County - Medina County GCD - GMA 13	5,095	4,934	4,841	4,895	4,928	4,960	5,002	5,041	5,075
Lower Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	941	974	919	910	913	921	932	944	959
Total Inflows	119,587	128,246	150,398	118,709	115,091	112,342	109,993	107,971	107,872

Frio County – Evergreen UWCD

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	25,172	27,609	12,225	10,225	8,580	7,258	6,151	5,205	4,308
Pumping	74,975	85,409	122,199	92,226	89,952	87,827	85,708	83,658	83,658
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	194	172	159	159	78	74	74	40	0
General Head Boundary	1,726	1,423	1,272	1,117	1,001	883	818	751	708
Stream Leakage	341	309	275	257	240	227	216	203	182
Sparta - Out to Atascosa County - Evergreen UWCD - GMA 13	407	420	395	420	433	444	455	465	474
Sparta - Out to Dimmit County - Wintergarden GCD - GMA 13	1	1	1	0	0	0	0	0	0
Sparta - Out to La Salle County - Wintergarden GCD - GMA 13	1,840	1,665	1,610	1,615	1,606	1,598	1,593	1,592	1,592
Sparta - Out to McMullen County - McMullen GCD - GMA 13	25	22	21	23	24	25	26	27	27
Sparta - Out to Zavala County - Wintergarden GCD - GMA 13	7	8	9	9	8	8	8	7	6
Weches - Out to Atascosa County - Evergreen UWCD - GMA 13	21	22	21	23	24	25	25	26	26
Weches - Out to Dimmit County - Wintergarden GCD - GMA 13	1	1	1	0	0	0	0	0	0
Weches - Out to La Salle County - Wintergarden GCD - GMA 13	81	76	74	77	78	79	79	80	81
Weches - Out to McMullen County - McMullen GCD - GMA 13	2	2	1	2	2	2	2	2	2
Weches - Out to Zavala County - Wintergarden GCD - GMA 13	4	4	4	3	3	3	3	4	4
Queen City - Out to Atascosa County - Evergreen UWCD - GMA 13	952	1,110	1,091	1,374	1,537	1,665	1,780	1,895	1,990
Queen City - Out to La Salle County - Wintergarden GCD - GMA 13	1,442	1,438	1,368	1,522	1,592	1,641	1,683	1,720	1,757
Queen City - Out to McMullen County - McMullen GCD - GMA 13	48	48	44	49	52	54	56	58	59
Queen City - Out to Zavala County - Wintergarden GCD - GMA 13	397	416	423	419	419	418	416	411	406
Reklaw - Out to Atascosa County - Evergreen UWCD - GMA 13	140	139	153	161	167	178	190	200	210
Reklaw - Out to La Salle County - Wintergarden GCD - GMA 13	75	95	85	74	78	81	84	88	90
Reklaw - Out to McMullen County - McMullen GCD - GMA 13	3	4	3	3	4	4	4	4	4
Reklaw - Out to Zavala County - Wintergarden GCD - GMA 13	63	49	45	46	42	36	34	33	31
Carrizo - Out to Atascosa County - Evergreen UWCD - GMA 13	7,519	5,073	6,802	7,173	7,580	8,137	8,734	9,422	9,874
Carrizo - Out to La Salle County - Wintergarden GCD - GMA 13	795	665	432	303	297	295	295	296	294
Carrizo - Out to Zavala County - Wintergarden GCD - GMA 13	1,600	526	291	268	215	203	184	218	318
Upper Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	6	4	5	7	14	21	27	33	38
Upper Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	58	83	53	54	55	54	54	54	54
Upper Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	34	33	33	34	35	36	37	38	38
Middle Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	88	78	75	80	92	125	162	198	230
Middle Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	82	50	26	18	5	1	1	1	1
Middle Wilcox - Out to McMullen County - McMullen GCD - GMA 13	1	0	0	0	0	0	0	0	0
Middle Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	101	143	135	135	134	133	131	129	127
Lower Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	578	513	486	447	443	530	700	864	1,043
Lower Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	327	261	233	64	6	0	0	0	0
Lower Wilcox - Out to McMullen County - McMullen GCD - GMA 13	11	8	7	3	0	0	0	0	0
Lower Wilcox - Out to Medina County - Medina County GCD - GMA 13	63	44	34	25	19	14	9	7	5
Lower Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	408	327	308	293	277	265	254	244	234
Total Outflows from the GCAS	119,587	128,246	150,399	118,709	115,092	112,343	109,993	107,972	107,872

Total Increase(+)/Decrease(-) in Storage	-1,837	-10,033	-34,137	-16,113	-15,749	-15,337	-14,972	-14,575	-14,979

Gonzales County – Gonzales County UWCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	2,706	17,615	30,601	32,278	33,425	34,350	34,987	34,834	26,691
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	238	270	426	528	624	731	851	978	1,120
Recharge	11,638	13,007	13,007	13,007	13,007	13,007	13,007	13,007	13,007
Stream Leakage	1,244	1,221	1,514	2,367	3,149	5,125	5,558	5,737	6,023
Sparta - In from De Witt County - Pecan Valley GCD - GMA 15	4	5	6	6	5	5	4	4	3
Sparta - In from Fayette County - Fayette County GCD - GMA 12	92	124	249	281	292	300	307	313	317
Sparta - In from Fayette County - Fayette County GCD - GMA 15	5	6	6	8	8	9	9	9	9
Sparta - In from Gonzales County - ND Gonzales - GMA 13	113	121	120	121	118	115	112	109	106
Sparta - In from Karnes County - Evergreen UWCD - GMA 13	32	33	35	36	37	37	37	37	38
Sparta - In from Karnes County - Evergreen UWCD - GMA 15	15	15	16	16	16	16	16	16	16
Sparta - In from Lavaca County - ND Lavaca - GMA 15	29	36	33	41	42	42	42	42	42
Sparta - In from Wilson County - Evergreen UWCD - GMA 13	138	143	144	145	144	144	143	142	141
Weches - In from De Witt County - Pecan Valley GCD - GMA 15	7	10	14	16	16	14	12	10	7
Weches - In from Fayette County - Fayette County GCD - GMA 12	17	21	31	37	38	40	41	41	42
Weches - In from Fayette County - Fayette County GCD - GMA 15	1	2	1	2	3	3	3	3	4
Weches - In from Gonzales County - ND Gonzales - GMA 13	47	55	54	54	51	47	44	42	40
Weches - In from Karnes County - Evergreen UWCD - GMA 13	18	18	20	21	21	21	21	21	20
Weches - In from Karnes County - Evergreen UWCD - GMA 15	18	19	21	22	22	22	22	22	21
Weches - In from Lavaca County - ND Lavaca - GMA 15	6	10	10	14	15	15	16	16	16
Weches - In from Wilson County - Evergreen UWCD - GMA 13	16	17	17	17	17	17	17	17	17
Queen City - In from Caldwell County - Gonzales County UWCD - GMA 13	652	705	540	257	141	113	95	61	45
Queen City - In from De Witt County - Pecan Valley GCD - GMA 15	0	1	5	7	8	8	8	8	8
Queen City - In from Fayette County - Fayette County GCD - GMA 12	432	505	757	893	956	1,018	1,075	1,128	1,171
Queen City - In from Fayette County - Fayette County GCD - GMA 15	2	2	2	3	4	5	5	6	6
Queen City - In from Gonzales County - ND Gonzales - GMA 13	21	34	36	44	46	48	49	49	50
Queen City - In from Guadalupe County - Guadalupe County GCD - GMA 13	3	3	4	4	5	6	7	8	9
Queen City - In from Karnes County - Evergreen UWCD - GMA 13	30	32	43	45	46	46	46	46	45
Queen City - In from Karnes County - Evergreen UWCD - GMA 15	7	9	13	15	16	16	17	17	17
Queen City - In from Lavaca County - ND Lavaca - GMA 15	6	14	19	27	28	29	30	30	31
Queen City - In from Wilson County - Evergreen UWCD - GMA 13	710	726	870	954	984	1,001	1,012	1,014	1,011
Reklaw - In from Caldwell County - Gonzales County UWCD - GMA 13	203	217	231	249	268	285	300	319	334
Reklaw - In from De Witt County - Pecan Valley GCD - GMA 15	0	4	29	35	41	46	49	52	53
Reklaw - In from Fayette County - Fayette County GCD - GMA 12	23	29	45	59	70	81	93	102	111
Reklaw - In from Fayette County - Fayette County GCD - GMA 15	1	1	2	3	5	7	9	11	13
Reklaw - In from Gonzales County - ND Gonzales - GMA 13	15	19	40	62	78	91	102	111	117
Reklaw - In from Guadalupe County - Guadalupe County GCD - GMA 13	90	101	114	122	128	129	131	128	127
Reklaw - In from Karnes County - Evergreen UWCD - GMA 13	4	12	22	23	24	26	26	27	27
Reklaw - In from Karnes County - Evergreen UWCD - GMA 15	3	11	21	23	24	25	26	26	26
Reklaw - In from Lavaca County - ND Lavaca - GMA 15	6	8	9	13	19	25	31	35	39
Reklaw - In from Wilson County - Evergreen UWCD - GMA 13	33	47	67	74	79	81	83	87	92
Carrizo - In from Caldwell County - Gonzales County UWCD - GMA 13	6,209	7,112	7,042	4,917	4,732	4,396	4,052	3,801	3,325
Carrizo - In from De Witt County - Pecan Valley GCD - GMA 15	0	207	536	634	736	825	890	949	969
Carrizo - In from Fayette County - Fayette County GCD - GMA 12	892	1,124	1,561	2,710	4,289	6,303	8,046	9,623	10,726
Carrizo - In from Fayette County - Fayette County GCD - GMA 15	0	0	1	71	194	346	488	610	709
Carrizo - In from Gonzales County - ND Gonzales - GMA 13	225	365	1,320	1,728	2,140	2,805	3,431	4,037	4,413
Carrizo - In from Guadalupe County - Guadalupe County GCD - GMA 13	4,427	7,886	9,590	8,461	8,634	7,951	6,770	5,834	4,508
Carrizo - In from Karnes County - Evergreen UWCD - GMA 13	188	1,047	1,742	1,733	1,759	1,754	1,713	1,657	1,558
Carrizo - In from Karnes County - Evergreen UWCD - GMA 15	69	483	819	817	831	836	829	816	786
Carrizo - In from Lavaca County - ND Lavaca - GMA 15	1	31	71	152	515	1,054	1,546	1,970	2,291
Carrizo - In from Wilson County - Evergreen UWCD - GMA 13	1,798	9,171	11,697	12,541	13,875	14,528	14,473	14,617	14,019
Upper Wilcox - In from Caldwell County - Gonzales County UWCD - GMA 13	11	12	12	9	9	8	7	7	7
Upper Wilcox - In from De Witt County - Pecan Valley GCD - GMA 15	0	7	17	20	23	26	27	29	29
Upper Wilcox - In from Fayette County - Fayette County GCD - GMA 12	1	1	2	4	7	10	13	16	18
Upper Wilcox - In from Fayette County - Fayette County GCD - GMA 15	0	0	0	0	0	1	1	1	2
Upper Wilcox - In from Gonzales County - ND Gonzales - GMA 13	1	12	27	35	42	49	54	59	61
Upper Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	22	37	52	55	65	72	76	82	74
Upper Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	0	3	3	3	3	3	2	2	2
Upper Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	0	0	1	1	1	1	1	1	1
Upper Wilcox - In from Lavaca County - ND Lavaca - GMA 15	0	0	0	0	1	2	2	3	4
Upper Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	2	8	11	11	12	13	12	12	12
Middle Wilcox - In from Caldwell County - Edwards Aquifer Authority - GMA 13	0	0	95	128	153	178	204	228	251
Middle Wilcox - In from Caldwell County - Gonzales County UWCD - GMA 13	178	176	217	283	340	404	475	552	634
Middle Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	0	0	101	162	210	258	310	359	406
Middle Wilcox - In from De Witt County - Pecan Valley GCD - GMA 15	0	0	20	58	135	224	317	394	453
Middle Wilcox - In from Fayette County - Fayette County GCD - GMA 12	64	52	50	65	122	190	267	345	424
Middle Wilcox - In from Fayette County - Fayette County GCD - GMA 15	4	2	2	3	7	11	17	23	29
Middle Wilcox - In from Gonzales County - ND Gonzales - GMA 13	38	358	346	850	1,262	1,673	2,063	2,332	2,534
Middle Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	1,701	1,776	2,358	3,547	4,582	5,697	6,366	6,812	7,127
Middle Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	12	11	42	95	123	145	156	145	128
Middle Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	7	6	9	27	45	63	80	88	89
Middle Wilcox - In from Lavaca County - ND Lavaca - GMA 15	14	8	9	15	24	34	47	63	79
Middle Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	154	259	1,018	2,701	4,125	5,503	5,698	5,487	5,356
Lower Wilcox - In from Caldwell County - Edwards Aquifer Authority - GMA 13	0	0	0	65	272	516	727	1,000	1,239
Lower Wilcox - In from Caldwell County - Gonzales County UWCD - GMA 13	216	188	72	89	271	522	782	1,128	1,488
Lower Wilcox - In from Caldwell County - Plum Creek CD - GMA 13	0	0	0	23	172	352	519	724	918
Lower Wilcox - In from De Witt County - Pecan Valley GCD - GMA 15	0	0	0	241	719	1,186	1,489	2,451	2,756
Lower Wilcox - In from Fayette County - Fayette County GCD - GMA 12	355	294	280	360	496	683	911	1,157	1,454
Lower Wilcox - In from Fayette County - Fayette County GCD - GMA 15	32	26	23	25	35	51	71	94	122
Lower Wilcox - In from Gonzales County - ND Gonzales - GMA 13	142	93	79	817	2,085	3,315	4,093	5,588	6,442
Lower Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	1,563	1,407	457	1,947	3,886	5,967	6,975	9,114	10,010
Lower Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	111	95	113	241	330	404	249	0	0
Lower Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	71	57	58	120	194	259	261	454	489
Lower Wilcox - In from Lavaca County - ND Lavaca - GMA 15	62	45	39	47	70	104	148	196	256
Lower Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	298	278	855	3,086	5,100	7,061	3,458	1,649	1,639
Total Inflows	37,493	67,864	89,939	100,829	116,647	132,931	136,558	143,175	138,845

Gonzales County – Gonzales County UWCD

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	5,774	3,592	1,694	898	531	325	254	186	173
Pumping	4,186	39,513	68,881	83,816	98,091	109,924	110,299	110,799	103,253
Springs	342	252	191	124	81	52	36	21	15
Evapotranspiration	353	368	313	194	162	99	71	63	19
General Head Boundary	5,661	5,442	5,051	4,574	4,216	3,877	3,551	3,246	2,969
Stream Leakage	12,486	11,029	7,880	5,645	3,602	3,048	2,549	2,113	1,791
Sparta - Out to De Witt County - Pecan Valley GCD - GMA 15	1	1	1	1	1	1	1	1	1
Sparta - Out to Fayette County - Fayette County GCD - GMA 12	1	2	2	4	4	5	5	5	5
Sparta - Out to Gonzales County - ND Gonzales - GMA 13	59	57	58	61	65	70	75	81	87
Sparta - Out to Wilson County - Evergreen UWCD - GMA 13	24	25	26	27	28	29	30	31	32
Weches - Out to De Witt County - Pecan Valley GCD - GMA 15	5	4	4	3	3	3	3	2	2
Weches - Out to Fayette County - Fayette County GCD - GMA 12	0	0	0	1	1	1	1	1	1
Weches - Out to Fayette County - Fayette County GCD - GMA 15	0	0	0	0	0	0	0	0	0
Weches - Out to Gonzales County - ND Gonzales - GMA 13	26	25	25	26	27	30	34	39	44
Weches - Out to Wilson County - Evergreen UWCD - GMA 13	4	4	5	5	5	4	4	4	5
Queen City - Out to Caldwell County - Gonzales County UWCD - GMA 13	0	0	0	37	145	265	348	404	438
Queen City - Out to De Witt County - Pecan Valley GCD - GMA 15	3	1	1	1	0	0	0	0	0
Queen City - Out to Fayette County - Fayette County GCD - GMA 12	0	0	0	1	1	1	2	2	2
Queen City - Out to Fayette County - Fayette County GCD - GMA 15	1	0	0	0	0	0	0	0	0
Queen City - Out to Gonzales County - ND Gonzales - GMA 13	46	40	44	50	58	69	80	92	103
Queen City - Out to Lavaca County - ND Lavaca - GMA 15	3	0	0	0	0	0	0	0	0
Queen City - Out to Wilson County - Evergreen UWCD - GMA 13	27	28	33	41	48	54	59	64	69
Reklaw - Out to Caldwell County - Gonzales County UWCD - GMA 13	6	6	6	6	6	5	5	5	5
Reklaw - Out to De Witt County - Pecan Valley GCD - GMA 15	18	1	0	0	0	0	0	0	0
Reklaw - Out to Fayette County - Fayette County GCD - GMA 12	0	0	0	0	0	1	1	2	2
Reklaw - Out to Fayette County - Fayette County GCD - GMA 15	2	2	1	0	0	0	0	0	0
Reklaw - Out to Gonzales County - ND Gonzales - GMA 13	65	33	32	35	40	44	49	54	58
Reklaw - Out to Guadalupe County - Guadalupe County GCD - GMA 13	4	5	6	7	7	7	7	8	8
Reklaw - Out to Karnes County - Evergreen UWCD - GMA 15	1	0	0	0	0	0	0	0	0
Reklaw - Out to Lavaca County - ND Lavaca - GMA 15	14	8	8	0	0	0	0	0	0
Reklaw - Out to Wilson County - Evergreen UWCD - GMA 13	1	1	2	2	2	3	5	7	6
Carrizo - Out to Caldwell County - Gonzales County UWCD - GMA 13	0	0	0	643	3,891	7,469	10,059	12,098	13,080
Carrizo - Out to De Witt County - Pecan Valley GCD - GMA 15	303	0	0	0	0	0	0	0	0
Carrizo - Out to Fayette County - Fayette County GCD - GMA 12	388	71	0	0	278	934	1,445	1,915	2,143
Carrizo - Out to Fayette County - Fayette County GCD - GMA 15	135	101	61	19	0	0	0	0	0
Carrizo - Out to Gonzales County - ND Gonzales - GMA 13	1,899	929	1,258	1,034	805	852	941	1,039	1,116
Carrizo - Out to Guadalupe County - Guadalupe County GCD - GMA 13	13	30	94	376	648	907	1,127	1,258	1,659
Carrizo - Out to Karnes County - Evergreen UWCD - GMA 15	49	0	0	0	0	0	0	0	0
Carrizo - Out to Lavaca County - ND Lavaca - GMA 15	699	564	486	146	0	0	0	0	0
Carrizo - Out to Wilson County - Evergreen UWCD - GMA 13	143	0	0	0	0	0	0	0	0
Upper Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	0	0	0	1	4	9	14	19	23
Upper Wilcox - Out to De Witt County - Pecan Valley GCD - GMA 15	9	0	0	0	0	0	0	0	0
Upper Wilcox - Out to Fayette County - Fayette County GCD - GMA 12	1	0	0	0	0	1	2	2	3
Upper Wilcox - Out to Fayette County - Fayette County GCD - GMA 15	0	0	0	0	0	0	0	0	0
Upper Wilcox - Out to Gonzales County - ND Gonzales - GMA 13	19	3	4	3	3	3	4	4	4
Upper Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	1	1	2	3	6	10	14	19	37
Upper Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	0	0	0	0	0	0	0	0	0
Upper Wilcox - Out to Lavaca County - ND Lavaca - GMA 15	1	1	1	0	0	0	0	0	0
Upper Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	0	0	0	0	0	0	0	0	0
Middle Wilcox - Out to Caldwell County - Edwards Aquifer Authority - GMA 13	2,273	2,157	2,030	1,922	1,820	1,695	1,484	1,272	1,069
Middle Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	57	53	0	0	0	0	0	3	10
Middle Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	103	50	0	0	0	0	0	0	0
Middle Wilcox - Out to De Witt County - Pecan Valley GCD - GMA 15	54	50	22	6	5	4	2	1	0
Middle Wilcox - Out to Fayette County - Fayette County GCD - GMA 12	15	26	18	1	0	0	0	0	0
Middle Wilcox - Out to Fayette County - Fayette County GCD - GMA 15	11	8	7	6	4	3	2	2	1
Middle Wilcox - Out to Gonzales County - ND Gonzales - GMA 13	389	1,886	419	324	394	490	599	684	753
Middle Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	67	15	0	71	206	349	408	455	484
Middle Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	6	6	4	0	0	0	0	0	0
Middle Wilcox - Out to Lavaca County - ND Lavaca - GMA 15	79	59	50	39	25	14	5	2	2
Middle Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	12	10	0	0	0	0	0	0	0
Lower Wilcox - Out to Caldwell County - Edwards Aquifer Authority - GMA 13	127	145	98	0	0	0	0	0	0
Lower Wilcox - Out to Caldwell County - Gonzales County UWCD - GMA 13	4	25	120	86	76	42	9	0	0
Lower Wilcox - Out to Caldwell County - Plum Creek CD - GMA 13	42	67	87	0	0	0	0	0	0
Lower Wilcox - Out to De Witt County - Pecan Valley GCD - GMA 15	243	201	155	1	0	0	0	0	0
Lower Wilcox - Out to Fayette County - Fayette County GCD - GMA 15	18	14	12	9	8	9	12	16	22
Lower Wilcox - Out to Gonzales County - ND Gonzales - GMA 13	1,012	765	513	248	520	849	1,125	1,589	2,053
Lower Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	1	15	121	288	798	1,338	1,773	2,594	2,918
Lower Wilcox - Out to Karnes County - Evergreen UWCD - GMA 13	0	0	0	0	0	0	0	893	1,339
Lower Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	35	30	24	0	0	0	11	435	731
Lower Wilcox - Out to Lavaca County - ND Lavaca - GMA 15	124	98	81	48	32	35	52	82	124
Lower Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	48	42	11	0	0	0	0	1,562	2,186
Total Outflows from the GCAS	37,494	67,864	89,939	100,829	116,647	132,931	136,558	143,175	138,845
Total Increase(+)/Decrease(-) in Storage	3,068	-14,023	-28,907	-31,380	-32,894	-34,025	-34,733	-34,648	-26,518

Gonzales County – ND Gonzales

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	2	1,618	592	1,200	1,696	2,076	2,175	2,624	2,591
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	145	140	141	147	158	171	188	208	230
Recharge	0	0	0	0	0	0	0	0	0
Stream Leakage	0	0	0	0	0	0	0	0	0
Sparta - In from De Witt County - Pecan Valley GCD - GMA 15	9	9	10	10	10	10	10	9	9
Sparta - In from Gonzales County - Gonzales County UWCD - GMA 13	59	57	58	61	65	70	75	81	87
Sparta - In from Lavaca County - ND Lavaca - GMA 15	24	26	26	28	28	27	27	27	27
Weches - In from De Witt County - Pecan Valley GCD - GMA 15	21	26	30	32	32	31	29	26	23
Weches - In from Gonzales County - Gonzales County UWCD - GMA 13	26	25	25	26	27	30	34	39	44
Weches - In from Lavaca County - ND Lavaca - GMA 15	26	29	30	31	31	31	31	30	30
Queen City - In from De Witt County - Pecan Valley GCD - GMA 15	3	4	7	9	11	11	11	11	11
Queen City - In from Gonzales County - Gonzales County UWCD - GMA 13	46	40	44	50	58	69	80	92	103
Queen City - In from Lavaca County - ND Lavaca - GMA 15	17	21	22	24	24	23	23	22	22
Reklaw - In from De Witt County - Pecan Valley GCD - GMA 15	0	1	19	30	41	51	58	63	66
Reklaw - In from Gonzales County - Gonzales County UWCD - GMA 13	65	33	32	35	40	44	49	54	58
Reklaw - In from Lavaca County - ND Lavaca - GMA 15	23	28	34	40	46	53	59	65	71
Carrizo - In from De Witt County - Pecan Valley GCD - GMA 15	0	4	148	225	371	513	631	727	782
Carrizo - In from Gonzales County - Gonzales County UWCD - GMA 13	1,899	929	1,258	1,034	805	852	941	1,039	1,116
Carrizo - In from Lavaca County - ND Lavaca - GMA 15	52	182	363	487	692	1,034	1,365	1,667	1,911
Upper Wilcox - In from De Witt County - Pecan Valley GCD - GMA 15	0	1	33	39	52	63	72	79	82
Upper Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	19	3	4	3	3	3	4	4	4
Upper Wilcox - In from Lavaca County - ND Lavaca - GMA 15	0	1	3	5	8	12	15	18	21
Middle Wilcox - In from De Witt County - Pecan Valley GCD - GMA 15	0	0	140	109	209	341	475	592	682
Middle Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	389	1,886	419	324	394	490	599	684	753
Middle Wilcox - In from Lavaca County - ND Lavaca - GMA 15	23	17	21	49	81	133	202	270	334
Lower Wilcox - In from De Witt County - Pecan Valley GCD - GMA 15	1	0	0	221	766	1,244	1,518	1,921	1,996
Lower Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	1,012	765	513	248	520	849	1,125	1,589	2,053
Lower Wilcox - In from Lavaca County - ND Lavaca - GMA 15	239	152	126	162	283	463	665	889	1,188
Total Inflows	4,100	5,998	4,096	4,628	6,450	8,696	10,462	12,831	14,295

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	606	282	439	0	0	0	0	0	0
Pumping	3	2,498	0	0	0	0	0	0	0
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	0	0	0	0	0	0	0	0	0
General Head Boundary	699	720	698	648	596	542	488	438	390
Stream Leakage	0	0	0	0	0	0	0	0	0
Sparta - Out to De Witt County - Pecan Valley GCD - GMA 15	3	3	2	2	2	2	2	3	3
Sparta - Out to Gonzales County - Gonzales County UWCD - GMA 13	113	121	120	121	118	115	112	109	106
Sparta - Out to Lavaca County - ND Lavaca - GMA 15	3	2	2	2	3	3	3	3	4
Weches - Out to De Witt County - Pecan Valley GCD - GMA 15	2	1	1	0	0	0	0	0	0
Weches - Out to Gonzales County - Gonzales County UWCD - GMA 13	47	55	54	54	51	47	44	42	40
Weches - Out to Lavaca County - ND Lavaca - GMA 15	1	0	0	0	0	0	0	1	1
Queen City - Out to De Witt County - Pecan Valley GCD - GMA 15	3	0	0	0	0	0	0	0	0
Queen City - Out to Gonzales County - Gonzales County UWCD - GMA 13	21	34	36	44	46	48	49	49	50
Queen City - Out to Lavaca County - ND Lavaca - GMA 15	0	0	0	0	0	0	0	0	0
Reklaw - Out to De Witt County - Pecan Valley GCD - GMA 15	33	11	0	0	0	0	0	0	0
Reklaw - Out to Gonzales County - Gonzales County UWCD - GMA 13	15	19	40	62	78	91	102	111	117
Reklaw - Out to Lavaca County - ND Lavaca - GMA 15	2	0	0	0	0	0	0	0	0
Carrizo - Out to De Witt County - Pecan Valley GCD - GMA 15	528	239	81	11	0	0	0	0	0
Carrizo - Out to Gonzales County - Gonzales County UWCD - GMA 13	225	365	1,320	1,728	2,140	2,805	3,431	4,037	4,413
Carrizo - Out to Lavaca County - ND Lavaca - GMA 15	534	358	301	129	0	0	0	0	0
Upper Wilcox - Out to De Witt County - Pecan Valley GCD - GMA 15	37	11	4	0	0	0	0	0	0
Upper Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	1	12	27	35	42	49	54	59	61
Upper Wilcox - Out to Lavaca County - ND Lavaca - GMA 15	7	4	3	0	0	0	0	0	0
Middle Wilcox - Out to De Witt County - Pecan Valley GCD - GMA 15	154	146	51	17	1	0	0	0	0
Middle Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	38	358	346	850	1,262	1,673	2,063	2,332	2,534
Middle Wilcox - Out to Lavaca County - ND Lavaca - GMA 15	121	102	85	52	17	0	0	0	0
Lower Wilcox - Out to De Witt County - Pecan Valley GCD - GMA 15	543	405	282	7	0	0	0	0	0
Lower Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	142	93	79	817	2,085	3,315	4,093	5,588	6,442
Lower Wilcox - Out to Lavaca County - ND Lavaca - GMA 15	221	158	124	50	9	5	20	60	135
Total Outflows from the GCAS	4,100	5,998	4,096	4,628	6,450	8,696	10,462	12,831	14,295

Total Increase(+)/Decrease(-) in Storage	605	-1,336	-153	-1,200	-1,696	-2,076	-2,175	-2,624	-2,591

Guadalupe County – Guadalupe County GCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	5,374	7,338	52,408	35,630	38,572	41,561	41,684	46,398	44,507
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	16,201	18,107	18,024	17,734	17,693	17,484	17,358	17,276	17,108
Stream Leakage	3,698	3,780	7,160	9,630	11,839	14,072	15,614	16,852	17,700
Queen City - In from Wilson County - Evergreen UWCD - GMA 13	1	1	1	1	1	1	1	1	1
Reklaw - In from Gonzales County - Gonzales County UWCD - GMA 13	4	5	6	7	7	7	7	8	8
Reklaw - In from Wilson County - Evergreen UWCD - GMA 13	2	2	3	3	3	3	3	2	2
Carrizo - In from Gonzales County - Gonzales County UWCD - GMA 13	13	30	94	376	648	907	1,127	1,258	1,659
Carrizo - In from Wilson County - Evergreen UWCD - GMA 13	1	156	414	789	990	1,162	1,238	1,280	1,298
Upper Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	1	1	2	3	6	10	14	19	37
Upper Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	0	0	3	8	11	13	14	16	18
Middle Wilcox - In from Caldwell County - Edwards Aquifer Authority - GMA 13	389	412	368	304	279	259	240	222	202
Middle Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	67	15	0	71	206	349	408	455	484
Middle Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	77	72	178	459	797	1,220	1,475	1,587	1,606
Lower Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	56	59	63	84	112	146	184	226	266
Lower Wilcox - In from Caldwell County - Edwards Aquifer Authority - GMA 13	117	125	271	504	765	1,124	1,445	1,826	2,135
Lower Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	1	15	121	288	798	1,338	1,773	2,594	2,918
Lower Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	424	419	1,004	1,703	2,619	3,288	3,958	3,797	3,857
Total Inflows	26,427	30,537	80,118	67,595	75,345	82,944	86,544	93,817	93,806

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	2,915	3,219	583	380	266	205	220	184	185
Pumping	4,134	3,710	55,490	39,568	41,561	43,323	42,126	42,206	41,667
Springs	0	0	1	8	13	22	26	29	31
Evapotranspiration	2	16	26	29	43	43	43	43	43
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	4,218	4,228	3,458	2,739	2,069	1,585	1,221	927	676
Queen City - Out to Gonzales County - Gonzales County UWCD - GMA 13	3	3	4	4	5	6	7	8	9
Queen City - Out to Wilson County - Evergreen UWCD - GMA 13	5	5	6	6	7	8	8	9	10
Reklaw - Out to Gonzales County - Gonzales County UWCD - GMA 13	90	101	114	122	128	129	131	128	127
Reklaw - Out to Wilson County - Evergreen UWCD - GMA 13	19	22	30	34	38	42	45	43	42
Carrizo - Out to Gonzales County - Gonzales County UWCD - GMA 13	4,427	7,886	9,590	8,461	8,634	7,951	6,770	5,834	4,508
Carrizo - Out to Wilson County - Evergreen UWCD - GMA 13	2,067	3,100	3,728	3,543	3,382	3,234	2,986	2,715	2,365
Upper Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	22	37	52	55	65	72	76	82	74
Upper Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	28	36	39	39	43	50	54	57	60
Middle Wilcox - Out to Caldwell County - Edwards Aquifer Authority - GMA 13	1,136	1,080	1,232	1,340	1,362	1,377	1,380	1,370	1,365
Middle Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	1,701	1,776	2,358	3,547	4,582	5,697	6,366	6,812	7,127
Middle Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	1,648	1,637	1,471	1,663	1,899	2,283	2,526	2,864	3,099
Lower Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 13	64	64	63	63	63	62	62	56	47
Lower Wilcox - Out to Caldwell County - Edwards Aquifer Authority - GMA 13	592	563	339	307	284	330	399	465	551
Lower Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	1,563	1,407	457	1,947	3,886	5,967	6,975	9,114	10,010
Lower Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	1,791	1,645	1,080	3,739	7,016	10,558	15,123	20,872	21,809
Total Outflows from the GCAS	26,426	30,537	80,118	67,594	75,345	82,943	86,544	93,817	93,806

Total Increase(+)/Decrease(-) in Storage	-2,458	-4,118	-51,825	-35,250	-38,306	-41,355	-41,464	-46,214	-44,322

Karnes County – Evergreen UWCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	121	846	1,817	2,693	3,200	4,050	5,410	7,840	5,811
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	128	134	148	190	235	287	348	417	492
Recharge	0	0	0	0	0	0	0	0	0
Stream Leakage	0	0	0	0	0	0	0	0	0
Sparta - In from Atascosa County - Evergreen UWCD - GMA 13	5	5	5	4	4	3	3	2	2
Sparta - In from Karnes County - Evergreen UWCD - GMA 15	71	72	74	74	70	66	62	58	54
Sparta - In from Wilson County - Evergreen UWCD - GMA 13	59	62	70	97	122	153	189	231	274
Weches - In from Atascosa County - Evergreen UWCD - GMA 13	2	2	2	2	2	1	1	1	0
Weches - In from Karnes County - Evergreen UWCD - GMA 15	30	33	36	35	31	27	23	20	17
Weches - In from Wilson County - Evergreen UWCD - GMA 13	33	33	35	51	67	83	99	114	129
Queen City - In from Atascosa County - Evergreen UWCD - GMA 13	4	4	4	5	3	2	1	0	0
Queen City - In from Karnes County - Evergreen UWCD - GMA 15	29	31	43	54	44	41	39	40	42
Queen City - In from Wilson County - Evergreen UWCD - GMA 13	469	462	441	552	663	765	864	960	1,053
Reklaw - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	1	2	2	2	2	2	1
Reklaw - In from Karnes County - Evergreen UWCD - GMA 15	23	21	30	39	37	33	28	24	19
Reklaw - In from Wilson County - Evergreen UWCD - GMA 13	91	75	47	65	79	90	102	113	126
Carrizo - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	140	167	197	233	258	281	295
Carrizo - In from Karnes County - Evergreen UWCD - GMA 15	1,242	843	1,999	2,286	2,726	3,211	3,556	3,869	3,873
Carrizo - In from Wilson County - Evergreen UWCD - GMA 13	4,265	3,371	1,527	1,920	1,801	1,578	1,335	1,045	925
Upper Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	0	0	0	0	0	0	0
Upper Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	5	3	17	18	21	23	25	26	26
Upper Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	4	5	0	1	0	0	0	0	0
Middle Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	0	0	2	4	6	11	22
Middle Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	4	6	5	23	96	194	297	393	466
Middle Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	126	113	70	31	25	29	36	43	48
Lower Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	0	33	55	101	198	543	999
Lower Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	0	0	0	0	893	1,339
Lower Wilcox - In from Karnes County - Evergreen UWCD - GMA 15	46	56	65	685	2,304	4,207	5,980	14,827	17,088
Lower Wilcox - In from Wilson County - Evergreen UWCD - GMA 13	2,234	2,036	1,604	82	120	174	254	756	867
Total Inflows	8,991	8,213	8,181	9,110	11,907	15,361	19,118	32,509	33,968

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	473	312	29	0	0	0	0	0	0
Pumping	199	113	691	758	840	932	1,001	1,043	1,043
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	0	0	0	0	0	0	0	0	0
General Head Boundary	655	635	587	483	389	309	240	182	135
Stream Leakage	0	0	0	0	0	0	0	0	0
Sparta - Out to Atascosa County - Evergreen UWCD - GMA 13	35	36	36	35	35	34	34	33	33
Sparta - Out to Gonzales County - Gonzales County UWCD - GMA 13	32	33	35	36	37	37	37	37	38
Sparta - Out to Karnes County - Evergreen UWCD - GMA 15	32	31	30	27	28	29	31	33	35
Sparta - Out to Wilson County - Evergreen UWCD - GMA 13	134	129	118	88	60	40	28	22	19
Weches - Out to Atascosa County - Evergreen UWCD - GMA 13	18	19	19	18	17	17	16	15	15
Weches - Out to Gonzales County - Gonzales County UWCD - GMA 13	18	18	20	21	21	21	21	21	20
Weches - Out to Karnes County - Evergreen UWCD - GMA 15	27	26	22	21	24	28	32	38	44
Weches - Out to Wilson County - Evergreen UWCD - GMA 13	12	11	11	7	5	4	2	1	1
Queen City - Out to Atascosa County - Evergreen UWCD - GMA 13	64	65	66	61	57	54	51	49	47
Queen City - Out to Gonzales County - Gonzales County UWCD - GMA 13	30	32	43	45	46	46	46	46	45
Queen City - Out to Karnes County - Evergreen UWCD - GMA 15	78	76	55	59	75	100	126	156	188
Queen City - Out to Wilson County - Evergreen UWCD - GMA 13	12	11	8	6	4	2	1	1	2
Reklaw - Out to Atascosa County - Evergreen UWCD - GMA 13	35	35	28	26	25	24	21	18	16
Reklaw - Out to Gonzales County - Gonzales County UWCD - GMA 13	4	12	22	23	24	26	26	27	27
Reklaw - Out to Karnes County - Evergreen UWCD - GMA 15	88	69	37	36	40	43	48	55	64
Reklaw - Out to Wilson County - Evergreen UWCD - GMA 13	2	2	4	9	8	7	6	5	3
Carrizo - Out to Atascosa County - Evergreen UWCD - GMA 13	1,109	883	572	846	839	787	717	631	543
Carrizo - Out to Gonzales County - Gonzales County UWCD - GMA 13	188	1,047	1,742	1,733	1,759	1,754	1,713	1,657	1,558
Carrizo - Out to Karnes County - Evergreen UWCD - GMA 15	3,148	1,749	568	752	787	781	755	711	652
Carrizo - Out to Wilson County - Evergreen UWCD - GMA 13	506	926	1,596	1,828	2,284	2,780	3,129	3,504	3,653
Upper Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	6	5	6	7	7	7	6	6	5
Upper Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	0	3	3	3	3	3	2	2	2
Upper Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	13	7	2	2	2	1	1	1	0
Upper Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	0	0	8	8	10	12	13	15	16
Middle Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	12	12	12	10	8	5	2	0	0
Middle Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	12	11	42	95	123	145	156	145	128
Middle Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	82	76	63	34	19	14	17	25	36
Middle Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	2	2	21	207	446	676	830	978	1,047
Lower Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	100	114	111	116	114	41	11	0	0
Lower Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	111	95	113	241	330	404	249	0	0
Lower Wilcox - Out to Karnes County - Evergreen UWCD - GMA 15	1,755	1,611	1,445	126	126	148	226	867	1,314
Lower Wilcox - Out to Wilson County - Evergreen UWCD - GMA 13	2	8	16	1,341	3,315	6,048	9,521	22,185	23,239
Total Outflows from the GCAS	8,991	8,213	8,181	9,110	11,907	15,361	19,118	32,509	33,968

Total Increase(+)/Decrease(-) in Storage	352	-534	-1,789	-2,693	-3,200	-4,050	-5,410	-7,840	-5,811

La Salle County – Wintergarden GCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	11,938	11,438	13,624	7,885	6,507	5,820	5,383	5,079	5,006
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	6,703	7,243	7,237	7,657	8,027	8,328	8,596	8,843	9,087
Recharge	2,050	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291
Stream Leakage	0	0	0	0	0	0	0	0	0
Sparta - In from Dimmit County - Wintergarden GCD - GMA 13	438	466	473	482	488	492	495	496	482
Sparta - In from Frio County - Evergreen UWCD - GMA 13	1,840	1,665	1,610	1,615	1,606	1,598	1,593	1,592	1,592
Sparta - In from McMullen County - McMullen GCD - GMA 13	70	65	45	40	36	33	30	27	25
Sparta - In from Webb County - ND Webb - GMA 13	479	881	713	757	793	822	848	872	892
Weches - In from Dimmit County - Wintergarden GCD - GMA 13	106	109	111	113	114	115	115	116	116
Weches - In from Frio County - Evergreen UWCD - GMA 13	81	76	74	77	78	79	79	80	81
Weches - In from McMullen County - McMullen GCD - GMA 13	7	6	4	3	3	2	2	1	1
Weches - In from Webb County - ND Webb - GMA 13	83	94	94	97	101	104	107	109	112
Queen City - In from Dimmit County - Wintergarden GCD - GMA 13	1,437	1,394	1,388	1,441	1,469	1,490	1,508	1,525	1,543
Queen City - In from Frio County - Evergreen UWCD - GMA 13	1,442	1,438	1,368	1,522	1,592	1,641	1,683	1,720	1,757
Queen City - In from McMullen County - McMullen GCD - GMA 13	75	74	27	13	7	5	3	2	1
Queen City - In from Webb County - ND Webb - GMA 13	1,356	1,373	1,389	1,407	1,437	1,470	1,501	1,532	1,563
Reklaw - In from Dimmit County - Wintergarden GCD - GMA 13	319	341	351	379	391	401	409	417	425
Reklaw - In from Frio County - Evergreen UWCD - GMA 13	75	95	85	74	78	81	84	88	90
Reklaw - In from McMullen County - McMullen GCD - GMA 13	16	56	4	5	5	5	5	4	4
Reklaw - In from Webb County - ND Webb - GMA 13	350	366	376	386	402	415	428	441	452
Carrizo - In from Dimmit County - Wintergarden GCD - GMA 13	2,282	2,590	2,971	2,890	2,951	2,997	3,039	3,076	3,141
Carrizo - In from Frio County - Evergreen UWCD - GMA 13	795	665	432	303	297	295	295	296	294
Carrizo - In from McMullen County - McMullen GCD - GMA 13	1,287	966	701	653	763	793	810	820	849
Carrizo - In from Webb County - ND Webb - GMA 13	985	999	1,028	1,123	1,188	1,231	1,272	1,312	1,352
Upper Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	1,137	1,163	1,232	1,307	1,346	1,376	1,403	1,428	1,460
Upper Wilcox - In from Frio County - Evergreen UWCD - GMA 13	58	83	53	54	55	54	54	54	54
Upper Wilcox - In from McMullen County - McMullen GCD - GMA 13	425	302	221	252	266	277	285	292	302
Upper Wilcox - In from Webb County - ND Webb - GMA 13	1,216	1,229	1,257	1,354	1,433	1,485	1,534	1,582	1,629
Middle Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	187	210	208	222	227	231	235	239	244
Middle Wilcox - In from Frio County - Evergreen UWCD - GMA 13	82	50	26	18	5	1	1	1	1
Middle Wilcox - In from McMullen County - McMullen GCD - GMA 13	35	27	21	17	16	19	24	29	34
Middle Wilcox - In from Webb County - ND Webb - GMA 13	130	129	128	126	127	128	129	131	134
Lower Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	966	1,053	1,048	1,069	1,098	1,130	1,164	1,202	1,244
Lower Wilcox - In from Frio County - Evergreen UWCD - GMA 13	327	261	233	64	6	0	0	0	0
Lower Wilcox - In from McMullen County - McMullen GCD - GMA 13	127	91	74	46	8	10	37	71	105
Lower Wilcox - In from Webb County - ND Webb - GMA 13	973	878	834	794	772	760	758	762	771
Total Inflows	39,875	40,166	41,730	36,538	35,980	35,978	36,199	36,529	37,134

La Salle County – Wintergarden GCD

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	4,834	4,965	1,415	715	423	249	145	82	43
Pumping	5,831	10,604	7,534	7,534	7,534	7,534	7,534	7,534	7,534
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	1,372	1,084	709	682	616	554	508	500	490
General Head Boundary	8,770	8,167	8,077	7,589	7,185	6,880	6,621	6,396	6,191
Stream Leakage	6,745	4,454	3,622	3,100	2,782	2,490	2,276	2,106	1,966
Sparta - Out to Dimmit County - Wintergarden GCD - GMA 13	121	116	113	110	105	100	96	91	87
Sparta - Out to Frio County - Evergreen UWCD - GMA 13	236	239	242	241	240	240	240	240	240
Sparta - Out to McMullen County - McMullen GCD - GMA 13	248	256	269	278	287	294	301	307	313
Sparta - Out to Webb County - ND Webb - GMA 13	215	144	153	157	158	159	160	162	163
Weches - Out to Dimmit County - Wintergarden GCD - GMA 13	38	36	35	33	32	30	29	28	27
Weches - Out to Frio County - Evergreen UWCD - GMA 13	8	8	8	8	8	8	8	8	8
Weches - Out to McMullen County - McMullen GCD - GMA 13	49	52	55	59	62	65	67	70	72
Weches - Out to Webb County - ND Webb - GMA 13	17	12	14	15	15	15	15	15	16
Queen City - Out to Dimmit County - Wintergarden GCD - GMA 13	114	114	108	96	86	77	71	67	63
Queen City - Out to Frio County - Evergreen UWCD - GMA 13	110	129	129	105	103	103	104	105	106
Queen City - Out to McMullen County - McMullen GCD - GMA 13	399	419	475	518	557	589	622	654	684
Queen City - Out to Webb County - ND Webb - GMA 13	231	238	239	241	241	242	243	245	247
Reklaw - Out to Dimmit County - Wintergarden GCD - GMA 13	6	3	3	7	6	6	5	5	5
Reklaw - Out to Frio County - Evergreen UWCD - GMA 13	33	31	39	45	48	52	55	60	64
Reklaw - Out to McMullen County - McMullen GCD - GMA 13	64	73	87	105	112	120	130	139	147
Reklaw - Out to Webb County - ND Webb - GMA 13	20	33	38	40	40	40	40	40	40
Carrizo - Out to Dimmit County - Wintergarden GCD - GMA 13	162	79	92	53	46	44	43	42	44
Carrizo - Out to Frio County - Evergreen UWCD - GMA 13	7,627	6,352	14,753	10,751	10,930	11,136	11,302	11,440	11,808
Carrizo - Out to McMullen County - McMullen GCD - GMA 13	644	896	1,219	1,809	1,894	2,173	2,466	2,746	2,985
Carrizo - Out to Webb County - ND Webb - GMA 13	6	31	36	32	32	33	35	36	36
Upper Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	78	33	17	17	12	10	9	8	9
Upper Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	683	495	1,114	787	803	821	836	848	877
Upper Wilcox - Out to McMullen County - McMullen GCD - GMA 13	380	408	553	743	792	862	945	1,026	1,100
Upper Wilcox - Out to Webb County - ND Webb - GMA 13	2	2	3	2	2	2	2	2	3
Middle Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	6	2	1	0	0	0	0	0	1
Middle Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	269	229	120	146	169	198	227	253	280
Middle Wilcox - Out to McMullen County - McMullen GCD - GMA 13	53	48	47	49	52	59	69	79	90
Middle Wilcox - Out to Webb County - ND Webb - GMA 13	4	2	2	3	3	4	4	4	4
Lower Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	94	7	0	25	46	64	78	90	103
Lower Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	49	106	112	157	282	429	570	698	819
Lower Wilcox - Out to McMullen County - McMullen GCD - GMA 13	300	271	265	254	233	248	292	351	418
Lower Wilcox - Out to Webb County - ND Webb - GMA 13	56	30	27	33	42	49	52	53	53
Total Outflows from the GCAS	39,875	40,165	41,730	36,538	35,980	35,978	36,199	36,529	37,134
Total Increase(+)/Decrease(-) in Storage	-7,104	-6,473	-12,209	-7,169	-6,083	-5,571	-5,239	-4,997	-4,963

Maverick County – ND Maverick

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	1,041	101	298	172	97	87	109	4	3
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	3,908	4,352	4,352	4,352	4,352	4,352	4,352	4,352	4,352
Stream Leakage	2,579	2,418	2,040	1,806	1,671	1,585	1,486	1,414	1,373
Carrizo - In from Zavala County - Wintergarden GCD - GMA 13	81	75	7	6	6	7	7	8	8
Upper Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	0	2	3	5	6	7	8	8	9
Upper Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	23	16	11	25	22	22	21	19	18
Middle Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	131	164	173	185	195	203	211	217	222
Middle Wilcox - In from Webb County - ND Webb - GMA 13	278	273	263	253	245	239	237	235	234
Middle Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	28	16	12	15	13	13	13	11	11
Lower Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	1	1	1	1	1	1	1	1	1
Lower Wilcox - In from Webb County - ND Webb - GMA 13	6	5	4	3	2	1	0	0	0
Lower Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	5	5	5	6	6	7	7	8	8
Total Inflows	8,082	7,428	7,171	6,829	6,617	6,523	6,452	6,277	6,238

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	2,904	3,800	2,780	2,329	2,066	1,869	1,720	1,699	1,570
Pumping	1,644	15	545	545	545	545	545	276	276
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	149	165	183	190	196	202	205	210	213
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	109	59	79	153	216	253	284	339	386
Reklaw - Out to Zavala County - Wintergarden GCD - GMA 13	11	11	11	11	11	11	11	11	11
Carrizo - Out to Zavala County - Wintergarden GCD - GMA 13	668	709	831	763	752	761	769	776	783
Upper Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	123	100	90	80	72	65	59	55	51
Upper Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	39	42	52	75	51	51	51	52	51
Middle Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	454	533	549	563	574	583	591	597	603
Middle Wilcox - Out to Webb County - ND Webb - GMA 13	237	232	239	245	249	254	261	267	273
Middle Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	61	63	75	89	78	87	88	89	90
Lower Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	836	862	890	915	938	961	984	1,004	1,023
Lower Wilcox - Out to Webb County - ND Webb - GMA 13	270	260	268	271	273	275	276	278	280
Lower Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	578	576	578	600	596	606	608	623	628
Total Outflows from the GCAS	8,082	7,428	7,171	6,830	6,617	6,524	6,452	6,277	6,238

Total Increase(+)/Decrease(-) in Storage	1,863	3,699	2,482	2,157	1,969	1,783	1,611	1,695	1,567

McMullen County – McMullen GCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	2,018	6,854	6,076	5,175	3,560	3,884	4,114	4,335	4,570
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	469	520	566	716	894	1,046	1,208	1,384	1,570
Recharge	0	0	0	0	0	0	0	0	0
Stream Leakage	0	0	0	0	0	0	0	0	0
Sparta - In from Atascosa County - Evergreen UWCD - GMA 13	178	178	180	188	200	210	219	228	237
Sparta - In from Frio County - Evergreen UWCD - GMA 13	25	22	21	23	24	25	26	27	27
Sparta - In from La Salle County - Wintergarden GCD - GMA 13	248	256	269	278	287	294	301	307	313
Sparta - In from Live Oak County - Live Oak UWCD - GMA 16	2	2	2	2	3	3	3	3	3
Sparta - In from McMullen County - McMullen GCD - GMA 16	3	3	3	4	4	4	4	5	5
Sparta - In from Webb County - ND Webb - GMA 13	1	1	1	1	1	1	1	1	1
Weches - In from Atascosa County - Evergreen UWCD - GMA 13	20	20	20	21	23	24	26	29	31
Weches - In from Frio County - Evergreen UWCD - GMA 13	2	2	1	2	2	2	2	2	2
Weches - In from La Salle County - Wintergarden GCD - GMA 13	49	52	55	59	62	65	67	70	72
Weches - In from Live Oak County - Live Oak UWCD - GMA 16	3	2	2	3	3	3	3	3	2
Weches - In from McMullen County - McMullen GCD - GMA 16	24	21	24	29	32	33	34	35	37
Weches - In from Webb County - ND Webb - GMA 13	1	2	2	2	2	2	2	2	2
Queen City - In from Atascosa County - Evergreen UWCD - GMA 13	467	489	482	511	552	587	623	657	690
Queen City - In from Frio County - Evergreen UWCD - GMA 13	48	48	44	49	52	54	56	58	59
Queen City - In from La Salle County - Wintergarden GCD - GMA 13	399	419	475	518	557	589	622	654	684
Queen City - In from Live Oak County - Live Oak UWCD - GMA 16	15	9	8	11	12	10	8	6	5
Queen City - In from McMullen County - McMullen GCD - GMA 16	24	18	20	25	26	24	24	23	23
Queen City - In from Webb County - ND Webb - GMA 13	3	3	3	3	4	4	5	5	5
Reklaw - In from Atascosa County - Evergreen UWCD - GMA 13	45	48	54	57	52	50	49	51	53
Reklaw - In from Frio County - Evergreen UWCD - GMA 13	3	4	3	3	4	4	4	4	4
Reklaw - In from La Salle County - Wintergarden GCD - GMA 13	64	73	87	105	112	120	130	139	147
Reklaw - In from Live Oak County - Live Oak UWCD - GMA 16	28	26	37	37	24	16	11	8	6
Reklaw - In from McMullen County - McMullen GCD - GMA 16	18	37	43	47	35	35	35	35	35
Reklaw - In from Webb County - ND Webb - GMA 13	6	6	7	8	9	9	10	11	11
Carrizo - In from Atascosa County - Evergreen UWCD - GMA 13	762	1,150	615	218	63	73	80	86	90
Carrizo - In from La Salle County - Wintergarden GCD - GMA 13	644	896	1,219	1,809	1,894	2,173	2,466	2,746	2,985
Carrizo - In from Live Oak County - Live Oak UWCD - GMA 16	199	358	523	504	292	285	297	313	324
Carrizo - In from McMullen County - McMullen GCD - GMA 16	63	298	358	386	263	263	271	278	282
Carrizo - In from Webb County - ND Webb - GMA 13	21	22	25	30	32	34	35	37	39
Upper Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	105	91	72	21	11	13	15	16	17
Upper Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	380	408	553	743	792	862	945	1,026	1,100
Upper Wilcox - In from Live Oak County - Live Oak UWCD - GMA 16	108	95	183	193	113	126	137	146	150
Upper Wilcox - In from McMullen County - McMullen GCD - GMA 16	87	85	250	328	231	243	262	274	282
Upper Wilcox - In from Webb County - ND Webb - GMA 13	12	13	14	17	19	19	20	22	23
Middle Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	81	61	55	40	18	8	5	3	3
Middle Wilcox - In from Frio County - Evergreen UWCD - GMA 13	1	0	0	0	0	0	0	0	0
Middle Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	53	48	47	49	52	59	69	79	90
Middle Wilcox - In from Live Oak County - Live Oak UWCD - GMA 16	21	17	17	16	14	11	9	8	10
Middle Wilcox - In from McMullen County - McMullen GCD - GMA 16	9	6	3	2	1	1	2	2	3
Middle Wilcox - In from Webb County - ND Webb - GMA 13	2	2	2	2	2	2	2	2	2
Lower Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	814	714	669	389	56	13	18	29	39
Lower Wilcox - In from Frio County - Evergreen UWCD - GMA 13	11	8	7	3	0	0	0	0	0
Lower Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	300	271	265	254	233	248	292	351	418
Lower Wilcox - In from Live Oak County - Live Oak UWCD - GMA 16	128	122	120	114	92	72	72	100	149
Lower Wilcox - In from McMullen County - McMullen GCD - GMA 16	18	17	17	18	18	15	9	10	28
Lower Wilcox - In from Webb County - ND Webb - GMA 13	22	20	20	19	18	18	18	18	19
Total Inflows	8,001	13,814	13,522	13,031	10,748	11,638	12,612	13,624	14,644

McMullen County – McMullen GCD

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	1,786	861	680	427	239	121	51	15	1
Pumping	104	7,635	7,771	7,771	4,857	4,857	4,857	4,857	4,857
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	0	0	0	0	0	0	0	0	0
General Head Boundary	2,852	2,627	2,452	2,054	1,687	1,431	1,214	1,026	865
Stream Leakage	0	0	0	0	0	0	0	0	0
Sparta - Out to Atascosa County - Evergreen UWCD - GMA 13	98	95	96	95	93	94	94	95	95
Sparta - Out to La Salle County - Wintergarden GCD - GMA 13	70	65	45	40	36	33	30	27	25
Sparta - Out to Live Oak County - Live Oak UWCD - GMA 16	10	12	12	11	10	9	10	10	10
Sparta - Out to McMullen County - McMullen GCD - GMA 16	1	1	1	1	1	1	1	1	1
Weches - Out to Atascosa County - Evergreen UWCD - GMA 13	15	14	14	12	11	10	10	11	11
Weches - Out to La Salle County - Wintergarden GCD - GMA 13	7	6	4	3	3	2	2	1	1
Weches - Out to Live Oak County - Live Oak UWCD - GMA 16	10	12	12	10	8	7	8	8	9
Weches - Out to McMullen County - McMullen GCD - GMA 16	5	5	6	6	6	7	8	9	9
Queen City - Out to Atascosa County - Evergreen UWCD - GMA 13	100	91	100	95	95	102	110	116	122
Queen City - Out to La Salle County - Wintergarden GCD - GMA 13	75	74	27	13	7	5	3	2	1
Queen City - Out to Live Oak County - Live Oak UWCD - GMA 16	2	4	3	1	0	1	3	5	7
Queen City - Out to McMullen County - McMullen GCD - GMA 16	2	3	3	3	4	5	5	6	7
Reklaw - Out to Atascosa County - Evergreen UWCD - GMA 13	6	1	2	8	13	16	20	24	29
Reklaw - Out to La Salle County - Wintergarden GCD - GMA 13	16	56	4	5	5	5	5	4	4
Reklaw - Out to Live Oak County - Live Oak UWCD - GMA 16	0	0	0	0	0	0	3	8	13
Reklaw - Out to McMullen County - McMullen GCD - GMA 16	8	7	11	14	16	18	21	24	27
Carrizo - Out to Atascosa County - Evergreen UWCD - GMA 13	511	364	695	929	1,913	2,669	3,283	3,851	4,308
Carrizo - Out to Frio County - Evergreen UWCD - GMA 13	64	46	87	51	62	63	64	64	66
Carrizo - Out to La Salle County - Wintergarden GCD - GMA 13	1,287	966	701	653	763	793	810	820	849
Carrizo - Out to Live Oak County - Live Oak UWCD - GMA 16	0	0	0	0	8	79	156	236	306
Carrizo - Out to McMullen County - McMullen GCD - GMA 16	38	56	63	71	79	91	110	128	145
Upper Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	65	126	142	167	272	374	452	524	582
Upper Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	6	7	11	7	7	8	8	8	8
Upper Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	425	302	221	252	266	277	285	292	302
Upper Wilcox - Out to Live Oak County - Live Oak UWCD - GMA 16	0	0	0	0	7	61	104	144	179
Upper Wilcox - Out to McMullen County - McMullen GCD - GMA 16	40	31	43	61	77	93	111	129	146
Middle Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	2	2	2	4	11	30	54	79	104
Middle Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	0	0	0	1	3	4	4	5	5
Middle Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	35	27	21	17	16	19	24	29	34
Middle Wilcox - Out to Live Oak County - Live Oak UWCD - GMA 16	8	8	7	5	3	1	1	1	5
Middle Wilcox - Out to McMullen County - McMullen GCD - GMA 16	6	5	5	10	18	20	23	26	29
Lower Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	21	19	18	12	16	236	569	882	1,209
Lower Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	0	0	0	0	1	4	7	9	11
Lower Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	127	91	74	46	8	10	37	71	105
Lower Wilcox - Out to Live Oak County - Live Oak UWCD - GMA 16	105	103	99	84	43	9	3	36	107
Lower Wilcox - Out to McMullen County - McMullen GCD - GMA 16	95	94	92	91	87	74	56	45	52
Total Outflows from the GCAS	8,001	13,814	13,522	13,031	10,748	11,638	12,612	13,624	14,644
Total Increase(+)/Decrease(-) in Storage	-232	-5,993	-5,396	-4,748	-3,321	-3,763	-4,063	-4,321	-4,569

Medina County – Medina County GCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	18,314	15,922	12,793	11,633	10,552	9,792	9,145	8,592	8,163
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	12,184	13,588	13,588	13,588	13,588	13,588	13,588	13,588	13,588
Stream Leakage	2,479	2,491	2,492	2,476	2,489	2,504	2,515	2,527	2,531
Carrizo - In from Atascosa County - Evergreen UWCD - GMA 13	678	750	797	848	871	880	881	875	863
Carrizo - In from Uvalde County - Uvalde County UWCD - GMA 13	43	39	43	44	44	44	44	44	44
Upper Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	19	23	25	28	31	33	35	36	38
Upper Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 13	8	8	8	8	8	8	8	8	8
Middle Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	194	232	242	265	285	301	315	326	337
Middle Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	2	2	2	2	2	3	3	3	3
Middle Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 13	64	63	55	54	50	48	47	46	45
Lower Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	219	302	302	352	391	417	448	475	499
Lower Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	2	2	3	4	4	5	5	6	6
Lower Wilcox - In from Frio County - Evergreen UWCD - GMA 13	63	44	34	25	19	14	9	7	5
Lower Wilcox - In from Medina County - Medina County GCD - GMA 10	57	46	44	44	45	47	48	50	51
Lower Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 10	30	27	27	27	28	28	29	29	30
Lower Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 13	222	195	181	176	173	171	171	171	170
Total Inflows	34,576	33,733	30,636	29,573	28,581	27,883	27,291	26,782	26,381

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	1,643	1,512	1,337	1,014	834	716	620	543	479
Pumping	2,994	4,740	2,627	2,627	2,627	2,627	2,627	2,627	2,627
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	182	195	246	312	343	352	358	363	366
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	238	212	274	291	304	312	319	325	330
Reklaw - Out to Frio County - Evergreen UWCD - GMA 13	3	3	3	3	3	3	4	4	4
Carrizo - Out to Atascosa County - Evergreen UWCD - GMA 13	947	903	909	948	948	947	943	935	925
Carrizo - Out to Frio County - Evergreen UWCD - GMA 13	20,359	18,067	17,238	16,180	15,178	14,437	13,787	13,219	12,753
Carrizo - Out to Uvalde County - Uvalde County UWCD - GMA 13	6	6	6	6	6	6	6	6	6
Carrizo - Out to Zavala County - Wintergarden GCD - GMA 13	86	86	84	80	76	74	72	71	71
Upper Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	23	24	27	28	29	30	31	33	34
Upper Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	281	309	332	354	372	387	399	409	419
Upper Wilcox - Out to Uvalde County - Uvalde County UWCD - GMA 13	1	1	1	1	1	1	1	1	1
Upper Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	10	9	9	10	10	10	10	10	10
Middle Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	218	211	214	223	233	243	254	265	275
Middle Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	1,615	1,700	1,681	1,766	1,833	1,891	1,951	1,998	2,045
Middle Wilcox - Out to Uvalde County - Uvalde County UWCD - GMA 13	26	25	24	23	22	21	21	21	20
Middle Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	37	28	27	28	30	31	31	30	28
Lower Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	571	545	550	603	638	674	713	747	782
Lower Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 10	12	14	15	15	16	18	20	21	22
Lower Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	5,095	4,934	4,841	4,895	4,928	4,960	5,002	5,041	5,075
Lower Wilcox - Out to Medina County - Medina County GCD - GMA 10	7	6	7	7	7	7	6	6	6
Lower Wilcox - Out to Uvalde County - Uvalde County UWCD - GMA 13	162	151	138	120	106	102	87	80	79
Lower Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	61	51	45	39	34	32	30	28	26
Total Outflows from the GCAS	34,576	33,733	30,636	29,573	28,580	27,883	27,291	26,782	26,381

Total Increase(+)/Decrease(-) in Storage	-16,671	-14,410	-11,456	-10,620	-9,719	-9,076	-8,526	-8,049	-7,684

Uvalde County – Uvalde County UWCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	4,055	3,163	2,767	2,617	2,516	2,384	2,287	2,148	2,030
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	2,637	2,947	2,947	2,947	2,947	2,947	2,947	2,947	2,947
Stream Leakage	1,111	1,127	1,118	1,098	1,094	1,091	1,088	1,083	1,079
Carrizo - In from Medina County - Medina County GCD - GMA 13	6	6	6	6	6	6	6	6	6
Upper Wilcox - In from Medina County - Medina County GCD - GMA 13	1	1	1	1	1	1	1	1	1
Middle Wilcox - In from Medina County - Medina County GCD - GMA 13	26	25	24	23	22	21	21	21	20
Middle Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 10	27	26	28	28	28	28	28	28	28
Middle Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	0	0	1	1	0	0	0	0	0
Lower Wilcox - In from Medina County - Medina County GCD - GMA 13	162	151	138	120	106	102	87	80	79
Lower Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 10	965	942	992	1,005	1,007	1,002	997	991	986
Lower Wilcox - In from Zavala County - Wintergarden GCD - GMA 13	6	7	30	63	93	149	215	284	326
Total Inflows	8,996	8,395	8,054	7,909	7,821	7,733	7,677	7,590	7,503

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	224	363	211	123	103	88	85	75	63
Pumping	131	6	0	0	0	0	0	0	0
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	0	0	0	2	4	5	6	7	7
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	10	10	15	15	15	15	15	15	15
Carrizo - Out to Medina County - Medina County GCD - GMA 13	43	39	43	44	44	44	44	44	44
Carrizo - Out to Zavala County - Wintergarden GCD - GMA 13	1,580	1,561	1,632	1,642	1,649	1,659	1,661	1,660	1,661
Upper Wilcox - Out to Medina County - Medina County GCD - GMA 13	8	8	8	8	8	8	8	8	8
Upper Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	122	130	131	134	136	139	141	142	143
Middle Wilcox - Out to Medina County - Medina County GCD - GMA 13	64	63	55	54	50	48	47	46	45
Middle Wilcox - Out to Uvalde County - Uvalde County UWCD - GMA 10	1	1	1	1	1	1	1	1	1
Middle Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	1,155	1,073	1,027	1,013	1,005	989	972	956	935
Lower Wilcox - Out to Medina County - Medina County GCD - GMA 13	222	195	181	176	173	171	171	171	170
Lower Wilcox - Out to Uvalde County - Uvalde County UWCD - GMA 10	8	9	10	12	12	13	13	13	13
Lower Wilcox - Out to Zavala County - Wintergarden GCD - GMA 13	5,428	4,937	4,738	4,686	4,620	4,554	4,514	4,452	4,398
Total Outflows from the GCAS	8,996	8,395	8,054	7,909	7,821	7,733	7,677	7,590	7,504

Total Increase(+)/Decrease(-) in Storage	-3,832	-2,800	-2,556	-2,494	-2,413	-2,297	-2,202	-2,073	-1,967

Webb County – ND Webb

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	23,613	2,343	1,524	948	704	520	399	320	274
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	6,295	6,067	5,866	5,662	5,483	5,322	5,173	5,040	4,919
Recharge	13,889	15,522	15,522	15,522	15,522	15,522	15,522	15,522	15,522
Stream Leakage	36,255	41,019	39,325	37,503	35,704	34,516	33,527	32,713	32,023
Sparta - In from Dimmit County - Wintergarden GCD - GMA 13	33	32	31	29	28	27	26	25	24
Sparta - In from La Salle County - Wintergarden GCD - GMA 13	215	144	153	157	158	159	160	162	163
Weches - In from Dimmit County - Wintergarden GCD - GMA 13	23	21	19	18	16	15	14	13	12
Weches - In from La Salle County - Wintergarden GCD - GMA 13	17	12	14	15	15	15	15	15	16
Queen City - In from Dimmit County - Wintergarden GCD - GMA 13	656	638	630	589	549	511	478	445	417
Queen City - In from La Salle County - Wintergarden GCD - GMA 13	231	238	239	241	241	242	243	245	247
Reklaw - In from Dimmit County - Wintergarden GCD - GMA 13	242	252	256	259	251	251	252	252	252
Reklaw - In from La Salle County - Wintergarden GCD - GMA 13	20	33	38	40	40	40	40	40	40
Carrizo - In from Dimmit County - Wintergarden GCD - GMA 13	89	96	142	146	148	148	149	149	149
Carrizo - In from La Salle County - Wintergarden GCD - GMA 13	6	31	36	32	32	33	35	36	36
Upper Wilcox - In from Mexico	29	31	31	32	32	33	33	33	34
Upper Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	640	672	751	781	788	790	789	787	784
Upper Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	2	2	3	2	2	2	2	2	3
Middle Wilcox - In from Mexico	19	18	18	17	17	16	16	16	15
Middle Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	191	208	217	226	232	236	239	241	243
Middle Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	4	2	2	3	3	4	4	4	4
Middle Wilcox - In from Maverick County - ND Maverick - GMA 13	237	232	239	245	249	254	261	267	273
Lower Wilcox - In from Mexico	111	109	108	107	105	104	104	103	103
Lower Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	1,276	1,358	1,389	1,400	1,391	1,377	1,364	1,353	1,343
Lower Wilcox - In from La Salle County - Wintergarden GCD - GMA 13	56	30	27	33	42	49	52	53	53
Lower Wilcox - In from Maverick County - ND Maverick - GMA 13	270	260	268	271	273	275	276	278	280
Total Inflows	84,419	69,368	66,849	64,276	62,027	60,462	59,172	58,115	57,229

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	41,712	37,252	34,356	31,457	28,798	26,830	25,120	23,645	22,328
Pumping	626	524	1,006	1,006	1,006	1,006	1,006	1,006	1,006
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	5,876	5,793	5,791	5,796	5,819	5,843	5,885	5,927	5,955
General Head Boundary	829	768	772	777	781	783	785	787	790
Stream Leakage	25,712	15,140	15,252	15,306	15,411	15,541	15,669	15,786	15,915
Sparta - Out to Dimmit County - Wintergarden GCD - GMA 13	23	22	20	18	18	18	18	18	18
Sparta - Out to La Salle County - Wintergarden GCD - GMA 13	479	881	713	757	793	822	848	872	892
Sparta - Out to McMullen County - McMullen GCD - GMA 13	1	1	1	1	1	1	1	1	1
Weches - Out to Dimmit County - Wintergarden GCD - GMA 13	20	18	18	17	16	16	15	15	15
Weches - Out to La Salle County - Wintergarden GCD - GMA 13	83	94	94	97	101	104	107	109	112
Weches - Out to McMullen County - McMullen GCD - GMA 13	1	2	2	2	2	2	2	2	2
Queen City - Out to Dimmit County - Wintergarden GCD - GMA 13	688	769	823	886	944	998	1,048	1,100	1,162
Queen City - Out to La Salle County - Wintergarden GCD - GMA 13	1,356	1,373	1,389	1,407	1,437	1,470	1,501	1,532	1,563
Queen City - Out to McMullen County - McMullen GCD - GMA 13	3	3	3	3	4	4	5	5	5
Reklaw - Out to Dimmit County - Wintergarden GCD - GMA 13	278	279	278	280	291	302	312	320	328
Reklaw - Out to La Salle County - Wintergarden GCD - GMA 13	350	366	376	386	402	415	428	441	452
Reklaw - Out to McMullen County - McMullen GCD - GMA 13	6	6	7	8	9	9	10	11	11
Carrizo - Out to Mexico	3	2	2	2	2	2	3	3	3
Carrizo - Out to Dimmit County - Wintergarden GCD - GMA 13	266	259	226	233	240	247	254	260	267
Carrizo - Out to La Salle County - Wintergarden GCD - GMA 13	985	999	1,028	1,123	1,188	1,231	1,272	1,312	1,352
Carrizo - Out to McMullen County - McMullen GCD - GMA 13	21	22	25	30	32	34	35	37	39
Upper Wilcox - Out to Mexico	12	14	15	17	18	19	20	21	22
Upper Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	891	852	822	840	860	878	895	911	927
Upper Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	1,216	1,229	1,257	1,354	1,433	1,485	1,534	1,582	1,629
Upper Wilcox - Out to McMullen County - McMullen GCD - GMA 13	12	13	14	17	19	19	20	22	23
Middle Wilcox - Out to Mexico	18	18	17	17	16	16	16	15	15
Middle Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	135	118	111	107	105	104	104	104	105
Middle Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	130	129	128	126	127	128	129	131	134
Middle Wilcox - Out to Maverick County - ND Maverick - GMA 13	278	273	263	253	245	239	237	235	234
Middle Wilcox - Out to McMullen County - McMullen GCD - GMA 13	2	2	2	2	2	2	2	2	2
Lower Wilcox - Out to Mexico	109	107	106	104	103	102	101	101	100
Lower Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	1,306	1,145	1,081	1,039	1,023	1,019	1,023	1,031	1,041
Lower Wilcox - Out to La Salle County - Wintergarden GCD - GMA 13	973	878	834	794	772	760	758	762	771
Lower Wilcox - Out to Maverick County - ND Maverick - GMA 13	6	5	4	3	2	1	0	0	0
Lower Wilcox - Out to McMullen County - McMullen GCD - GMA 13	22	20	20	19	18	18	18	18	19
Total Outflows from the GCAS	84,427	69,376	66,856	64,283	62,036	60,468	59,179	58,123	57,237

Total Increase(+)/Decrease(-) in Storage	18,098	34,909	32,832	30,509	28,094	26,310	24,720	23,325	22,055

Wilson County – Evergreen UWCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	9,317	24,044	44,426	43,446	47,379	55,416	78,041	68,401	62,206
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	798	859	967	1,122	1,298	1,493	1,704	1,920	2,148
Recharge	19,081	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325
Stream Leakage	7,330	8,595	11,455	13,348	14,095	14,871	15,621	16,068	16,213
Sparta - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	1	1	1	1	1	1	1
Sparta - In from Gonzales County - Gonzales County UWCD - GMA 13	24	25	26	27	28	29	30	31	32
Sparta - In from Karnes County - Evergreen UWCD - GMA 13	134	129	118	88	60	40	28	22	19
Weches - In from Gonzales County - Gonzales County UWCD - GMA 13	4	4	5	5	5	4	4	4	5
Weches - In from Karnes County - Evergreen UWCD - GMA 13	12	11	11	7	5	4	2	1	1
Queen City - In from Atascosa County - Evergreen UWCD - GMA 13	0	2	0	0	0	0	0	0	0
Queen City - In from Gonzales County - Gonzales County UWCD - GMA 13	27	28	33	41	48	54	59	64	69
Queen City - In from Guadalupe County - Guadalupe County GCD - GMA 13	5	5	6	6	7	8	8	9	10
Queen City - In from Karnes County - Evergreen UWCD - GMA 13	12	11	8	6	4	2	1	1	2
Reklaw - In from Bexar County - Edwards Aquifer Authority - GMA 13	47	47	58	72	77	80	82	84	79
Reklaw - In from Gonzales County - Gonzales County UWCD - GMA 13	1	1	2	2	2	3	5	7	6
Reklaw - In from Guadalupe County - Guadalupe County GCD - GMA 13	19	22	30	34	38	42	45	43	42
Reklaw - In from Karnes County - Evergreen UWCD - GMA 13	2	2	4	9	8	7	6	5	3
Carrizo - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	379	636	970	1,617	1,785	1,866	1,832
Carrizo - In from Bexar County - Edwards Aquifer Authority - GMA 13	3,563	2,735	2,378	2,599	2,892	3,038	3,135	3,190	3,208
Carrizo - In from Gonzales County - Gonzales County UWCD - GMA 13	143	0	0	0	0	0	0	0	0
Carrizo - In from Guadalupe County - Guadalupe County GCD - GMA 13	2,067	3,100	3,728	3,543	3,382	3,234	2,986	2,715	2,365
Carrizo - In from Karnes County - Evergreen UWCD - GMA 13	506	926	1,596	1,828	2,284	2,780	3,129	3,504	3,653
Upper Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	0	0	1	1	1	1	1
Upper Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	29	43	38	52	65	77	88	100	111
Upper Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	0	0	0	0	0	0
Upper Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	28	36	39	39	43	50	54	57	60
Upper Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	0	0	8	8	10	12	13	15	16
Middle Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	6	12	12	23	24	28	55
Middle Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	588	591	771	1,034	1,161	1,490	1,670	1,878	2,090
Middle Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	12	10	0	0	0	0	0	0	0
Middle Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	1,648	1,637	1,471	1,663	1,899	2,283	2,526	2,864	3,099
Middle Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	2	2	21	207	446	676	830	978	1,047
Lower Wilcox - In from Atascosa County - Evergreen UWCD - GMA 13	0	0	1,361	1,414	1,440	3,647	4,112	5,558	6,881
Lower Wilcox - In from Bexar County - Edwards Aquifer Authority - GMA 13	3,135	3,138	6,614	7,888	8,446	17,977	18,632	22,303	22,847
Lower Wilcox - In from Gonzales County - Gonzales County UWCD - GMA 13	48	42	11	0	0	0	0	1,562	2,186
Lower Wilcox - In from Guadalupe County - Guadalupe County GCD - GMA 13	1,791	1,645	1,080	3,739	7,016	10,558	15,123	20,872	21,809
Lower Wilcox - In from Karnes County - Evergreen UWCD - GMA 13	2	8	16	1,341	3,315	6,048	9,521	22,185	23,239
Total Inflows	50,379	69,025	97,991	105,543	117,761	146,890	180,591	197,664	196,660

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	6,315	4,584	2,188	1,336	841	554	388	282	202
Pumping	11,943	27,213	41,366	40,042	45,049	69,997	107,181	126,771	126,771
Springs	1,008	694	541	402	310	231	172	127	97
Evapotranspiration	355	254	224	151	106	97	22	23	27
General Head Boundary	4,458	4,173	3,850	3,479	3,136	2,839	2,566	2,315	2,076
Stream Leakage	7,561	6,771	6,473	5,619	4,799	3,858	3,165	2,844	2,530
Sparta - Out to Atascosa County - Evergreen UWCD - GMA 13	192	185	186	186	183	180	178	175	172
Sparta - Out to Gonzales County - Gonzales County UWCD - GMA 13	138	143	144	145	144	144	143	142	141
Sparta - Out to Karnes County - Evergreen UWCD - GMA 13	59	62	70	97	122	153	189	231	274
Weches - Out to Atascosa County - Evergreen UWCD - GMA 13	30	29	30	29	29	28	28	27	27
Weches - Out to Gonzales County - Gonzales County UWCD - GMA 13	16	17	17	17	17	17	17	17	17
Weches - Out to Karnes County - Evergreen UWCD - GMA 13	33	33	35	51	67	83	99	114	129
Queen City - Out to Atascosa County - Evergreen UWCD - GMA 13	535	491	538	605	616	607	598	584	569
Queen City - Out to Gonzales County - Gonzales County UWCD - GMA 13	710	726	870	954	984	1,001	1,012	1,014	1,011
Queen City - Out to Guadalupe County - Guadalupe County GCD - GMA 13	1	1	1	1	1	1	1	1	1
Queen City - Out to Karnes County - Evergreen UWCD - GMA 13	469	462	441	552	663	765	864	960	1,053
Reklaw - Out to Atascosa County - Evergreen UWCD - GMA 13	80	80	57	65	74	79	83	82	89
Reklaw - Out to Bexar County - Edwards Aquifer Authority - GMA 13	0	1	2	2	4	6	8	9	10
Reklaw - Out to Gonzales County - Gonzales County UWCD - GMA 13	33	47	67	74	79	81	83	87	92
Reklaw - Out to Guadalupe County - Guadalupe County GCD - GMA 13	2	2	3	3	3	3	3	2	2
Reklaw - Out to Karnes County - Evergreen UWCD - GMA 13	91	75	47	65	79	90	102	113	126
Carrizo - Out to Atascosa County - Evergreen UWCD - GMA 13	5,265	4,888	2,074	3,734	3,979	3,628	3,418	3,182	3,053
Carrizo - Out to Bexar County - Edwards Aquifer Authority - GMA 13	506	996	7,873	12,104	14,481	16,682	17,089	17,590	18,126
Carrizo - Out to Gonzales County - Gonzales County UWCD - GMA 13	1,798	9,171	11,697	12,541	13,875	14,528	14,473	14,617	14,019
Carrizo - Out to Guadalupe County - Guadalupe County GCD - GMA 13	1	156	414	789	990	1,162	1,238	1,280	1,298
Carrizo - Out to Karnes County - Evergreen UWCD - GMA 13	4,265	3,371	1,527	1,920	1,801	1,578	1,335	1,045	925
Upper Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	4	4	2	3	3	3	3	3	3
Upper Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 13	1	2	9	14	18	22	25	27	29
Upper Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	2	8	11	11	12	13	12	12	12
Upper Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	0	0	3	8	11	13	14	16	18
Upper Wilcox - Out to Karnes County - Evergreen UWCD - GMA 13	4	5	0	1	0	0	0	0	0
Middle Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	56	67	54	72	84	53	36	16	1
Middle Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 13	206	146	131	171	183	195	207	201	190
Middle Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	154	259	1,018	2,701	4,125	5,503	5,698	5,487	5,356
Middle Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	77	72	178	459	797	1,220	1,475	1,587	1,606
Middle Wilcox - Out to Karnes County - Evergreen UWCD - GMA 13	126	113	70	31	25	29	36	43	48
Lower Wilcox - Out to Atascosa County - Evergreen UWCD - GMA 13	603	670	158	102	83	0	0	0	0
Lower Wilcox - Out to Bexar County - Edwards Aquifer Authority - GMA 13	325	318	12,161	12,133	12,150	10,922	10,961	10,435	10,198
Lower Wilcox - Out to Gonzales County - Gonzales County UWCD - GMA 13	298	278	855	3,086	5,100	7,061	3,458	1,649	1,639
Lower Wilcox - Out to Guadalupe County - Guadalupe County GCD - GMA 13	424	419	1,004	1,703	2,619	3,288	3,958	3,797	3,857
Lower Wilcox - Out to Karnes County - Evergreen UWCD - GMA 13	2,234	2,036	1,604	82	120	174	254	756	867
Total Outflows from the GCAS	50,378	69,025	97,991	105,542	117,761	146,890	180,592	197,665	196,660

Total Increase(+)/Decrease(-) in Storage	-3,002	-19,460	-42,238	-42,110	-46,538	-54,861	-77,652	-68,119	-62,005

Zavala County – Wintergarden GCD

Inflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
Out of Storage	20,199	21,927	17,469	12,960	10,599	9,606	8,706	7,976	7,195
River Leakage	0	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0	0
Recharge	22,103	24,702	24,702	24,702	24,702	24,702	24,702	24,702	24,702
Stream Leakage	24,094	23,964	23,921	23,659	23,445	23,193	22,993	22,619	22,262
Sparta - In from Dimmit County - Wintergarden GCD - GMA 13	14	19	22	24	25	26	27	27	27
Sparta - In from Frio County - Evergreen UWCD - GMA 13	7	8	9	9	8	8	8	7	6
Weches - In from Dimmit County - Wintergarden GCD - GMA 13	2	2	2	2	2	3	3	3	3
Weches - In from Frio County - Evergreen UWCD - GMA 13	4	4	4	3	3	3	3	4	4
Queen City - In from Dimmit County - Wintergarden GCD - GMA 13	691	744	773	793	810	795	769	759	743
Queen City - In from Frio County - Evergreen UWCD - GMA 13	397	416	423	419	419	418	416	411	406
Reklaw - In from Dimmit County - Wintergarden GCD - GMA 13	108	113	104	111	113	112	112	114	115
Reklaw - In from Frio County - Evergreen UWCD - GMA 13	63	49	45	46	42	36	34	33	31
Reklaw - In from Maverick County - ND Maverick - GMA 13	11	11	11	11	11	11	11	11	11
Carrizo - In from Dimmit County - Wintergarden GCD - GMA 13	3,228	3,751	3,651	3,747	3,905	4,041	4,159	4,263	4,374
Carrizo - In from Frio County - Evergreen UWCD - GMA 13	1,600	526	291	268	215	203	184	218	318
Carrizo - In from Maverick County - ND Maverick - GMA 13	668	709	831	763	752	761	769	776	783
Carrizo - In from Medina County - Medina County GCD - GMA 13	86	86	84	80	76	74	72	71	71
Carrizo - In from Uvalde County - Uvalde County UWCD - GMA 13	1,580	1,561	1,632	1,642	1,649	1,659	1,661	1,660	1,661
Upper Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	425	473	461	455	471	486	500	513	527
Upper Wilcox - In from Frio County - Evergreen UWCD - GMA 13	34	33	33	34	35	36	37	38	38
Upper Wilcox - In from Maverick County - ND Maverick - GMA 13	39	42	52	75	51	51	51	52	51
Upper Wilcox - In from Medina County - Medina County GCD - GMA 13	10	9	9	10	10	10	10	10	10
Upper Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 13	122	130	131	134	136	139	141	142	143
Middle Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	1,145	1,216	1,036	1,029	1,018	1,007	998	990	984
Middle Wilcox - In from Frio County - Evergreen UWCD - GMA 13	101	143	135	135	134	133	131	129	127
Middle Wilcox - In from Maverick County - ND Maverick - GMA 13	61	63	75	89	78	87	88	89	90
Middle Wilcox - In from Medina County - Medina County GCD - GMA 13	37	28	27	28	30	31	31	30	28
Middle Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 13	1,155	1,073	1,027	1,013	1,005	989	972	956	935
Lower Wilcox - In from Dimmit County - Wintergarden GCD - GMA 13	1,342	1,265	1,231	1,281	1,301	1,317	1,329	1,337	1,347
Lower Wilcox - In from Frio County - Evergreen UWCD - GMA 13	408	327	308	293	277	265	254	244	234
Lower Wilcox - In from Maverick County - ND Maverick - GMA 13	578	576	578	600	596	606	608	623	628
Lower Wilcox - In from Medina County - Medina County GCD - GMA 13	61	51	45	39	34	32	30	28	26
Lower Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 10	40	37	36	36	35	34	34	34	34
Lower Wilcox - In from Uvalde County - Uvalde County UWCD - GMA 13	5,428	4,937	4,738	4,686	4,620	4,554	4,514	4,452	4,398
Total Inflows	85,839	88,993	83,898	79,176	76,610	75,428	74,356	73,323	72,313

Outflows

Source	2000	2012	2020	2030	2040	2050	2060	2070	2080
In to Storage	40,835	32,533	31,131	29,378	28,013	26,737	25,617	24,477	23,202
Pumping	32,572	44,590	38,205	36,680	35,309	35,210	35,011	34,836	34,545
Springs	0	0	0	0	0	0	0	0	0
Evapotranspiration	0	0	0	0	0	0	0	5	9
General Head Boundary	0	0	0	0	0	0	0	0	0
Stream Leakage	81	80	99	109	126	142	155	167	185
Sparta - Out to Dimmit County - Wintergarden GCD - GMA 13	37	42	46	50	53	56	59	61	63
Sparta - Out to Frio County - Evergreen UWCD - GMA 13	59	65	70	75	80	83	88	92	96
Weches - Out to Dimmit County - Wintergarden GCD - GMA 13	5	6	6	7	8	8	9	10	11
Weches - Out to Frio County - Evergreen UWCD - GMA 13	7	8	8	9	9	10	11	12	13
Queen City - Out to Dimmit County - Wintergarden GCD - GMA 13	322	346	368	400	445	492	538	601	646
Queen City - Out to Frio County - Evergreen UWCD - GMA 13	408	406	406	408	411	413	416	418	421
Reklaw - Out to Dimmit County - Wintergarden GCD - GMA 13	45	62	66	70	91	57	57	56	62
Reklaw - Out to Frio County - Evergreen UWCD - GMA 13	157	153	155	155	154	155	155	155	156
Carrizo - Out to Dimmit County - Wintergarden GCD - GMA 13	639	658	798	812	820	820	823	826	839
Carrizo - Out to Frio County - Evergreen UWCD - GMA 13	8,559	8,075	10,651	9,151	9,200	9,292	9,388	9,499	9,891
Carrizo - Out to Maverick County - ND Maverick - GMA 13	81	75	7	6	6	7	7	8	8
Upper Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	113	123	117	127	127	126	127	127	128
Upper Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	320	246	384	336	338	339	340	339	345
Upper Wilcox - Out to Maverick County - ND Maverick - GMA 13	23	16	11	25	22	22	21	19	18
Middle Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	14	30	11	11	10	10	9	9	9
Middle Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	527	323	294	303	308	312	316	319	326
Middle Wilcox - Out to Maverick County - ND Maverick - GMA 13	28	16	12	15	13	13	13	11	11
Middle Wilcox - Out to Uvalde County - Uvalde County UWCD - GMA 13	0	0	1	1	0	0	0	0	0
Lower Wilcox - Out to Dimmit County - Wintergarden GCD - GMA 13	55	155	100	69	55	47	43	40	39
Lower Wilcox - Out to Frio County - Evergreen UWCD - GMA 13	941	974	919	910	913	921	932	944	959
Lower Wilcox - Out to Maverick County - ND Maverick - GMA 13	5	5	5	6	6	7	7	8	8
Lower Wilcox - Out to Uvalde County - Uvalde County UWCD - GMA 13	6	7	30	63	93	149	215	284	326
Total Outflows from the GCAS	85,839	88,993	83,899	79,177	76,610	75,429	74,356	73,323	72,313

Total Increase(+)/Decrease(-) in Storage	20,636	10,606	13,661	16,418	17,414	17,131	16,911	16,501	16,006

Appendix 5.6 —
Presentation Regarding Hydrological Conditions

DISCUSSION OF HYDROLOGICAL CONDITIONS

GMA 13 Agenda Item 8

June 26, 2020

LRE WATER

CONSIDERATION

- Texas Water Code Section 36.108(d)(3)
- Total Estimated Recoverable Storage (TERS)
- Recharge
- Inflows
- Discharge

TERS – SPARTA, QUEEN CITY, & CARRIZO-WILCOX

- Calculated by TWDB
- Total for GMA 13 = 2.2 billion acre-feet
  - 25% = 551 million acre-feet
  - 75% = 1.65 billion acre-feet
- Based on GAM structure and properties
- No consideration for water quality
- Will likely change with new model

INFLOWS/OUTFLOWS

- Estimates based on model results
- Primary outflow is pumping (> 475,000 acre-feet per year)
- Average of more than 200,000 acre-feet per year (~0.3 inches per year)
- Stream leakage is the highest inflow (net inflow > 50,000 acre-feet per year in planning period)
  - Highly uncertain
  - Does not accurately reflect other recent research by TWDB

CHANGE IN STORAGE

- Storage decline of 180,000 to 230,000 acre-feet per year from 2020 through 2080

- 61-year storage reduction
  - < 1 percent of 100% TERS estimate
  - < 3 percent of 25% TERS estimate

DISCUSSION

- Pumping will continue to be the greatest outflow
  - Current pumping file simulates more than 500,000 acre-feet per year
- Modeling suggests additional inflow from streams will occur
  - Magnitude of inflow is relative
  - GAM is not a good tool for simulating effects on surface water
- Modeled storage reduction is relatively small
- Values will change with new model

QUESTIONS/DISCUSSION

Discussion of Hydrological Conditions

GMA 13 Agenda Item 8
June 26, 2020

Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

LRE WATER

Appendix 5.7 —
Discussion of Environmental Impacts

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 13
From:	Michael R. Keester, P.G.
Date:	July 6, 2020
Project:	2021 Joint Planning
Subject:	Discussion of Environmental Impacts

Per Texas Water Code Section 36.108(d)(4) districts within each groundwater management area shall consider "other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water" as they relate to proposed desired future conditions. Typically the primary environmental factor of interest is the impact of pumping on baseflows in rivers and streams. However, quantitative assessment of how pumping associated with potential desired future conditions may affect streamflow is not possible with the available tools.

Kelley and others (2004) discuss the limitations of the existing model to predict baseflow. The errors and uncertainty in the GAM associated with the predicted effects on streamflow are well documented and the water budgets provided in the discussion of hydrogeological conditions should be viewed as relative rather than absolute amounts. As noted in the discussion of hydrogeological conditions, the GAM does show an increase in the amount of water captured from streamflow; however, due to the size of the grid cells and the purpose of the model, the results are at best a relative representation of how declining water levels may cause streams to gain less water from the shallow groundwater system or how springs may discharge less groundwater.

In 2016, the Texas Water Development Board completed a study that included an assessment of the contribution of groundwater to surface water (Anaya and others, 2016). For their study, Anaya and others (2016) did not use the available groundwater models noting that "they are generally not appropriately scaled, conceptualized, or calibrated to model groundwater and surface-water interactions." Rather, they utilized information from U.S. Geological Survey stream gages to assess the contribution of groundwater to stream baseflow.

The study results identified that for the entire Carrizo-Wilcox Aquifer an estimated 1,100,000 acre-feet of groundwater discharges annually to surface water. For the Sparta the estimated average annual baseflow is 189,000 acre-feet and it is 1,050,000 for the Queen City. Most of the baseflow from these aquifers occurs in the eastern portion of Texas near Louisiana with an average annual groundwater discharge from the three aquifers of about 170,000 acre-feet occurring in the counties in GMA 13. Table 1, Table 2, and Table 3 provide the estimated baseflow values for counties in GMA 13 from the Carrizo-Wilcox, Queen City, and Sparta aquifers, respectively.

Table 1. Estimated groundwater flow from the Carrizo-Wilcox Aquifer to surface water by county in GMA 13 (Anaya and others, 2016).

County	Outcrop Area (Square Miles)	Average Baseflow (Arce-Feet per Year)	Median Baseflow (Arce-Feet per Year)
Atascosa	143	9,346	3,260
Bexar	366	29,920	11,881
Caldwell	299	20,068	4,637
Dimmit	256	2,753	652
Frio	26	869	290
Gonzales	21	2,318	797
Guadalupe	362	19,633	5,941
Karnes	0	0	0
La Salle	0	0	0
Maverick	189	2,898	724
McMullen	0	0	0
Medina	342	14,344	4,709
Uvalde	118	2,825	580
Webb	22	217	72
Wilson	143	7,897	2,898
Zapata	—	—	—
Zavala	255	5,506	1,232
Total	2,542	118,595	37,672

Table 2. Estimated groundwater flow from the Queen City Aquifer to surface water by county in GMA 13 (Anaya and others, 2016).

County	Outcrop Area (Square Miles)	Average Baseflow (Arce-Feet per Year)	Median Baseflow (Arce-Feet per Year)
Atascosa	185	11,229	3,985
Bexar	0	0	0
Caldwell	21	1,739	580
Dimmit	0	0	0
Frio	381	10,722	3,405
Gonzales	144	9,490	2,898
Guadalupe	2	145	72
Karnes	0	0	0
La Salle	0	0	0
Maverick	0	0	0
McMullen	0	0	0
Medina	0	0	0
Uvalde	0	0	0
Webb	0	0	0
Wilson	227	13,113	4,854
Zapata	—	—	—
Zavala	0	0	0
Total	960	46,438	15,793

Table 3. Estimated groundwater flow from the Sparta Aquifer to surface water by county in GMA 13 (Anaya and others, 2016).

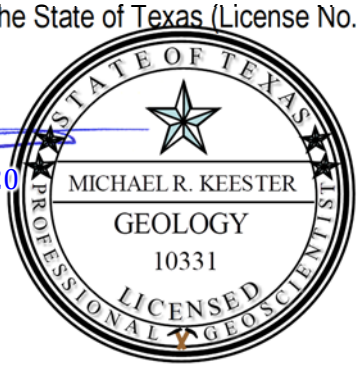
County	Outcrop Area (Square Miles)	Average Baseflow (Arce-Feet per Year)	Median Baseflow (Arce-Feet per Year)
Atascosa	0	0	0
Bexar	0	0	0
Caldwell	0	0	0
Dimmit	0	0	0
Frio	60	942	290
Gonzales	47	3,333	1,014
Guadalupe	0	0	0
Karnes	0	0	0
La Salle	0	0	0
Maverick	0	0	0
McMullen	0	0	0
Medina	0	0	0
Uvalde	0	0	0
Webb	0	0	0
Wilson	39	2,246	797
Zapata	—	—	—
Zavala	0	0	0
Total	146	6,520	2,101

The contribution of groundwater to baseflow occurs in the outcrop area where streams are in direct contact with the aquifer materials. Where groundwater levels are shallow in the outcrop area, the groundwater may discharge to local surface water drainages. If groundwater levels decline below the bottom of the streambed, groundwater will no longer discharge to that portion of the stream and the stream may begin losing water to the aquifer.

The adopted DFC of minimizing water level declines in the outcrop area may directly affect the contribution to baseflow. While there may be some diminishment in baseflow contribution due to declining water levels associated with pumping, we do not anticipate a significant decline during the planning period. That is, we would not expect the overall contribution to streams within GMA 13 to diminish to the point where streams were contributing to groundwater rather than groundwater discharging to streams.

Geoscientist Seal

This report documents the work of the following licensed professional geoscientists with LRE Water, LLC, a licensed professional geoscientist firm in the State of Texas (License No. 50516).



Michael R. Keester, P.G. 07/06/2020
Senior Project Manager | Hydrogeologist

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Appendix 5.8 —
Presentation Regarding Environmental Impacts

DISCUSSION OF ENVIRONMENTAL IMPACTS

GMA 13 Agenda Item 8

June 26, 2020

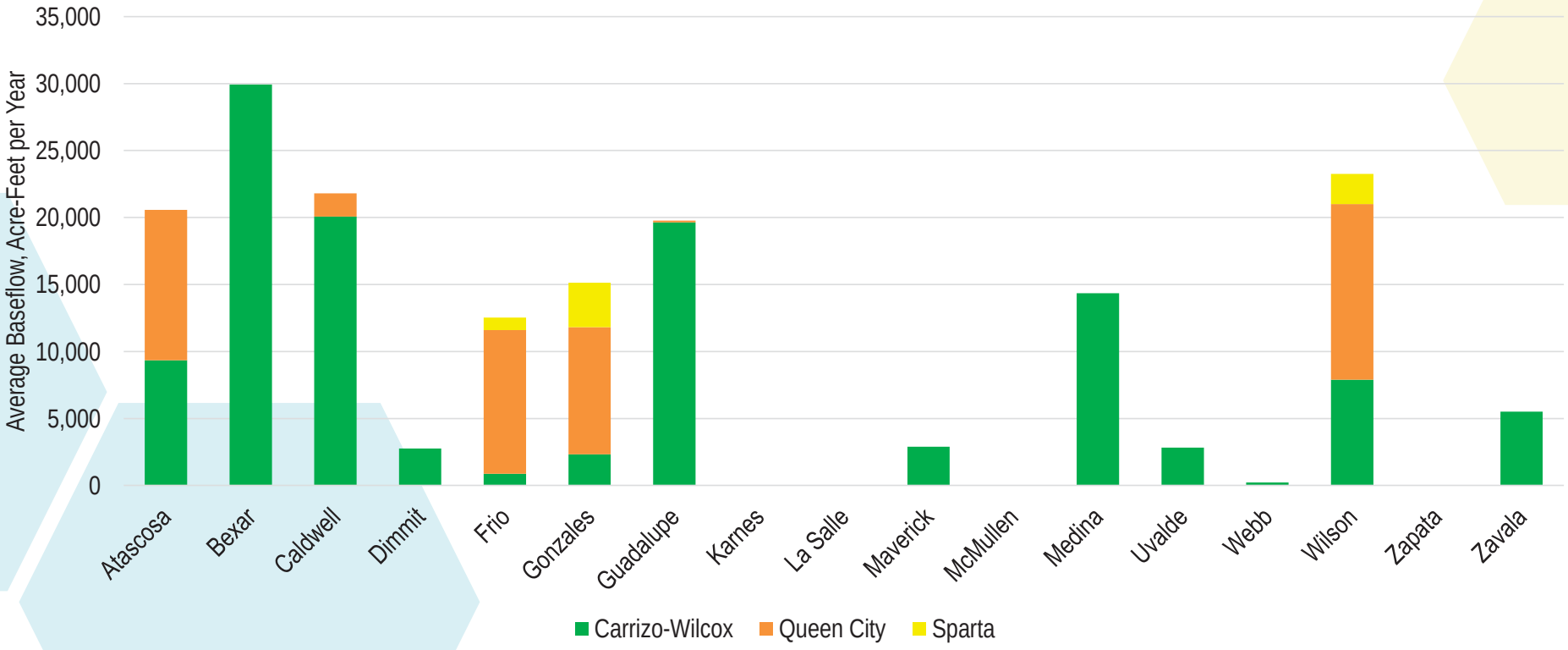
CONSIDERATION

- Texas Water Code Section 36.108(d)(4)
- Impact on streamflow as it relates to the interaction between surface water and groundwater
- Not possible to model with the GAM

2016 TEXAS AQUIFERS STUDY

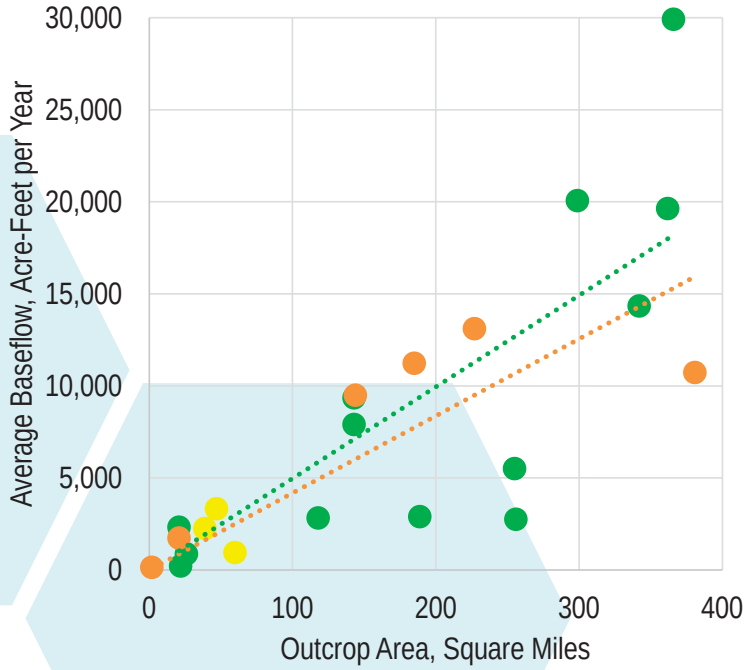
- Study conducted by the TWDB
- Used USGS stream gage data to assess contributions of groundwater to stream baseflow
- Approximately 2.34 million acre-feet per year of groundwater discharges from the Sparta, Queen City, and Carrizo-Wilcox aquifers to surface water
  - Approximately 170,000 acre-feet per year in GMA 13

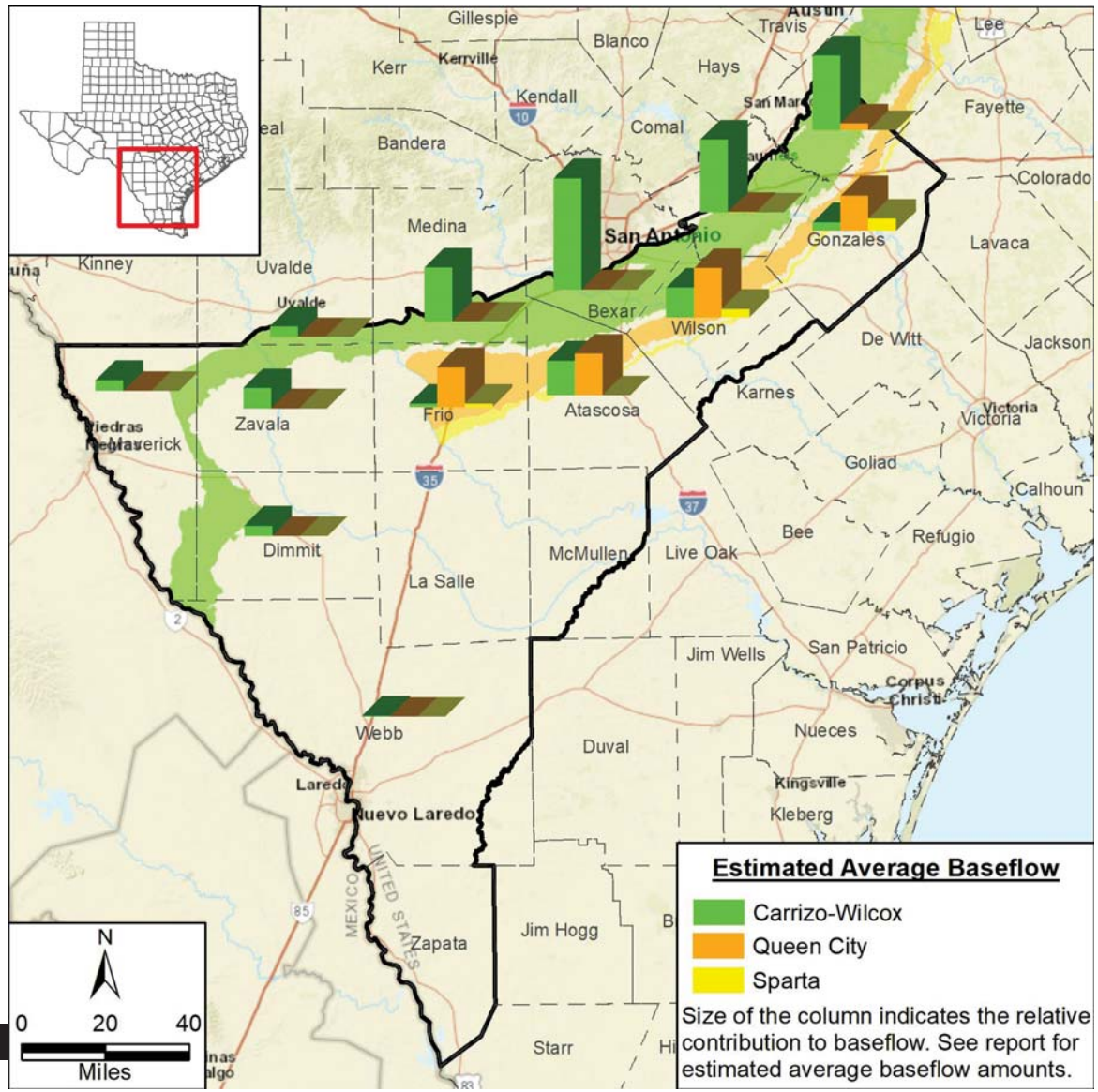
AVERAGE BASEFLOW



AVERAGE BASEFLOW

Generally, more outcrop = more baseflow





DISCUSSION

- Estimated baseflow is much greater than represented in the GAM
- Some possible decline in baseflow associated with water level declines
- Limiting decrease in saturated thickness in outcrop areas will minimize impact to baseflow

QUESTIONS/DISCUSSION

Discussion of Environmental Impacts

GMA 13 Agenda Item 8
June 26, 2020

Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

LRE WATER

Appendix 5.9 —
Discussion of Subsidence Impacts

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 13
From:	Michael R. Keester, P.G.
Date:	November 13, 2020
Project:	2021 Joint Planning
Subject:	Discussion of Subsidence Impacts

Per Texas Water Code Section 36.108(d)(5) districts within each groundwater management area shall consider "impacts on subsidence" as they relate to proposed desired future conditions. As noted in the explanatory reports for the 2016 Joint Planning, land subsidence has not been an issue with the Sparta, Queen City, Carrizo-Wilcox, or Yegua-Jackson aquifers (Hutchison, 2017a; Hutchison, 2017b). While subsidence has not historically been an issue, that does not mean it has not or will not occur.

When considering the potential for subsidence, as discussed by Furnans and others (2018), there are three primary variables that determine the magnitude, location, and timing of subsidence related to groundwater pumping, namely:

- The distribution, thickness, and compressibility of clay layers;
- The amount and timing of water-level changes; and,
- The lowest historical water level (that is, long-term water level declines).

Clay thickness within the GMA 13 aquifers is typically less than 100 feet. Furnans and others (2018) characterize the clays of the Carrizo-Wilcox, Queen City, and Sparta aquifers as hard with the clays of the Yegua-Jackson Aquifer characterized as stiff. When water levels in the aquifers decline it causes a depressurization of the aquifer which releases water slowly from the clay layers. The slow dewatering of these clay layers causes the reorientation of the clay grains perpendicular to the vertical load causing aquifer compaction and land surface subsidence (Kasmarek, 2013). Furnans and others (2018) evaluated each of the factors determining subsidence risk at nearly 6,000 well locations within GMA 13. Figure 1 illustrates the subsidence risk at well locations in GMA 13.

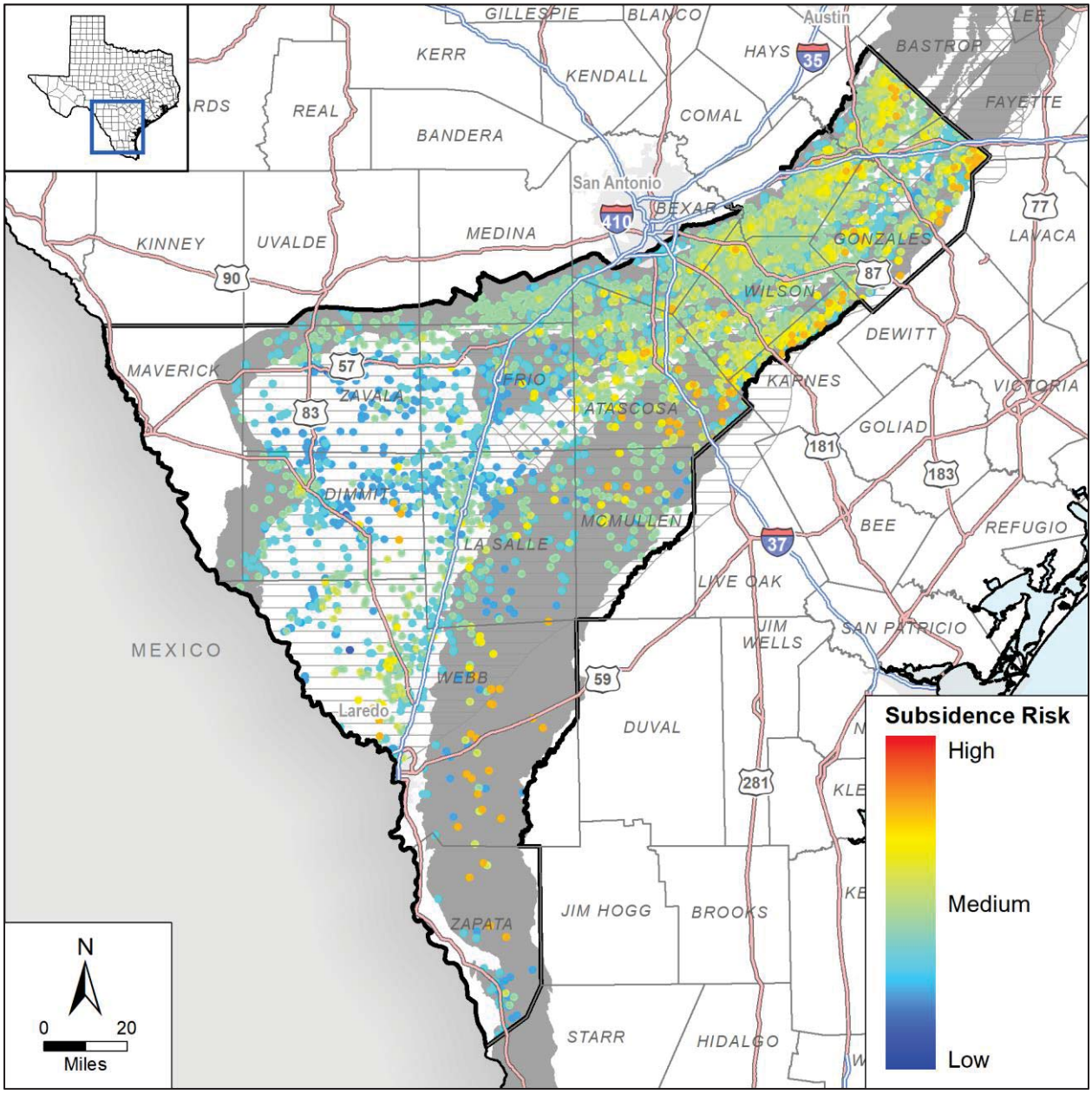


Figure 1. Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers subsidence risk vulnerability at well locations. Modified from Furnans and others (2018).

The risk values illustrated on Figure 1 are qualitative and illustrate the relative subsidence risk at the well locations. The values range from 0 to 10 (inclusive) with a value of 0 indicating low risk for subsidence due to groundwater pumping and a value of 10 indicating high risk. Visual review of Figure 1 suggests that much of the area has a low to medium risk for subsidence. Evaluation of the risk assessment at the well locations

indicates more than 75 percent of the well locations (third quartile) in GMA 13 have a subsidence risk value of 4.8 or less. Table 1 provides summary statistics for the subsidence risk values for all of the aquifers for each county in GMA 13. Figure 2 is a box and whisker plot illustrating the total weighted subsidence risk statistics for all of the aquifers for each county in GMA 13 (see Figure 3 for an explanation of the parts of the box and whisker plot). Attached are tables (Table 4 through Table 7) and plots (Figure 6 through Figure 9) of the subsidence risk values for each of the aquifers.

Development of the total weighted risk for subsidence due to groundwater pumping included assessing how water levels were predicted to change under the adopted desired future conditions (Furnans and others, 2018). Using the current pumping scenarios, we updated the calculations and the subsidence risk value results for the potential desired future conditions and the results are not significantly different from the results reported by Furnans and others (2018).

Using the formulas provided in the subsidence prediction tool developed as part of the evaluation of subsidence risk, we calculated the predicted range in potential subsidence at each well location due to the predicted change in water level associated with the pumping scenarios currently being used in the models. While the calculations are for screening purposes only and do not account for the time delay between water level decline and aquifer compaction, they provide insight into the potential effects of water level decline on land surface subsidence. Table 2 and Table 3 provide statistics for the minimum and maximum predicted subsidence associated with the adopted pumping scenario for all of the aquifers for each county in GMA 13, respectively. Figure 4 and Figure 5 illustrate the statistical values for the minimum and maximum predicted subsidence. Attached are tables and plots (Figure 6 through Figure 9) of the predicted minimum (Table 8 through Table 11; Figure 10 through Figure 13) and maximum (Table 12 through Table 15; Figure 14 through Figure 17) subsidence associated with each of the aquifers.

As obsevered in Table 3, the equations used to calculate potential subsidence can result in values that do not reflect what could actually occur. In most counties/GCDs, the maximum calculated predicted subsidence in Table 3 is much greater than would actually occur. These values are outliers and should not be considered as reasonable estimates. However, the third quartile values in Table 2 and Table 3 provide a reasonable indication of the range of potenial future subsidence based on aquifer conditions and water level declines associated with the current pumping scenarios.

Subsidence is known to occur along the Texas Gulf Coast, but has not historically been an issue in GMA 13 (Hutchison, 2017a; Hutchison, 2017b). As water levels in the aquifers decline, we can anticipate some compaction of the aquifer sediments. However, not all compaction necessarily corresponds to land-surface subsidence (Geertsma, 1973). Based on the aquifer characteristics, predicted water level declines and our available tools, we do not expect subsidence will become an issue within GMA 13 during the planning period.

Geoscientist Seal

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Michael R. Keester, P.G.
Senior Project Manager | Hydrogeologist

11/13/2020

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Furnans, J., Keester, M., Colvin, D., Bauer, J., Barber, J., Gin, G., Danielson, V., Erickson, L., Ryan, R., Khorzad, K., Worsley, A., and Snyder, G., 2018, Final Report: Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping: Texas Water Development Board Contract Report No, 1648302062, 434 p.

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Kasmarek, M.C., 2013, Hydrogeology and Simulation of Groundwater Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas, 1891-2009: U.S. Geological Survey Scientific Investigations Report 2012-5154, Version 1.1, 55 p.

Table 1. Total weighted subsidence risk statistics for all of the aquifers for each county/GCD in GMA 13. Statistics calculated from datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenarios.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	2.8	3.9	4.2	5.0	7.8	4.6	1.1	738
Bexar (EAA)	2.8	3.3	4.1	5.0	7.8	4.2	1.1	423
Caldwell (EAA)	3.8	4.2	4.2	4.8	6.1	4.5	0.5	27
Caldwell (Gonzales County UWCD)	3.4	4.4	4.5	5.2	6.4	4.7	0.5	86
Caldwell (No GCD)	4.2	4.2	4.4	5.2	5.5	4.6	0.5	42
Caldwell (Plum Creek CD)	3.8	4.2	4.4	5.2	7.2	4.6	0.6	90
Dimmit (Wintergarden GCD)	1.9	3.1	3.3	3.9	7.0	3.5	0.7	432
Frio (Evergreen UWCD)	2.3	3.0	3.3	4.1	7.0	3.7	0.8	439
Gonzales (Gonzales County UWCD)	3.0	4.2	4.8	5.2	7.8	4.8	1.0	611
Gonzales (No GCD)	3.3	5.5	6.9	7.8	7.8	6.4	1.3	17
Guadalupe (Guadalupe County GCD)	3.1	4.2	4.5	4.7	7.2	4.5	0.5	386
Karnes (Evergreen UWCD)	3.0	3.3	5.5	6.9	7.8	5.2	1.6	150
La Salle (Wintergarden GCD)	3.0	3.0	3.9	4.2	7.0	3.9	0.8	288
Maverick (No GCD)	3.8	3.8	3.8	3.8	4.1	3.8	0.1	10
McMullen (McMullen GCD)	2.8	4.1	4.4	5.3	7.5	4.6	1.1	83
Medina (Medina County GCD)	2.8	3.6	4.2	4.2	5.2	4.0	0.5	284
Uvalde (Uvalde County UWCD)	3.1	3.3	4.2	4.5	4.7	4.0	0.6	18
Webb (No GCD)	1.9	2.8	3.8	4.7	7.5	3.9	1.3	473
Wilson (Evergreen UWCD)	2.8	4.2	4.5	4.8	7.0	4.5	0.7	978
Zapata (No GCD)	3.0	3.0	3.0	4.7	7.5	4.1	1.7	26
Zavala (Wintergarden GCD)	1.9	2.8	3.0	3.8	5.2	3.3	0.7	261
GMA 13	**1.9**	**3.4**	**4.2**	**4.8**	**7.8**	**4.2**	**1.0**	**5,862**

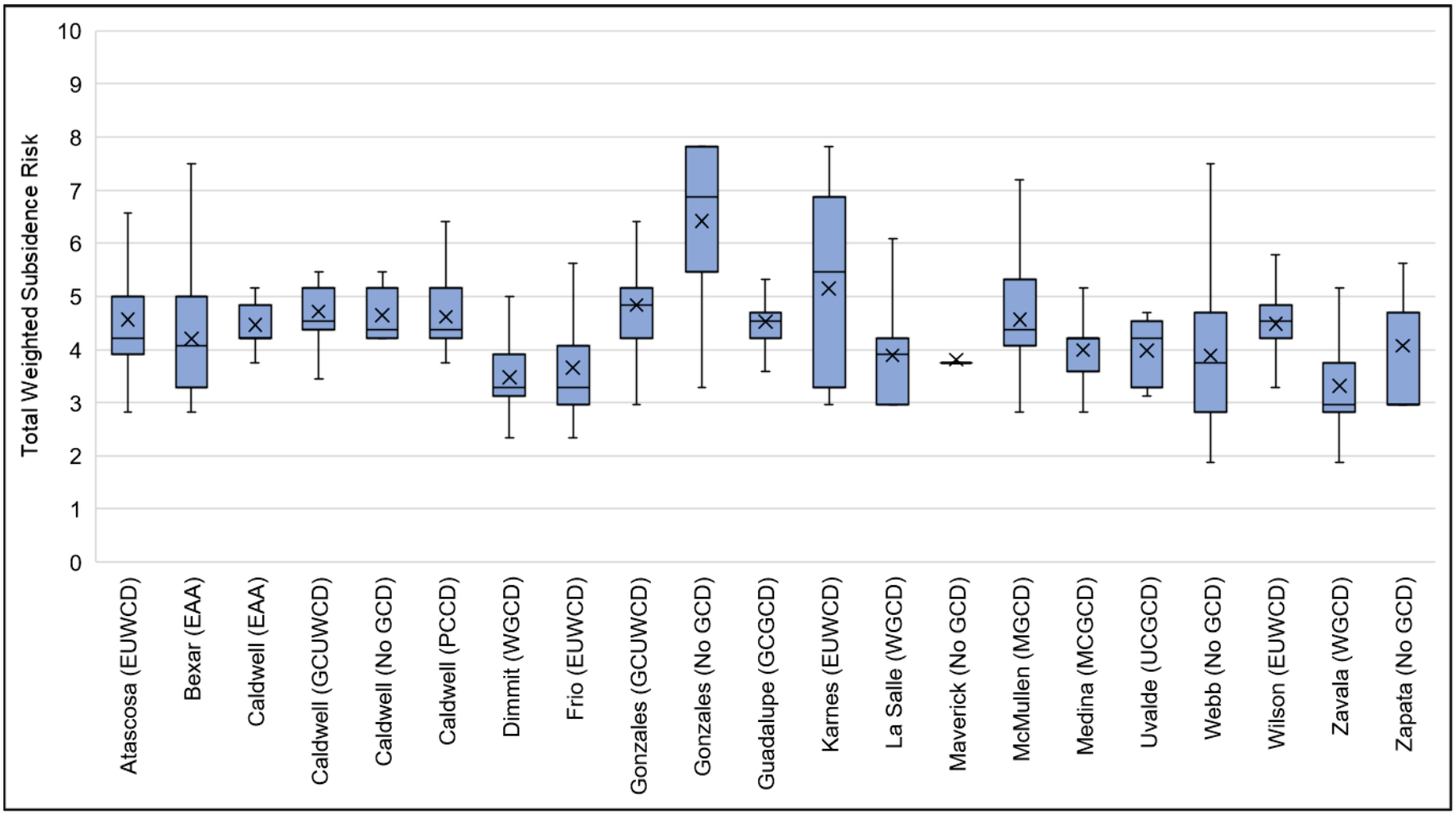


Figure 2. Box and whisker plot of the total weighted subsidence risk for all of the aquifers for each county/GCD in GMA 13. Prepared from datasets developed by Furnans and others (2018).

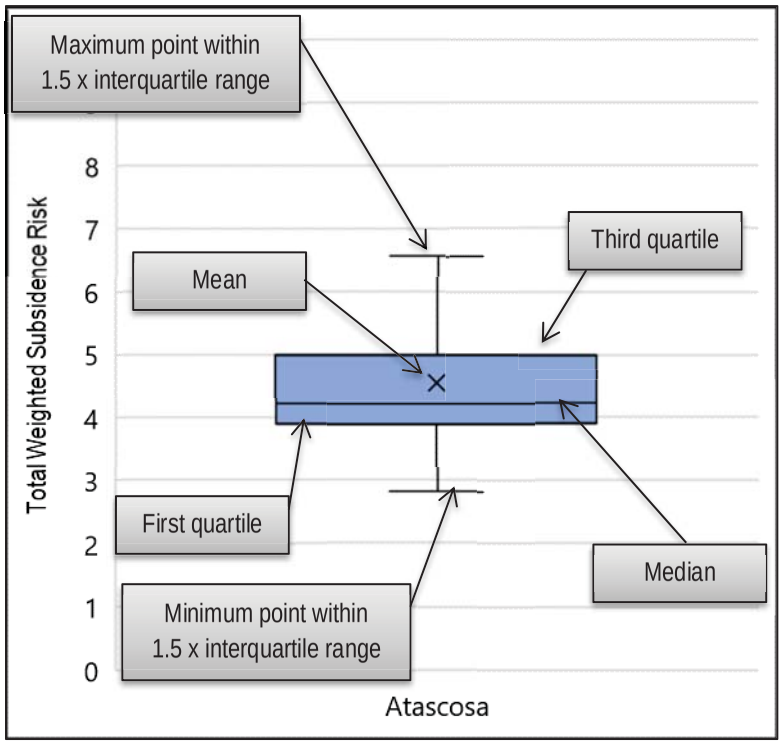


Figure 3. Legend illustrating the parts of the box and whisker plot. Interquartile range is the difference between the third and first quartile. Outliers beyond the whiskers are not shown.

Table 2. Minimum predicted subsidence in 2080 due to compaction of the aquifers in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenarios.

County (GCD)	Minimum	First Quartile	Median	Third Quartile	Maximum	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.1	1.7	0.1	0.2	738
Bexar (EAA)	0.0	0.0	0.0	0.1	4.5	0.2	0.6	423
Caldwell (EAA)	0.0	0.0	0.0	0.1	0.4	0.1	0.1	27
Caldwell (Gonzales County UWCD)	0.0	0.0	0.1	0.3	1.3	0.2	0.2	86
Caldwell (No GCD)	0.0	0.0	0.1	0.2	0.7	0.1	0.2	42
Caldwell (Plum Creek CD)	0.0	0.0	0.1	0.2	1.7	0.2	0.3	90
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.5	0.0	0.0	432
Frio (Evergreen UWCD)	0.0	0.0	0.0	0.0	1.0	0.0	0.1	439
Gonzales (Gonzales County UWCD)	0.0	0.0	0.0	0.1	2.0	0.1	0.2	611
Gonzales (No GCD)	0.0	0.0	0.1	0.2	0.5	0.1	0.1	17
Guadalupe (Guadalupe County GCD)	0.0	0.0	0.0	0.2	1.5	0.1	0.2	386
Karnes (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	150
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	288
Maverick (No GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10
McMullen (McMullen GCD)	0.0	0.0	0.0	0.0	1.2	0.0	0.1	83
Medina (Medina County GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.0	284
Uvalde (Uvalde County UWCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	18
Webb (No GCD)	0.0	0.0	0.0	0.0	0.4	0.0	0.0	473
Wilson (Evergreen UWCD)	0.0	0.0	0.0	0.1	1.8	0.1	0.2	978
Zapata (No GCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	26
Zavala (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.0	261
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**4.5**	**0.1**	**0.2**	**5,862**

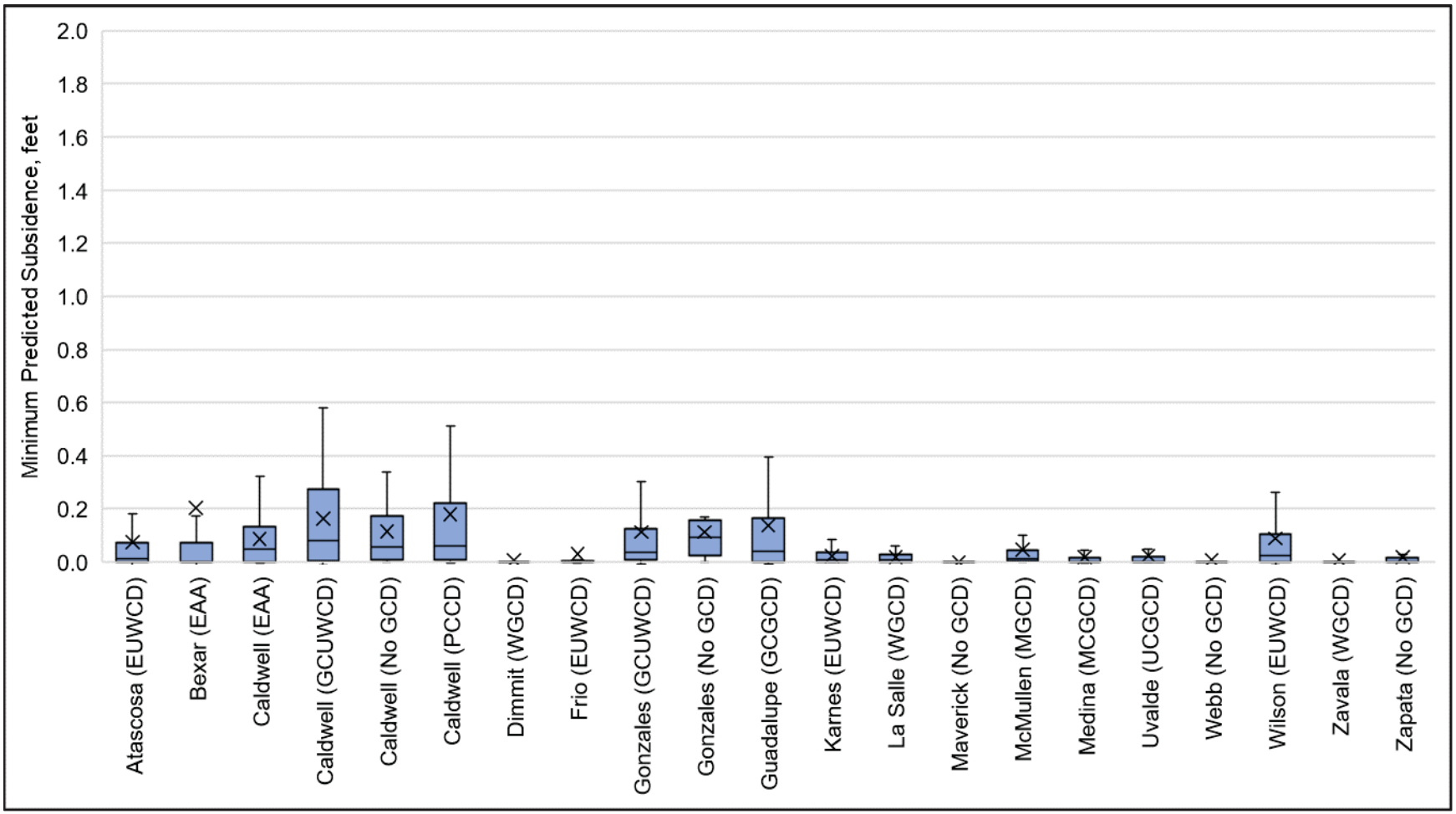


Figure 4. Box and whisker plot of the minimum predicted subsidence in 2080 due to compaction of the aquifers in GMA 13 due to water level declines.

Table 3. Maximum predicted subsidence in 2080 due to compaction of the aquifers in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenarios.

County (GCD)	Minimum	First Quartile	Median	Third Quartile	Maximum	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.1	3.3	0.1	0.3	738
Bexar (EAA)	0.0	0.0	0.0	0.1	8.5	0.4	1.1	423
Caldwell (EAA)	0.0	0.0	0.1	0.3	0.7	0.2	0.2	27
Caldwell (Gonzales County UWCD)	0.0	0.0	0.2	0.5	2.4	0.3	0.4	86
Caldwell (No GCD)	0.0	0.0	0.1	0.3	1.4	0.2	0.3	42
Caldwell (Plum Creek CD)	0.0	0.0	0.1	0.4	3.1	0.3	0.6	90
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.9	0.0	0.1	432
Frio (Evergreen UWCD)	0.0	0.0	0.0	0.0	1.9	0.1	0.2	439
Gonzales (Gonzales County UWCD)	0.0	0.0	0.1	0.2	3.7	0.2	0.4	611
Gonzales (No GCD)	0.0	0.1	0.2	0.3	1.0	0.2	0.2	17
Guadalupe (Guadalupe County GCD)	0.0	0.0	0.1	0.3	2.8	0.3	0.4	386
Karnes (Evergreen UWCD)	0.0	0.0	0.0	0.1	0.4	0.0	0.1	150
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.1	0.3	0.0	0.0	288
Maverick (No GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10
McMullen (McMullen GCD)	0.0	0.0	0.0	0.1	2.3	0.1	0.3	83
Medina (Medina County GCD)	0.0	0.0	0.0	0.0	0.6	0.0	0.1	284
Uvalde (Uvalde County UWCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.1	18
Webb (No GCD)	0.0	0.0	0.0	0.0	0.7	0.0	0.1	473
Wilson (Evergreen UWCD)	0.0	0.0	0.1	0.2	3.3	0.2	0.3	978
Zapata (No GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.1	26
Zavala (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.5	0.0	0.1	261
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**8.5**	**0.1**	**0.4**	**5,862**

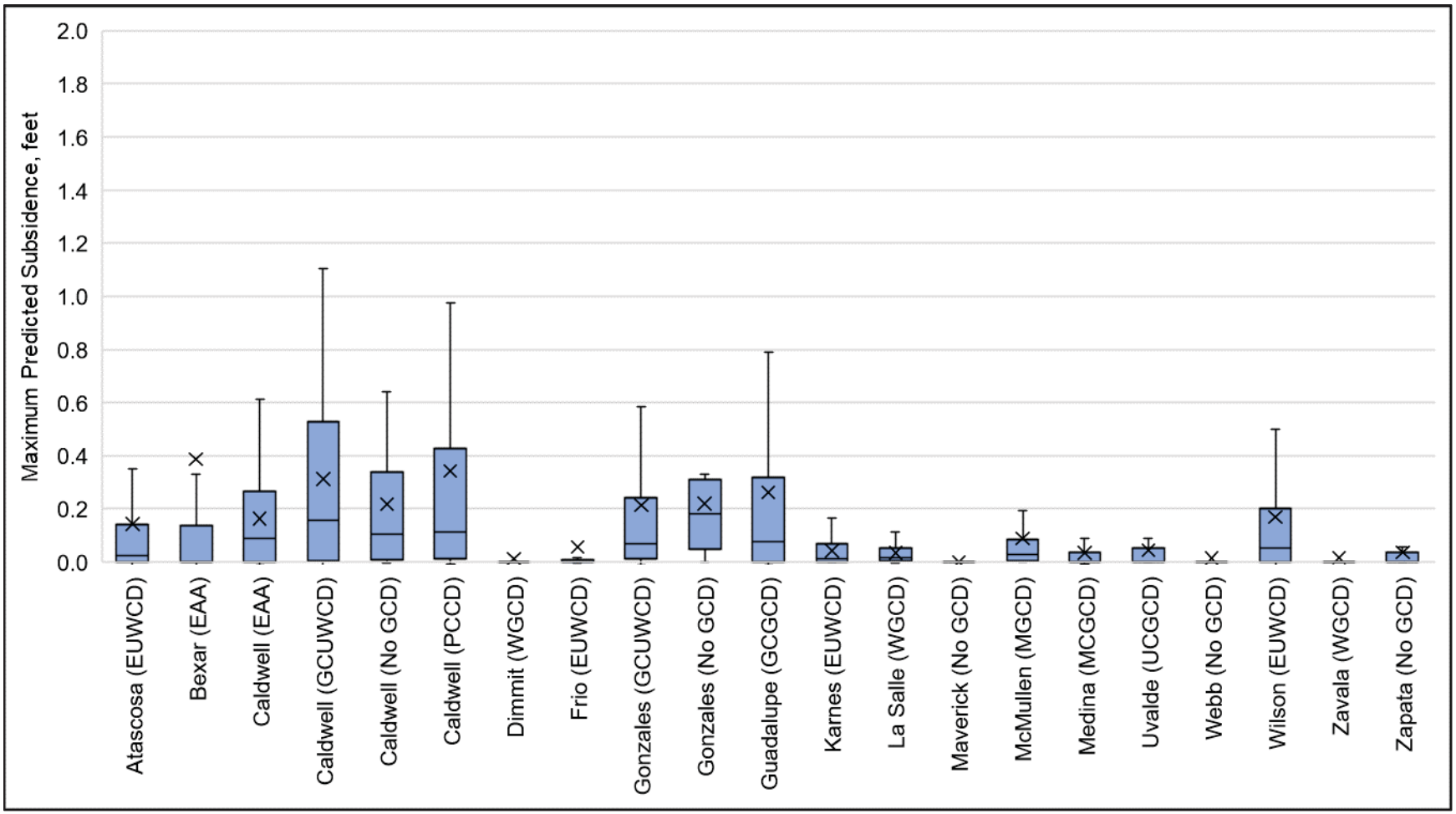


Figure 5. Box and whisker plot of the maximum predicted subsidence in 2080 due to compaction of the aquifers in GMA 13 due to water level declines.

Tables and Plots for each Aquifer in GMA 13

Table 4. Total weighted subsidence risk statistics for Carrizo-Wilcox Aquifer for each county/GCD in GMA 13. Statistics calculated from datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	2.8	4.1	4.8	5.0	7.3	4.7	0.8	241
Bexar (EAA)	2.8	3.3	4.1	5.0	7.8	4.2	1.1	423
Caldwell (EAA)	3.8	4.2	4.2	4.8	6.1	4.5	0.5	27
Caldwell (Gonzales County UWCD)	3.4	4.4	4.5	5.2	6.4	4.7	0.5	83
Caldwell (No GCD)	4.2	4.2	4.4	5.2	5.5	4.6	0.5	42
Caldwell (Plum Creek CD)	3.8	4.2	4.4	5.2	7.2	4.6	0.6	90
Dimmit (Wintergarden GCD)	1.9	3.0	3.1	3.9	5.9	3.4	0.6	333
Frio (Evergreen UWCD)	3.0	3.1	4.2	4.8	7.0	4.2	0.9	108
Gonzales (Gonzales County UWCD)	3.8	4.5	4.5	5.0	7.7	4.8	0.6	150
Gonzales (No GCD)	5.5	5.5	5.5	5.5	5.5	5.5	0.0	1
Guadalupe (Guadalupe County GCD)	3.1	4.2	4.5	4.7	7.2	4.5	0.5	386
Karnes (Evergreen UWCD)	4.5	4.6	5.2	5.5	5.8	5.1	0.5	6
La Salle (Wintergarden GCD)	3.0	3.0	3.4	3.9	6.3	3.6	0.7	169
Maverick (No GCD)	3.8	3.8	3.8	3.8	4.1	3.8	0.1	10
McMullen (McMullen GCD)	3.4	4.4	4.4	5.3	7.2	4.8	0.7	59
Medina (Medina County GCD)	2.8	3.6	4.2	4.2	5.2	4.0	0.5	284
Uvalde (Uvalde County UWCD)	3.1	3.3	4.2	4.5	4.7	4.0	0.6	18
Webb (No GCD)	3.8	3.8	4.1	4.7	6.7	4.4	0.8	83
Wilson (Evergreen UWCD)	2.8	4.2	4.5	4.5	6.7	4.4	0.5	640
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	1.9	3.0	3.6	4.2	5.2	3.6	0.7	141
GMA 13	**1.9**	**3.4**	**4.2**	**4.8**	**7.8**	**4.2**	**1.0**	**3,294**

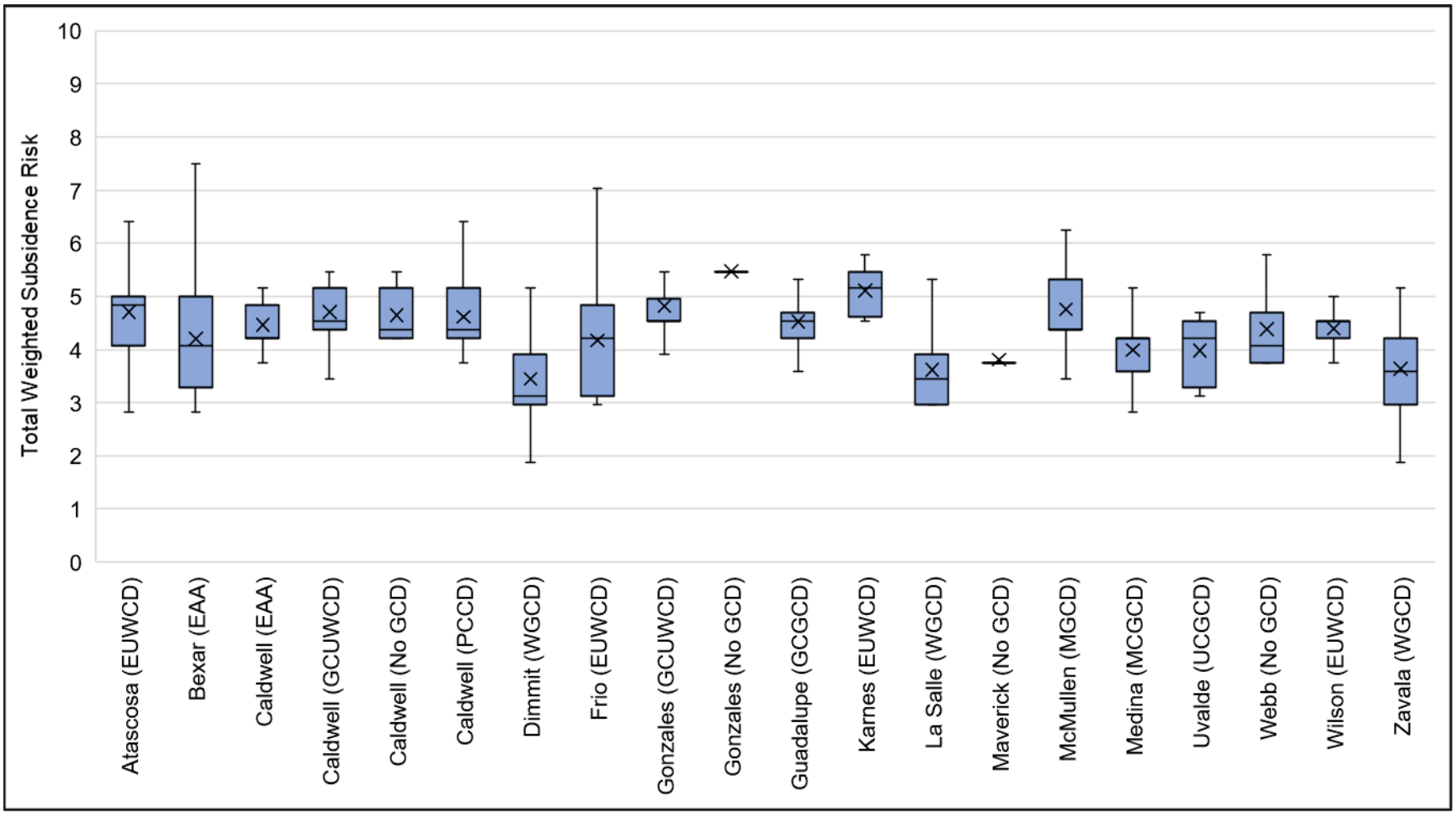


Figure 6. Box and whisker plot of the total weighted subsidence risk for the Carrizo-Wilcox Aquifer for each county/GCD in GMA 13. Prepared from datasets developed by Furnans and others (2018).

Table 5. Total weighted subsidence risk statistics for Queen City Aquifer for each county/GCD in GMA 13. Statistics calculated from datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	3.0	3.9	4.2	5.2	7.3	4.6	1.0	347
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	4.2	4.8	5.3	5.3	5.3	4.9	0.5	3
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	2.3	3.1	3.3	4.0	7.0	3.6	1.0	90
Frio (Evergreen UWCD)	2.3	3.0	3.0	3.8	6.7	3.5	0.8	278
Gonzales (Gonzales County UWCD)	3.0	3.9	4.4	5.2	7.0	4.6	0.8	219
Gonzales (No GCD)	—	—	—	—	—	—	—	0
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	4.4	4.4	4.4	4.4	4.4	4.4	0.0	1
La Salle (Wintergarden GCD)	3.9	4.2	4.2	4.2	7.0	4.4	0.7	23
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	—	—	—	—	—	—	—	0
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	1.9	2.8	2.8	4.1	7.0	3.6	1.0	260
Wilson (Evergreen UWCD)	3.0	3.9	4.2	4.8	7.0	4.3	0.7	217
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	1.9	2.8	2.8	3.1	4.7	2.9	0.4	120
GMA 13	**1.9**	**3.4**	**4.2**	**4.8**	**7.8**	**4.2**	**1.0**	**1,558**

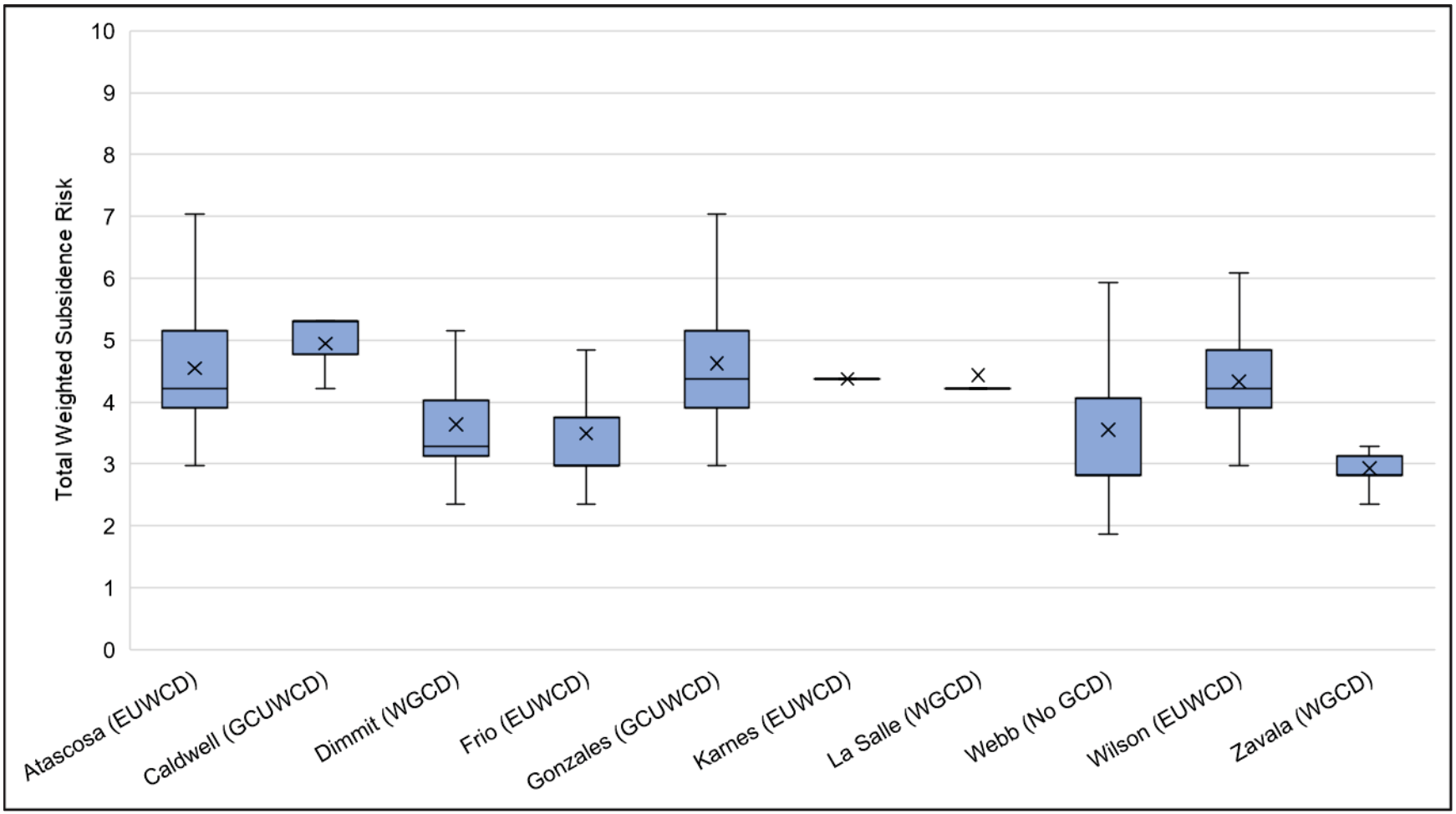


Figure 7. Box and whisker plot of the total weighted subsidence risk for the Queen City Aquifer for each county/GCD in GMA 13. Prepared from datasets developed by Furnans and others (2018).

Table 6. Total weighted subsidence risk statistics for Sparta Aquifer for each county/GCD in GMA 13. Statistics calculated from datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	3.0	3.3	3.3	4.2	5.2	3.5	0.5	96
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	—	—	—	—	—	—	—	0
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	3.3	3.3	3.3	3.3	3.3	3.3	0.0	9
Frio (Evergreen UWCD)	3.3	3.3	3.3	3.3	4.2	3.5	0.4	53
Gonzales (Gonzales County UWCD)	3.3	3.9	4.1	4.2	4.8	4.1	0.2	68
Gonzales (No GCD)	—	—	—	—	—	—	—	0
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	—	—	—	—	—	—	—	0
La Salle (Wintergarden GCD)	3.8	4.2	4.2	4.2	5.2	4.2	0.2	75
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	—	—	—	—	—	—	—	0
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	2.3	2.9	3.8	3.8	5.2	3.4	0.7	86
Wilson (Evergreen UWCD)	3.9	4.2	4.2	4.2	5.2	4.3	0.2	16
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	—	—	—	—	—	—	—	0
GMA 13	**1.9**	**3.4**	**4.2**	**4.8**	**7.8**	**4.2**	**1.0**	**403**

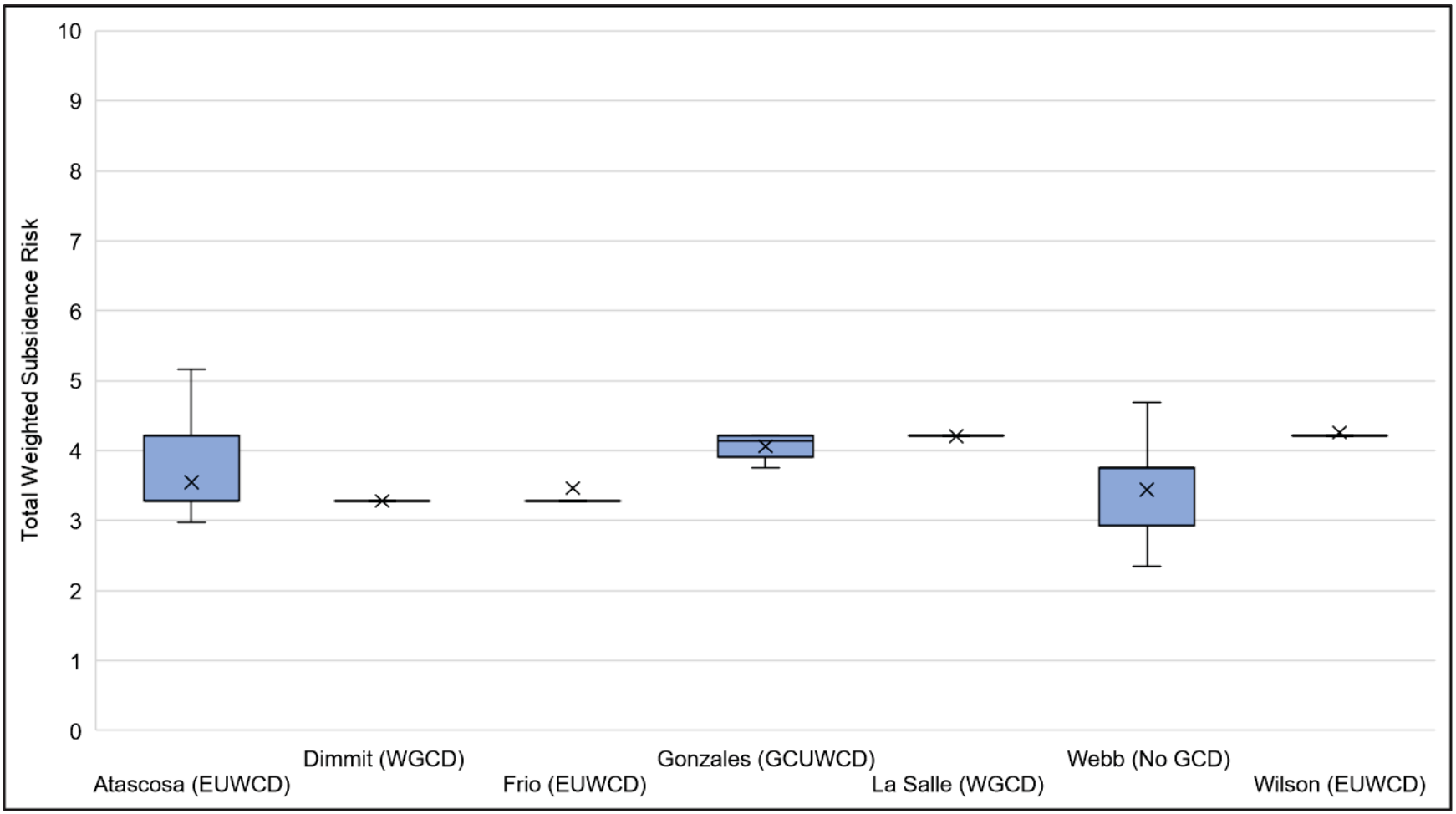


Figure 8. Box and whisker plot of the total weighted subsidence risk for the Sparta Aquifer for each county/GCD in GMA 13. Prepared from datasets developed by Furnans and others (2018).

Table 7. Total weighted subsidence risk statistics for Yegua-Jackson Aquifer for each county/GCD in GMA 13. Statistics calculated from datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	3.3	5.0	5.9	7.6	7.8	5.8	1.7	54
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	—	—	—	—	—	—	—	0
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	—	—	—	—	—	—	—	0
Frio (Evergreen UWCD)	—	—	—	—	—	—	—	0
Gonzales (Gonzales County UWCD)	3.0	5.0	5.0	5.9	7.8	5.4	1.3	174
Gonzales (No GCD)	3.3	5.7	6.9	7.8	7.8	6.5	1.3	16
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	3.0	3.3	5.9	6.9	7.8	5.2	1.7	143
La Salle (Wintergarden GCD)	3.0	3.0	4.7	5.5	6.6	4.3	1.4	21
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	2.8	2.8	3.1	4.8	7.5	4.1	1.7	24
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	3.0	4.3	6.6	7.5	7.5	5.8	1.8	44
Wilson (Evergreen UWCD)	3.3	5.0	5.0	5.9	6.9	5.4	0.9	105
Zapata (No GCD)	3.0	3.0	3.0	4.7	7.5	4.1	1.7	26
Zavala (Wintergarden GCD)	—	—	—	—	—	—	—	0
GMA 13	**1.9**	**3.4**	**4.2**	**4.8**	**7.8**	**4.2**	**1.0**	**607**

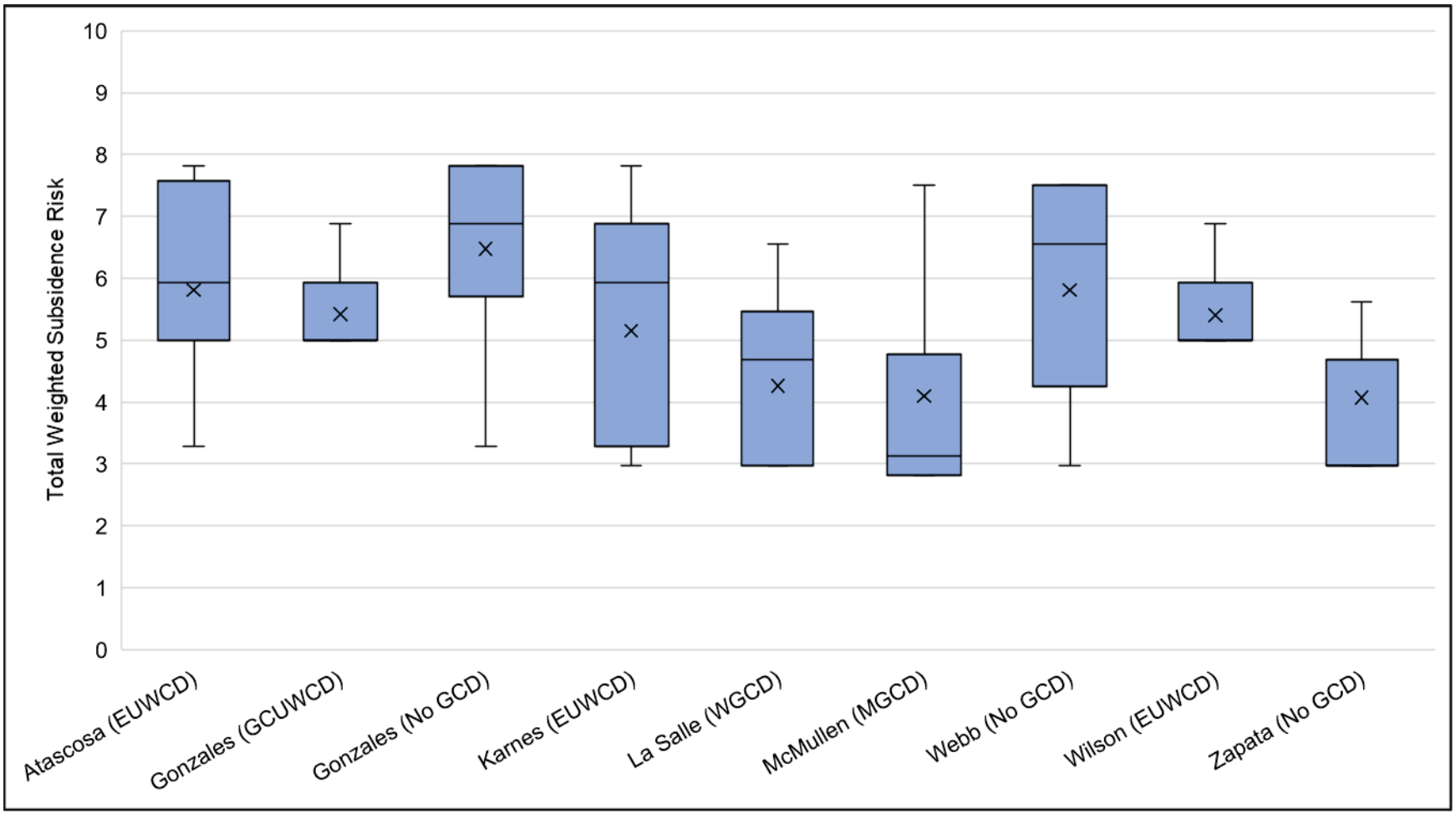


Figure 9. Box and whisker plot of the total weighted subsidence risk for the Yegua-Jackson Aquifer for each county/GCD in GMA 13. Prepared from datasets developed by Furnans and others (2018).

Table 8. Minimum predicted subsidence in 2080 due to compaction of the Carrizo-Wilcox Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.1	0.2	1.7	0.2	0.2	241
Bexar (EAA)	0.0	0.0	0.0	0.1	4.5	0.2	0.6	423
Caldwell (EAA)	0.0	0.0	0.0	0.1	0.4	0.1	0.1	27
Caldwell (Gonzales County UWCD)	0.0	0.0	0.1	0.3	1.3	0.2	0.2	83
Caldwell (No GCD)	0.0	0.0	0.1	0.2	0.7	0.1	0.2	42
Caldwell (Plum Creek CD)	0.0	0.0	0.1	0.2	1.7	0.2	0.3	90
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.5	0.0	0.0	333
Frio (Evergreen UWCD)	0.0	0.0	0.1	0.1	1.0	0.1	0.2	108
Gonzales (Gonzales County UWCD)	0.0	0.0	0.1	0.4	2.0	0.2	0.3	150
Gonzales (No GCD)	0.2	0.2	0.2	0.2	0.2	0.2	0.0	1
Guadalupe (Guadalupe County GCD)	0.0	0.0	0.0	0.2	1.5	0.1	0.2	386
Karnes (Evergreen UWCD)	0.0	0.0	0.1	0.2	0.2	0.1	0.1	6
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	169
Maverick (No GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10
McMullen (McMullen GCD)	0.0	0.0	0.0	0.1	0.3	0.0	0.0	59
Medina (Medina County GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.0	284
Uvalde (Uvalde County UWCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	18
Webb (No GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83
Wilson (Evergreen UWCD)	0.0	0.0	0.0	0.2	1.8	0.1	0.2	640
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.0	141
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**4.5**	**0.1**	**0.2**	**3,294**

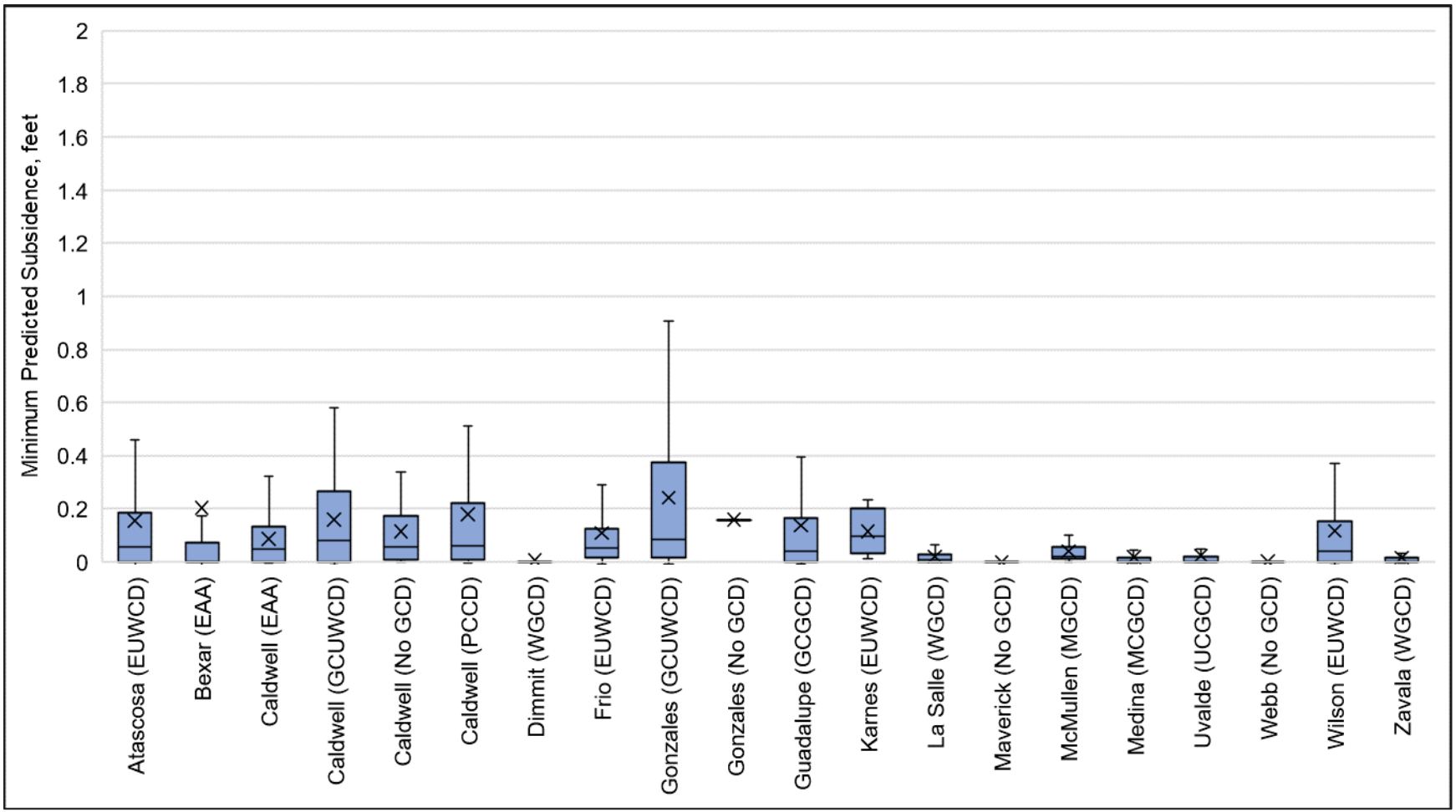


Figure 10. Box and whisker plot of the minimum predicted subsidence in 2080 due to compaction of the Carrizo-Wilcox Aquifer in GMA 13 due to water level declines.

Table 9. Minimum predicted subsidence in 2080 due to compaction of the Queen City Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.1	0.5	0.0	0.1	347
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	0.1	0.2	0.3	0.3	0.4	0.3	0.1	3
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	90
Frio (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.6	0.0	0.0	278
Gonzales (Gonzales County UWCD)	0.0	0.0	0.1	0.2	0.8	0.1	0.1	219
Gonzales (No GCD)	—	—	—	—	—	—	—	0
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	23
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	—	—	—	—	—	—	—	0
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	260
Wilson (Evergreen UWCD)	0.0	0.0	0.0	0.1	0.3	0.0	0.1	217
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**4.5**	**0.1**	**0.2**	**1,558**

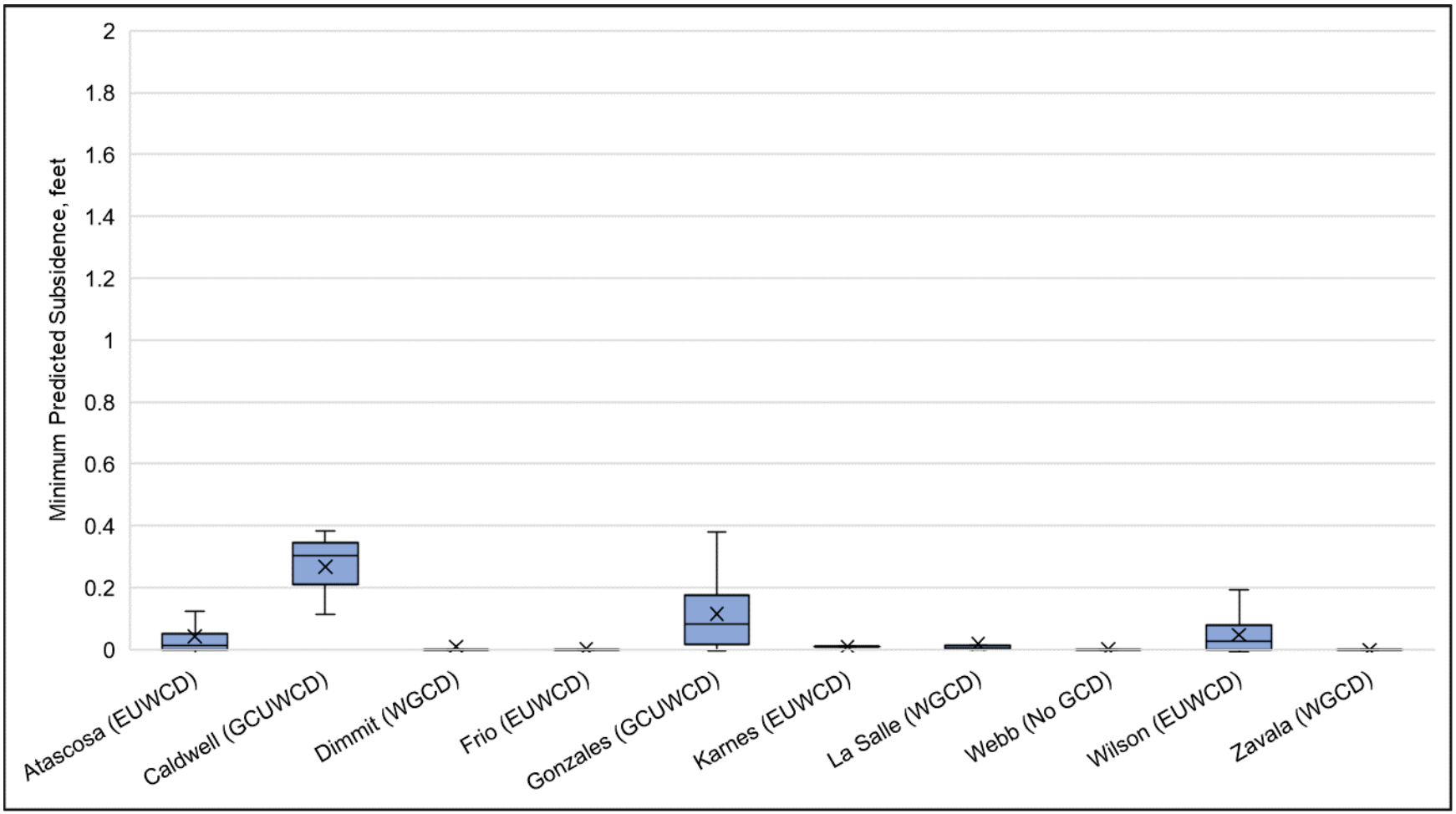


Figure 11. Box and whisker plot of the minimum predicted subsidence in 2080 due to compaction of the Queen City Aquifer in GMA 13 due to water level declines.

Table 10. Minimum predicted subsidence in 2080 due to compaction of the Sparta Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	96
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	—	—	—	—	—	—	—	0
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9
Frio (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53
Gonzales (Gonzales County UWCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	68
Gonzales (No GCD)	—	—	—	—	—	—	—	0
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	—	—	—	—	—	—	—	0
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	75
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	—	—	—	—	—	—	—	0
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.0	86
Wilson (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	16
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	—	—	—	—	—	—	—	0
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**4.5**	**0.1**	**0.2**	**403**

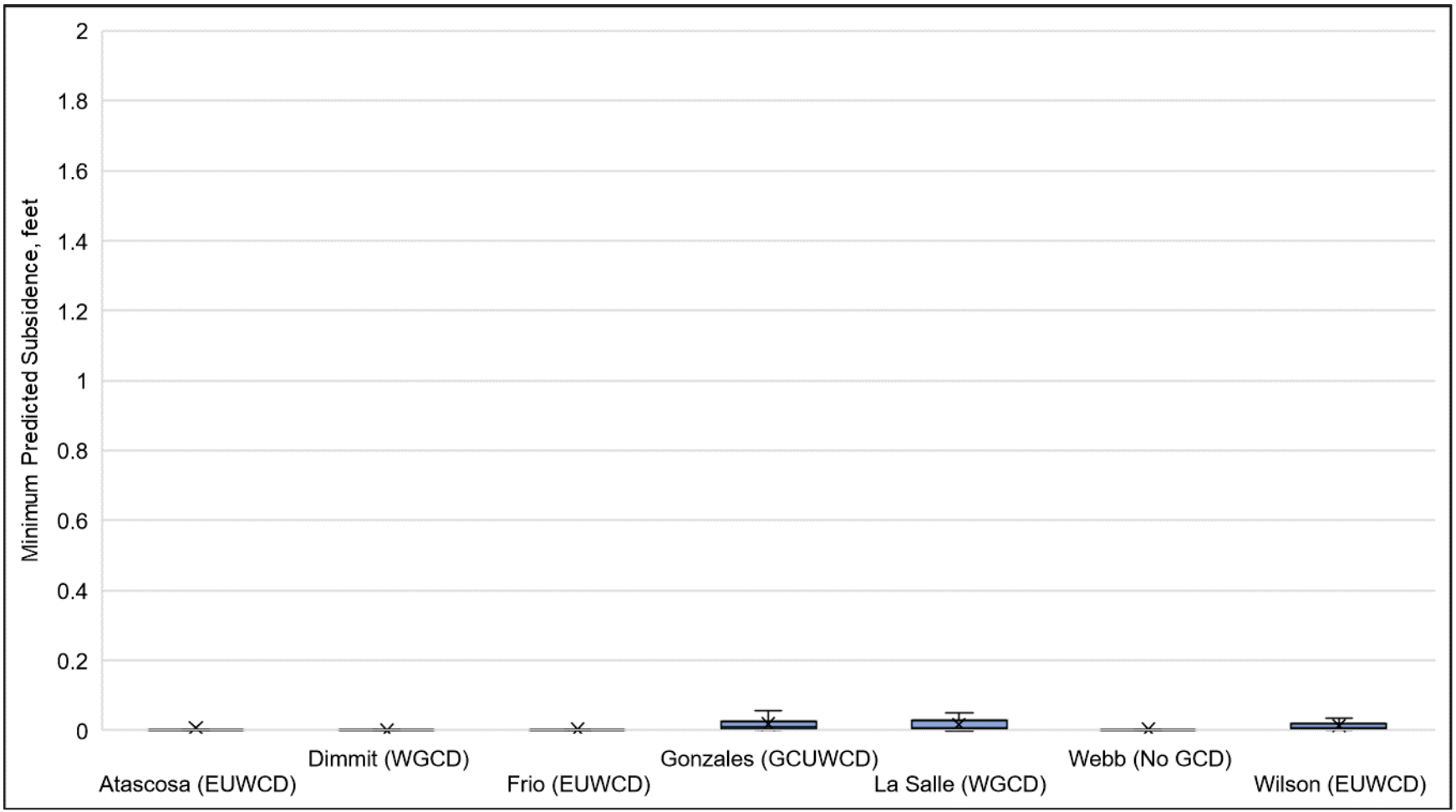


Figure 12. Box and whisker plot of the minimum predicted subsidence in 2080 due to compaction of the Sparta Aquifer in GMA 13 due to water level declines.

Table 11. Minimum predicted subsidence in 2080 due to compaction of the Yegua-Jackson Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.4	0.0	0.1	54
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	—	—	—	—	—	—	—	0
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	—	—	—	—	—	—	—	0
Frio (Evergreen UWCD)	—	—	—	—	—	—	—	0
Gonzales (Gonzales County UWCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	174
Gonzales (No GCD)	0.0	0.0	0.1	0.1	0.5	0.1	0.1	16
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	143
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	0.0	0.0	0.0	0.0	1.2	0.1	0.2	24
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	0.0	0.0	0.0	0.1	0.4	0.1	0.1	44
Wilson (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	105
Zapata (No GCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	26
Zavala (Wintergarden GCD)	—	—	—	—	—	—	—	0
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**4.5**	**0.1**	**0.2**	**607**

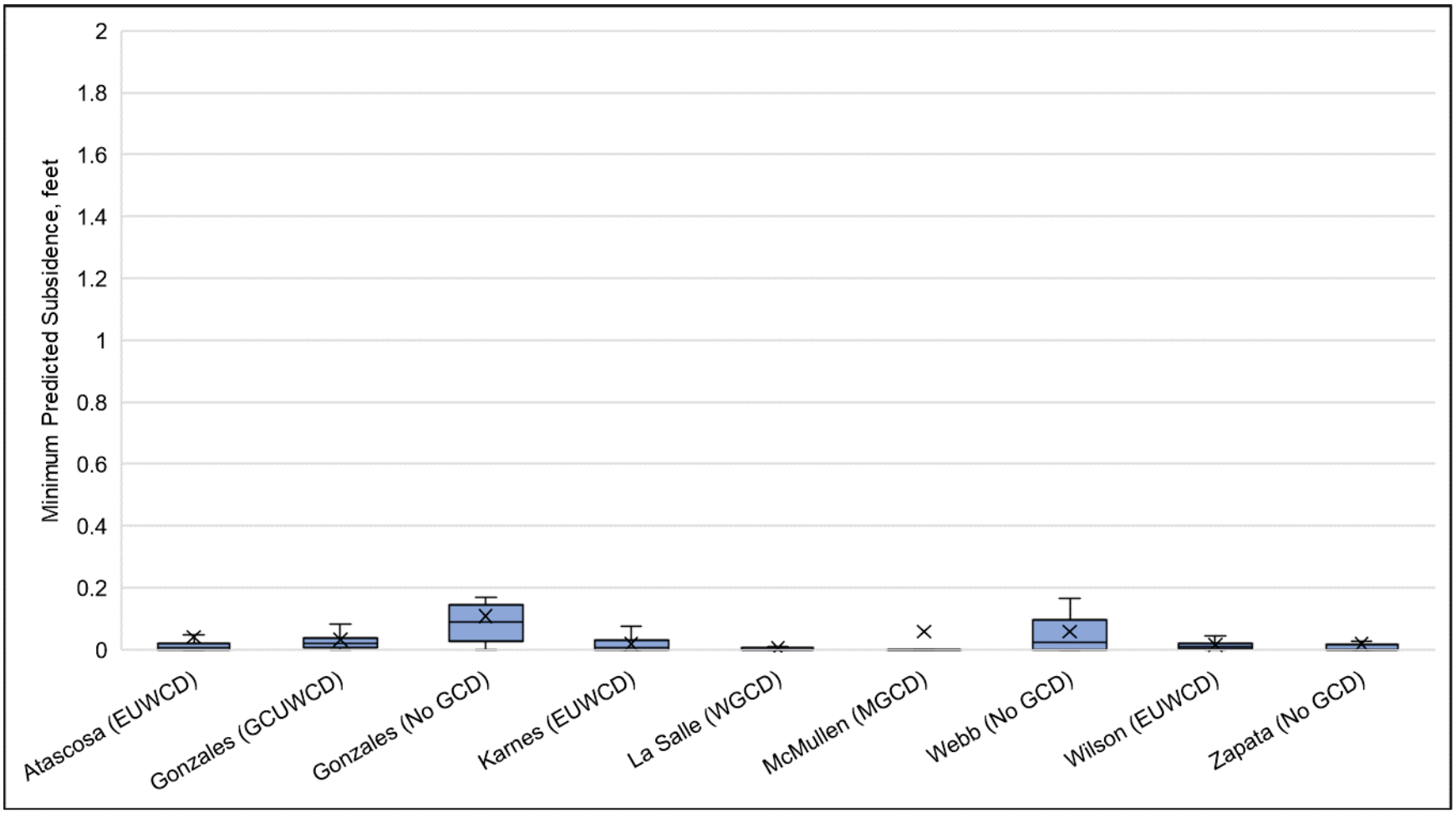


Figure 13. Box and whisker plot of the minimum predicted subsidence in 2080 due to compaction of the Yegua-Jackson Aquifer in GMA 13 due to water level declines.

Table 12. Maximum predicted subsidence in 2080 due to compaction of the Carrizo-Wilcox Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.1	0.4	3.3	0.3	0.5	241
Bexar (EAA)	0.0	0.0	0.0	0.1	8.5	0.4	1.1	423
Caldwell (EAA)	0.0	0.0	0.1	0.3	0.7	0.2	0.2	27
Caldwell (Gonzales County UWCD)	0.0	0.0	0.2	0.5	2.4	0.3	0.4	83
Caldwell (No GCD)	0.0	0.0	0.1	0.3	1.4	0.2	0.3	42
Caldwell (Plum Creek CD)	0.0	0.0	0.1	0.4	3.1	0.3	0.6	90
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.9	0.0	0.1	333
Frio (Evergreen UWCD)	0.0	0.0	0.1	0.2	1.9	0.2	0.3	108
Gonzales (Gonzales County UWCD)	0.0	0.0	0.2	0.7	3.7	0.5	0.7	150
Gonzales (No GCD)	0.3	0.3	0.3	0.3	0.3	0.3	0.0	1
Guadalupe (Guadalupe County GCD)	0.0	0.0	0.1	0.3	2.8	0.3	0.4	386
Karnes (Evergreen UWCD)	0.0	0.1	0.2	0.4	0.4	0.2	0.2	6
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.1	0.3	0.0	0.0	169
Maverick (No GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10
McMullen (McMullen GCD)	0.0	0.0	0.0	0.1	0.6	0.1	0.1	59
Medina (Medina County GCD)	0.0	0.0	0.0	0.0	0.6	0.0	0.1	284
Uvalde (Uvalde County UWCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.1	18
Webb (No GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83
Wilson (Evergreen UWCD)	0.0	0.0	0.1	0.3	3.3	0.2	0.4	640
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.5	0.0	0.1	141
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**8.5**	**0.1**	**0.4**	**3,294**

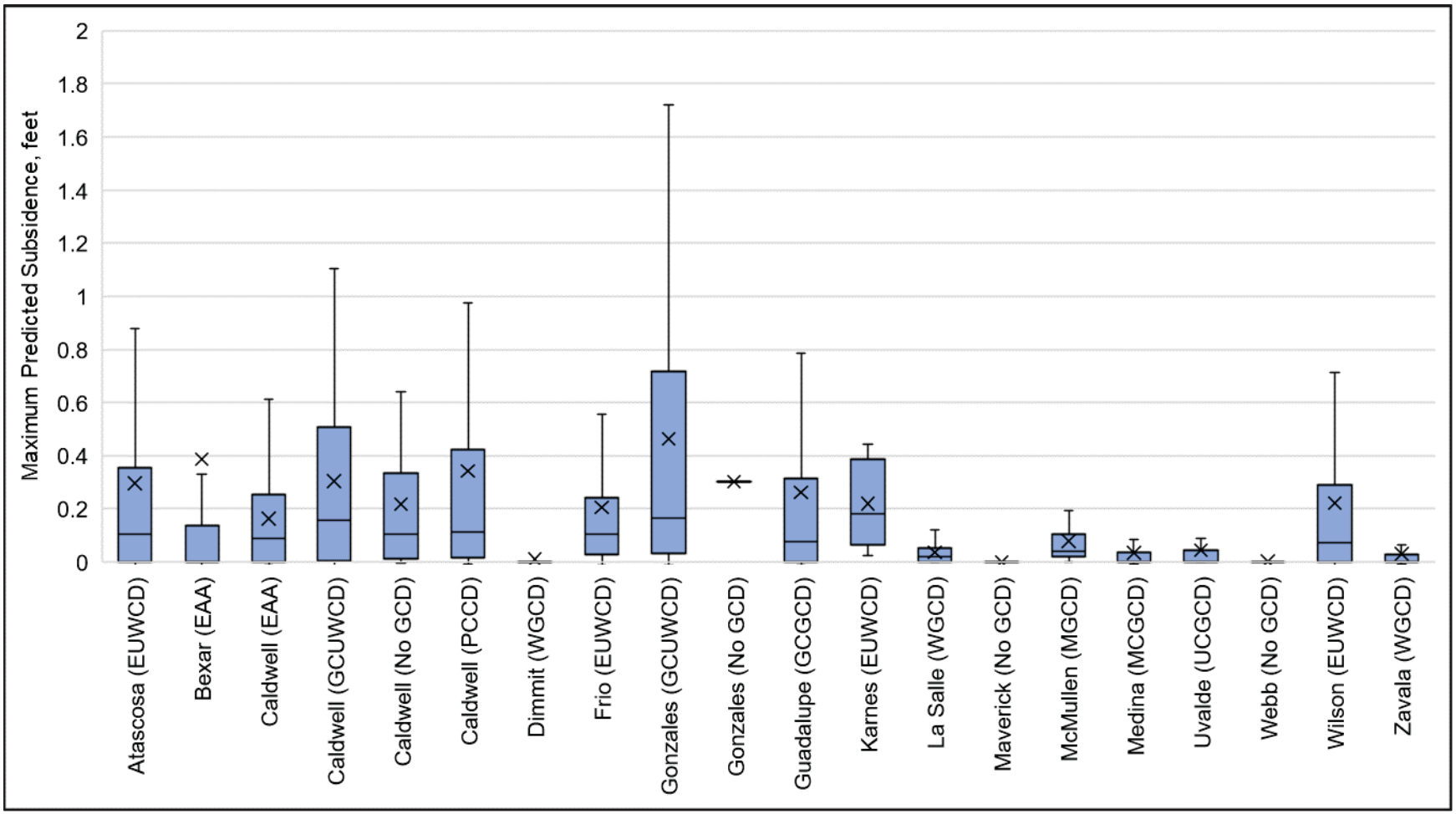


Figure 14. Box and whisker plot of the maximum predicted subsidence in 2080 due to compaction of the Carrizo-Wilcox Aquifer in GMA 13 due to water level declines.

Table 13. Maximum predicted subsidence in 2080 due to compaction of the Queen City Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.1	1.0	0.1	0.1	347
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	0.2	0.4	0.6	0.7	0.7	0.5	0.2	3
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.4	0.0	0.1	90
Frio (Evergreen UWCD)	0.0	0.0	0.0	0.0	1.2	0.0	0.1	278
Gonzales (Gonzales County UWCD)	0.0	0.0	0.2	0.3	1.4	0.2	0.2	219
Gonzales (No GCD)	—	—	—	—	—	—	—	0
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.1	23
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	—	—	—	—	—	—	—	0
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	260
Wilson (Evergreen UWCD)	0.0	0.0	0.1	0.2	0.6	0.1	0.1	217
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**8.5**	**0.1**	**0.4**	**1558**

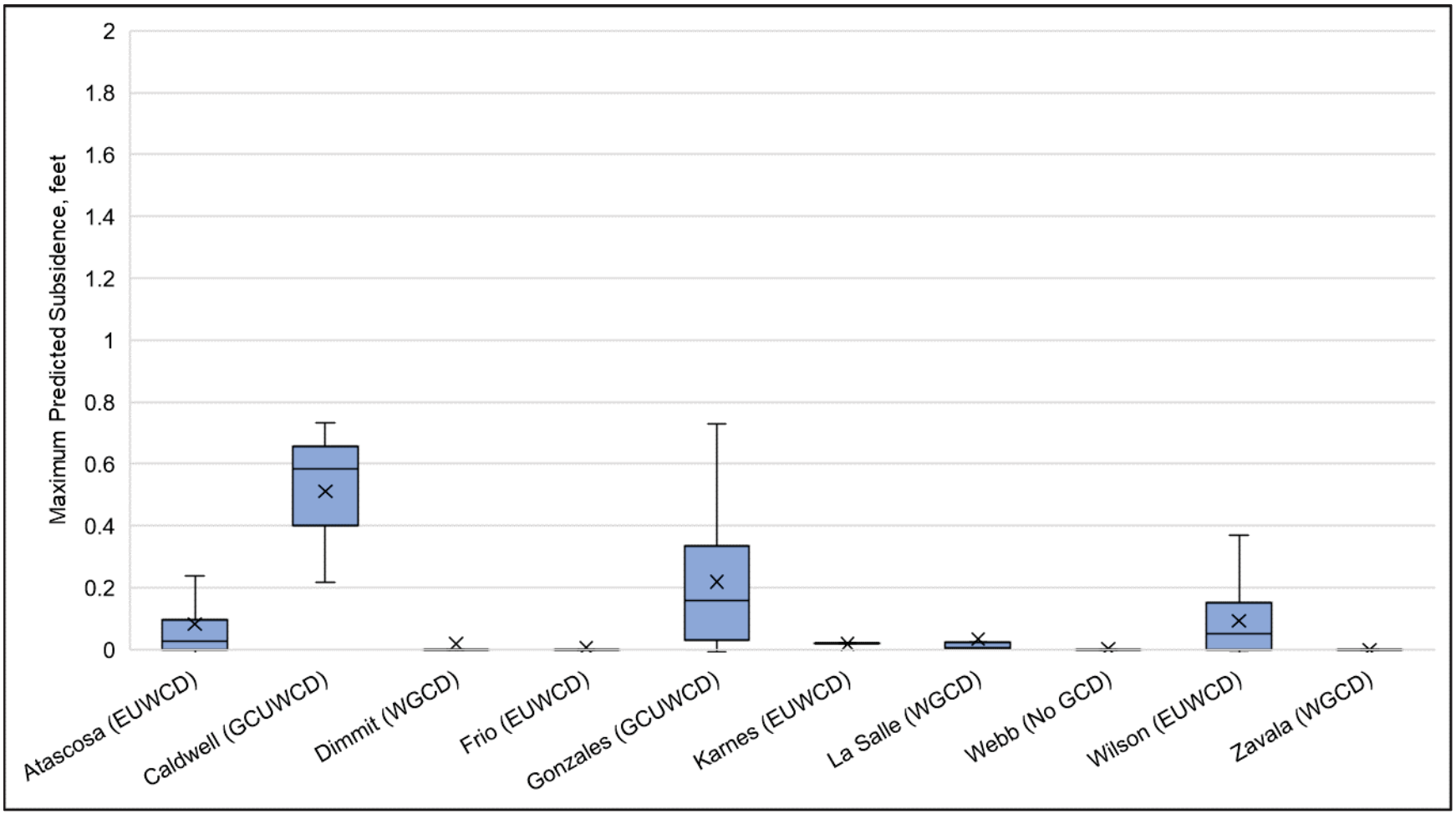


Figure 15. Box and whisker plot of the maximum predicted subsidence in 2080 due to compaction of the Queen City Aquifer in GMA 13 due to water level declines.

Table 14. Maximum predicted subsidence in 2080 due to compaction of the Sparta Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	96
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	—	—	—	—	—	—	—	0
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9
Frio (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53
Gonzales (Gonzales County UWCD)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	68
Gonzales (No GCD)	—	—	—	—	—	—	—	0
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	—	—	—	—	—	—	—	0
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.1	0.2	0.0	0.0	75
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	—	—	—	—	—	—	—	0
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	0.0	0.0	0.0	0.0	0.5	0.0	0.1	86
Wilson (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	16
Zapata (No GCD)	—	—	—	—	—	—	—	0
Zavala (Wintergarden GCD)	—	—	—	—	—	—	—	0
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**8.5**	**0.1**	**0.4**	**403**

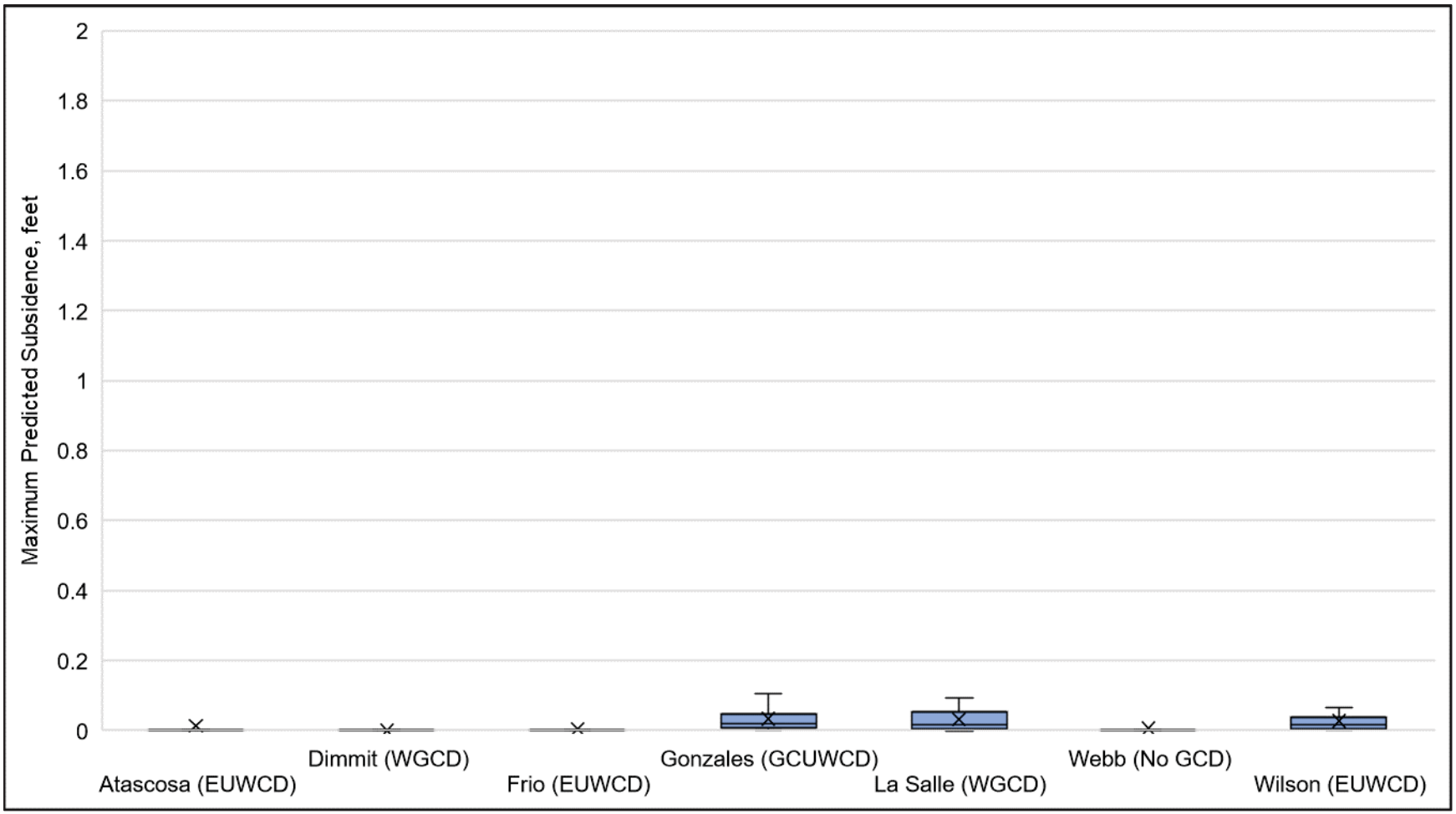


Figure 16. Box and whisker plot of the maximum predicted subsidence in 2080 due to compaction of the Sparta Aquifer in GMA 13 due to water level declines.

Table 15. Maximum predicted subsidence in 2080 due to compaction of the Yegua-Jackson Aquifer in GMA 13 due to water level declines. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the current pumping scenario.

County (GCD)	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk	Mean	Standard Deviation	Number of Wells
Atascosa (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.8	0.1	0.2	54
Bexar (EAA)	—	—	—	—	—	—	—	0
Caldwell (EAA)	—	—	—	—	—	—	—	0
Caldwell (Gonzales County UWCD)	—	—	—	—	—	—	—	0
Caldwell (No GCD)	—	—	—	—	—	—	—	0
Caldwell (Plum Creek CD)	—	—	—	—	—	—	—	0
Dimmit (Wintergarden GCD)	—	—	—	—	—	—	—	0
Frio (Evergreen UWCD)	—	—	—	—	—	—	—	0
Gonzales (Gonzales County UWCD)	0.0	0.0	0.0	0.1	0.4	0.1	0.1	174
Gonzales (No GCD)	0.0	0.0	0.2	0.3	1.0	0.2	0.2	16
Guadalupe (Guadalupe County GCD)	—	—	—	—	—	—	—	0
Karnes (Evergreen UWCD)	0.0	0.0	0.0	0.1	0.3	0.0	0.1	143
La Salle (Wintergarden GCD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21
Maverick (No GCD)	—	—	—	—	—	—	—	0
McMullen (McMullen GCD)	0.0	0.0	0.0	0.0	2.3	0.1	0.5	24
Medina (Medina County GCD)	—	—	—	—	—	—	—	0
Uvalde (Uvalde County UWCD)	—	—	—	—	—	—	—	0
Webb (No GCD)	0.0	0.0	0.0	0.2	0.7	0.1	0.2	44
Wilson (Evergreen UWCD)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	105
Zapata (No GCD)	0.0	0.0	0.0	0.0	0.3	0.0	0.1	26
Zavala (Wintergarden GCD)	—	—	—	—	—	—	—	0
GMA 13	**0.0**	**0.0**	**0.0**	**0.1**	**8.5**	**0.1**	**0.4**	**607**

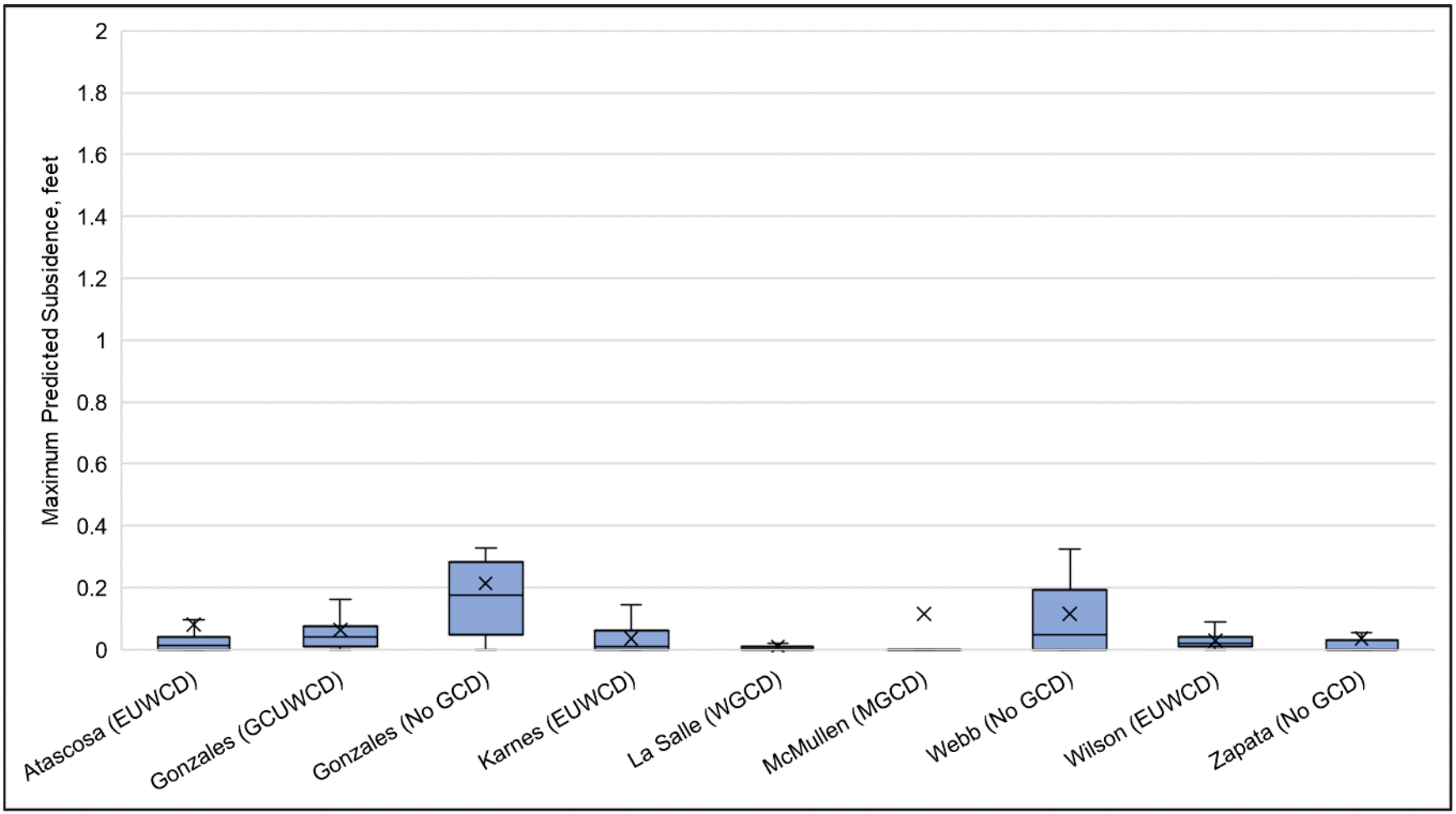


Figure 17. Box and whisker plot of the maximum predicted subsidence in 2080 due to compaction of the Yegua-Jackson Aquifer in GMA 13 due to water level declines.

Appendix 5.10 —
Presentation Regarding Subsidence Impacts

DISCUSSION OF SUBSIDENCE IMPACTS

November 13, 2020

CONSIDERATION

- Texas Water Code Section 36.108(d)(5)
- Impact on subsidence as it relates to potential DFCs
- Not possible to model with the GAMs

SUBSIDENCE

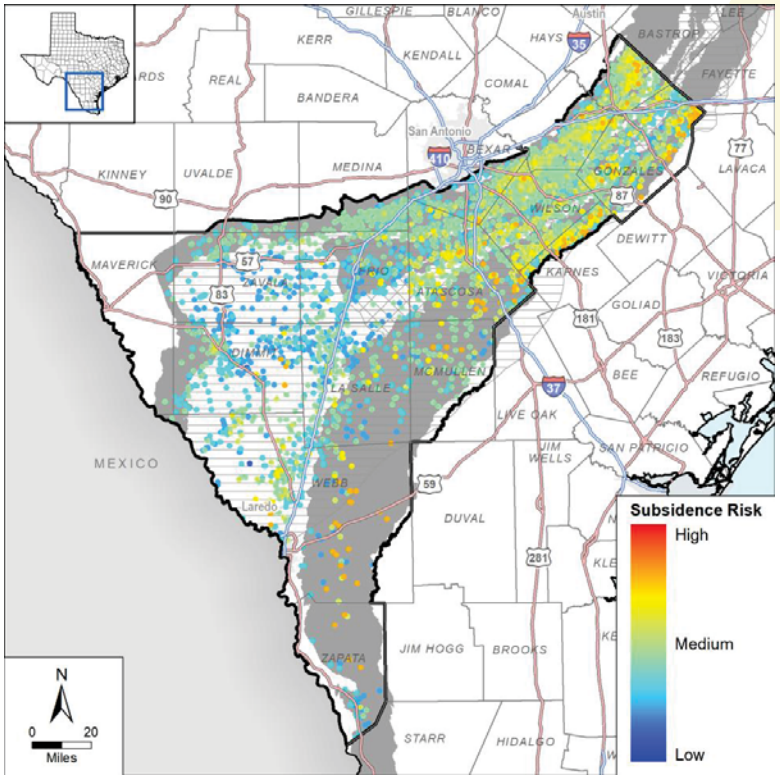
- Occurs when aquifer material compresses
- Magnitude, location, and timing controlled by
  - The distribution, thickness, and compressibility of clay layers
  - The amount and timing of water-level changes
  - The lowest historical water level
- No documented occurrences and has not historically been an issue in GMA 13

SUBSIDENCE RISK

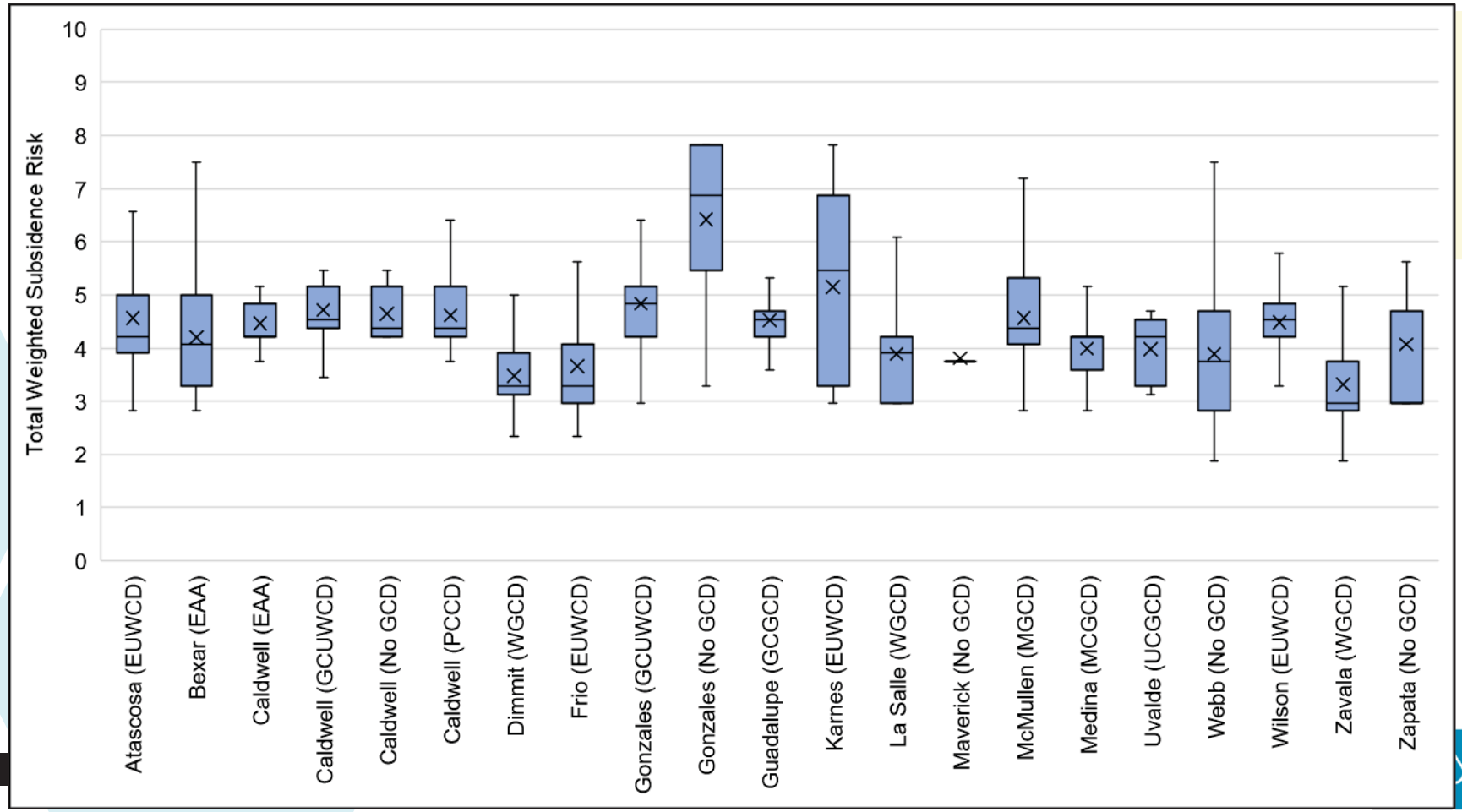
- Study completed in 2018 for TWDB
- Considered factors controlling subsidence to assign risk due to groundwater pumping
- Total clay layer thickness strongly influences risk
  - Depressurization causes reorientation of clay grains

SUBSIDENCE RISK

- Nearly 6,000 wells evaluated
- Risk values range from 0 to 10
- Generally low to medium risk
- 75% of locations have risk value of 4.8 or less



SUBSIDENCE RISK

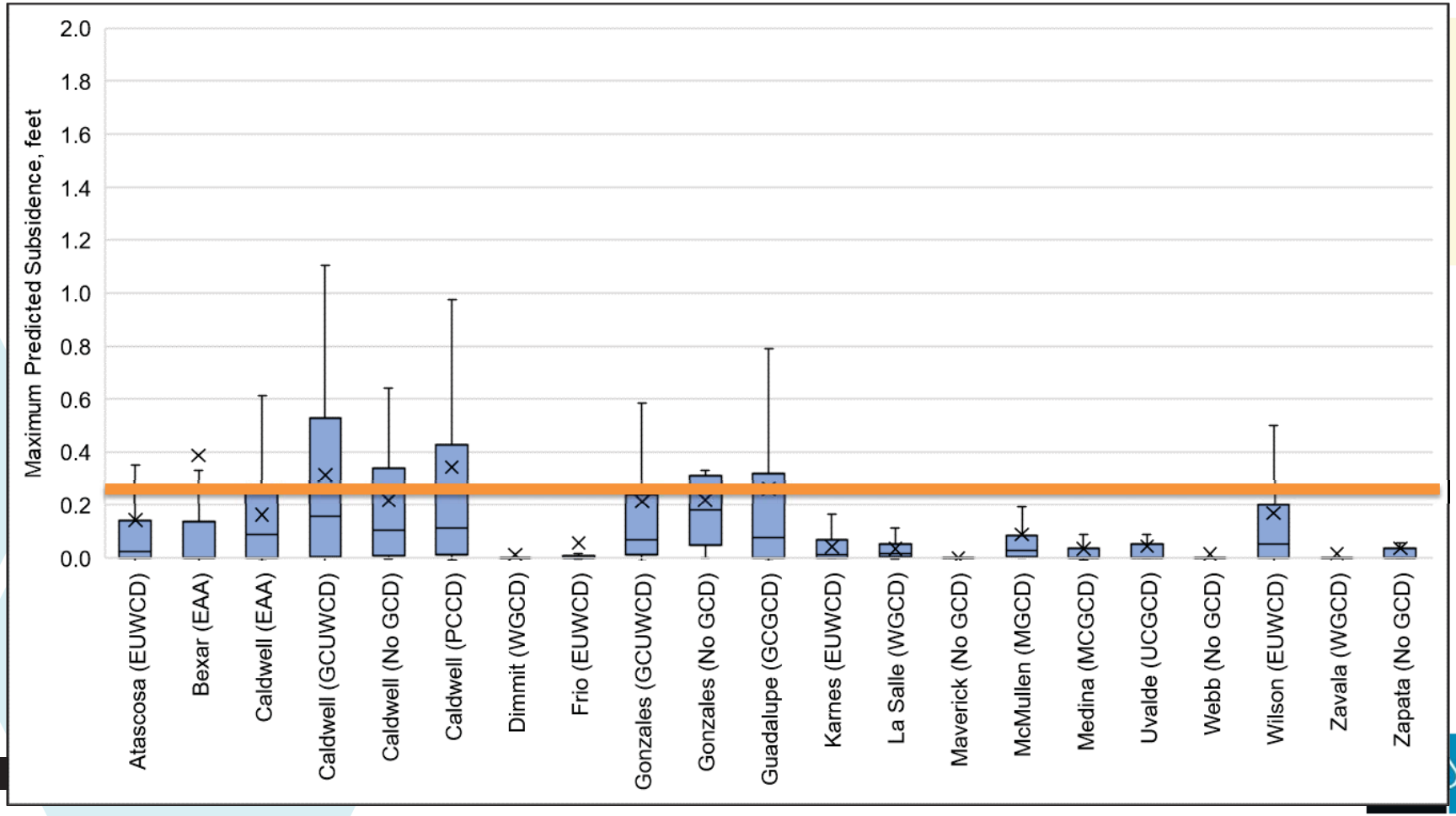


WATER

POTENTIAL SUBSIDENCE

- Used equations in TWDB subsidence prediction tool
  - Analytical solution
  - Delay not included in equations
  - Updated predicted water level changes
- Calculated predicted subsidence at well locations
  - Some results are beyond reasonable expectations
  - 3rd quartile of calculations provide a reasonable range

MAXIMUM PREDICTED SUBSIDENCE



WATER

DISCUSSION

- Subsidence not historically an issue within GMA 13
- Due to the characteristics of the aquifer, future compaction due to pumping is possible
- Future land-surface subsidence is not expected to be noticeable or to become an issue during the planning period

QUESTIONS/DISCUSSION

Discussion of Subsidence Impacts

November 13, 2020

Appendix 5.11 —
Discussion of Socioeconomic Impacts

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 13
From:	Michael R. Keester, P.G.
Date:	November 13, 2020
Project:	2021 Joint Planning
Subject:	Discussion of Socioeconomic Impacts

Per Texas Water Code Section (TWC) 36.108(d)(6) districts within each groundwater management area shall consider "socioeconomic impacts reasonably expected to occur" as they relate to proposed desired future conditions. This section contains the only guidance provided in the TWC regarding "consideration" of this factor, leaving the Groundwater Management Areas (GMAs) and Groundwater Conservation Districts (GCDs) to use their best judgment in developing and considering this factor during the Desired Future Condition (DFC) joint planning process. Given the lack of information available to GCDs regarding socioeconomic impacts relevant to the DFC joint planning process, GMAs look to the analyses conducted by the Texas Water Development Board (TWDB) to support the regional and state water planning processes. Also, while these TWDB analyses are not directly on point for the question before GMAs and GCDs, the DFC joint planning process has an indirect relationship to the regional and state water planning processes because the adopted DFCs result in modeled available groundwater (MAG) amounts that are given to the GCDs and the regional water planning groups (RWPGs). Those MAGS are then one of the considered potential water supplies for meeting water supply needs in each region.

Regional and State Water Plan Socioeconomic Considerations

Regional and state water planning in Texas considers socioeconomic impacts as required by statute. TWC §16.051(a) directs the TWDB to prepare and adopt a comprehensive state water plan that incorporates the regional water plans adopted under TWC §16.053. The state water plan is to provide for water resources development, management, and conservation and drought preparedness so that enough water is available at a reasonable cost to ensure public health and safety, further economic development, and protect the state's agricultural and natural resources. TWC §16.053(a) requires each RWPG to prepare a regional water plan to meet these same objectives for each region.

The TWDB rules administer the state and regional water planning processes and include requirements for the RWPGs to evaluate the socioeconomic impacts of not meeting water

supply needs. Specifically, 31 Texas Administrative Code (TAC) §357.11(j) states that the TWDB Executive Administrator will provide technical assistance to the RWPGs with certain analyses, including methods to evaluate the social and economic impacts of not meeting needs, when requested. Further, 31 TAC §357.33(c) requires that each RWPG evaluate the social and economic impacts of not meeting water needs and report on them for that region.

To carry out this requirement, the TWDB staff prepares regional water planning analyses of social and economic impacts based on water supply needs from the regional water plans. These impacts are summarized in the state water plan. In summary, the RWPGs, based upon projected water demands and existing water supplies, identify projected water needs that could occur under a repeat of a drought of record. TWDB staff then estimate the socioeconomic impacts of those water needs if they are not met for a single year of the drought of record in each planning decade.

For the socioeconomic impact analyses, TWDB examines multiple impacts. Financial transfer impacts include tax losses (state, local, and utility tax collections), water trucking costs, and utility revenue losses. Social impacts include lost consumer surplus (a welfare economics measure of consumer wellbeing), and population and school enrollment losses. These results are incorporated into the regional water plans, and ultimately summarized in the state water plan.

The TWDB prepared information for use by all RWPGs for the 2016 regional water plans, including Regions L, M, and N, the three RWPGs that cover some portion of GMA 13. TWDB staff have also prepared information for use by RWPGs for the 2021 RWPG regional water plans that are currently being reviewed and revised, as appropriate, in light of comments received during the public comment period. New to the 2021 planning cycle, the TWDB developed an interactive dashboard to view regional and county-level socioeconomic impacts.

It is important to note that some members of GMA 13 and representatives of the GMA 13 GCDs are appointed to the three RWPGs. These members receive information related to these planning groups' meetings and regularly attend and contribute to these RWPGs. Also, GMA 13 routinely includes an item on their meeting agendas to receive reports and consider possible action related to reports and communication from GMA 13's member GCDs and GMA 13 representatives to the RWPGs as a means to discuss and share GCD updates and information of interest provided from the RWPGs.

While TWDB assessments are useful to understand the importance of meeting projected water needs, these analyses **do not** evaluate socioeconomic impacts of proposed DFCs

at the GMA level, and such an analysis is not conducted by TWDB. It is important to keep in mind, though, that the DFCs result in groundwater availability amounts for potential water management strategies that can meet some of the water supply needs and, therefore, are indirectly tied to the socioeconomic analysis discussion for regional and state water planning.

2016 DFCs Socioeconomic Impacts Factor Discussion

Similar to the discussion above, Hutchison (2017a; 2017b) referred to the socioeconomic reports developed by the TWDB during the previous round of joint planning. These reports quantified the socioeconomic impact of not meeting needs identified in the regional water plans. In addition, Hutchison (2017a; 2017b) pointed out that there are two active mitigation programs in GMA 13 that are in place to address impacts of groundwater development on local landowners.

2022 DFCs Socioeconomic Impacts Factor Discussion

The information presented in the explanatory reports prepared for the 2016 DFCs remains applicable for the current round of joint planning. To update the evaluation and provide a quantitative estimate of the socioeconomic impacts, we reviewed the information developed by Dr. John Ellis (2019a; 2019b; 2019c) for the 2021 regional water plans for Regions L, M, and N. Within these reports, the estimated socioeconomic impact for not meeting identified projected water needs for each county is calculated In terms of income losses and job losses. Figure 1 and Table 1 provide the estimated income losses associated with not meeting the projected water needs. Figure 2 and Table 2 provided the estimated job losses associated with not meeting the projected water needs.

Ellis (2019a; 2019b; 2019c) indicates that the highest income losses through 2060 would be associated with not meeting mining water needs. Not meet mining water use needs also has the highest number of job losses through 2050. The next highest income and job losses are associated with not meeting municipal water use needs.

To estimate the socioeconomic impact associated with the potential DFCs, we reviewed the identified strategies from the 2017 State Water Plan that were associated with the aquifers in GMA 13, were discussed during the GMA 13 meeting on February 7, 2020, and summarized in the technical memorandum also dated February 7, 2020 (http://bit.ly/GMA_13_3rd_Round). Some of these groundwater strategies are expected to change in the 2022 State Water Plan. However, the values presented provide a general

and relative reference for possible socioeconomic impacts associated with the potential DFCs.

To estimate the socioeconomic impact associated with the groundwater strategies, we used the total strategies to calculate the income losses and job losses per acre-foot of water and then multiplied the value by the groundwater strategy. While the TWDB's calculation of the potential socioeconomic impact is much more complicated, the method we applied provides an indication of the relative socioeconomic impact associated with groundwater strategies from the 2017 State Water Plan along with an indication of the socioeconomic impact associated with the potential DFCs and corresponding MAG as these values are reflected in the model pumping files. Figure 3 and Table 3 provide the estimated income losses associated with not meeting the projected water needs that may be met with groundwater strategies. Figure 4 and Table 4 provide the estimated job losses associated with not meeting the projected water needs that may be met with groundwater strategies.

The only significant projected income and job losses are associated with groundwater strategies are for not meeting municipal needs. Most other uses did not have strategies, the amounts were very small, or Ellis (2019a; 2019b; 2019c) did not report any socioeconomic impact associated with the use. Once again, these estimated socioeconomic impacts are relative to one another. As Ellis (2019a; 2019b; 2019c) states, "**[t]he results must be interpreted carefully. It is the general and relative magnitudes of impacts as well as the changes of these impacts over time that should be the focus rather than the absolute numbers.**" Estimated socioeconomic impact values for each county and water use type are provided in Table 5 through Table 8. For counties and use types with no water needs per the 2017 State Water Plan or with no groundwater strategies, there is no estimated socioeconomic impact associated with the potential DFCs.

If you have any questions, please let me know.

References

Ellis, J.R., 2019a, Socioeconomic Impacts of Projected Water Shortages for the Coastal Bend (Region N) Regional Water Planning Area: Prepared in Support of the 2021 Region N Regional Water Plan, 23 p.

Ellis, J.R., 2019b, Socioeconomic Impacts of Projected Water Shortages for the Rio Grande (Region M) Regional Water Planning Area: Prepared in Support of the 2021 Region M Regional Water Plan, 23 p.

Ellis, J.R., 2019c, Socioeconomic Impacts of Projected Water Shortages for the South Central Texas (Region L) Regional Water Planning Area: Prepared in Support of the 2021 Region L Regional Water Plan, 24 p.

Hutchison, W.R., 2017a, Desired Future Condition Explanatory Report (Final) Carrizo-Wilcox/Queen City/Sparta Aquifers for Groundwater Management Area 13: DFC Explanatory Report, 23 p.

Hutchison, W.R., 2017b, GMA 13 Explanatory Report - Final - Yegua-Jackson Aquifer: DFC Explanatory Report, 12 p.

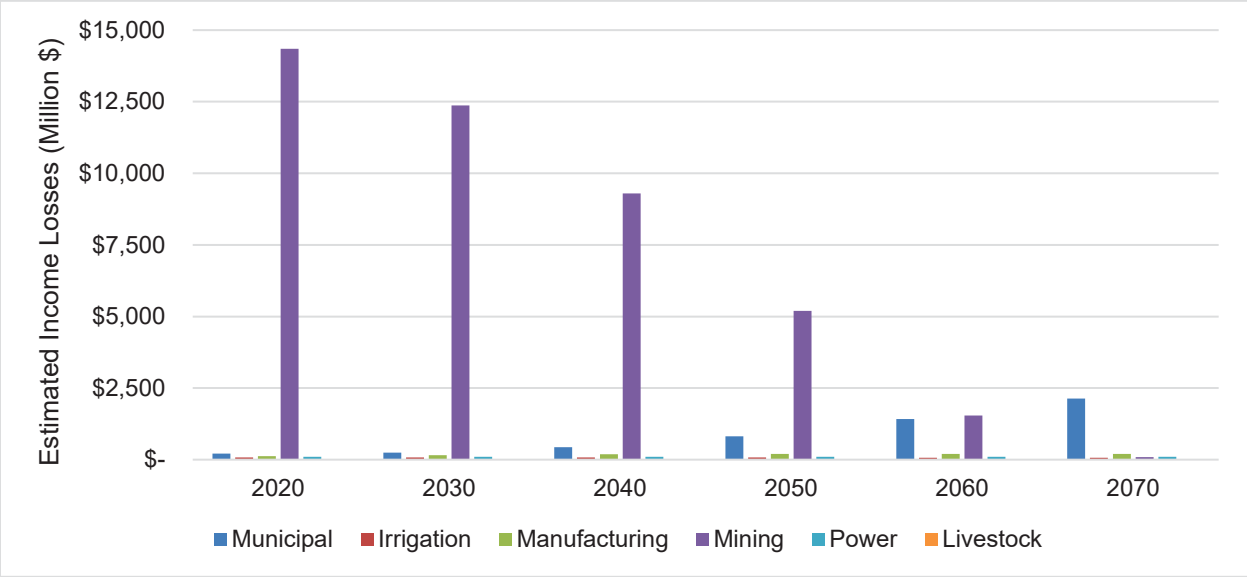


Figure 1. **Summary of estimated income losses within GMA 13 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 13). Values from Ellis (2019a; 2019b; 2019c).**

Table 1. **Summary of estimated income losses (million $) within GMA 13 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 13). Values from Ellis (2019a; 2019b; 2019c).**

Use	2020	2030	2040	2050	2060	2070
Municipal	$ 207.66	$ 247.36	$ 434.02	$ 812.25	$ 1,423.43	$ 2,138.21
Irrigation	$ 79.16	$ 76.87	$ 74.88	$ 72.73	$ 71.05	$ 70.72
Manufacturing	$ 118.02	$ 157.76	$ 192.13	$ 204.90	$ 204.90	$ 204.90
Mining	$14,346.91	$12,366.74	$ 9,296.53	$ 5,200.30	$ 1,544.93	$ 88.33
Power	$ 94.79	$ 94.79	$ 94.79	$ 94.79	$ 94.79	$ 94.79
Livestock	$ 6.63	$ 6.53	$ 8.33	$ 9.44	$ 10.67	$ 10.67
Total	**$14,853.17**	**$12,950.05**	**$10,100.68**	**$ 6,394.41**	**$ 3,349.77**	**$ 2,607.62**

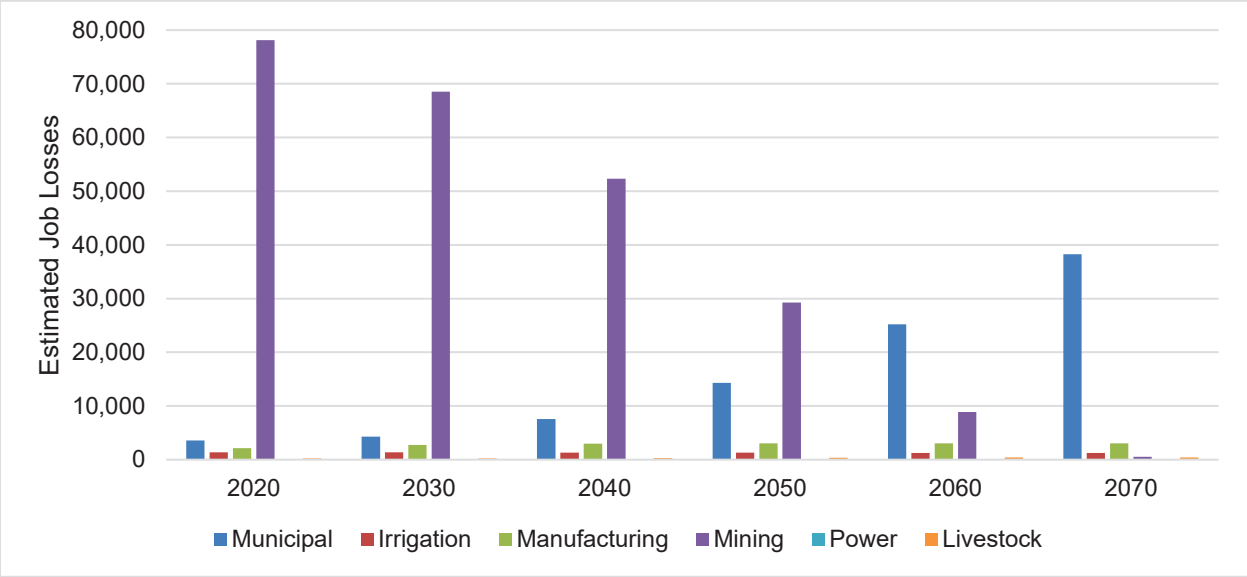


Figure 2. **Summary of estimated job losses within GMA 13 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 13). Values from Ellis (2019a; 2019b; 2019c).**

Table 2. **Summary of estimated job losses within GMA 13 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 13). Values from Ellis (2019a; 2019b; 2019c).**

Use	2020	2030	2040	2050	2060	2070
Municipal	3,593	4,311	7,586	14,286	25,219	38,269
Irrigation	1,371	1,339	1,312	1,282	1,262	1,264
Manufacturing	2,152	2,720	2,952	3,039	3,039	3,039
Mining	78,114	68,551	52,313	29,249	8,860	513
Power	0	0	0	0	0	0
Livestock	257	253	323	365	412	412
Total	**85,487**	**77,174**	**64,486**	**48,221**	**38,792**	**43,497**

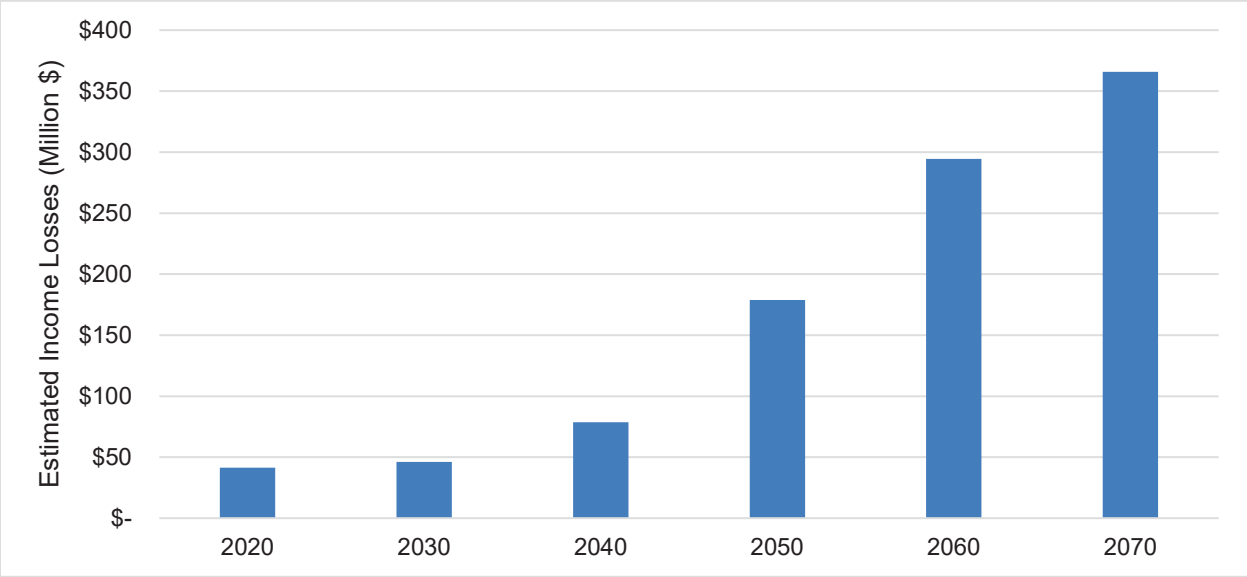


Figure 3. **Summary of estimated income losses within GMA 13 if projected municipal water needs associated with groundwater strategies are not met. Estimates are for whole counties (including areas outside of GMA 13).**

Table 3. **Summary of estimated income losses (million $) within GMA 13 if projected municipal water needs associated with groundwater strategies are not met. Estimates are for whole counties (including areas outside of GMA 13).**

Use	2020	2030	2040	2050	2060	2070
Municipal	$ 41.49	$ 46.19	$ 78.76	$ 178.76	$ 294.54	$ 365.77
Irrigation	$ -	$ -	$ -	$ -	$ -	$ -
Manufacturing	$ 0.21	$ 0.21	$ 0.21	$ 0.21	$ 0.21	$ 0.21
Mining	$ -	$ -	$ -	$ -	$ -	$ -
Power	$ -	$ -	$ -	$ -	$ -	$ -
Livestock	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 41.70**	**$ 46.40**	**$ 78.97**	**$ 178.97**	**$ 294.75**	**$ 365.98**

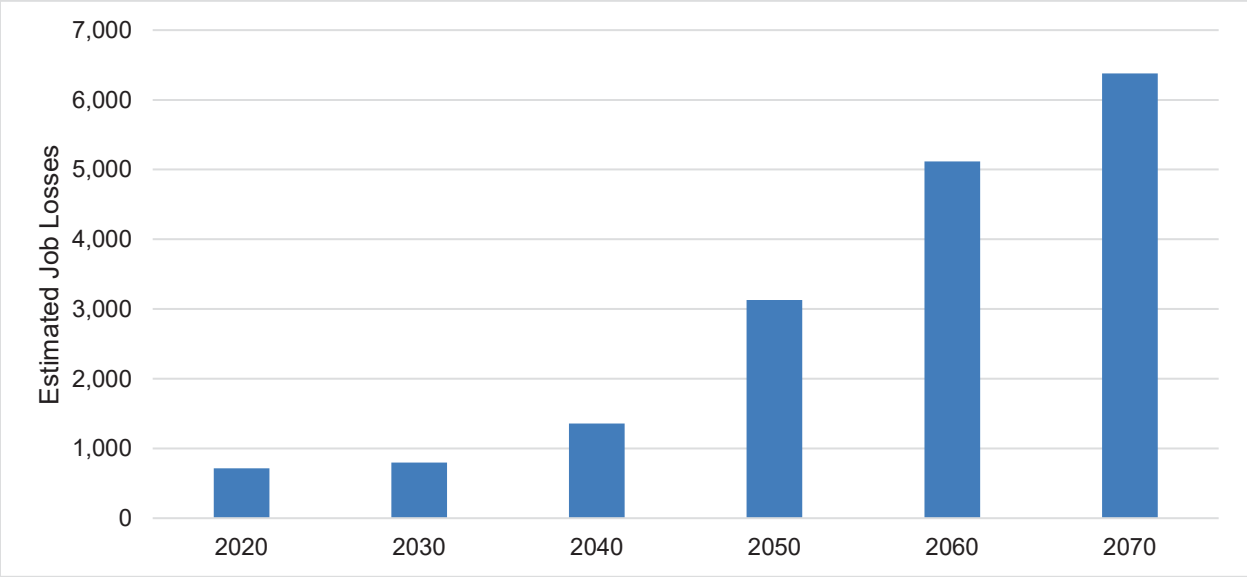


Figure 4. **Summary of estimated job losses within GMA 13 if projected municipal water needs associated with groundwater strategies are not met. Estimates are for whole counties (including areas outside of GMA 13).**

Table 4. **Summary of estimated job losses within GMA 13 if projected municipal water needs associated with groundwater strategies are not met. Estimates are for whole counties (including areas outside of GMA 13).**

Use	2020	2030	2040	2050	2060	2070
Municipal	716	798	1,359	3,131	5,116	6,380
Irrigation	0	0	0	0	0	0
Manufacturing	2	2	2	2	2	2
Mining	0	0	0	0	0	0
Power	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Total	718	800	1,361	3,133	5,118	6,382

Table 5. Summary of estimated income losses (million $) for counties within GMA 13 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c).

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Atascosa	L	Municipal	$6.52	$8.70	$12.68	$16.54	$20.57	$24.16
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Bexar*	L	Municipal	$102.48	$113.74	$254.91	$517.90	$907.12	$1,401.82
		Irrigation	$0.92	$0.92	$0.92	$0.92	$0.92	$0.92
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	$94.79	$94.79	$94.79	$94.79	$94.79	$94.79
		Livestock	NI	NI	NI	NI	NI	NI
Caldwell*	L	Municipal	$1.21	$1.61	$4.71	$10.35	$22.89	$38.76
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Dimmit	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	$3.97	$3.97	$3.97	$3.97	$3.97	$3.97
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	$4,116.25	$4,202.00	$3,558.84	$2,089.31	$622.70	$18.57
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Frio	L	Municipal	$10.81	$16.41	$21.97	$26.05	$29.61	$32.90
		Irrigation	$0.00	$0.00	$0.00	$0.00	$0.30	$0.91
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Gonzales	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Guadalupe*	L	Municipal	$0.03	$0.05	$8.19	$58.02	$144.05	$205.33
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	$0.00	$17.48	$17.48	$17.48	$17.48	$17.48
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Karnes*	L	Municipal	$5.16	$5.08	$4.66	$4.57	$6.57	$6.40
		Irrigation	$0.13	$0.13	$0.68	$0.68	$0.68	$0.68
		Manufacturing	$0.00	$0.00	$34.37	$47.14	$47.14	$47.14
		Mining	$1,879.79	$1,319.99	$743.71	$109.72	$11.62	$0.97
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
LaSalle	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	$0.19	$0.19	$0.20	$0.21	$0.22	$0.23
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	$3,983.72	$4,134.76	$3,638.75	$2,231.58	$829.29	$68.54
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI

Table 5 (cont.). Summary of estimated income losses (million $) for counties within GMA 13 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c).

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Maverick	M	Municipal	$2.57	$7.99	$18.23	$33.51	$52.05	$64.03
		Irrigation	$12.02	$9.62	$7.43	$5.46	$3.73	$2.29
		Manufacturing	$0.23	$0.23	$0.23	$0.23	$0.23	$0.23
		Mining	$362.84	$1,154.08	$1,323.37	$769.69	$81.32	$0.00
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
McMullen*	N	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Medina*	L	Municipal	$16.32	$20.84	$25.35	$30.35	$34.73	$38.37
		Irrigation	$18.46	$18.63	$18.60	$18.76	$18.85	$19.40
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	$0.00	$0.00	$0.00	$0.00	$0.00	$0.25
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Uvalde*	L	Municipal	$60.80	$68.72	$75.60	$83.44	$91.59	$99.55
		Irrigation	$25.48	$25.64	$25.72	$25.87	$26.05	$26.25
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	$5.38	$5.28	$6.53	$8.19	$9.42	$9.42
Webb*	M	Municipal	$0.27	$0.42	$0.62	$16.45	$87.80	$188.59
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	$115.50	$137.76	$137.76	$137.76	$137.76	$137.76
		Mining	$4,004.31	$1,555.91	$31.86	$0.00	$0.00	$0.00
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Wilson	L	Municipal	$1.13	$2.85	$4.96	$11.07	$20.87	$31.14
		Irrigation	$0.82	$0.83	$0.84	$0.85	$0.93	$1.12
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	$1.25	$1.25	$1.80	$1.25	$1.25	$1.25
Zapata	M	Municipal	$0.36	$0.95	$2.14	$4.00	$5.58	$7.16
		Irrigation	$5.43	$5.14	$4.85	$4.55	$4.26	$3.97
		Manufacturing	$2.29	$2.29	$2.29	$2.29	$2.29	$2.29
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Zavala	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	$11.74	$11.80	$11.67	$11.46	$11.14	$10.98
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
GMA 13		Municipal	$207.66	$247.36	$434.02	$812.25	$1,423.43	$2,138.21
		Irrigation	$79.16	$76.87	$74.88	$72.73	$71.05	$70.72
		Manufacturing	$118.02	$157.76	$192.13	$204.90	$204.90	$204.90
		Mining	$14,346.91	$12,366.74	$9,296.53	$5,200.30	$1,544.93	$88.33
		Power	$94.79	$94.79	$94.79	$94.79	$94.79	$94.79
		Livestock	$6.63	$6.53	$8.33	$9.44	$10.67	$10.67

"NI" = No estimated impact

*Estimates for whole county includes area outside of GMA 13

Table 6. Summary of estimated job losses for counties within GMA 13 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c).

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Atascosa	L	Municipal	112	150	218	285	354	416
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Bexar*	L	Municipal	1,765	1,958	4,389	8,918	15,620	24,139
		Irrigation	19	19	19	19	19	19
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	0	0	0	0	0	0
		Livestock	NI	NI	NI	NI	NI	NI
Caldwell*	L	Municipal	20	26	77	174	289	662
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Dimmit	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	65	65	65	65	65	65
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	23,860	24,357	20,629	12,111	3,609	108
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Frio	L	Municipal	186	283	378	449	510	567
		Irrigation	0	0	0	0	7	20
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Gonzales	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Guadalupe*	L	Municipal	1	1	141	999	2,480	3,536
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	0	179	179	179	179	179
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Karnes*	L	Municipal	89	88	80	79	113	110
		Irrigation	2	2	12	12	12	12
		Manufacturing	0	0	232	319	319	319
		Mining	10,879	7,651	4,311	636	67	6
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
LaSalle	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	6	6	6	7	7	7
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	23,092	23,967	21,092	12,935	4,807	397
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI

Table 6 (cont.). Summary of estimated job losses for counties within GMA 13 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c).

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Maverick	M	Municipal	59	182	416	765	1,188	1,461
		Irrigation	176	141	109	80	55	33
		Manufacturing	2	2	2	2	2	2
		Mining	1,682	5,349	6,133	3,567	377	0
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
McMullen*	N	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Medina*	L	Municipal	281	359	437	523	598	661
		Irrigation	353	356	355	359	360	371
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	0	0	0	0	0	2
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Uvalde*	L	Municipal	1,047	1,183	1,302	1,437	1,577	1,714
		Irrigation	455	458	460	462	466	469
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	207	203	251	315	362	362
Webb*	M	Municipal	6	10	14	375	2,004	4,304
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	2,017	2,406	2,406	2,406	2,406	2,406
		Mining	18,601	7,227	148	0	0	0
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Wilson	L	Municipal	19	49	85	191	359	536
		Irrigation	18	18	18	18	20	24
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	50	50	72	50	50	50
Zapata	M	Municipal	8	22	49	91	127	163
		Irrigation	72	68	64	60	56	52
		Manufacturing	133	133	133	133	133	133
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Zavala	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	205	206	204	200	195	192
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
GMA 13		Municipal	3,593	4,311	7,586	14,286	25,219	38,269
		Irrigation	1,371	1,339	1,312	1,282	1,262	1,264
		Manufacturing	2,152	2,720	2,952	3,039	3,039	3,039
		Mining	78,114	68,551	52,313	29,249	8,860	513
		Power	0	0	0	0	0	0
		Livestock	257	253	323	365	412	412

"NI" = No estimated impact

*Estimates for whole county includes area outside of GMA 13

Table 7. Summary of estimated income losses (million $) for counties within GMA 13 if projected water needs associated with groundwater strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Atascosa	L	Municipal	$1.83	$2.49	$2.07	$2.69	$3.56	$4.58
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Bexar*	L	Municipal	$35.81	$36.21	$59.15	$103.70	$148.06	$187.49
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Livestock	NI	NI	NI	NI	NI	NI
Caldwell*	L	Municipal	$1.15	$1.59	$4.62	$10.22	$7.20	$6.31
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Dimmit	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Frio	L	Municipal	$0.00	$0.00	$0.00	$0.00	$0.00	$0.66
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Gonzales	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Guadalupe*	L	Municipal	$0.02	$0.04	$5.81	$43.04	$107.92	$133.04
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NS	NS	NS	$0.00	$0.00	$0.00
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Karnes*	L	Municipal	$1.91	$1.57	$1.19	$1.04	$1.32	$1.18
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NS	NS	NS	NS	NS	NS
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
LaSalle	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI

Table 7 (cont.). Summary of estimated income losses (million $) for counties within GMA 13 if projected water needs associated with groundwater strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Maverick	M	Municipal	$0.00	$0.00	$0.00	$7.87	$10.23	$9.97
		Irrigation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Manufacturing	$0.21	$0.21	$0.21	$0.21	$0.21	$0.21
		Mining	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
McMullen*	N	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Medina*	L	Municipal	$0.45	$1.50	$1.52	$2.24	$2.93	$3.71
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Uvalde*	L	Municipal	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NS	NS	NS	NS	NS	NS
Webb*	M	Municipal	$0.00	$0.00	$0.00	$0.00	$1.03	$1.56
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Mining	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Wilson	L	Municipal	$0.00	$2.08	$3.03	$5.75	$9.57	$14.10
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NS	NS	NS	NS	NS	NS
Zapata	M	Municipal	$0.33	$0.71	$1.37	$2.23	$2.73	$3.17
		Irrigation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Manufacturing	NS	NS	NS	NS	NS	NS
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Zavala	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
GMA 13		Municipal	$41.49	$46.19	$78.76	$178.76	$294.54	$365.77
		Irrigation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Manufacturing	$0.21	$0.21	$0.21	$0.21	$0.21	$0.21
		Mining	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Power	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
		Livestock	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

"NI" = No estimated impact

"NS" = No strategies

*Estimates for whole county includes area outside of GMA 13

Table 8. Summary of estimated job losses for counties within GMA 13 if projected water needs associated with groundwater strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Atascosa	L	Municipal	31	43	36	46	61	79
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Bexar*	L	Municipal	617	623	1,018	1,786	2,549	3,228
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	0	0	0	0	0	0
		Livestock	NI	NI	NI	NI	NI	NI
Caldwell*	L	Municipal	19	26	76	172	91	108
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Dimmit	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Frio	L	Municipal	0	0	0	0	0	11
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Gonzales	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Guadalupe*	L	Municipal	1	1	100	741	1,858	2,291
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NS	NS	NS	0	0	0
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Karnes*	L	Municipal	33	27	20	18	23	20
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NS	NS	NS	NS	NS	NS
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
LaSalle	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI

Table 8 (cont.). Summary of estimated job losses for counties within GMA 13 if projected water needs associated with groundwater strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Maverick	M	Municipal	0	0	0	180	234	228
		Irrigation	0	0	0	0	0	0
		Manufacturing	2	2	2	2	2	2
		Mining	0	0	0	0	0	0
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
McMullen*	N	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Medina*	L	Municipal	8	26	26	39	50	64
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NS	NS	NS	NS	NS	NS
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Uvalde*	L	Municipal	0	0	0	0	0	0
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NS	NS	NS	NS	NS	NS
Webb*	M	Municipal	0	0	0	0	24	36
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	0	0	0	0	0	0
		Mining	0	0	0	0	0	0
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Wilson	L	Municipal	0	36	52	99	165	243
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NS	NS	NS	NS	NS	NS
Zapata	M	Municipal	7	16	31	51	62	72
		Irrigation	0	0	0	0	0	0
		Manufacturing	NS	NS	NS	NS	NS	NS
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Zavala	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
GMA 13		Municipal	716	798	1,359	3,131	5,116	6,380
		Irrigation	0	0	0	0	0	0
		Manufacturing	2	2	2	2	2	2
		Mining	0	0	0	0	0	0
		Power	0	0	0	0	0	0
		Livestock	0	0	0	0	0	0

"NI" = No estimated impact

"NS" = No strategies

*Estimates for whole county includes area outside of GMA 13

Appendix 5.12 —
Presentation Regarding Socioeconomic Impacts

DISCUSSION OF SOCIOECONOMIC IMPACTS

November 13, 2020

CONSIDERATION

- Texas Water Code Section 36.108(d)(6)
- Socioeconomic impacts reasonably expected to occur
- Generally rely on information related to regional water planning

REGIONAL AND STATE WATER PLANS

- TWDB develops estimates based on water supply needs not being met during a drought of record
- Economic impacts
  - Tax losses
  - Water trucking costs
  - Utility revenue losses
- Social impacts
  - Consumer wellbeing
  - Population and school enrollment losses

RWPG SOCIOECONOMIC IMPACTS

- Not directly evaluated relative to possible DFCs
- Indirectly related through the MAG associated with DFCs
- Utilize the information from RWPGs (L, M, and N) to indirectly assess socioeconomic impacts related to DFCs and expected MAG

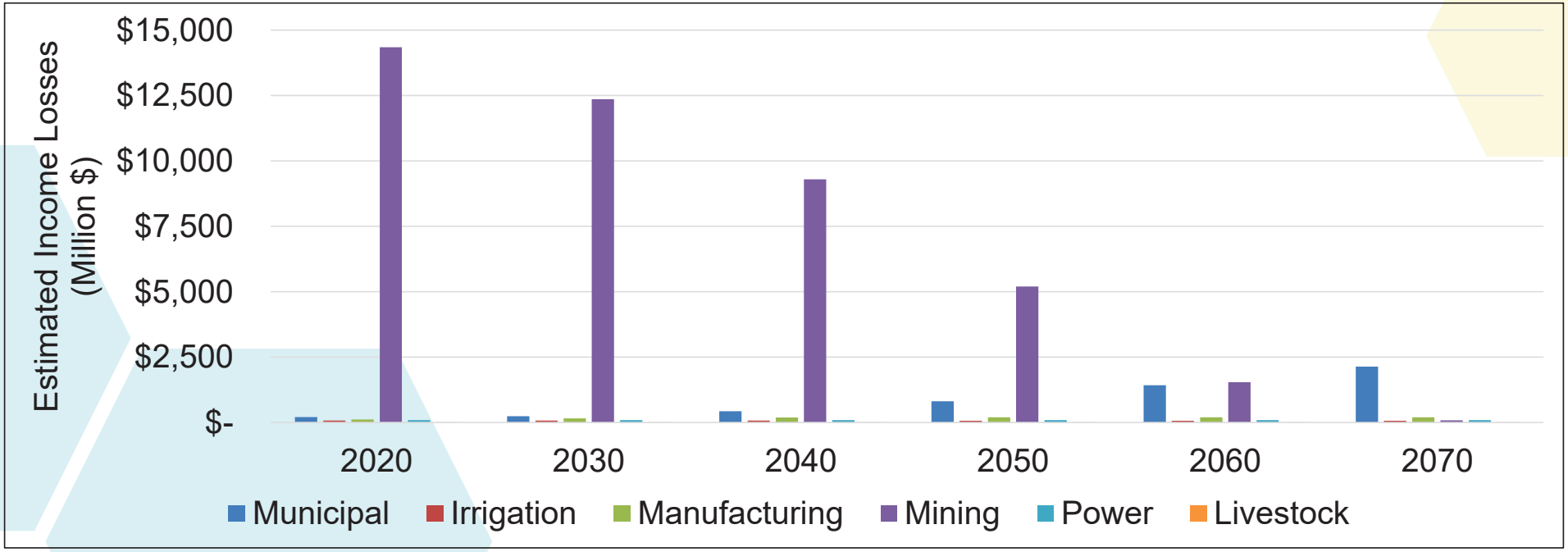
2016 CONSIDERATIONS SUMMARY

- TWDB socioeconomic impact reports
- Identified two mitigation programs in GMA 13
  - SAWS
  - GCUWCD

CURRENT CONSIDERATIONS

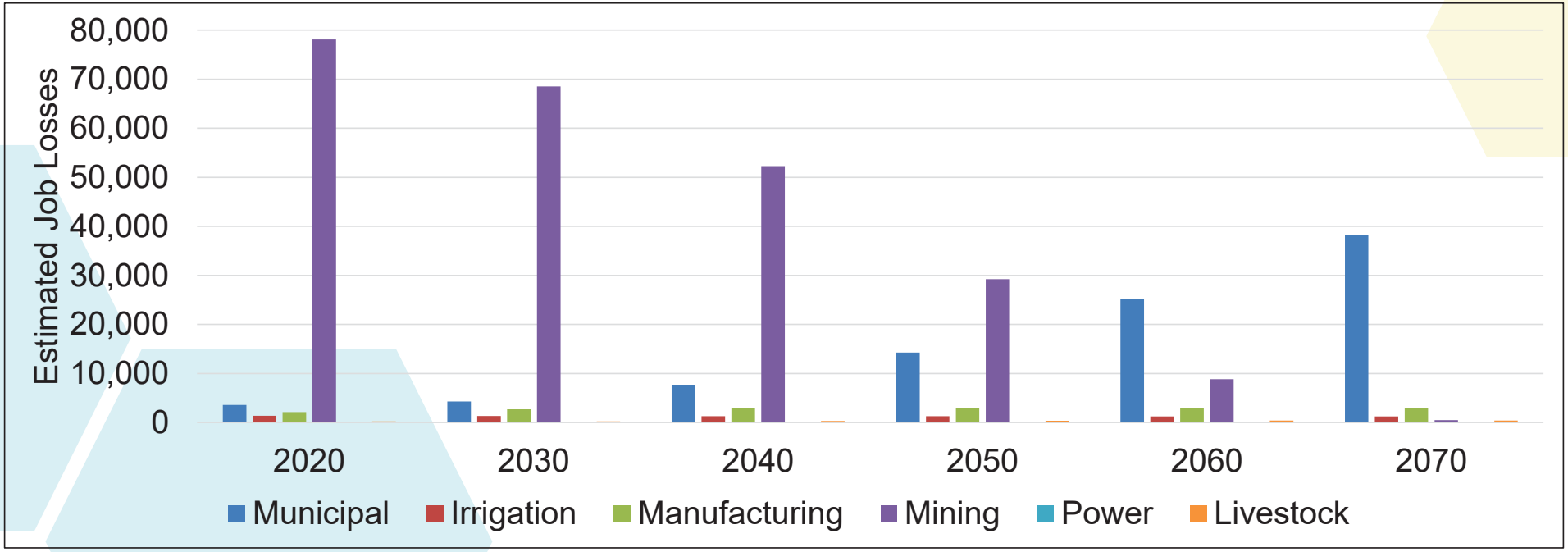
- 2016 considerations are still applicable
- 2021 RWPG socioeconomic impacts
  - Income losses
  - Job losses
- Estimated socioeconomic impacts from groundwater strategies using impact per acre-foot

GMA 13 ESTIMATED INCOME LOSSES OF NOT MEETING PROJECTED WATER NEEDS



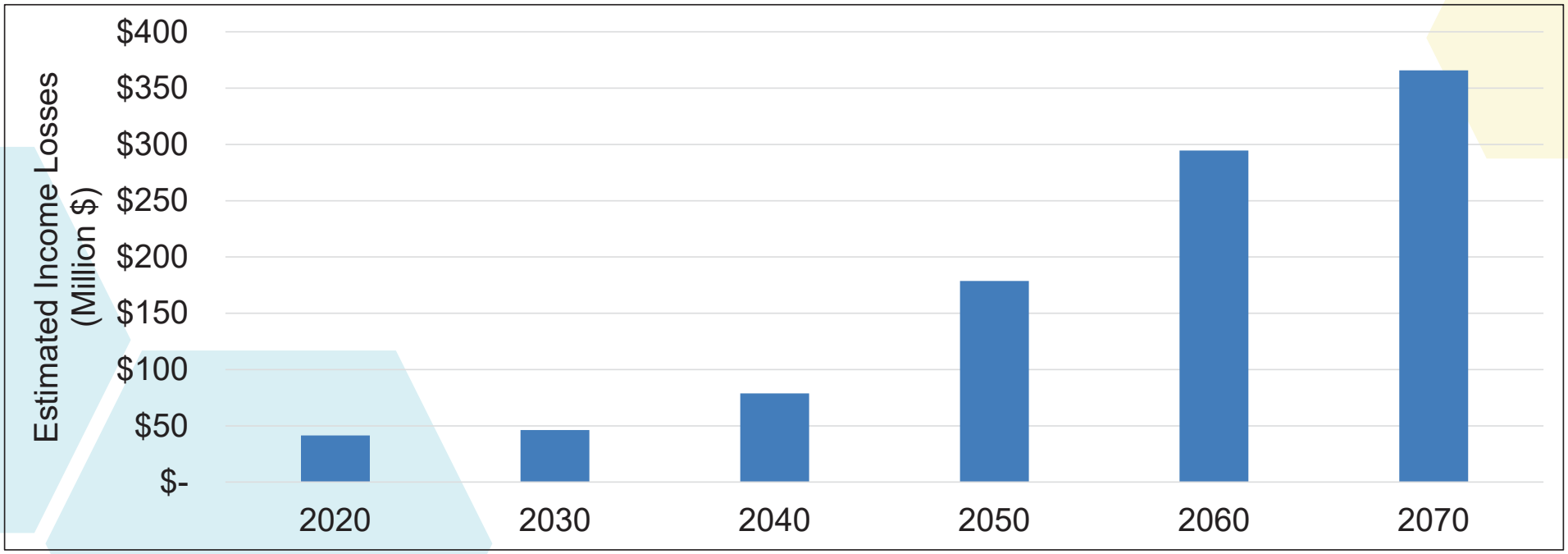
Summary of estimated income losses within GMA 13 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 13). Values from Ellis (2019a; 2019b; 2019c).

GMA 13 ESTIMATED JOB LOSSES OF NOT MEETING PROJECTED WATER NEEDS



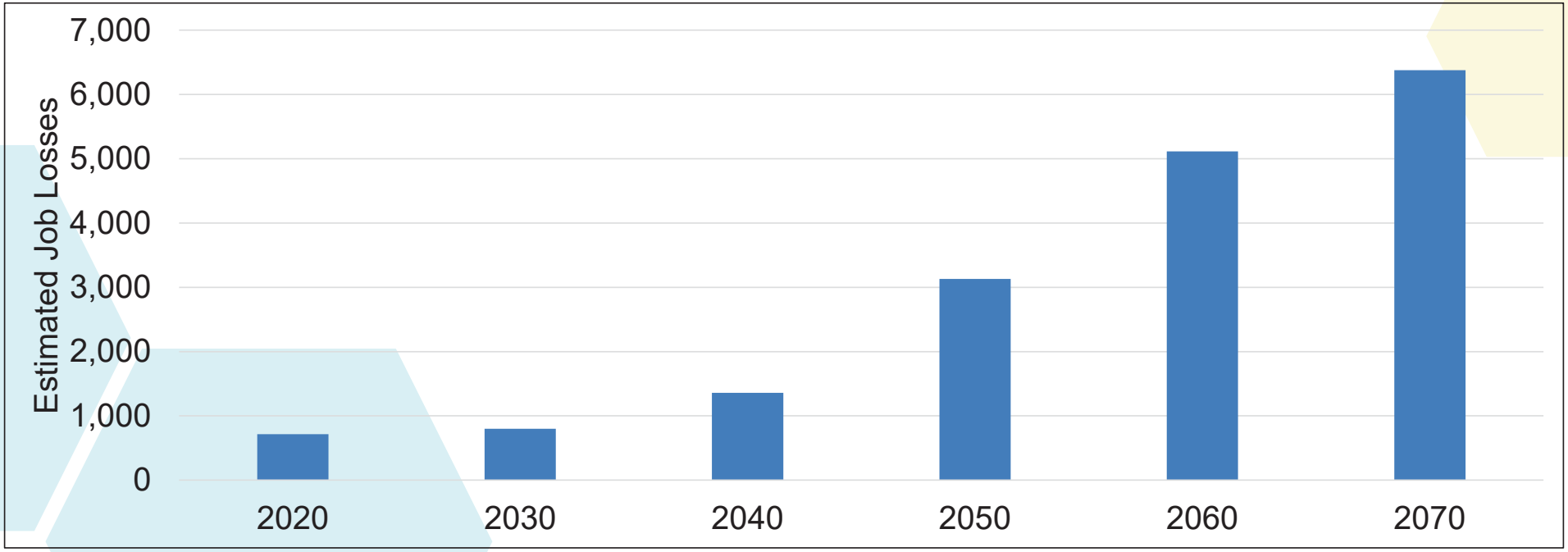
Summary of estimated job losses within GMA 13 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 13).
Values from Ellis (2019a; 2019b; 2019c).

GMA 13 ESTIMATED INCOME LOSSES OF NOT MEETING PROJECTED MUNICIPAL WATER NEEDS ASSOCIATED WITH GROUNDWATER STRATEGIES



Summary of estimated income losses within GMA 13 if projected municipal water needs associated with groundwater strategies are not met. Estimates are for whole counties (including areas outside of GMA 13).

GMA 13 ESTIMATED JOB LOSSES OF NOT MEETING PROJECTED MUNICIPAL WATER NEEDS ASSOCIATED WITH GROUNDWATER STRATEGIES



Summary of estimated income job within GMA 13 if projected municipal water needs associated with groundwater strategies are not met. Estimates are for whole counties (including areas outside of GMA 13).

GROUNDWATER SOCIOECONOMIC IMPACTS

- Municipal needs largest impacts
  - Bexar County
  - Guadalupe County
- Minor impacts associated with other uses
- RWPG data suggests little socioeconomic impact related to mining
  - Most 2017 SWP strategies tied to demand reduction
- Values show relative impact and are likely to change with 2022 State Water Plan

QUESTIONS/COMMENTS

Discussion of Socioeconomic Impacts

November 13, 2020

Appendix 5.13 —
Discussion of the Impacts of Desired Future Conditions on the Interests and Rights in Private Property

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 13
From:	Michael R. Keester, P.G.
Date:	November 13, 2020
Project:	2021 Joint Planning
Subject:	Discussion of the Impacts of Desired Future Conditions on the Interests and Rights in Private Property

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Per Texas Water Code Section (TWC) 36.108(d)(7), districts within each groundwater management area shall consider "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 [TWC] Section 36.002" as they relate to proposed desired future conditions. Per TWC 36.002, "a landowner owns the groundwater below the surface of the landowner's land as real property." While it is clear that a landowner owns the groundwater under the statute, the TWC does not entitle the landowner "the right to capture a specific amount of groundwater."

During the 2016 joint planning cycle, the Groundwater Management Area 13 (GMA 13) members considered the impact on private property rights within the context of the inclusion of proposed Region L water management strategies in the adopted pumping scenarios used in the model simulations that were the basis for the desired future condition. According to Hutchison (2017a; 2017b), GMA 13 considered the potential impacts on existing wells owners and surface water resources caused by increased pumping associated with Region L water management strategies as balanced with the increasing water demand in the GMA 13 area.

For the 2022 joint planning cycle, we have continued to work with the GMA 13 members and stakeholders to include all of the proposed water management strategies using groundwater resources in the model simulations. As discussed during GMA 13 meetings on November 8, 2019 and February 7, 2020, not all pumping inputs are realized in the final model outputs due to the model limitations. However, the GMA 13 members have sought to provide land owners or lessees the opportunity to produce the groundwater beneath their property.

The adopted desired future conditions (DFCs) require a 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. On one side of this balance is the production of groundwater. Through the GMA's consideration of various pumping scenarios, which included amounts to meet projected demands, the GMA 13 members have considered predictive pumping scenarios that reasonable reflect the highest practicable level of groundwater production. While it may be possible to produce greater amounts of groundwater from the aquifers, for this consideration we can assume the practicable amount to be that which is able to be used to meet projected demand (that is, projected beneficial use).

The other side of the balance includes many items, one of which (namely, the prevention of waste) suggests it is appropriate to consider the projected demand as a limitation on the highest practicable level of groundwater production. The other items can also be directly tied to considering the amount of pumping included in the various pumping scenarios, but can also be easily considered with respect to hydrogeologic conditions. Because water level change (that is, drawdown) is directly related to pumping, GMA 13 members are able to evaluate the model results for various scenarios to consider this side of the DFC balance. In addition, incorporating the uncertainty of model predictions (that is, predictive error) into the results from an adopted pumping scenario will help to improve how well potential DFCs based on model simulation results will help achieve the real-world conservation, preservation, protection, recharging and prevention of waste of groundwater, and control of subsidence.

For the GMA 13 DFC of 75 percent remaining saturated thickness remaining, the impact on private property cannot be considered within the context of a simulation using the existing groundwater availability model due to its inability to reasonably simulate the applicable aquifer conditions (Hutchison, 2017c). With the proposed pumping included in the model simulations causing a greater decrease in the saturated thickness than measured data suggest would occur, the impacts to private property with regard to water level declines may be less than simulations with the current model suggest.

With regard to private property rights and the ownership of groundwater, the pumping scenarios considered by GMA 13 do not appear to create a restriction on a landowners ability to produce their groundwater to meet projected beneficial use demands. With potential DFCs being based on model results using one of the GMA 13 pumping scenarios, it does not appear that there would be any significant impact on private property rights. In addition, inclusion of variances to the DFCs that are reflective of the observed error in model results will help address considerations related to a DFC that may appear restrictive to private property rights.

If you have any questions, please let us know.

References

Hutchison, W.R., 2017a, Desired Future Condition Explanatory Report (Final) Carrizo-Wilcox/Queen City/Sparta Aquifers for Groundwater Management Area 13: DFC Explanatory Report, 23 p.

Hutchison, W.R., 2017b, GMA 13 Explanatory Report - Final - Yegua-Jackson Aquifer: DFC Explanatory Report, 12 p.

Hutchison, W.R., 2017c, Sparta, Queen City, and Carrizo-Wilcox Aquifers: Summary of Scenario 9 Drawdown and Outcrop Results: GMA 13 Technical Memorandum 16-08, Final, 10 p.

Appendix 5.14 —
Presentation Regarding Impacts of Desired Future Conditions on the Interests and Rights in Private Property

DISCUSSION OF PRIVATE PROPERTY RIGHTS

November 13, 2020

LRE WATER

CONSIDERATION

- Texas Water Code Section 36.108(d)(7)
- Impact on the interests and rights in private property
- A landowner owns the groundwater, but not a specific amount*

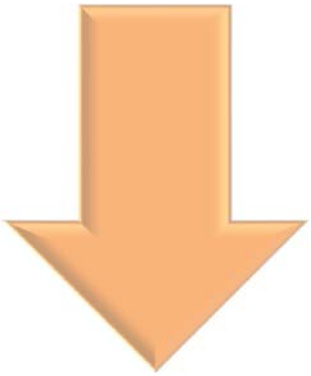
*A hydrogeologist's simplification of TWC 36.002. Not a legal opinion.

LRE WATER

SUMMARY

- 2016 joint planning
  - Include Region L water management strategies
  - Impact balanced with increasing demand
- 2022 joint planning
  - Similar process
  - Highest practicable production
    - Not necessarily highest possible
    - Considered through inclusion of projected demands in scenarios
  - Conservation, preservation, protection, recharging, and prevention of waste of groundwater, and control of subsidence
    - Considered through pumping scenarios
    - Scenarios result in various predicted water level changes which affect hydrogeologic conditions

Highest Practicable Level of Groundwater Production



Conservation, Preservation, Protection, Recharging, and Prevention of Waste of Groundwater, and Control of Subsidence

LRE WATER

DISCUSSION

- Balance test considered through modeling evaluations
  - Predicted pumping
  - Water level changes
  - Discussions of model limitations
- No significant impact on private property rights is apparent

QUESTIONS/COMMENTS

Discussion of Private Property Rights

November 13, 2020

Appendix 5.15 —
Discussion of Feasibility of Achieving the DFCs

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 13
From:	Michael R. Keester, P.G.
Date:	February 5, 2021
Project:	2021 Joint Planning
Subject:	Discussion of Feasibility of Achieving the DFCs

Per Texas Water Code Section 36.108(d)(8) for any proposed desired future conditions, the districts within each groundwater management area shall consider "the feasibility of achieving the desired future condition." During the previous round of joint planning, Hutchison (2017a; 2017b) discusses this factor by referencing the measurement of water levels in GMA 13 by Districts and the TWDB. He adds that evaluating the collected water level data for comparison with the adopted DFCs is covered in each District's management plan.

For the this third round of joint planning we looked to further the consideration by looking more closely at measured water levels compared to the model results. To investigate the question of how measured water level change compares with the GAM predictions, we began by reviewing wells located within GMA 13 that are identified as a TWDB, USGS, or GCD "current observation well" or "recorder well" in the TWDB Groundwater Database (TWDB, 2020). Of the 299 wells identified as completed in the Carrizo-Wilcox, Sparta, Queen City, or Yegua-Jackson aquifer, we filtered out:

- 33 wells with less than five publishable water-level measurements;
- 21 wells where the first measurement was after 12/31/2011;
- 9 well with a period of record that was less than five years; and,
- 7 wells where the model cell went dry prior to simulation date 12/31/2016

For the remaining 229 wells, we obtained the reported water-level measurements along with the simulated water levels associated with the current pumping files (namely, "GMA13_2019_001.wel" and "GMA13_YJ_2020_001.wel"). Figure 1 illustrates the location of the observation wells and Supplementary Table 1 summarizes the number of wells in each county.

Typically, when evaluating model results relative to measured water levels the statistical evaluation focuses on how well the model replicates the measured water levels. During the previous round of joint planning, Dr. Hutchison demonstrated how the GAM for the

Carrizo-Wilcox, Sparta, and Queen City aquifers cannot be used to simulate the primary DFC that 75 percent of the saturated thickness at the end of 2012 remains in 2070. However, for GMA 13 the secondary DFC for the Carrizo-Wilcox, Sparta, and Queen City aquifers and the DFC for the Yegua-Jackson Aquifer are stated in terms of average drawdown across a geographic area.

Evaluating how well the model matches measured water levels may indicate that average drawdown is also reasonably predicted. However, it is also possible for a model to not be able to match measured water levels while still reasonably matching the drawdown in the aquifer. By comparing the trend of the measured and modeled water levels we can begin to assess if the GAM predicted change in water level is a reasonable reflection of how measured water levels are changing. For example, a trend in measured water levels may be a decline of 1.0 feet per year (ft/yr) while the simulated water level decline trend may be 0.5 ft/yr. While the difference in trend appears small, over an 80-year period it suggests 40 feet of difference in predicted drawdown.

To investigate the trend in measured and simulated water levels, we analyzed the data points using Kendall-Theil regression which is less sensitive to outliers than simple linear regression (Granato, 2006). Figure 2 illustrates the trends calculated from the measured and simulated water levels at an observation well location. As shown in Supplementary Table 2, the average measured water level trend for the Carrizo-Wilcox, Sparta, and Queen City aquifers ranges from a slight rise of 0.12 ft/yr in Caldwell County to a decline of 8.77 ft/yr in La Salle County. For GMA 13 as a whole, the average decline is nearly 2 ft/yr for the Carrizo-Wilcox, Sparta, and Queen City aquifers. For the Yegua-Jackson Aquifer, the two wells average a measured water level decline trend of 0.76 ft/yr. Figure 3 illustrates the trends in measured water levels across GMA 13. For the trends, a value of -0.25 ft/yr or less was considered declining, a value of 0.25 ft/yr or more was considered rising, and a value between -0.25 ft/yr and 0.25 ft/yr was considered stable.

For the simulated water level trend, we limited the trend calculation to simulated water levels between 2000 and 2016 as this was the period for which pumping amounts were updated in the model. In addition, beyond the year 2016 the predictive pumping would have a greater influence on the estimated trend in simulated water levels. Supplementary Table 3 shows how the there are several more counties with rising trend as compared the measured water level trends. In addition, the average simulated water level decline trend for the Carrizo-Wilcox/Queen City/Sparta is 1.23 ft/yr less than the measured water level decline trend and it is 0.73 ft/yr less for the Yegua-Jackson aquifer. Figure 4 illustrates the simulated water level trends at well locations across GMA 13.

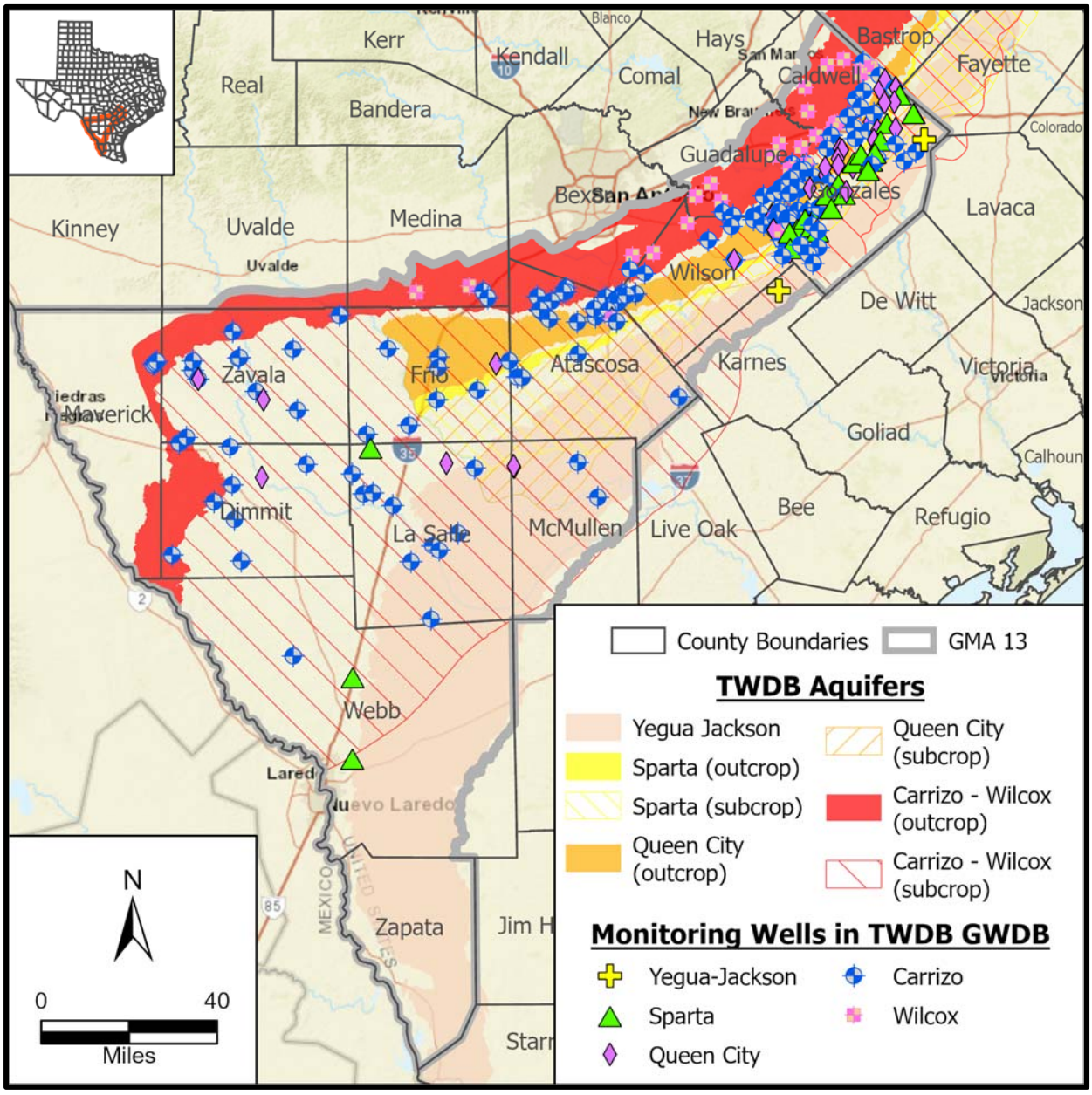


Figure 1. **Location of observation wells in the TWDB Groundwater Database (TWDB, 2020) located in each county and aquifer within GMA 13.**

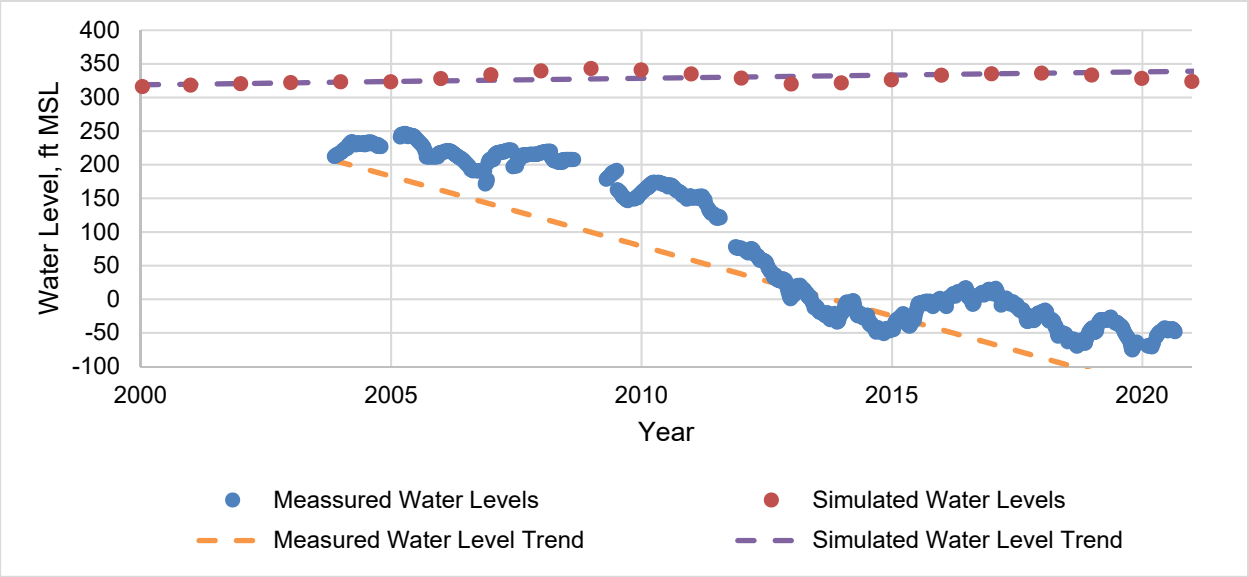


Figure 2. **Hydrograph illustrating the measured water level trend and simulated water level trend.**

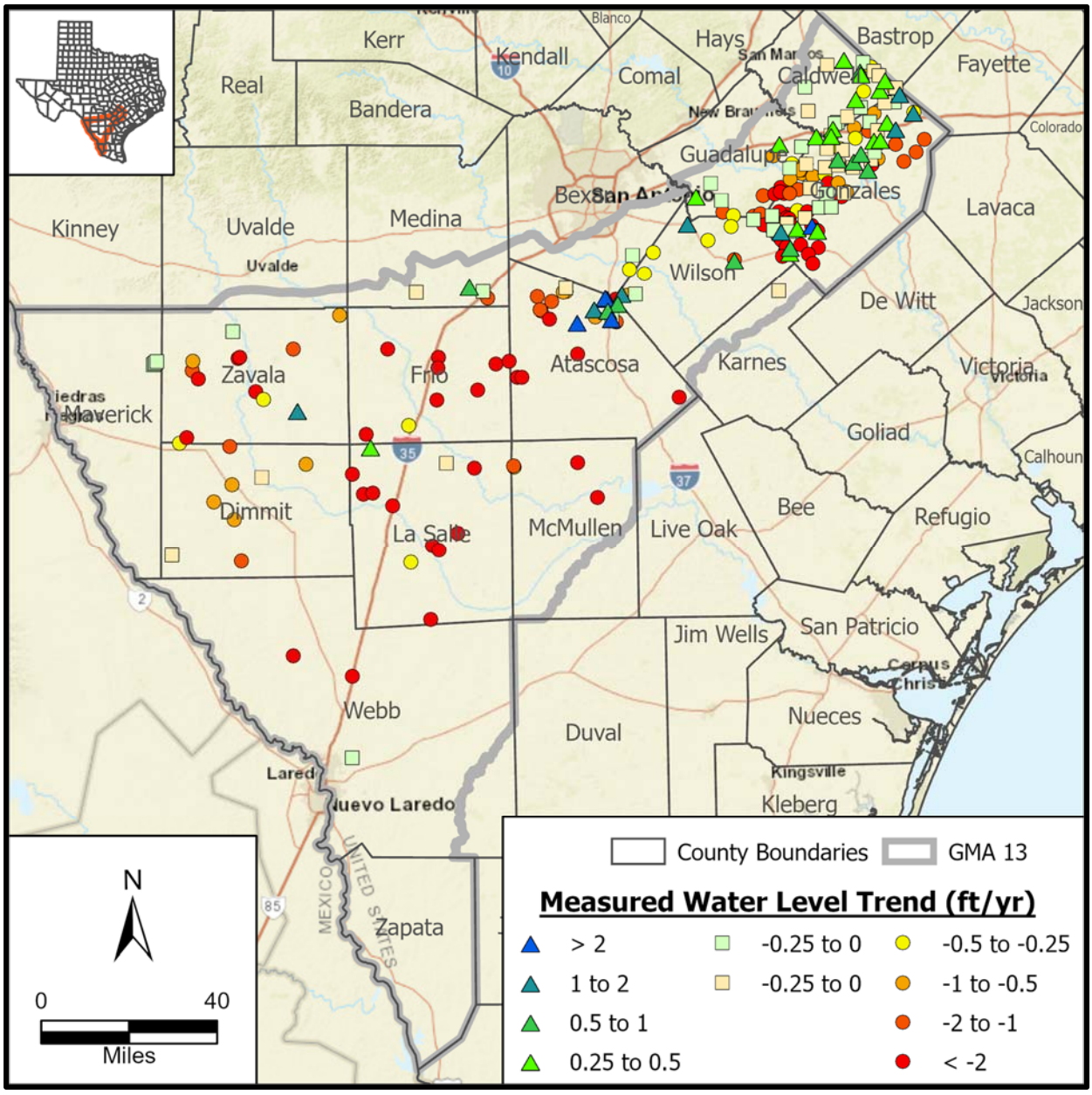


Figure 3. **Trend of measured water levels in feet per year (ft/yr) from observation wells (TWDB, 2020) located in each county and aquifer within GMA 13.**

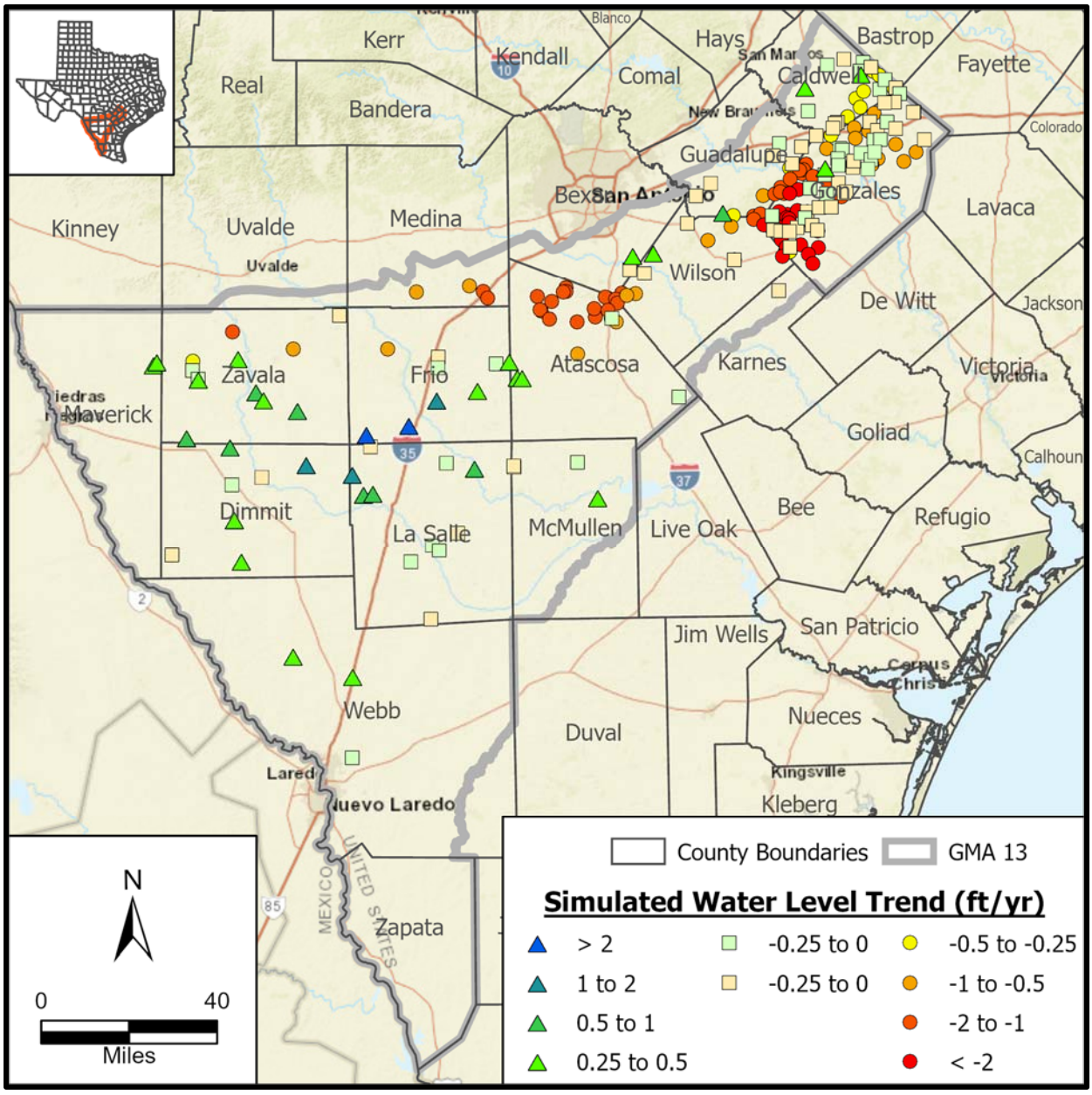


Figure 4. **Trend of simulated water levels in feet per year (ft/yr) at observation well locations in each county and aquifer within GMA 13.**

With the simulated GMA 13 pumping in the model for the Carrizo-Wilcox, Sparta, and Queen City aquifers having been updated to better reflect actual pumping between 2000 and 2016, the trends between measured and simulated water levels should be similar in a well calibrated model. For locations with trends that are of opposite sign (that is, negative measured trend and positive simulated trend or vice-versa), the results suggest the GAM is not reasonably predicting future drawdown. Figure 5 illustrates a comparison of the trend directions at observation well locations.

Southwest of mid-Atascosa County, several wells show a declining measured water level trend and a rising simulated water level trend. In these areas, achieving an average drawdown DFC would be challenging due to the simulate rise. For GMA 13 as a whole, the average measured water level trend (Supplementary Table 2) and average simulated water level trend (Supplementary Table 3) are both declining, but the measured water level trend is more than one foot per year more than the simulated water level trend. Based on these average trends, the GMA 13 secondary DFC for the Carrizo-Wilcox, Sparta, and Queen City aquifers could be exceeded after about one-half of the planning period (approximately 2041).

To help address the differences between the measured and simulated water level trends we can estimate the predictive error over the 2000 through 2016 period where the model includes updated pumping amounts. One way of calculating the error is to determine the root mean square error (RMSE) between the measured water level trend and the simulated water level trend for each well location. The RMSE is the square root of the average of the squared differences between the measured water level trends and the simulated water level trends. It is a measure of how far on average the error is from zero (zero would be a perfect match).

Table 1 provides the average RMSE of the calculated RMSE of the measured and simulated water level trends for each well for each county in GMA 13. These values provide an indication of how well the trends match within each county and the potential error we can expect from predicted values. One simple way to quantify the variance for a potential average drawdown-based DFC is to use the RMSE as an error bound (+/-) on the average drawdown.

The RMSE for the Carrizo-Wilcox, Sparta, and Queen City aquifers is 3.34 ft/yr for GMA 13. For the trend, this error value would suggest an average difference between the measured and simulated drawdown would be more than 30 feet after 10 years. While both Frio and La Salle counties have RMSE values that are much higher than most other

counties in the GMA, removing these high values from the calculation only reduces the RMSE for GMA 13 to 2.76 ft/yr.

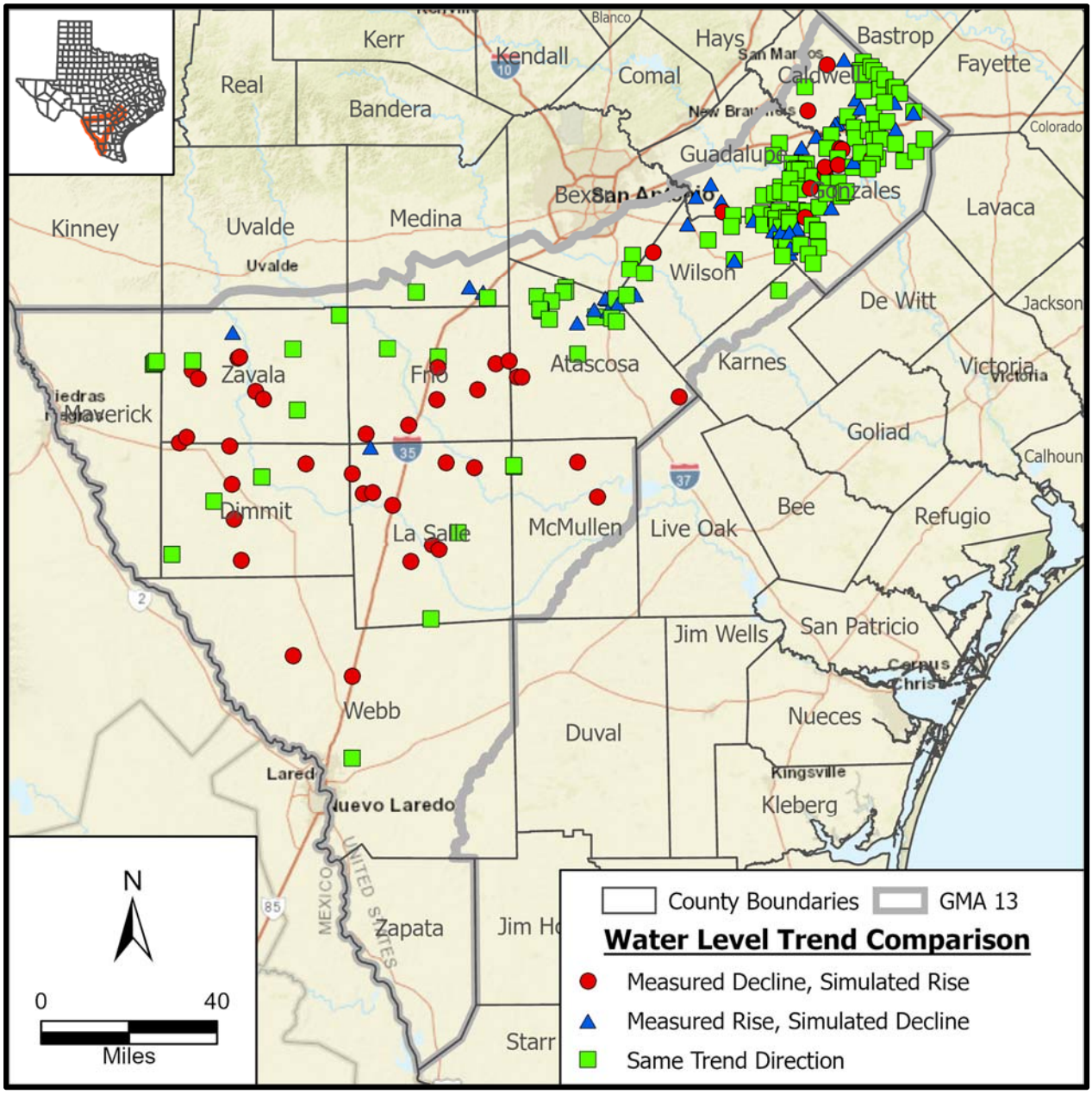


Figure 5. **Comparison of measured and simulated water level trends at observation well locations.**

Table 1. **RMSE between the measured water level trends and the simulated water level trends (ft/yr). "—" indicates no corresponding measured data for calculating a trend.**

County	Sparta	Queen City	Carrizo	Wilcox	Carrizo-Wilcox/ Sparta/ Queen City	Yegua-Jackson
Atascosa	—	0.03	2.57	0.32	2.46	—
Bexar	—	—	0.21	0.40	0.32	—
Caldwell	—	0.15	0.35	0.34	0.32	—
Dimmit	—	0.17	1.56	—	1.47	—
Frio	—	2.37	7.95	—	7.54	—
Gonzales	0.97	0.52	2.05	1.17	1.56	1.34
Guadalupe	—	—	0.92	0.40	0.73	—
Karnes	—	—	—	—	—	0.12
La Salle	0.57	0.13	11.21	—	10.23	—
Maverick	—	—	0.22	—	0.22	—
McMullen	—	1.04	3.01	—	2.25	—
Medina	—	—	1.39	0.87	1.16	—
Uvalde	—	—	—	—	—	—
Webb	2.26	—	2.38	—	2.30	—
Wilson	—	0.58	3.13	1.11	2.78	—
Zavala	—	2.73	4.31	—	4.11	—
GMA 13	**1.12**	**0.92**	**4.18**	**0.66**	**3.34**	**0.95**

When considering the feasibility of achieving the DFCs, the TWDB has historically looked primarily at the ability to model the DFCs. That is, if a single model simulation could replicate, or nearly so if a variance was adopted, the adopted DFCs throughout a GMA, then those DFCs were feasible. Understanding DFC feasibility as the ability to model the values allowed the TWDB to develop the modeled available groundwater values.

As Dr. Hutchison (2017a; 2017b) alluded during the previous round of joint planning, water level monitoring is a key part of groundwater management and a consideration regarding the feasibility of achieving the DFCs. Evaluation of the measured water level trends compared to the modeled water level trends, since January 1, 2000, indicates a GMA 13 wide average error between the measured and modeled water level trends in the Carrizo-Wilcox, Sparta, and Queen City aquifers of about 3 feet per year. With GMA 13's primary DFC that 75 percent of the saturated thickness at the end of 2012 remains in 2070, this error is not a factor. However, for the secondary DFC of an average drawdown of 48 feet in the Carrizo-Wilcox, Sparta, and Queen City aquifers for all of GMA 13, the error could be significant (more than 100 feet over the planning period).

With this stated, we encourage the GMA 13 members to carefully evaluate and discuss the differences between measured water levels and model results as you collect additional water level measurements. Only through evaluation of real-world data can you determine the achievement of your DFCs (which are long-term management goals). While DFCs must be adopted every five years, at a minimum, establishing DFCs is an iterative process that can be done at any time.

If you have any questions, please let us know.

Geoscientist Seal

This report documents the work of the following licensed professional geoscientists with LRE Water, LLC, a licensed professional geoscientist firm in the State of Texas (License No. 50516).

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Michael R. Keester, P.G.
Senior Project Manager | Hydrogeologist

References

Granato, G.E., 2006, Kendall-Theil Robust Line (KTRLine—version 1.0)—A visual basic program for calculating and graphing robust nonparametric estimates of linear-regression coefficients between two continuous variables: U.S. Geological Survey Techniques and Methods 4-A7, 31 p.

Hutchison, W.R., 2017a, Desired Future Condition Explanatory Report (Final) Carrizo-Wilcox/Queen City/Sparta Aquifers for Groundwater Management Area 13: DFC Explanatory Report, 23 p.

Hutchison, W.R., 2017b, GMA 13 Explanatory Report - Final - Yegua-Jackson Aquifer: DFC Explanatory Report, 12 p.

Texas Water Development Board, 2020, Groundwater Database Reports, http://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp, accessed September 2020.

Appendix A –
Supplementary Data Tables

Supplementary Table 1. Summary of the number of observation wells used in this analysis from the TWDB Groundwater Database (TWDB, 2020) located in each county and aquifer within GMA 13.

County	Sparta	Queen City	Carrizo	Wilcox	Yegua-Jackson	Total
Atascosa	—	1	22	1	—	24
Bexar	—	—	1	1	—	2
Caldwell	—	3	7	11	—	21
Dimmit	—	1	8	0	—	9
Frio	—	1	8	0	—	9
Gonzales	21	22	47	4	1	95
Guadalupe	—	—	8	7	—	15
Karnes	—	—	—	0	1	1
La Salle	1	1	10	0	—	12
Maverick	—	—	4	0	—	4
McMullen	—	2	2	0	—	4
Medina	—	—	2	2	—	4
Uvalde	—	—	—	—	—	—
Webb	2	—	1	0	—	3
Wilson	—	1	10	2	—	13
Zavala	—	2	11	0	—	13
GMA 13	**24**	**34**	**141**	**28**	**2**	**229**

Supplementary Table 2. Average trend of measured water levels in feet per year (ft/yr) from observation wells in the TWDB Groundwater Database (TWDB, 2020) located in each county and aquifer within GMA 13. "—" indicates no data available for calculating a trend. Negative values indicate a declining water level trend while positive values indicate a rising water level trend.

County	Sparta	Queen City	Carrizo	Wilcox	Carrizo-Wilcox/ Sparta/ Queen City	Yegua-Jackson
Atascosa	—	0.18	-0.65	-1.20	-0.66	—
Bexar	—	—	-0.26	0.09	-0.08	—
Caldwell	—	0.21	-0.06	0.18	0.12	—
Dimmit	—	-0.18	-0.89	—	-0.91	—
Frio	—	-2.16	-5.66	—	-5.93	—
Gonzales	0.47	-0.12	-2.56	0.34	-2.19	-1.38
Guadalupe	—	—	-1.44	0.06	-0.74	—
Karnes	—	—	—	—	—	-0.13
La Salle	0.38	-0.11	-8.79	—	-8.77	—
Maverick	—	—	0.09	—	0.09	—
McMullen	—	-0.97	-2.84	—	-3.81	—
Medina	—	—	-0.39	0.21	-0.09	—
Uvalde	—	—	—	—	—	—
Webb	-1.37	—	-2.05	—	-4.80	—
Wilson	—	0.52	-1.70	0.38	-1.31	—
Zavala	—	-2.08	-2.25	—	-2.63	—
GMA 13	**0.31**	**-0.29**	**-2.39**	**0.14**	**-1.99**	**-0.76**

Supplementary Table 3. Average trend of simulated water levels in feet per year (ft/yr) at observation well locations in each county and aquifer within GMA 13. "—" indicates no corresponding measured data available for calculating a trend. Negative values indicate a declining water level trend while positive values indicate a rising water level trend.

County	Sparta	Queen City	Carrizo	Wilcox	Carrizo-Wilcox/ Sparta/ Queen City	Yegua-Jackson
Atascosa	—	0.15	-1.02	-0.88	-1.01	—
Bexar	—	—	-0.05	0.50	0.22	—
Caldwell	—	0.11	-0.33	0.01	-0.10	—
Dimmit	—	-0.02	0.37	—	0.36	—
Frio	—	0.22	0.82	—	0.85	—
Gonzales	0.00	0.01	-2.04	-0.54	-1.92	-0.04
Guadalupe	—	—	-0.84	-0.18	-0.53	—
Karnes	—	—	—	—	—	-0.01
La Salle	-0.19	0.01	0.45	—	0.43	—
Maverick	—	—	0.30	—	0.30	—
McMullen	—	-0.11	0.16	—	0.05	—
Medina	—	—	-1.72	-0.55	-1.14	—
Uvalde	—	—	—	—	—	—
Webb	0.29	—	0.34	—	0.91	—
Wilson	—	-0.07	-1.10	0.14	-0.90	—
Zavala	—	0.19	0.11	—	0.14	—
GMA 13	**0.02**	**0.03**	**-0.89**	**-0.16**	**-0.76**	**-0.03**

Appendix 5.16 —
Presentation Regarding Feasibility of Achieving the DFCs

DISCUSSION OF FACTORS FOR CONSIDERATION RELATIVE TO POTENTIAL DFCS

February 5, 2021

LRE WATER

PROJECT UPDATE

- Wrapping up discussions of factors
- Prepare GAM simulation report
- Prepare draft explanatory report

Discussion	Date
Aquifer uses/condition	02/07/2020
Water needs/strategies	02/07/2020
Hydrological conditions	06/26/2020
Environmental conditions	06/26/2020
Subsidence	11/11/2020
Socioeconomic impacts	11/11/2020
Private property	11/11/2020
DFC feasibility	02/05/2021
Other information	02/05/2021

LRE WATER

DISCUSSION OF DFC FEASIBILITY

February 5, 2021

LRE WATER

CONSIDERATION

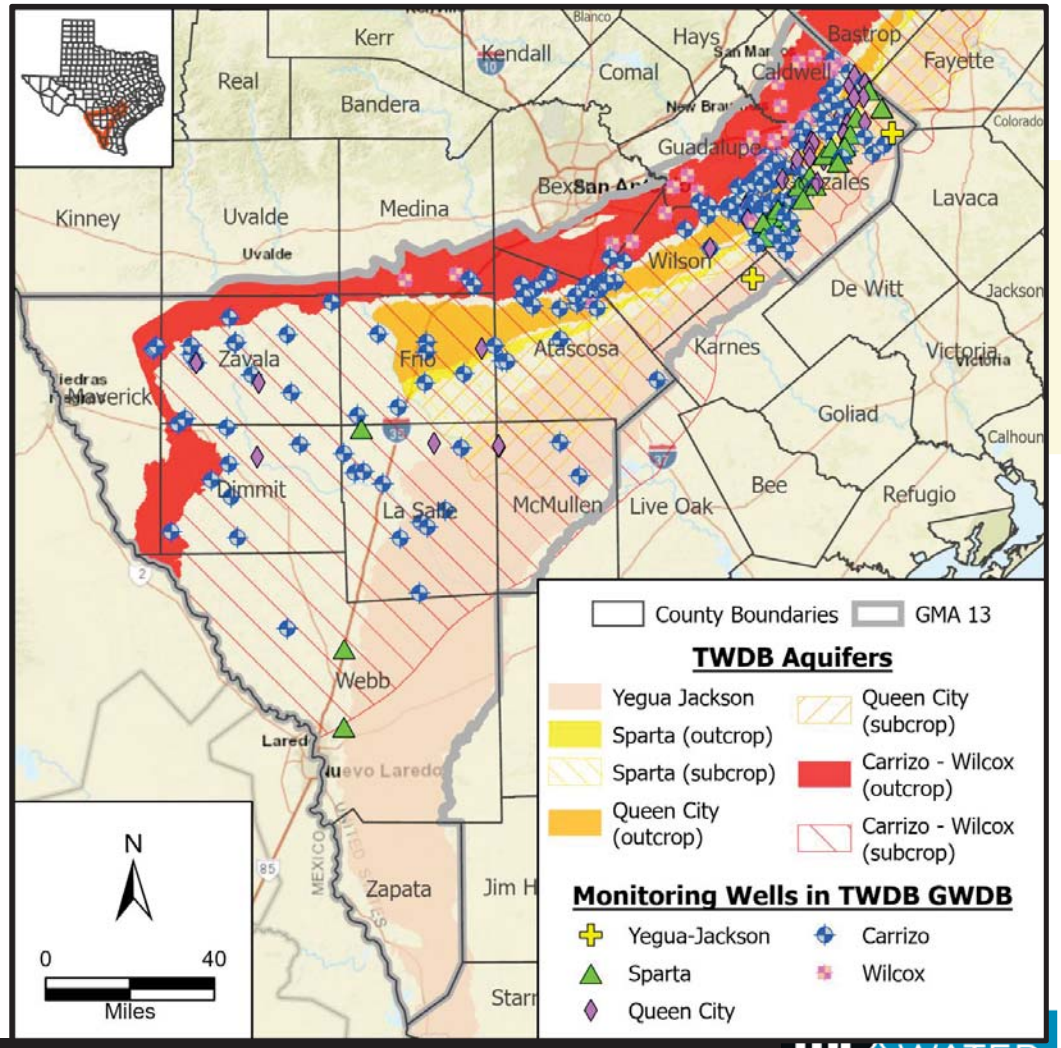
- Texas Water Code Section 36.108(d)(8)
- Feasibility of achieving the DFCs
- Can GMA members manage the aquifers in a manner that will allow them to not exceed the DFCs?

2016 CONSIDERATIONS SUMMARY

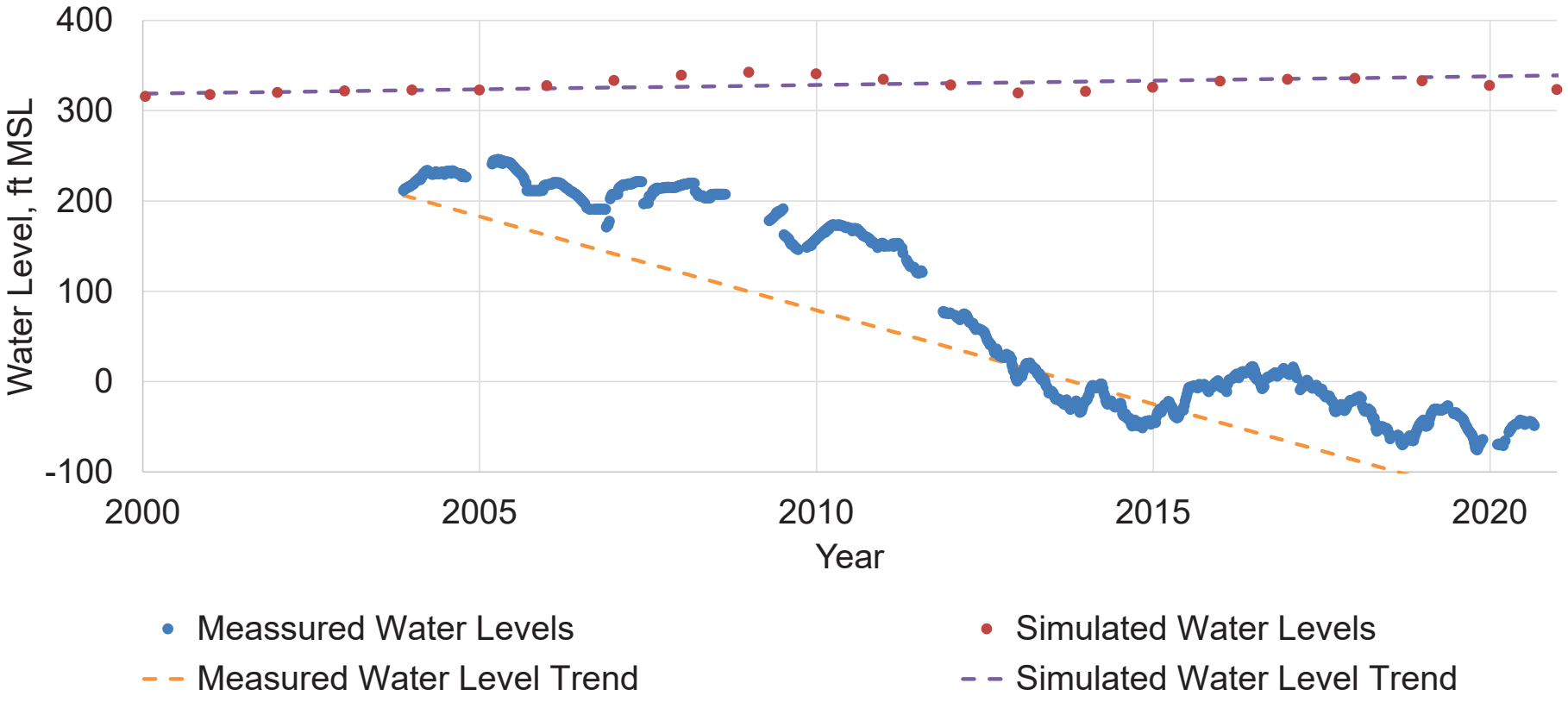
- Reference to measurement of water levels
- Data evaluation and comparison to DFCs covered in each District's management plan

QUANTITATIVE CONSIDERATIONS

- Pumping updated from 2000 through 2016
- 229 observation or recorder wells from TWDB database
- Evaluate trend of simulated versus measured water levels
  - Reflects recent change in water levels
  - Reflects ability of model to simulate observed changes
- Are trends consistent (going in the same direction)?
- What is the error between the trends?

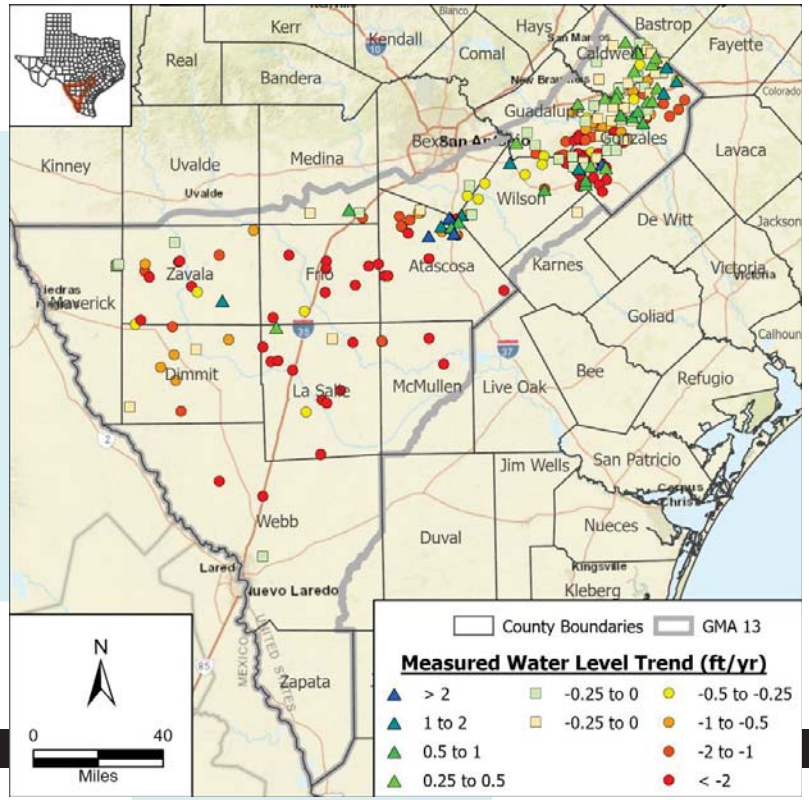


TREND COMPARISON

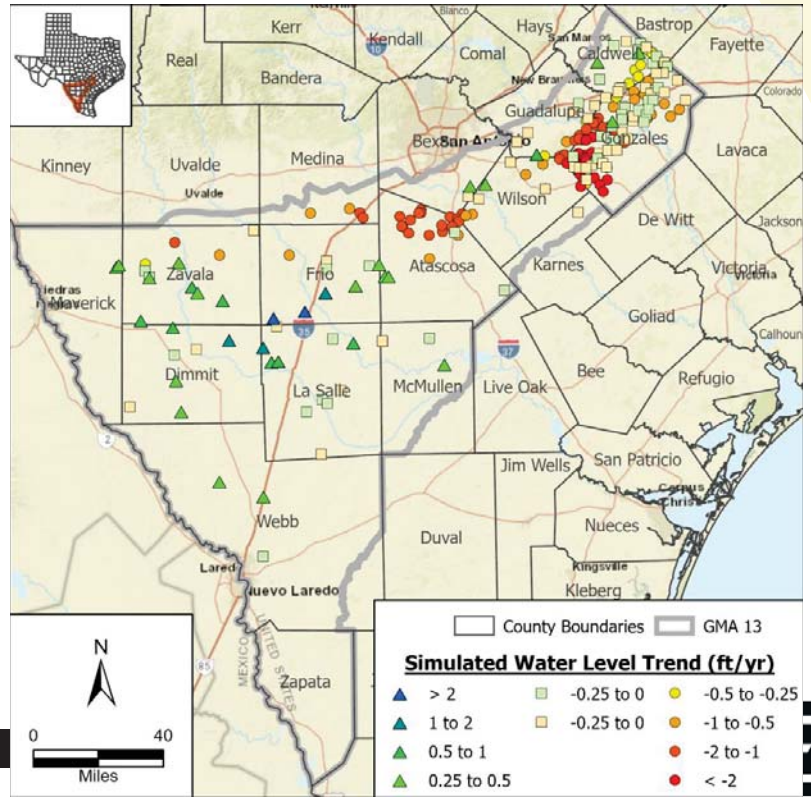


WATER LEVEL TRENDS (2000-2016)

Measured



Simulated



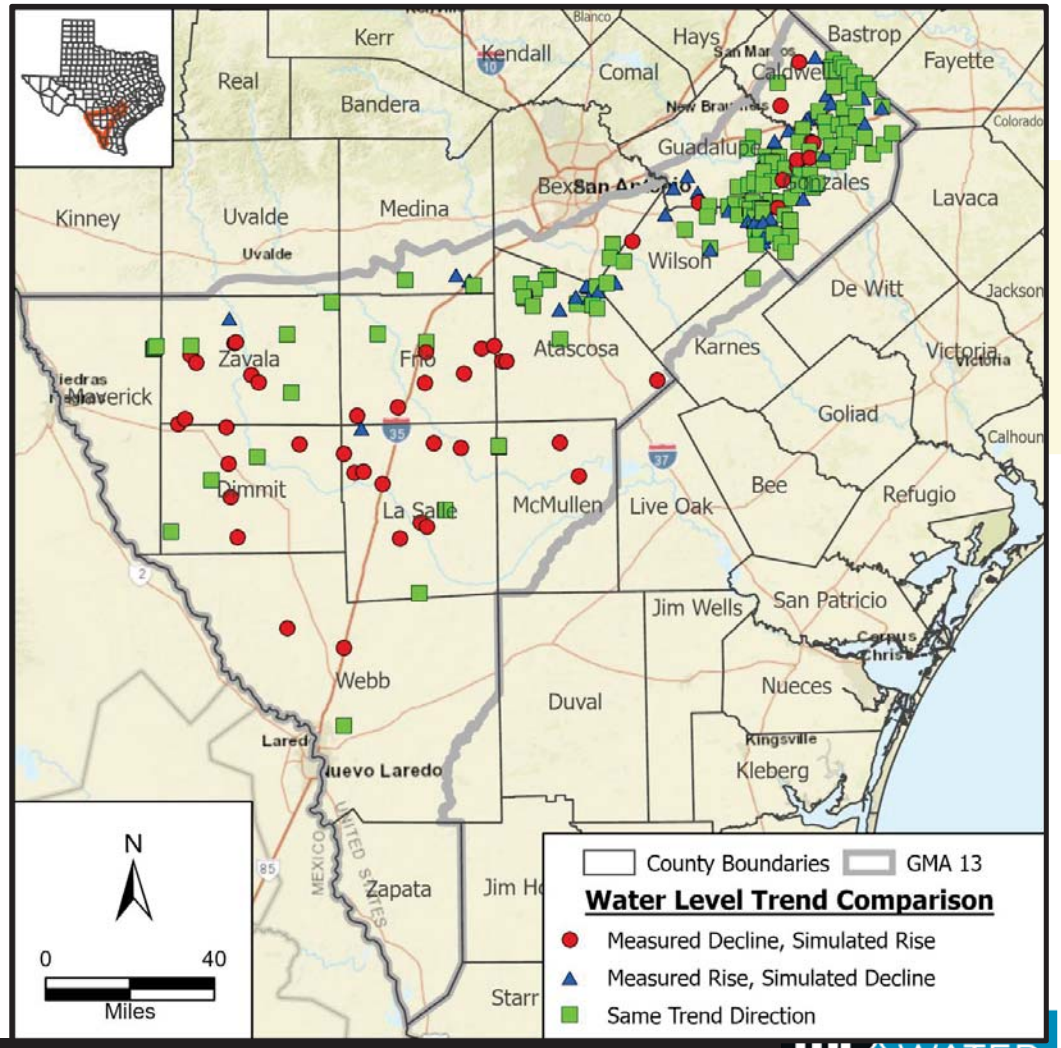
WATER

GMA 13 OBSERVATIONS

- Carrizo-Wilcox, Queen City, and Sparta aquifers (227 wells)
  - Average measured trend = -1.99 ft/yr
  - Average simulated trend = -0.76 ft/yr
- Yegua-Jackson Aquifer (2 wells)
  - Average measured trend = -0.76 ft/yr
  - Average simulated trend = -0.03 ft/yr

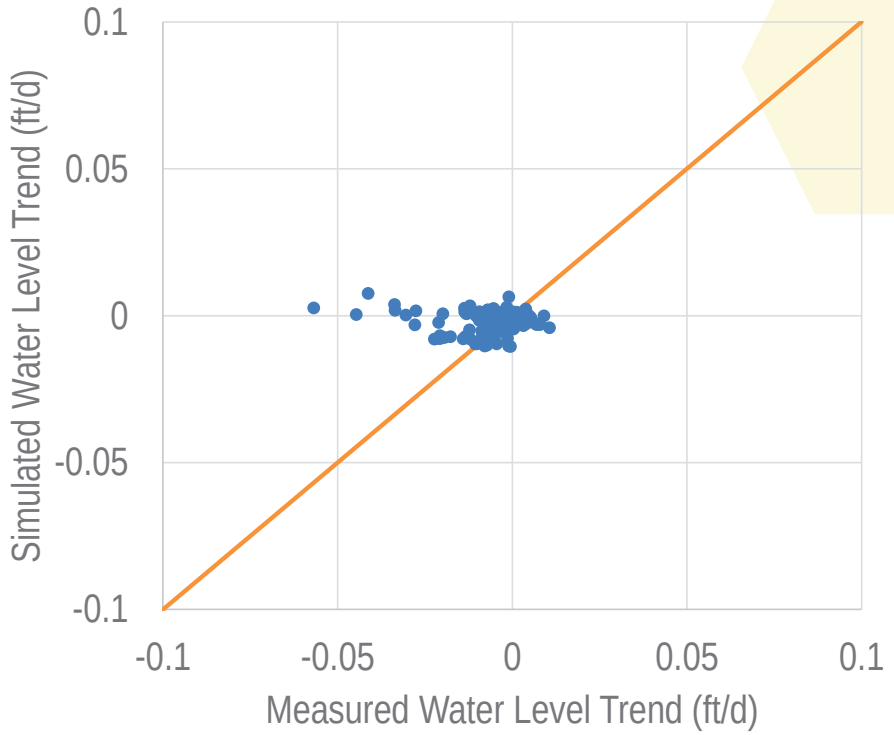
TREND COMPARISON

- Trend suggests potential future water level decline
- Measured and modeled water levels may not match, but trends should be similar
- Trends in different directions can be problematic
  - Measured decline, simulated rise: 49 wells
  - Measured rise, simulated decline: 43 wells
  - Same trend direction: 137 wells



GAM UNCERTAINTY

- Used root mean square error (RMSE) to quantify trend error
- RMSE is a measure of how far on average the error is from zero
- Tells you how concentrated the data pairs are around the line of best fit



RMSE BETWEEN TRENDS (FT/YR)

County	Sparta	Queen City	Carrizo	Wilcox	Carrizo-Wilcox/ Sparta/ Queen City	Yegua-Jackson
Atascosa	—	0.03	2.57	0.32	2.46	—
Bexar	—	—	0.21	0.40	0.32	—
Caldwell	—	0.15	0.35	0.34	0.32	—
Dimmit	—	0.17	1.56	—	1.47	—
Frio	—	2.37	7.95	—	7.54	—
Gonzales	0.97	0.52	2.05	1.17	1.56	1.34
Guadalupe	—	—	0.92	0.40	0.73	—
Karnes	—	—	—	—	—	0.12
La Salle	0.57	0.13	11.21	—	10.23	—
Maverick	—	—	0.22	—	0.22	—
McMullen	—	1.04	3.01	—	2.25	—
Medina	—	—	1.39	0.87	1.16	—
Uvalde	—	—	—	—	—	—
Webb	2.26	—	2.38	—	2.30	—
Wilson	—	0.58	3.13	1.11	2.78	—
Zavala	—	2.73	4.31	—	4.11	—
GMA 13	1.12	0.92	4.18	0.66	3.34	0.95

DISCUSSION

- Comparison of trends indicates significant model uncertainty in some areas
- Evaluation is not applicable to the Carrizo-Wilcox, Sparta, and Queen City aquifers primary DFC
- Potential average drawdown error
  - About 3 ft/yr for the Carrizo-Wilcox, Sparta, and Queen City aquifers
  - About 1 ft/yr for the Yegua-Jackson Aquifer

LRE WATER

QUESTIONS/COMMENTS

Discussion of DFC Feasibility

February 5, 2021

Appendix 5.17 —
Presentation Regarding Potentially Non-Relevant Aquifers for GMA 13 Joint Planning

DISCUSSION OF POTENTIALLY NON-RELEVANT AQUIFERS FOR GMA 13 JOINT PLANNING

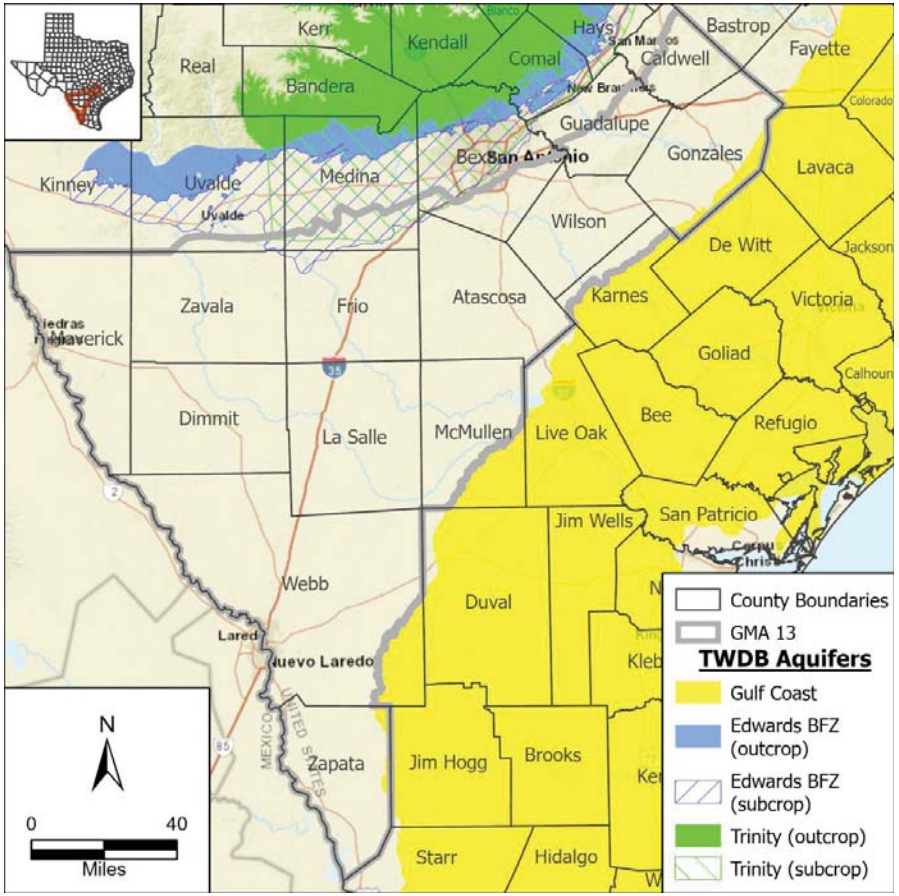
February 5, 2021

LRE WATER

TRINITY AQUIFER IN GMA 13

- Counties: Atascosa, Bexar, Medina (GMA 9), Uvalde (GMA 7)
- Characteristics – Deep, brackish to saline
- Use & demands – none to negligible
- TERS (GAM Task 13-036)

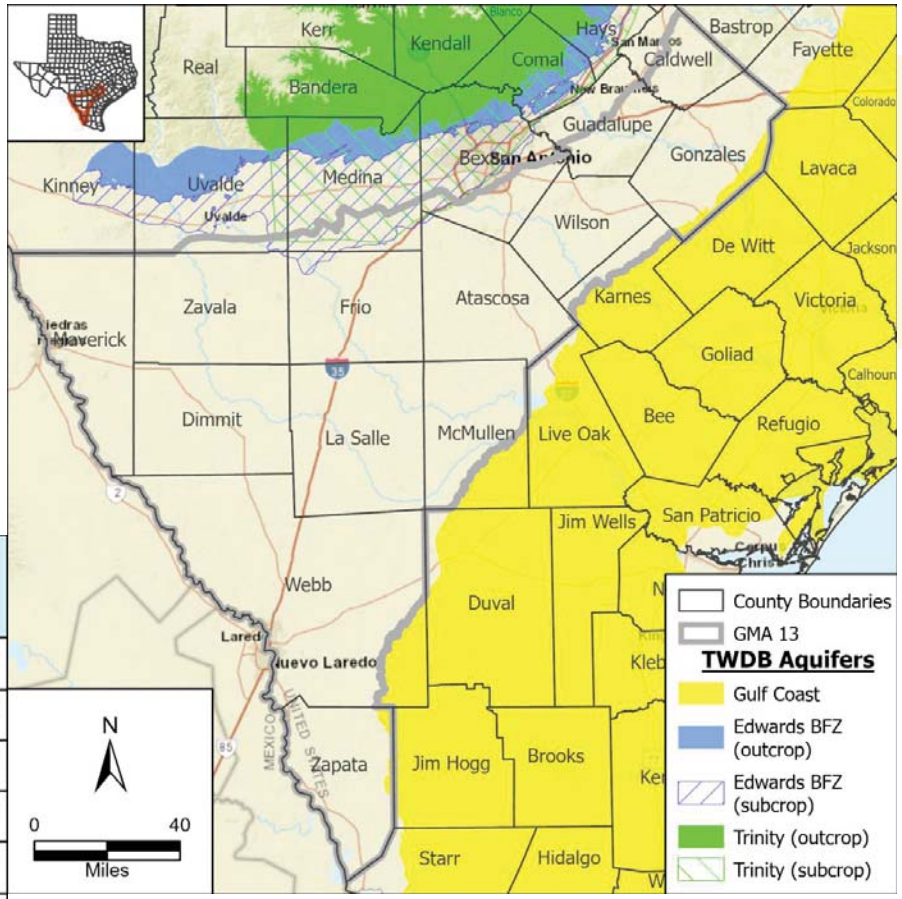
County	*Total Storage (acre-feet)*	*25% of Total Storage (acre-feet)*	*75% of Total Storage (acre-feet)*
Atascosa	35,000	8,750	26,250
Bexar	660,000	165,000	495,000
Medina	3,900,000	975,000	2,925,000
Uvalde	110,000	27,500	82,500
Total	4,705,000	1,176,250	3,528,750



EDWARDS (BFZ) AQUIFER IN GMA 13

- Counties: Atascosa, Bexar, Frio, Medina (GMA 10), Uvalde (GMA 10), Zavala
- Characteristics – Deep, brackish to saline
- Use & demands – none to negligible
- TERS (GAM Task 13-036)

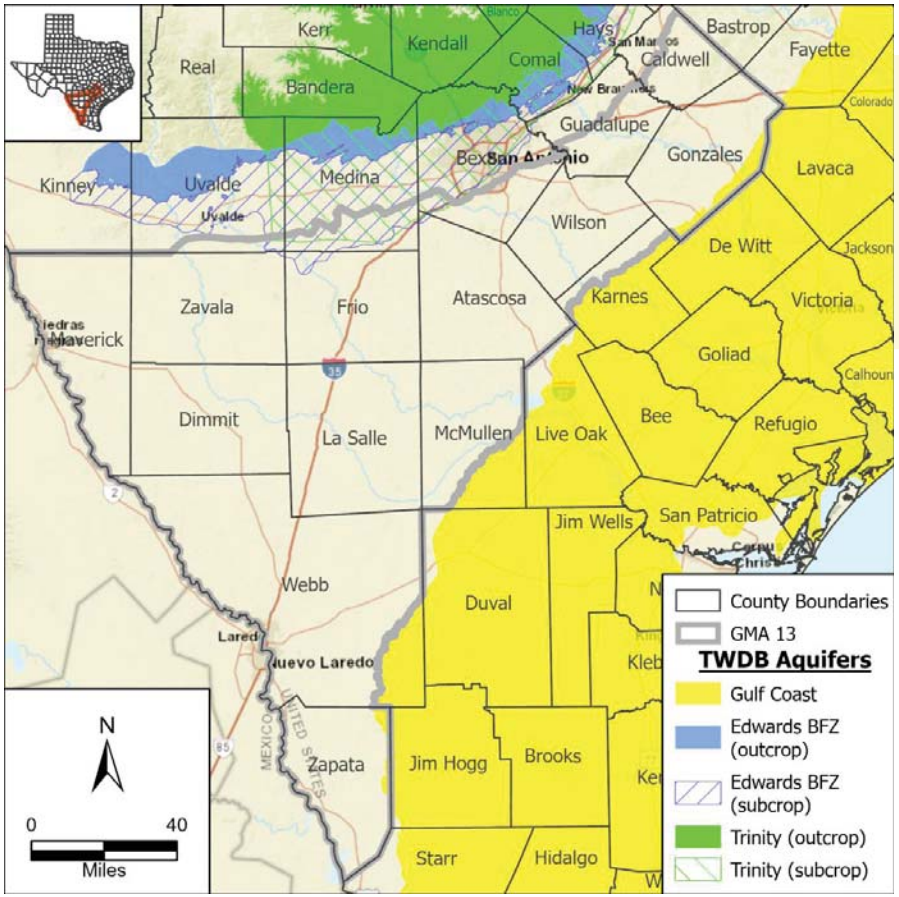
County	*Total Storage (acre-feet)*	*25% of Total Storage (acre-feet)*	*75% of Total Storage (acre-feet)*
Atascosa	29,000	7,250	21,750
Bexar	130,000	32,500	97,500
Frio	240,000	60,000	180,000
Medina	1,200,000	300,000	900,000
Uvalde	110,000	27,500	82,500
Zavala	9,400	2,350	7,050
Total	1,718,400	429,600	1,288,800



GULF COAST AQUIFER SYSTEM IN GMA 13

- Counties: Gonzales, Zapata
- Characteristics – Shallow outcrop
- Use & demands – none to negligible
- TERS (GAM Task 13-036)

County	Total Storage (acre-feet)	25% of Total Storage (acre-feet)	75% of Total Storage (acre-feet)
Gonzales	360,000	90,000	270,000
Zapata	2,100,000	525,000	1,575,000
Total	2,460,000	615,000	1,845,000



SUMMARY

- Trinity, Edwards (BFZ), and Gulf Coast aquifers each have a small footprint in GMA 13
- Some portions of aquifers managed as part of other GMAs
- Recommend these aquifers declared non-relevant for GMA 13 joint planning purposes

APPENDIX 6 —
COMMENTS AND PRESENTATIONS RELATED TO WEBB COUNTY

Appendix 6.1 —
Letter Dated May 11, 2021 from Mr. David L. Earl

EARL & ASSOCIATES
attorneys at law

DAVID L. EARL
ATTORNEY AT LAW/SHAREHOLDER

MEGAN J. EARL
ATTORNEY AT LAW/SHAREHOLDER

May 11, 2021

GMA-13 Contact
c/o Evergreen Underground Water Conservation District
110 Wyoming Blvd
Pleasanton, TX 78064
russell.labus@evergreenuwcd.org

RE: GMA 13 Desired Future Conditions for the Carrizo-Wilcox, Queen City, and Sparta aquifers

Dear GMA-13 Voting Member,

My firm represents a landowner in Webb County who is beginning the development of several thousand acres just a few miles north of the City of Laredo. As part of that development, we have begun the exploration and development of the groundwater resources from the Laredo Formation (that is, Sparta Aquifer) and Carrizo-Wilcox Aquifer. We have begun testing of the shallower formation and will conduct drilling and testing of the Carrizo-Wilcox Aquifer in the third quarter of this year.

Results of our initial investigations indicate groundwater resources are available beyond what the proposed secondary desired future condition (DFC) for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area (GMA) 13 reflects. Upon review of the documents used by the GMA 13 Joint Planning Committee in creating the proposed DFCs (http://bit.ly/GMA_13_3rd_Round), we believe inclusion of additional pumping from the Sparta and Carrizo layers within Webb County will not affect your first proposed DFC focusing on maintaining the saturated thickness in the outcrop. As such, we are requesting an increase in the secondary proposed desired future condition for the Carrizo-Wilcox, Queen City, and Sparta aquifers. **Specifically, we are requesting the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area 13 to be an average drawdown of 75 feet (+/- 5 feet) for all of Groundwater Management Area 13 from the end of 2012 conditions through the year 2080.**

As our work on developing groundwater resources is just beginning, we are expanding our awareness of the GMA joint planning process and how it ties in with regional water planning. We now understand how the work you are doing to develop DFCs will result in the modeled available groundwater (MAG) that the Region M planning group will use to consider possible strategies during the 2026 regional water planning cycle. In addition, we understand that certain funding options from the Texas Water Development Board

(TWDB) require that the strategy be included in the regional water plan. As such, we are requesting the change to the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers within GMA 13 for the purpose of ensuring the MAG values may include production associated with our development plans.

To determine the requested secondary DFC, Mr. Keester performed a series simulations with pumping added to the "GMA13_2019_001" simulation beginning in the year 2025 and continuing through the year 2080. The pumping simulations Mr. Keester performed are summarized in Table 1 along with the resulting GMA 13 average drawdown. As shown in Table 1, our requested change to the secondary DFC falls within the range of results from the simulations with the additional production.

Table 1. Pumping added to simulation "GMA13_2019_001" in Webb County north of near Laredo, Texas.

Total Pumping (acre-feet per year)	Sparta Pumping (acre-feet per year)	Carrizo Pumping (acre-feet per year)	GMA 13 Average Drawdown (feet)
20,000	1,000	19,000	68
25,000		24,000	71
30,000		29,000	73
35,000		34,000	76
40,000		39,000	78
45,000		44,000	78

We understand you have been working diligently over the last several years to consider various factors associated with the proposed DFCs. Relative to each of those considerations, we offer the following:

- Consideration 1 – "Aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another:"

  There are few users of the Carrizo Aquifer groundwater resources near Laredo. We are looking to develop the resource as a water supply for our development and to potentially serve other water needs in the county.

- Consideration 2 – "The water supply needs and water management strategies included in the state water plan:"

  The current simulated production from the aquifers in Webb County is about 1,000 acre-feet per year. Most groundwater use is for domestic, livestock, and mining activities. We believe additional groundwater supplies, possibly brackish, are available for various uses.

- Consideration 3 – "Hydrological conditions, including for each aquifer in the management area, the total estimated recoverable storage as provided by the

executive administrator, and the average annual recharge, inflows, and discharge:"

The total estimated recoverable storage for the Carrizo-Wilcox Aquifer in Webb County is 380,000,000 acre-feet of groundwater. Total proposed production from the Carrizo will be a small fraction of the total volume. Due the depth of the Carrizo at our location (more than 3,000 feet below ground level), the change in DFC associated with the production will not measurably affect recharge, inflows, or discharge.

- Consideration 4 – "Other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water:"

  Due the depth of the Carrizo at our location (more than 3,000 feet below ground level), the change in the secondary DFC associated with the production will not measurably affect surface water resources. Similarly, we do not anticipate production from the Laredo Formation to have any environmental impact.

- Consideration 5 – "The impact on subsidence:"

  As discussed in the GMA 13 documents, subsidence is not expected to be an issue in GMA 13 and we do not believe our proposed revision to the secondary DFC will change that expectation.

- Consideration 6 – "Socioeconomic impacts reasonably expected to occur:"

  No deleterious socioeconomic impacts would reasonably be expected to occur with the revision to the secondary DFC. On the contrary, including the additional production in the model will increase the MAG within Webb County which would allow for the development of the resource through affordable TWDB funding options.

  Consideration 7 – "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:"

  The requested revision to the secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers in GMA 13 is specifically associated with a private landowner seeking to develop the groundwater resources beneath the property. Not including the anticipated production could directly impact the private property rights of the landowner by limiting the ability to market the groundwater resources at an affordable price.

- Consideration 8 – “The feasibility of achieving the desired future condition:”

  As discussed in the GMA 13 documents, the groundwater availability model (GAM) is not capable of simulating the first DFC of limiting the reduction in saturated thickness in the outcrop. Similarly, the hydraulic properties assigned to the aquifers in the GAM within Webb County are very low and inhibit the flow of groundwater. As such the modeled impact is likely greater than will actually occur just as it is in other areas simulated with the GAM. As such, we do not believe the modification to the secondary DFC will affect the feasibility of GMA 13 achieving the primary DFC.

- Consideration 9 – “Any other information relevant to the specific desired future conditions:”

  Webb County is not within a groundwater conservation district. We are reaching out to each GMA 13 member to provide our information and request for a modification to the GMA 13 secondary DFC for the Carrizo-Wilcox, Queen City, and Sparta aquifers in GMA 13.

We appreciate the opportunity to present our request to include additional production within Webb County. Mr. Keester with LRE Water has performed the simulations of the impact with the additional production and can distribute those model files to the GMA 13 members. While the simulation results increase the average drawdown for GMA 13 as a whole, we are only requesting changes to pumping within our project area in Webb County. We are respectfully requesting that our potential production be included in the pumping file so that it may become part of the MAG for use in the 2026 regional water plan for Region M.

Sincerely,

EARL & ASSOCIATES, P.C.

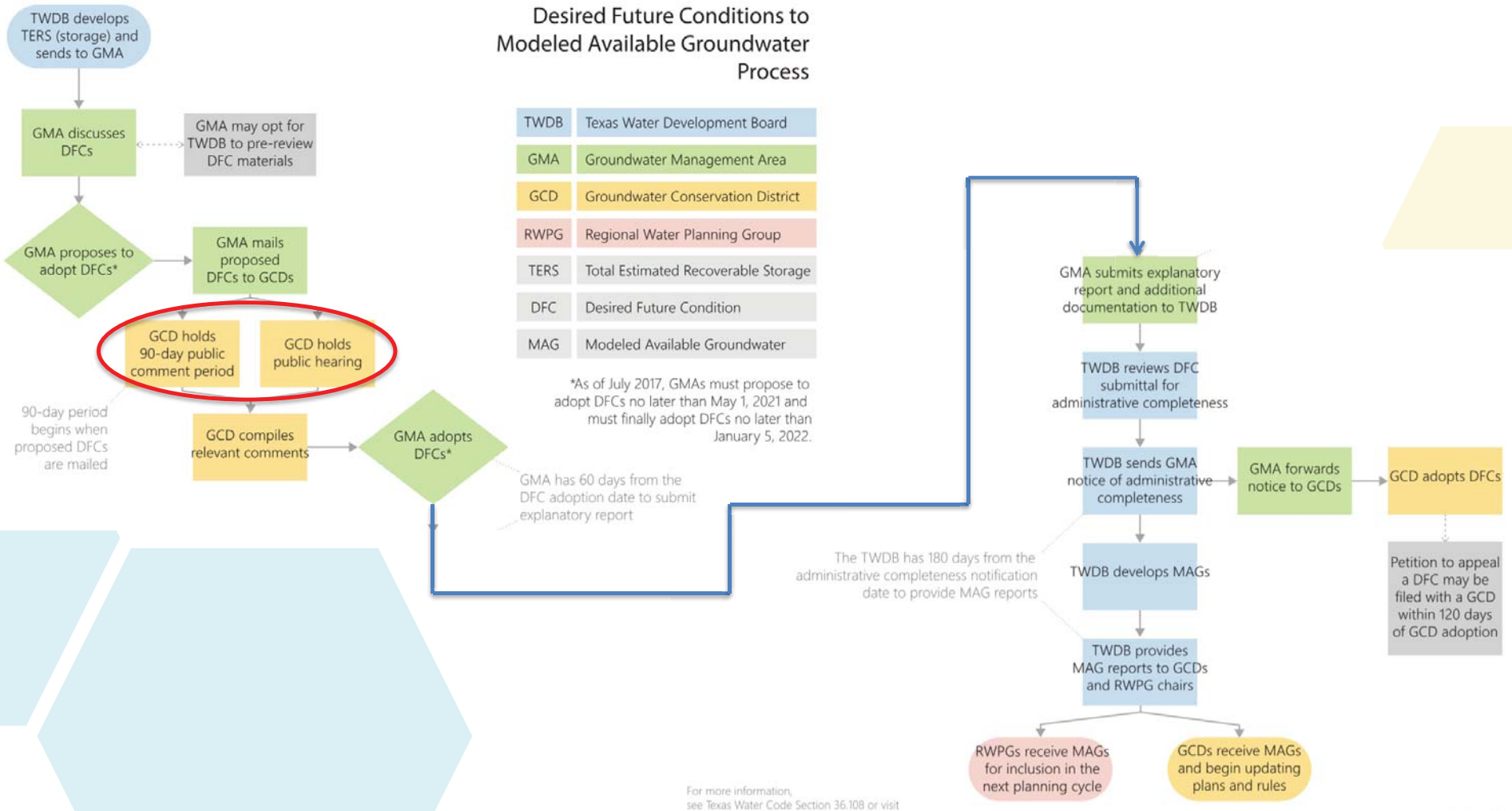
By: *David L. Earl*

David L. Earl,
Attorney at Law/Shareholder

Appendix 6.2 —
Presentation on June 11, 2021 to GMA 13 by LRE Water Regarding Comments on the DFCs within the Letter Dated May 11, 2021 from Mr. David L. Earl

DISCUSSION OF COMMENTS RECEIVED TO DATE REGARDING POTENTIAL DFCS

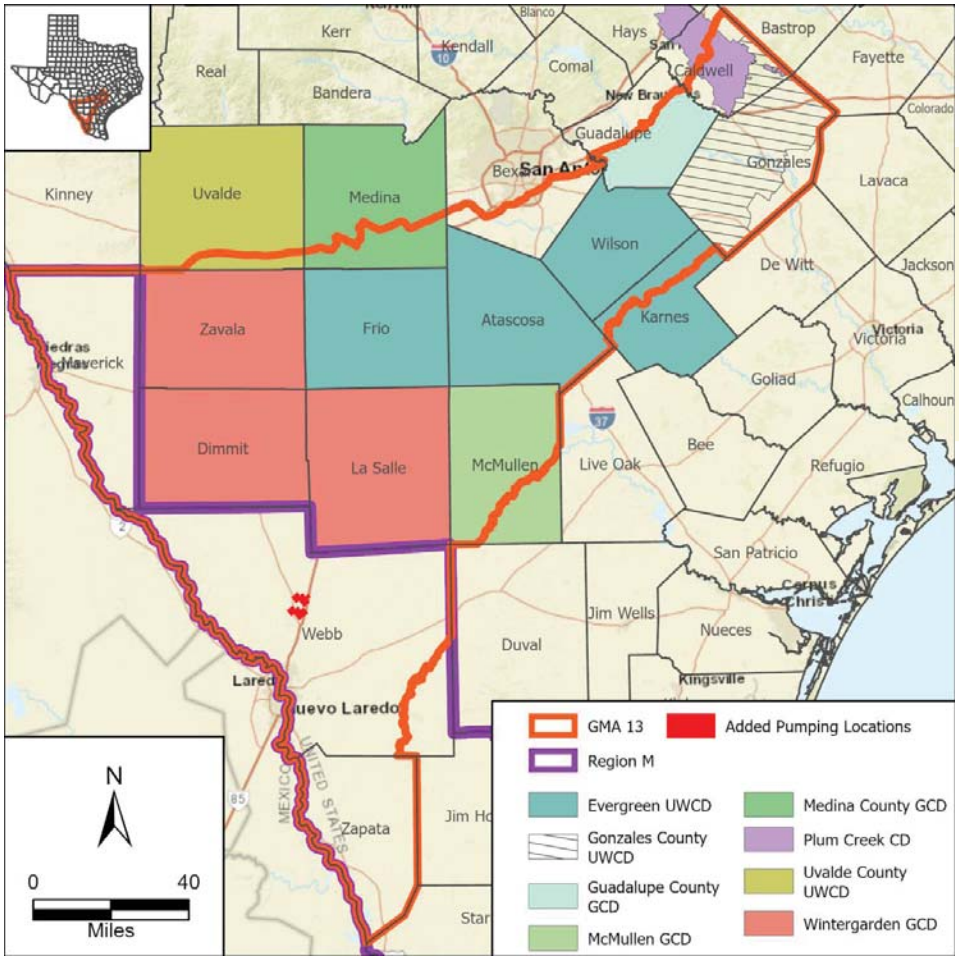
June 11, 2021



Source: TWDB (http://www.twdb.texas.gov/groundwater/docs/DFCFlowchart_May2020.pdf)

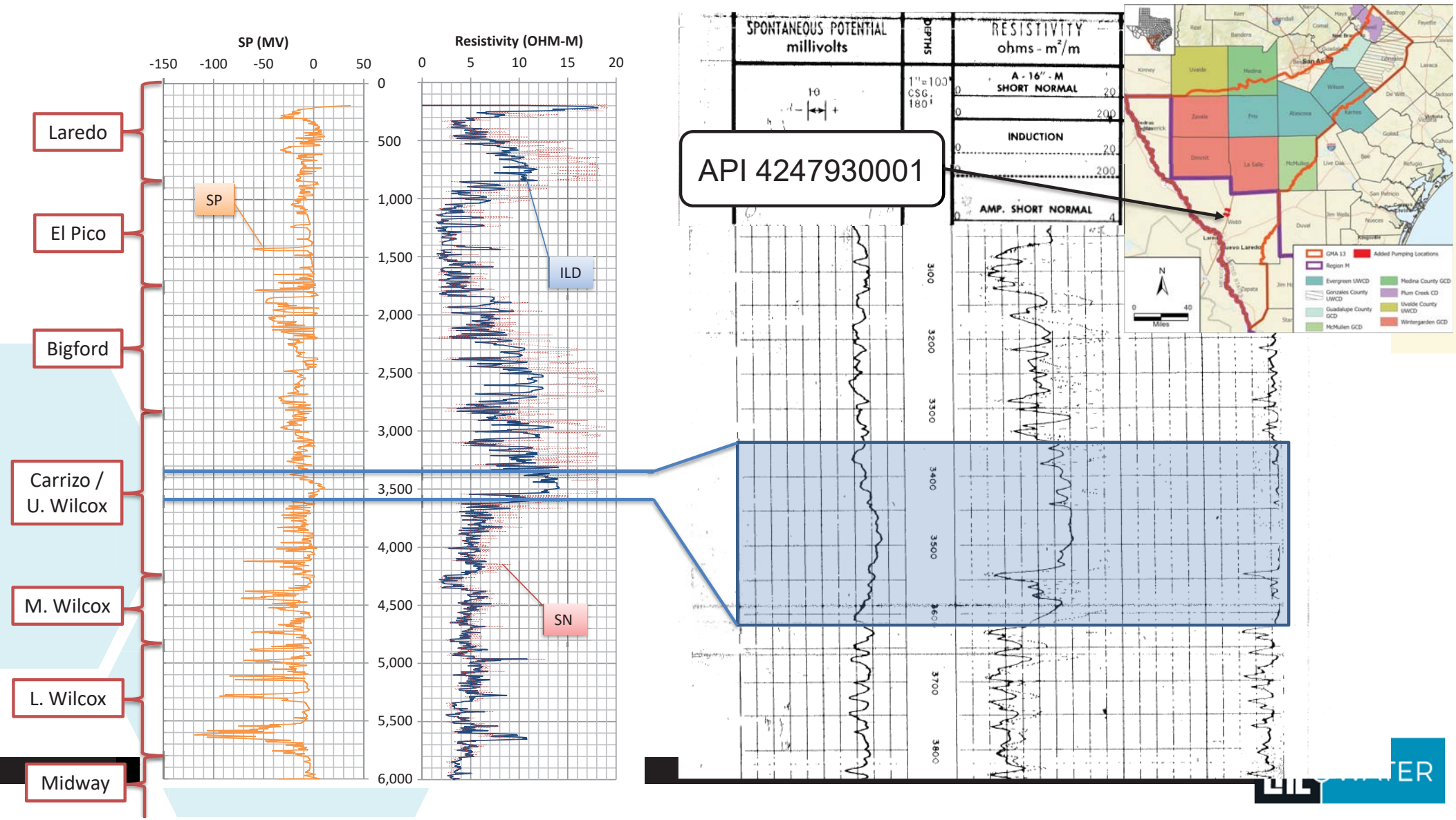
BACKGROUND

- Landowner in Webb County
  - Within GMA 13, but no GCD
  - Within Region M Planning Group
- Developing local groundwater resources
  - Laredo Formation –> Sparta equivalent in the model
  - Carrizo Sands
- Request for increasing simulated pumping to increase the MAG for Webb County
  - Increase secondary DFC for the Sparta, Queen City, and Carrizo-Wilcox to 75 feet (+/- 5 feet) of average drawdown
  - No change to primary DFC



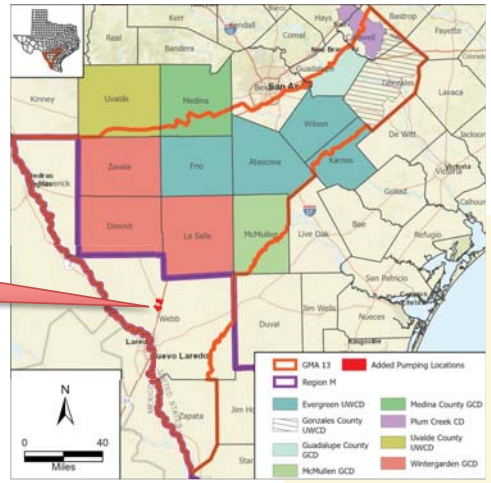
LOCAL FORMATION PROPERTIES

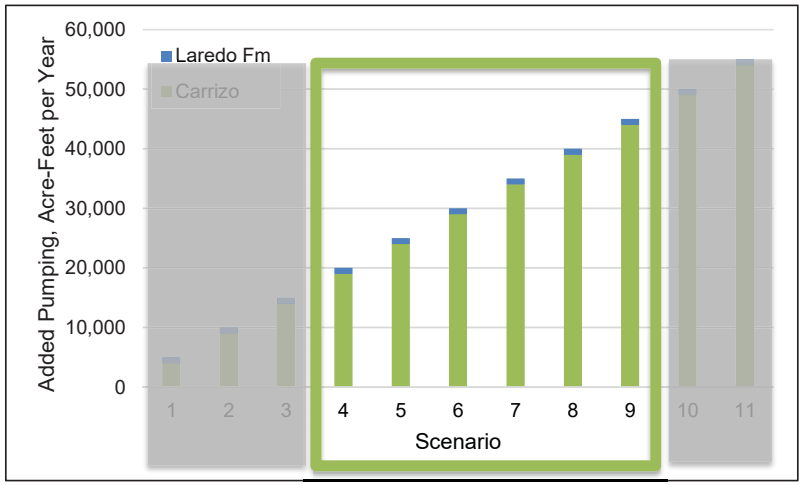
Stratigraphic / Hydrogeologic Units		Description	Approximate Depth to Top (ft BGL)	Approximate Thickness (ft)
Laredo Formation	**Sparta**	Productive sands toward the base	250-550	300
El Pico Clay	**Weches**	Clayey confining layers	550-800	30
	Queen City	Interbedded sands capable of providing water to wells	600-850	1,800
Bigford Formation	**Reklaw**	Clayey confining layers	2,400-2,700	100
Carrizo/Upper Wilcox		Interbedded sands capable of providing water to wells – Target sand toward the base	2,500-2,800	1,400
Middle Wilcox		Interbedded sands with poor quality water	3,800-4,200	500
Lower Wilcox			4,400-4,800	1,000
Midway Group		Thick clay confining unit	5,300-5,800	—


SP (MV)
-150
-100
-50
0
50
Resistivity (OHM-M)
0
5
10
15
20
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
SP
ILD
SN
Laredo
El Pico
Bigford
Carrizo / U. Wilcox
M. Wilcox
L. Wilcox
Midway
SPONTANEOUS POTENTIAL
millivolts
DEPTHS
RESISTIVITY
ohms - m²/m
A - 16" - M
SHORT NORMAL
INDUCTION
AMP. SHORT NORMAL
API 4247930001
3100
3200
3300
3400
3500
3600
3700
3800
N
0
40
Miles
GMA 13
Region M
Added Pumping Locations
Evergreen UWCD
Gonzales County UWCD
Guadalupe County GCD
McMullen GCD
Medina County GCD
Plum Creek CD
Uvalde County UWCD
Wintergarden GCD

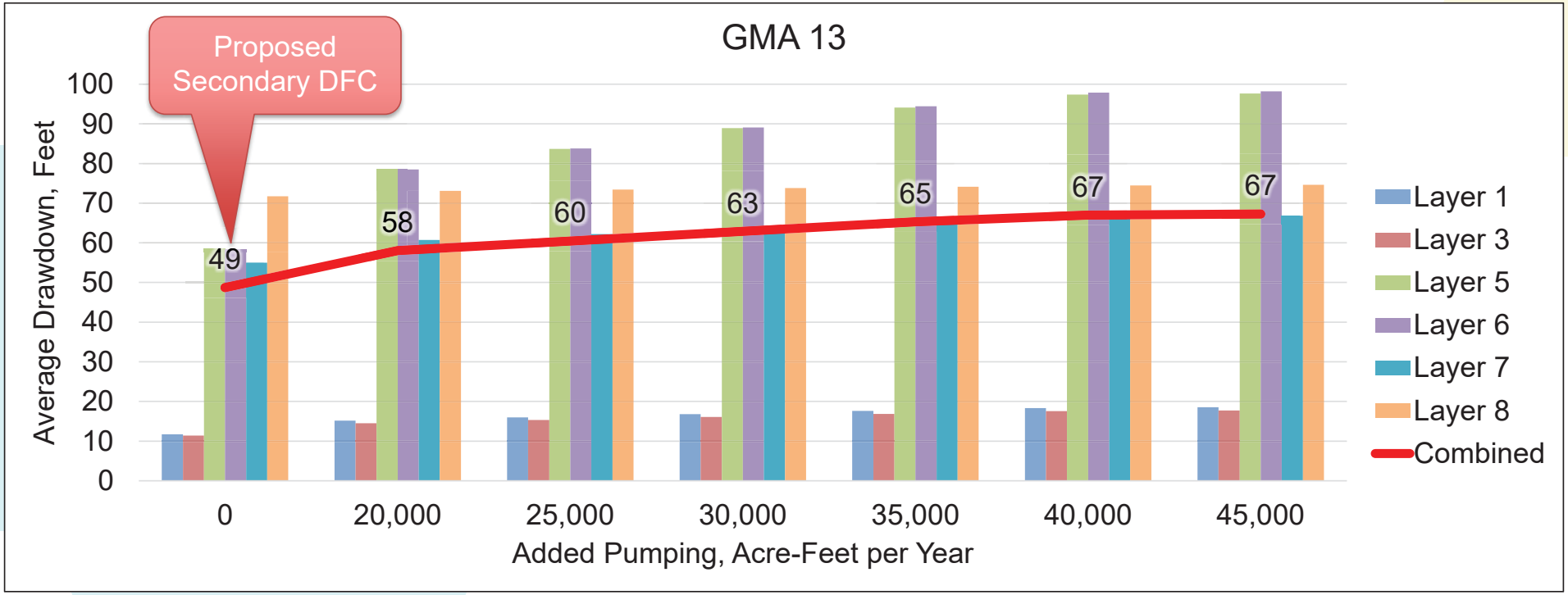
MODEL SCENARIOS

- Eleven scenarios
  - Increasing pumping from 5,000 to 55,000 acre-feet per year
  - Each scenario increases by 5,000 acre-feet per year
- 20 square miles (model cells)
  - 10 Laredo Fm (Sparta)
  - 10 Carrizo
- Simulated pumping begins in 2025
- Simulated pumping is constant through 2080





SIMULATION RESULTS
GMA 13 – AVERAGE DRAWDOWN

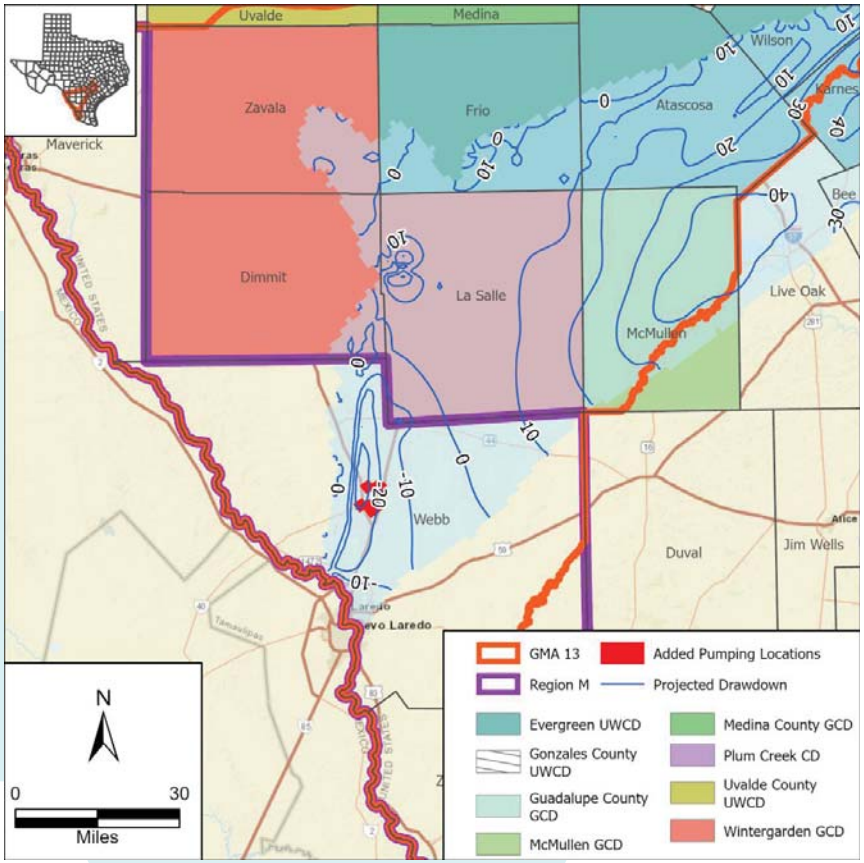


MODEL LIMITATIONS

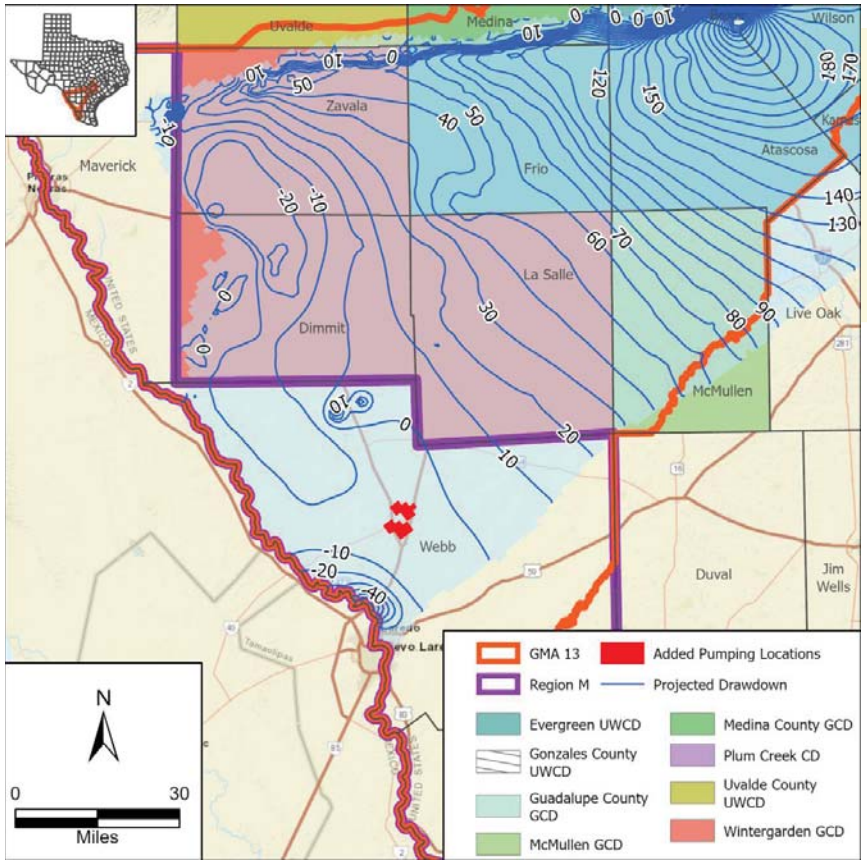
- Uncertain hydraulic properties for the local Carrizo/Upper Wilcox
  - Deep (> 2,500 feet BGL)
  - Wells typically completed in upper parts of formation
- No flow boundaries near property (~15 miles)
  - Along Rio Grande River
  - Along down dip
- Potentially more simulated drawdown than would actually occur

SIMULATION RESULTS – PROPOSED SECONDARY DFC

Sparta Drawdown 2012-2080

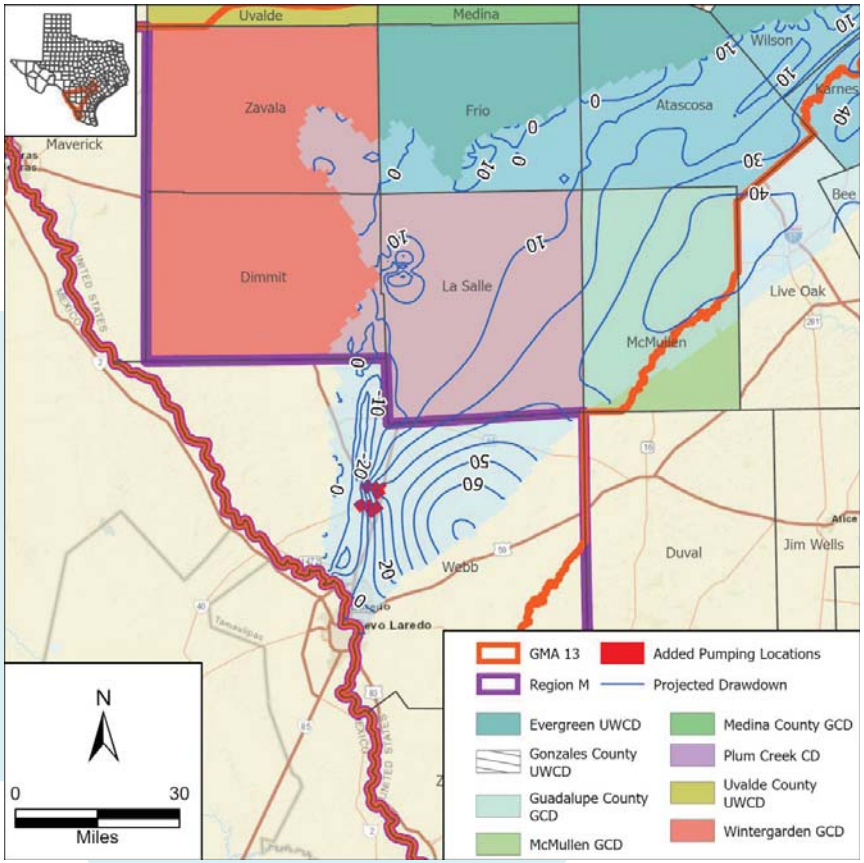


Carrizo Drawdown 2012-2080

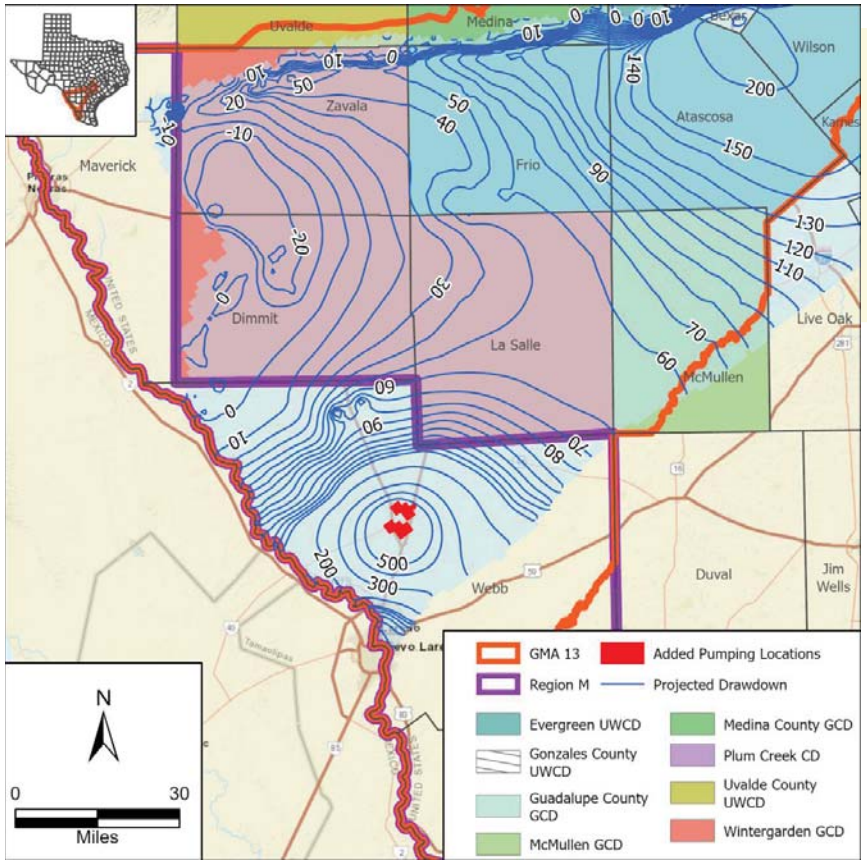


SIMULATION RESULTS – 40,000 ACRE-FEET PER YEAR ADDED

Sparta Drawdown 2012-2080

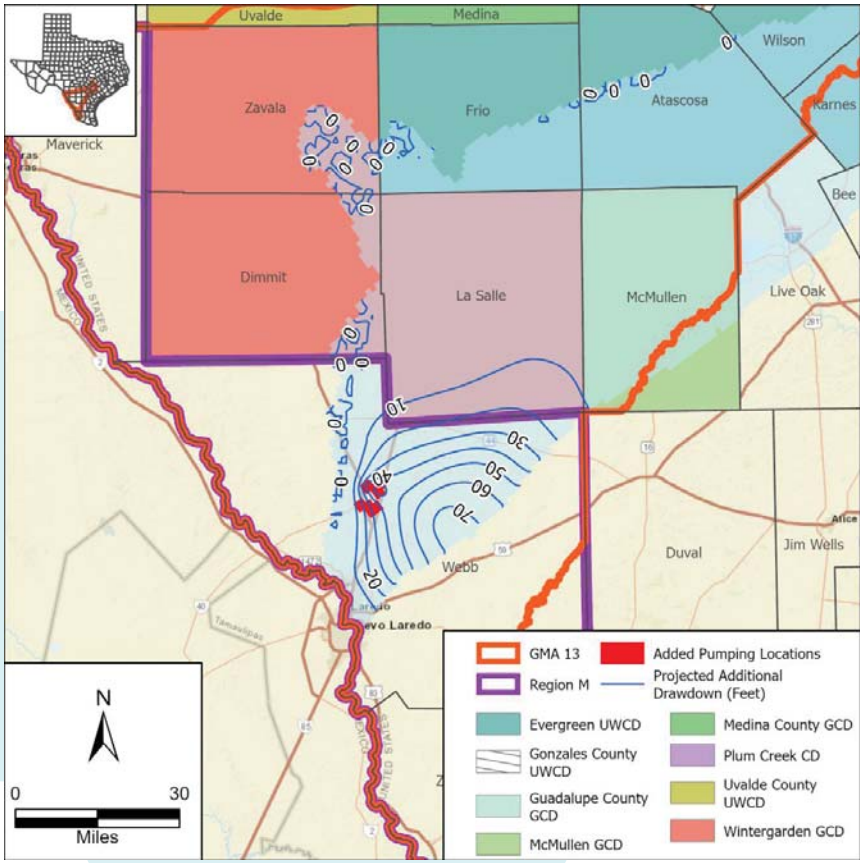


Carrizo Drawdown 2012-2080

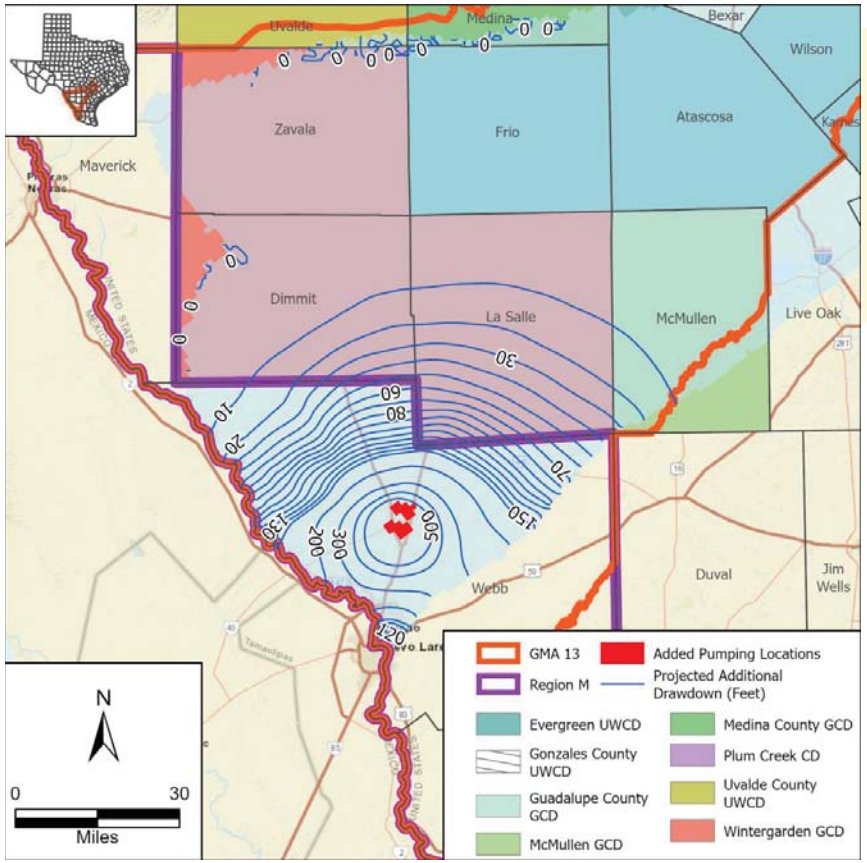


ADDITIONAL DRAWDOWN – 40,000 ACRE-FEET PER YEAR ADDED

Sparta Additional Drawdown 2080

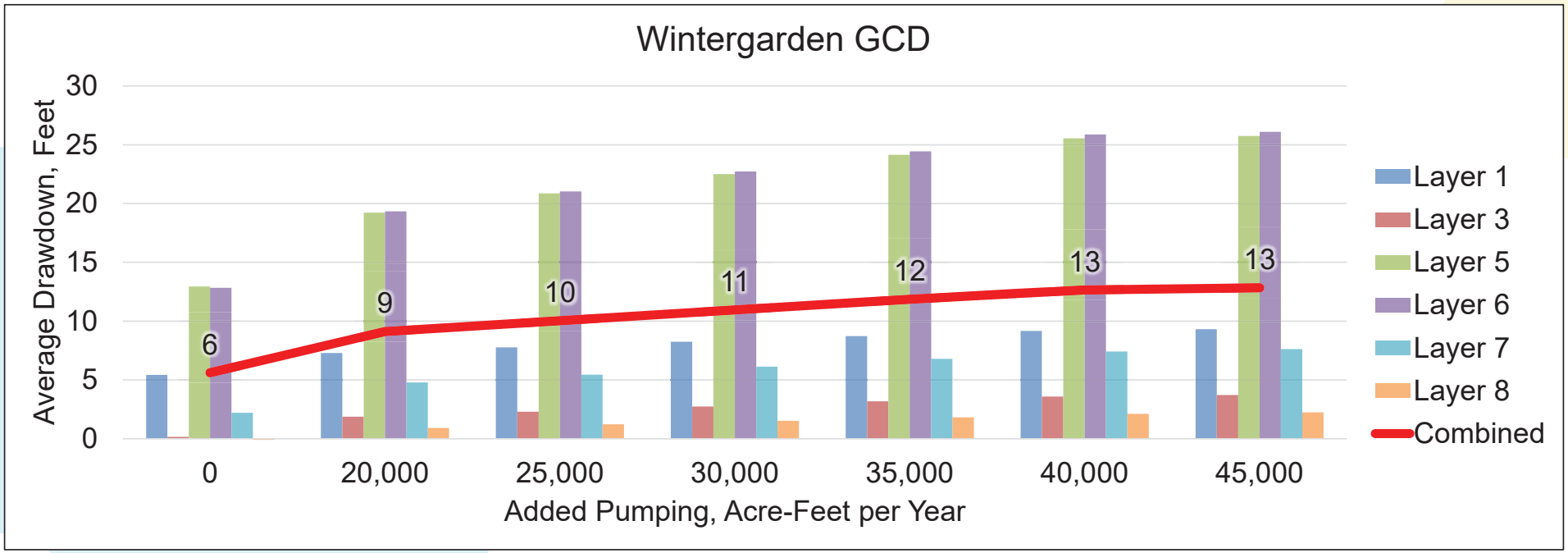


Carrizo Additional Drawdown 2080

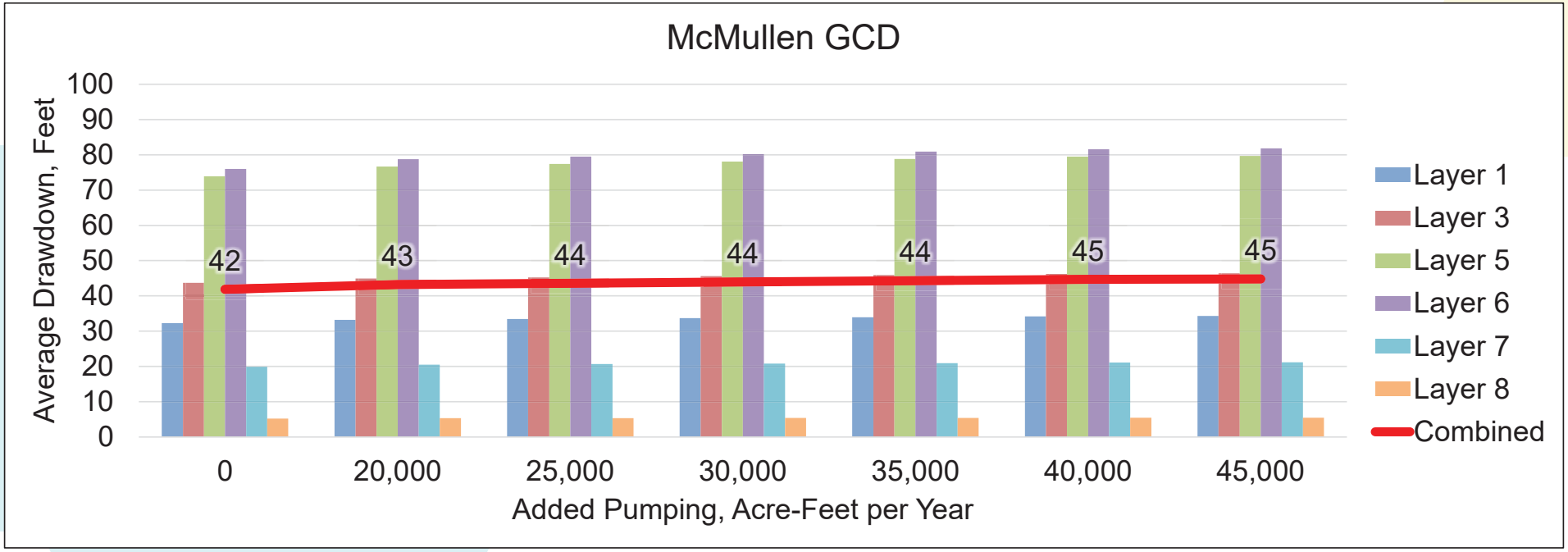


LRE WATER

SIMULATION RESULTS – AVERAGE DRAWDOWN

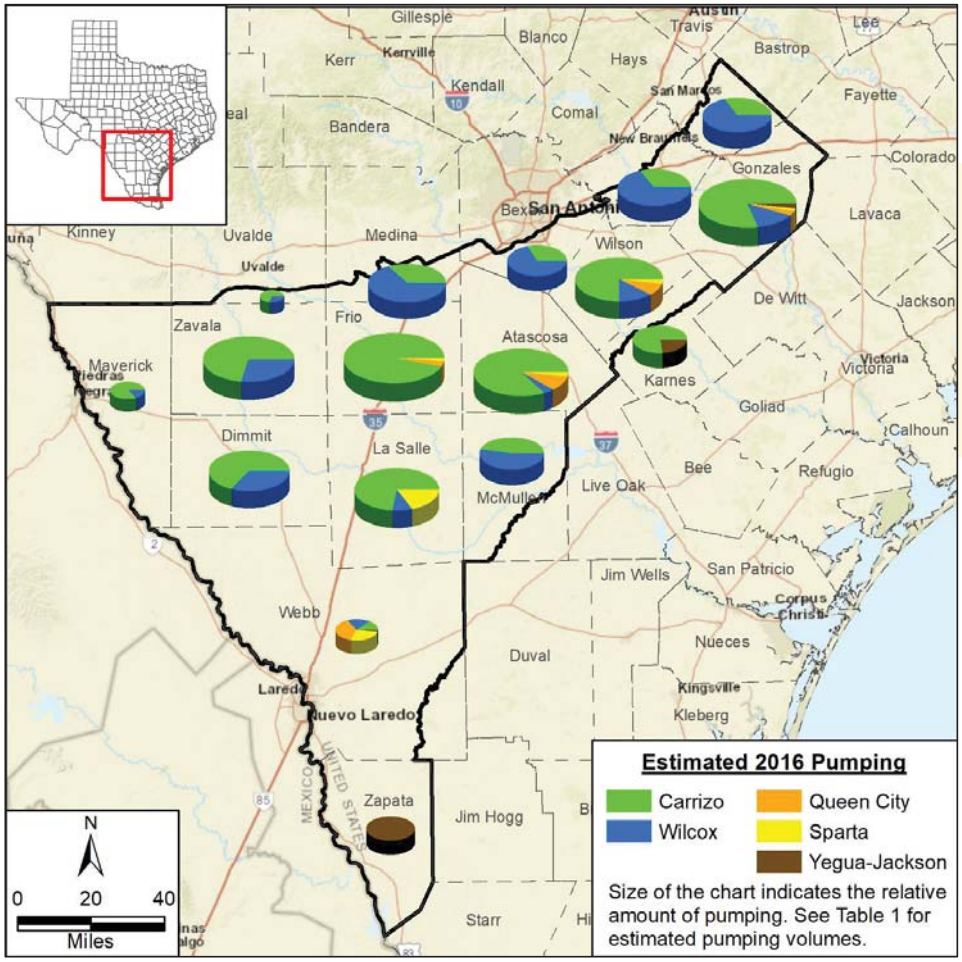


SIMULATION RESULTS – AVERAGE DRAWDOWN



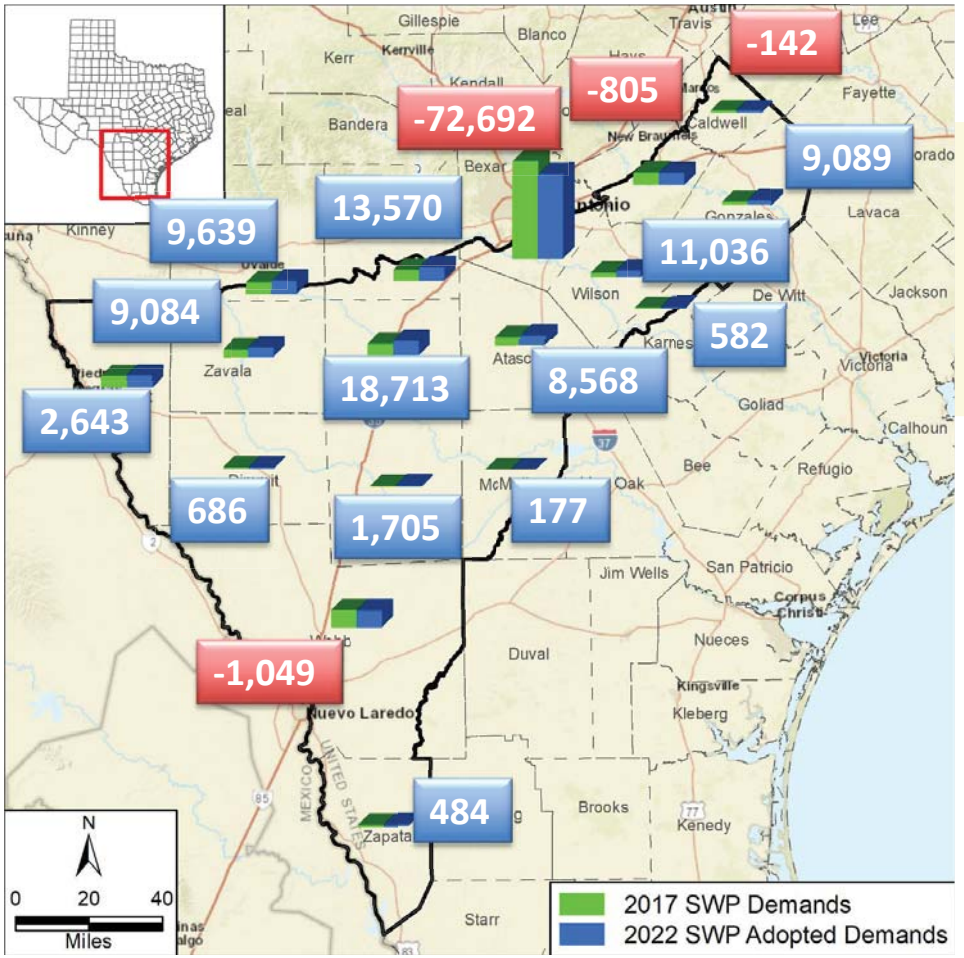
AQUIFER USES/ CONDITIONS

- No changes from discussion on February 7, 2020
- Relatively small amount of groundwater use currently
- Most groundwater use for domestic, livestock, and mining



WATER NEEDS/ STRATEGIES

- No changes from discussion on February 7, 2020
- Webb County decrease in projected 2070 demand is 1,049 acre-feet

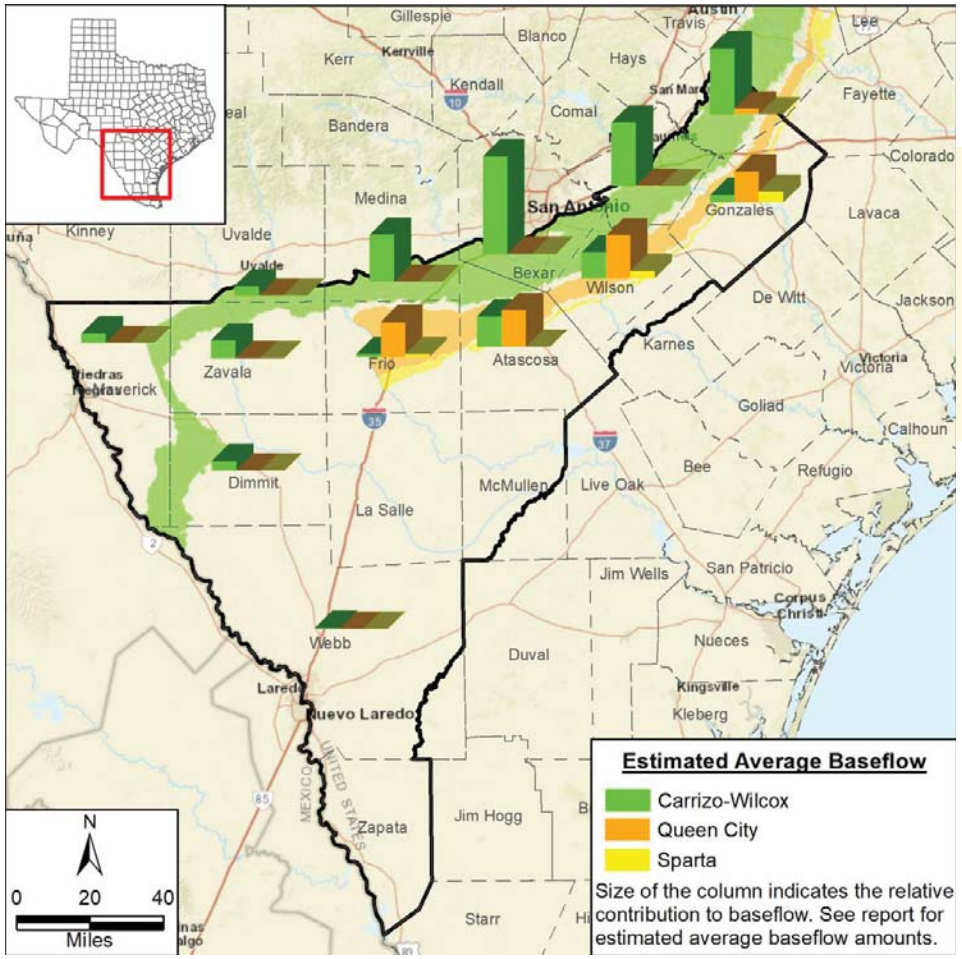


HYDROLOGICAL CONDITIONS

- No changes from discussion on June 26, 2020
- Webb County TERS
  - Sparta: Not Applicable
  - Carrizo-Wilcox: 380,000,000 Acre-Feet
- No expected measurable impact on recharge, inflows, or discharge

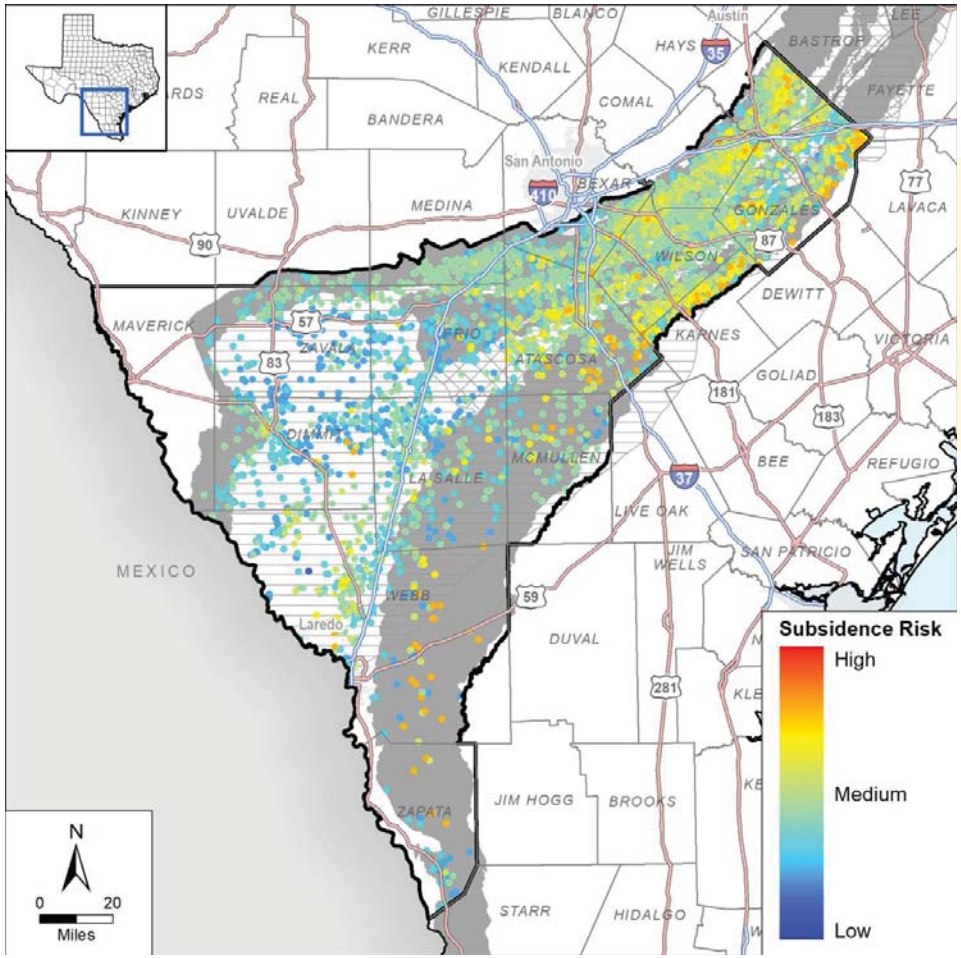
ENVIRONMENTAL IMPACTS

- No changes from discussion on June 26, 2020
- No expected measurable impact on streamflow



SUBSIDENCE

- No changes from discussion on November 13, 2020
- No documented occurrences and has not historically been an issue in GMA 13
- Low to medium risk for subsidence



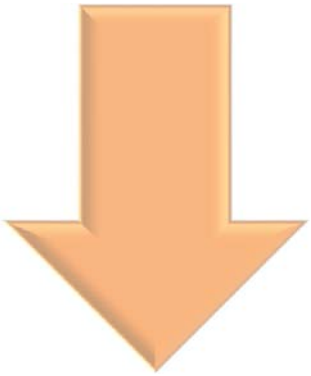
SOCIOECONOMIC IMPACTS

- No changes from discussion on November 13, 2020
- Primary impact associated with mining use
- By 2070, income losses associated with groundwater strategies estimated to be more than $1,500,000

IMPACT ON PRIVATE PROPERTY RIGHTS

- Discussion occurred on November 13, 2020
- Requested revision is specifically associated with a private landowner seeking to develop the groundwater resources beneath their property
- Potential impact
  - Inclusion: May impact other groundwater users
  - Exclusion: May impact marketability and application as a strategy in the Region M Plan

Highest Practicable Level of Groundwater Production



Conservation, Preservation, Protection, Recharging, and Prevention of Waste of Groundwater, and Control of Subsidence

LRE WATER

DFC FEASIBILITY

- No changes from discussion on February 5, 2021
- No requested change to the primary DFC of 75% remaining saturated thickness in the outcrop
- GAM does not represent water-level trends well
- Change is not likely to affect the primary DFC

SUMMARY

- Landowner in Webb County planning to develop groundwater resources beneath property
- Request to increase GMA 13 secondary DFC for the Sparta, Queen City, and Carrizo-Wilcox from 49 to 63 feet (+/- 5 feet) of average drawdown
  - Increase pumping input by 20,000 to 40,000 acre-feet per year
  - Result in MAG increase which can be used by Region M to meet needs
- Primarily affects Wintergarden GCD with average drawdown increase from 6 to 13 feet

LRE WATER

DISCUSSION

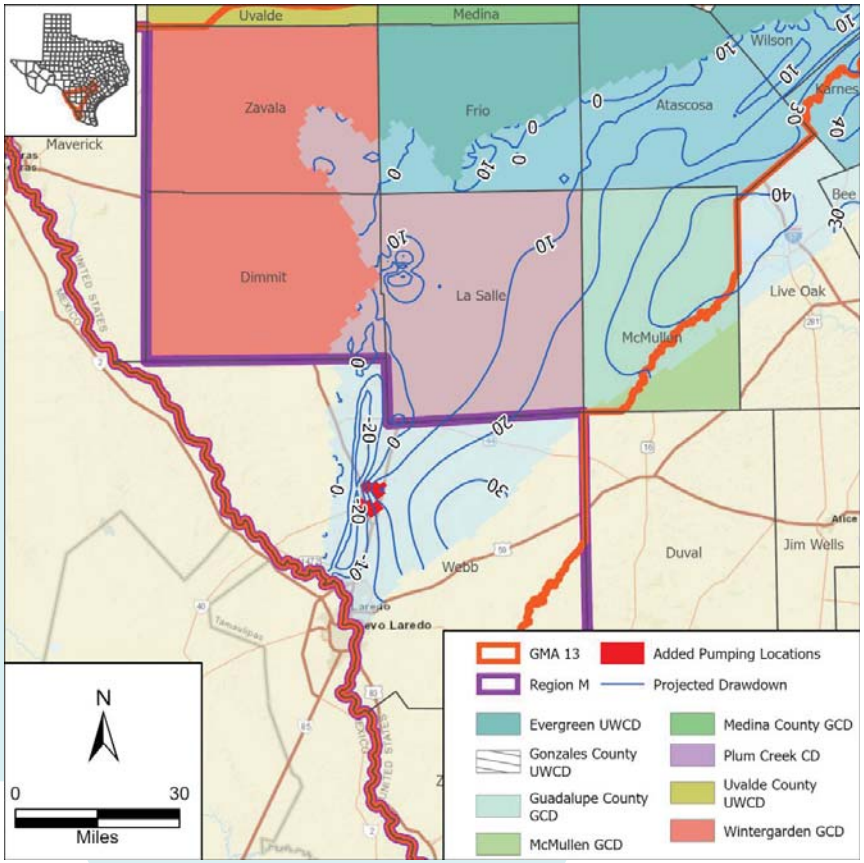
Discussion of Comments Received to Date Regarding Potential DFCs

June 10, 2021

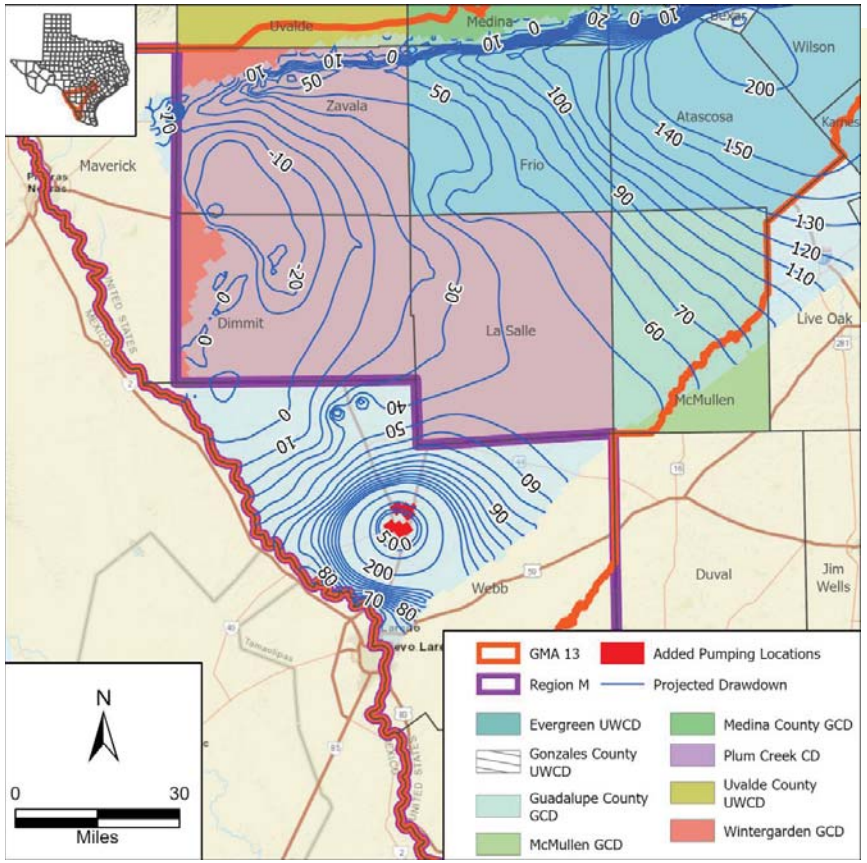
Meeting and project files available at: http://bit.ly/GMA_13_3rd_Round

SIMULATION RESULTS – 20,000 ACRE-FEET PER YEAR ADDED

Sparta Drawdown 2012-2080

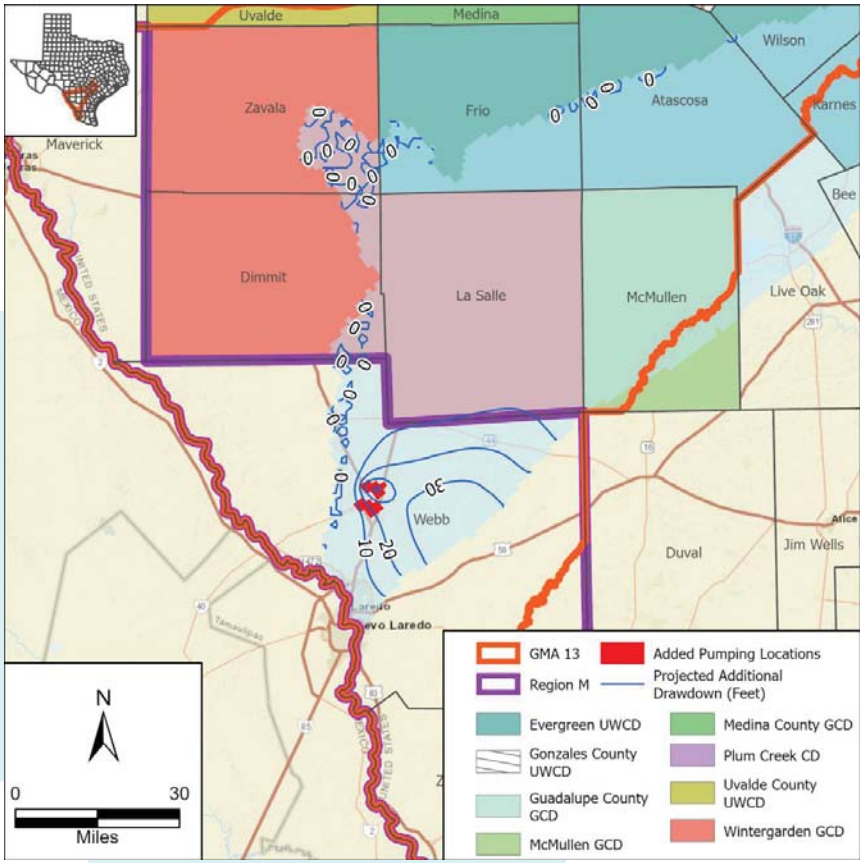


Carrizo Drawdown 2012-2080

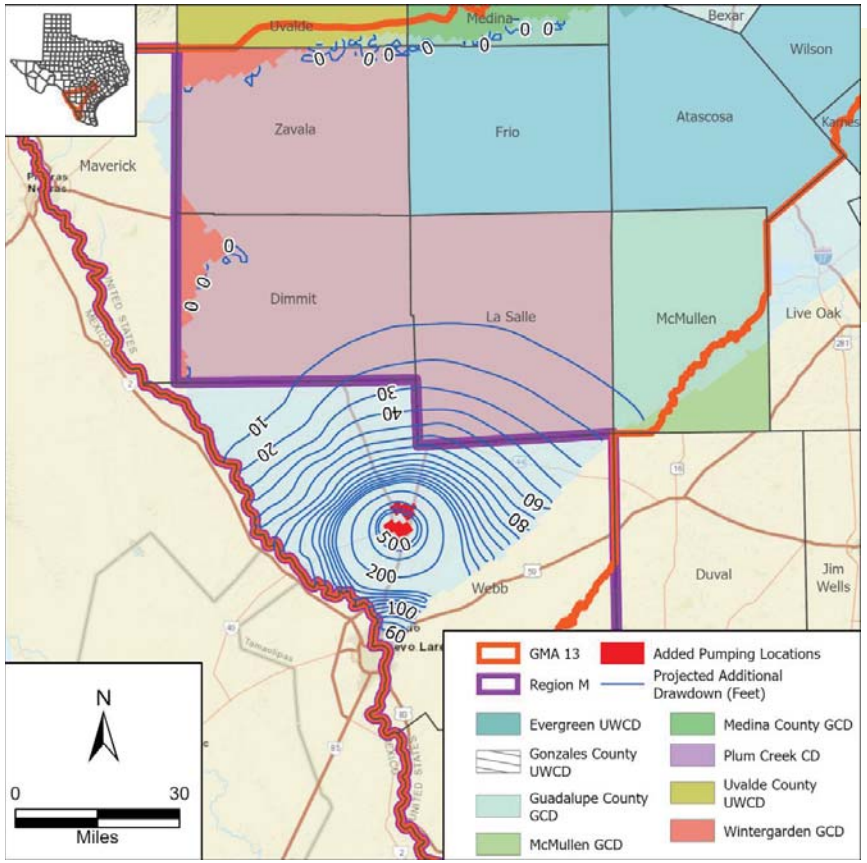


ADDITIONAL DRAWDOWN – 20,000 ACRE-FEET PER YEAR ADDED

Sparta Additional Drawdown 2080

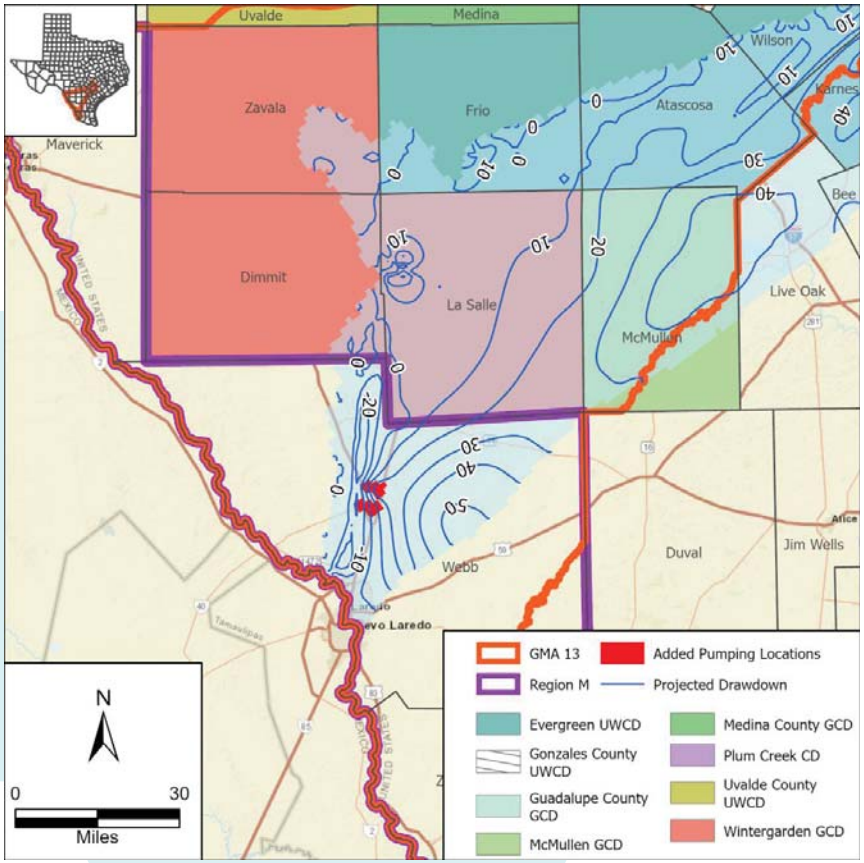


Carrizo Additional Drawdown 2080

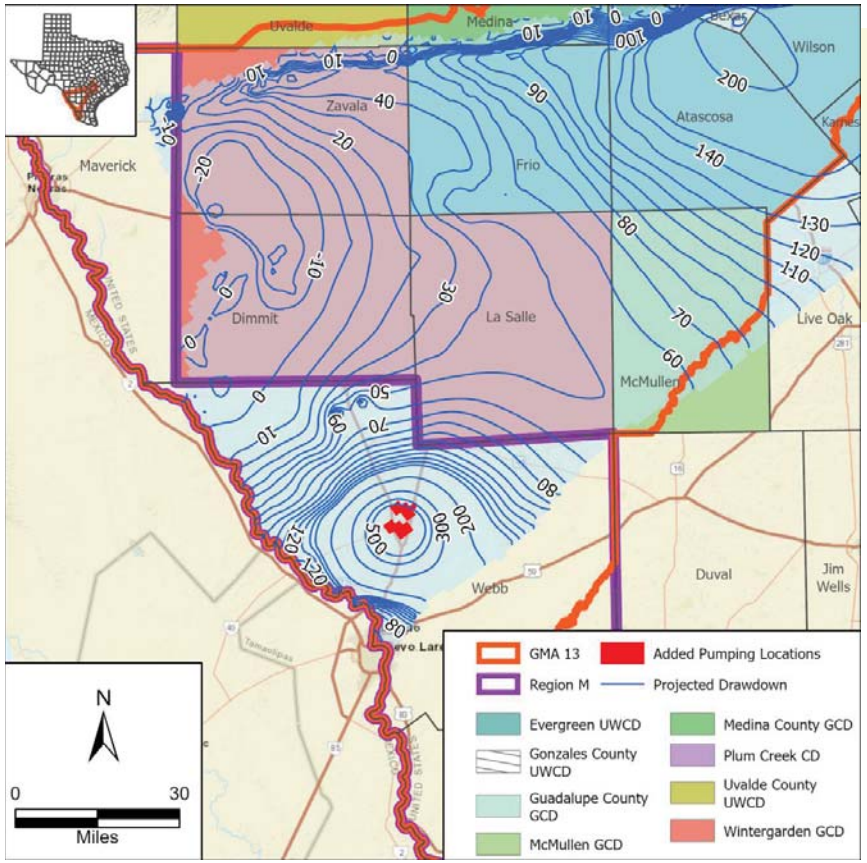


SIMULATION RESULTS – 30,000 ACRE-FEET PER YEAR ADDED

Sparta Drawdown 2012-2080



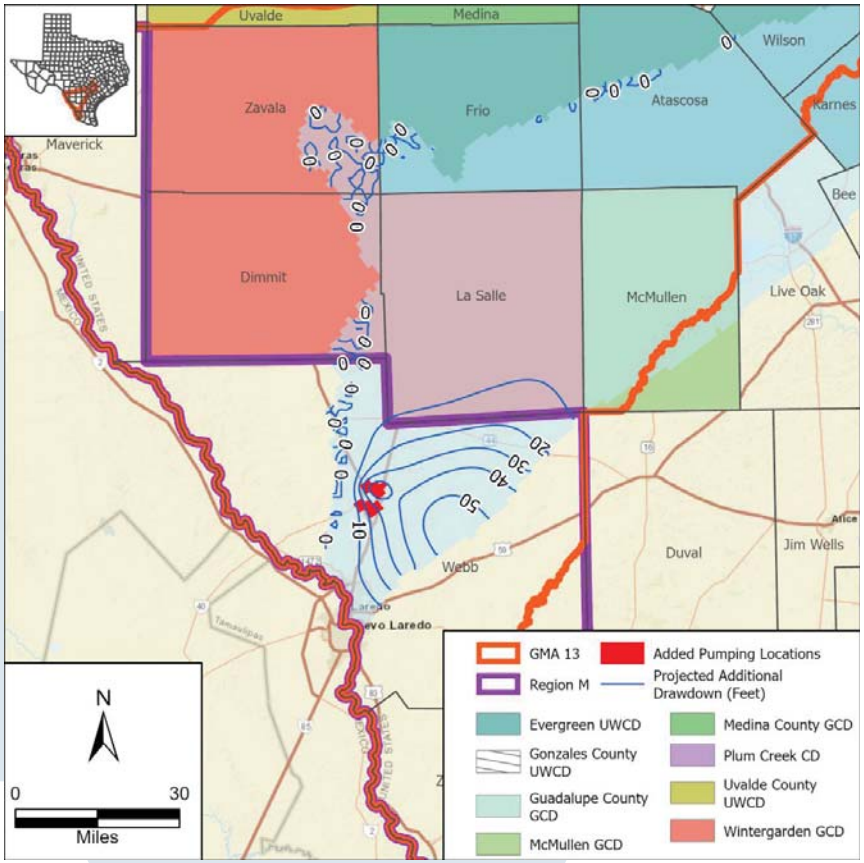
Carrizo Drawdown 2012-2080



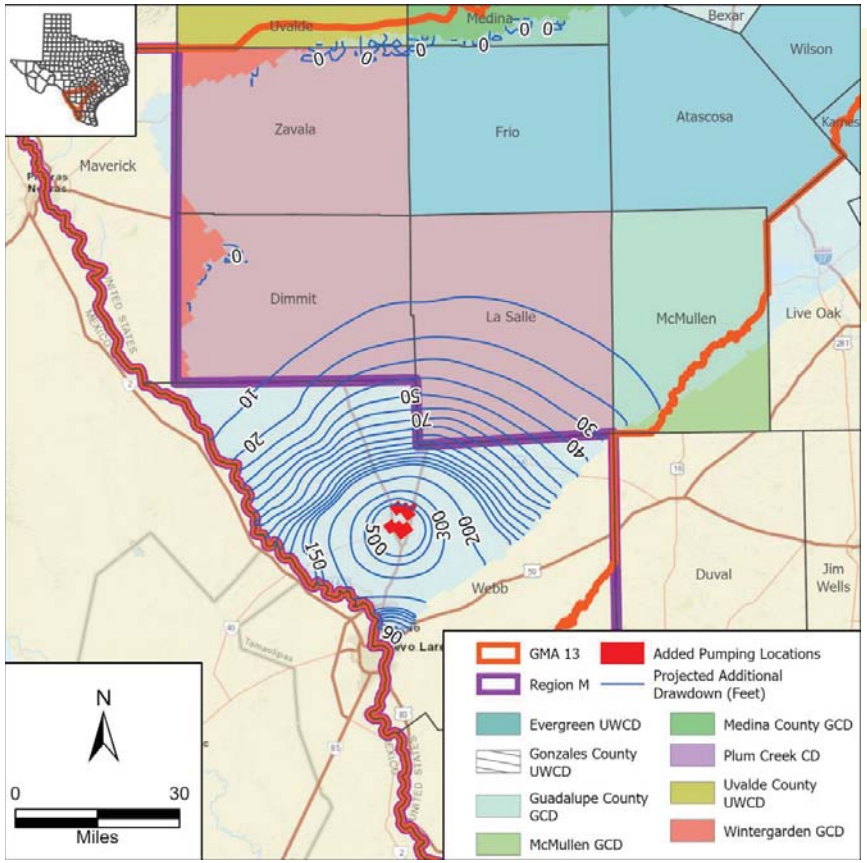
LRE WATER

ADDITIONAL DRAWDOWN – 30,000 ACRE-FEET PER YEAR ADDED

Sparta Additional Drawdown 2080



Carrizo Additional Drawdown 2080



Appendix 6.3 —
Letter Dated November 5, 2021 from Legacy W.S.C.

LEGACY W.S.C.

WATER FOR TOMORROW, TODAY

Dear GMA-13 Board Members –

During your September GMA-13 Board Meeting, members expressed concern that granting our request to increase pumping in Webb County would be inconsistent with the Region M Water Plan. This concern is unfounded, as the Region M Water Planning Group is required to limit its planning efforts to the MAG established by the TWDB based on the DFCs established by GMA-13. Therefore GMA-13 must first set the DFCs that allow Region M to plan water usage in their jurisdiction. As such, GMA-13 must take the first step by refining DFCs to include more Webb County pumping, in order for such pumping to be included within the Region M water plan.

Below is an excerpt of an email from Sarah Backhouse, the Regional Water Planning manager for TWDB, dated 10/1/2021. The email discussion was between Ms. Backhouse and Dr. Jordan Furnans. Ms. Backhouse may be reached at 512-936-2387 or sarah.backhouse@twdb.texas.gov . Emphasis was added.

> "The **MAGs resulting from the 2021 round of joint planning will be used for groundwater availability in the 2026 regional water plans**. The current 2021 regional water plans include the MAGs resulting from the 2016 joint planning process. Region M cannot amend their 2021 regional water plan to revise the MAGs unless the DFCs from 2016 were first revised, and corresponding MAGs revised. Without a revision to the MAGs used in the 2021 regional water plan, Region M would not be able to amend their plan to include a new groundwater project unless the yield from the project was within the remaining unallocated groundwater availability for the aquifer/county.
>
> **We recommend continuing to coordinate with the GMA in development of their DFCs, and Region M in development of their 2026 regional water plan**."

The above email clearly demonstrates that DFCs established by GMA-13 result in the MAG used in Regional Water Planning, and that modifying the DFCs now to include additional Webb County groundwater use is necessary if the any such groundwater projects are to be included in the Region M water plan for 2026. Failure to revise the DFCs now will prevent viable, developing projects from being included in the Region M water plan until 2031, which is an unnecessary limitation for entities within Webb County (including the City of Laredo) who would benefit from this project.

Therefore, Legacy Water Supply Corporation urges this board to increase the pumping in its DFCs for Webb County to 50,000 acre feet per year.

Sincerely,

Rick James P. Walker, President
November 5, 2021